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STATE OF MICHIGAN
IN THE SUPREME COURT

PEOPLE OF THE STATE OF MICHIGAN,
Plaintiff-Appellee,

v **No. 163939**

MILTON LEE LEMONS,
Defendant-Appellant.

Court of Appeals **No. 348277**
Third Circuit Court **No. 06-004818**

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caused serious physical harm. You'll also find that he knowingly created a risk of death or great bodily harm knowing that such a result would likely obtain due to his actions.

Judge, one of the other things that you'll learn through the course of this is that Mr. Lemons is a trained medical professional. We think that all these circumstances factor into what we believe will be the Court's conclusion that Mr. Lemons knew what it was he was doing when he shook his baby to death.

THE COURT: Thank you, Mr. Woodyard.

Mr. Cripps, do you wish to give an opening statement at this time?

MR. CRIPPS: I wish to reserve mine with the Court's permission.

THE COURT: All right. That's fine.

L O R I A N N L E M O N S,

having been duly sworn by the Court was examined and testified upon her oath as follows:

DIRECT EXAMINATION

BY MR. WOODYARD:

Q Good morning.

A Good morning.

Q Would you please just tell the Judge what your

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name is for the record?

A Lori Lemons.

Q And Ms. Lemons, what city do you live in?

A Wayne.

Q Were you living in Wayne last year in October?

A Yes.

Q What street?

A Clark Street.

Q Who did you live there with?

A Myself, my husband, my son and my daughter.

Q What is your son's name?

A Milton Lee Lemons, Junior.

Q What's your husband name?

A Milton Lee Lemons, Senior.

Q Do you see Milton Lee Lemons, Senior in the courtroom?

A Yes, I do.

Q Would you point to him please and tell the Judge what he is wearing?

A He's in a beige cream outfit.

MR. WOODYARD: Judge, for the record, Mrs. Lemons has identified the defendant.

THE COURT: Very well.

BY MR. WOODYARD:

Q You said you had a daughter?

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A Yes.
Q And what is her name?
A Nikita Faith Lemons.
Q And where was she born?
A She was born Oakwood Main in Dearborn Heights.
Q Were there any complications with her birth?
A No.
Q After she was born, where did she go after you were discharged from the hospital?
A She came home.
Q Were you discharged at the same time?
A Yes.
Q When you came home, who did you come home to?
A Came home to my son and my husband.
Q During the course of the next month or 10 weeks or so who -- Nikita?
A Myself and my husband.
Q Did you have any other care givers, babysitters, people who helped out?
A My parents. They would watch when I had my surgery. They watched overnight but mainly it was myself and my husband.
Q What about the doctors visits well-baby type of visits. Did you take Nikita for those visits?
A Yes, she had her two-month shots on the 26th of

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September.

Q What about before that had you taken her to the doctors?

A I had taken her once before. Yes, she had been to the doctor.

Q Was that a regular routine visit or was there something wrong?

A When she was a week old she started gasping and come to find out she was allergic to milk. So we changed her to soy.

Q This occasion when she was one week old you described it as gasping?

A Yes, she was gasping. She was starting to turn colors and suctioned her out.

Q Did you actually see this happen with your own eyes?

A Yes, she was in my arms.

Q Had you just fed her?

A No, we had been in the heat all day and, you know, she had ate but it had been a little while.

Q You said you suctioned her. What is that?

A With a bulb syringe to clear her mouth. To clear her airway, her nose. Clear her airway to breath.

Q What happened after that?

A She was fine.

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Q Did you take her to the hospital or a pediatrician or any medical provider to address that?

A Not that day.

Q But you said it was determined that she was allergic to milk.

A Yes, we took her to the doctor and told him what happened and they monitored her and she had one other episode, but I wasn't home for this other episode and we changed her formula to soy and she was fine.

THE COURT: Can we get a time frame for that?

MR. WOODYARD: Sure, Judge.

BY MR. WOODYARD:

Q When did you take Nikita to the doctor and bring this problem to the doctor's attention?

A It was in August.

Q In August.

A And we changed her formula in August.

Q She would have been about a month old then?

A Yes, about a month.

Q Maybe even a little bit less.

A Yes.

Q What was her date of birth?

A Seven 24-05.

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Q So sometime during the course of the next five weeks you had taken her to the doctor for this problem of gasping?

A Yes.

Q And changed her formula?

A Yes, and she was fine.

Q To a soy base?

A Yes.

Q Was it after you changed her formula that this second episode occurred?

A I don't know if the second episode actually occurred. I was not at home.

Q Did somebody tell you that it occurred?

A Yes, my husband.

Q Do you remember what he told you about that?

A I was checking on my nephew and he called me to rush home because she was gasping. She was having another one of her episodes. When I arrived home, she was fine.

Q And some time after that you got --

A That day we changed her formula. We went and got soy milk and after that she was fine. We never had any other episodes.

Q And where did your mother in relation to your home, close by, far away?

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A At first she was right across the street. Then we moved. Because we lived on Columbus at first then we moved in August to Clark Street.

Q So, sometime in August you changed her formula to soy?

A Uh-huh.

Q And after that you observed no further episodes of gasping?

A No further episodes.

Q Were you told about any further episodes of gasping?

A No.

Q How did you know to suction her mouth?

A CPR training, first aid training. I'm a certified nursing assistant.

Q All right.

A Go through the training.

Q You were certified by whom?

A The State of Michigan.

Q And in order to become certified as a -

A Nursing assistant.

Q As a nursing assistant, you had to go through some training?

A Yes.

Q Can you describe for the Judge what that training

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is?

A I had three month clinical group work in a nursing homes, taking care of patients, vitals, monitoring what they eat. We had to know the Heimlich, CPR, that they coded, standard nurses training.

Q In order to receive your certification did you have to take some kind of an examination?

A Yes, in the State of Michigan you have to take a clinical exam as well as a written.

Q What did Mr. Lemons do for a living?

A He is also a certified nursing assistant.

Q Have you spoken with Mr. Lemons about your jobs?

A We met on the job.

Q Do you know whether he also had received the same training that you had received?

A Yes, certified nursing assistant. We had the same cards.

THE COURT: When you say the same cards, Ms. Lemons, are you talking about the same certification?

THE WITNESS: Certification cards.

THE COURT: All right.

MR. WOODYARD: May I approach, Your Honor.

THE COURT: Yes.

BY MR. WOODYARD:

Q Ms. Lemons, I am handing you an item that is

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marked as People's No. 6, People's Proposed No. 6.

Ms. Lemons, I am handing you actually two items. The first is marked People's Proposed Exhibit No. 6 and the second is marked People's Proposed Exhibit No. 4. Do you recognize what those items are that I've just handed you?

A Yes, I do.

Q People's No. 4 is a photograph; is it not?

A Yes, it is.

Q And you recognize what is depicted in that photograph?

A Yes, it's a badge.

Q Why is it that you recognize that? Have you seen it before?

A Yes.

Q Where have you seen it?

A I've got one and my husband. That's my husband identification for the medical staffing agency that we work for.

Q You said earlier, you told Judge Kenny that you had met on the job. Is that the job that you worked at when you met him?

A No, this is actually this is the job that we went after we had been married. We just started

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working through it.

Q So you actually worked at -

A At a nursing home, an actual nursing home.

Q I see. And so that exhibit is actually Mr. Lemons work badge?

A Yes.

Q The photograph?

A Yes, this is a work badge.

Q And People's No. 6, do you recognize what that is?

A Yes, I do.

Q That's a photocopy of something. Why is it that you recognize what that is?

A I also have the same one with my name on it. It's a certification for the State of Michigan saying that you are certified as a nursing assistant by the State.

Q Okay. And is your name on that card?

A No.

Q Whose name is on that card?

A Milton Lemons.

Q And you've actually seen that before?

A Yes.

Q Like the original version.

A Yes.

Q Not the photocopy.

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A Yes, at the house. Yes.

THE COURT: Judge, I move to admit People's No. 4 and No. 6.

MR. CRIPPS: As to No. 4, first of all. I still don't see the relevancy of that. It's a photo ID of a work badge. And as to number six, it's simply a certification of his status a nursing assistant. What's behind that we don't know on this record so I would objection to the relevancy as to both exhibits, Your Honor.

THE COURT: All right. Response.

MR. WOODYARD: Judge, as for the relevance it's my burden to show that Mr. Lemons knowingly or intention caused harm and I think that if Mr. Lemons is an individual whose received some type of specialized training in medicine than that is relevant as to that specific aspect of my burden. And as it relates to the foundation, Ms. Lemons has testified that she has seen both of these items in her past and also she has testified about training that was required in order to receive the certification that's depicted in People's No. 6. So I think there's an adequate foundation as well.

THE COURT: Can I see the exhibits?

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All right. With regards to relevance with regards to People's Proposed Exhibit No. 4 which purports to be work identification card from a medical staff network having Mr. Lemons signature and purported to be his picture on this, I will allow it and I do think it has relevance. I think the weight to be given to it I think it subject to argument.

With regards to People's Proposed Exhibit No. 6, at this time I am not going to admit Proposed Exhibit No. 6. I think there is a necessity under the Michigan Rule of Evidence either 901 or 902 to have some further authentication of those documents, but my ruling doesn't preclude you, Mr. Woodyard, from laying some other foundation during the course of the trial for the admissibility of that.

I do think once again Proposed Exhibit No. 4 does have relevance but it's weight is for me to decide and for the parties to argue. So four will be received, six will not.

(PX Exhibit No. 4 received.)

MR. CRIPPS: Thank you, Your Honor.

THE COURT: All right.

BY MR. WOODYARD:

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Q Ms. Lemons, I am going to ask you about when you ended your maternity and went back to work.

A Okay.

Q Do you remember the date that you actually returned to work?

A Yes, it was October 10, 2005. It was a Monday.

Q What time did you go to work that day?

A I left at 2:30.

Q You left your home?

A In the afternoon.

Q You left your home at 2:30?

A Yes.

Q Did you spend the day prior to 2:30 at home?

A Yes, I did.

Q Who was home with you before you have left?

A My husband, my son and my daughter.

Q As you were getting ready to leave for work did you take some preparations with your daughter?

A I placed her in her swing. I put her pacifier on the tray of the swing and I turned it on, turned the music on.

Q Had you -

A I fed her at 11:30

THE COURT: All right. Hold on, hold on.

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Ms. Lemons, we're going to give you every opportunity to answer, but you have to wait until the question is asked because my court reporter has to take down everything that is being said and she can't take down both at the same time. All right? So just wait if you would until you hear the question. Go ahead.

Q What else had to done with Nikita before you left?

A I fed her bottle. I changed her. I dressed her. I was playing with her. And then at 2:30 I put her in her swing and put her pacifier in the tray of the swing. My husband was changing our son and I left out for work at 2:30.

Q After you fed Nikita, do you remember what you did with the bottle?

A I put it in the sink.

Q Did you go to work? When you left did you go to work?

A Yes, at 2:30 I left out and went to work.

Q Did you work day proceed normally?

A Until around seven o'clock when I got a phone call from my husband.

Q And did you get that call on a work phone, a cell phone?

A My cell phone. I was in the main dining room

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doing dinner for the residents.

Q And did your husband say anything? By your husband I am referring to Mr. Lemons. Did he say anything?

A What I gathered from the call is I needed to come that she was aspirating and come home where I go get her. I took off running and I basically hung up and I, you know, left the facility to go home.

Q How did you get there?

A My aunt drove me.

Q Did your aunt work with you?

A Yes, she came to pick me up at 2:30 for work.

Q Did you go to your home on Clark Street in Wayne?

A Yes, I did.

Q Can you tell the Judge what you saw when you got there?

A When I arrived we had to park down the street. I ran down the block. When I got into the house, I seen my husband standing there. I seen paramedics working on my daughter laying on the floor. My mom was sitting in the computer desk chair holding our son and then after I arrived there the scene I went hysterical and my husband was hysterical as well after I arrived.

Q Did you see your daughter Nikita?

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A Yes, she was laying lifeless on the floor. The paramedics were working on her. They were suctioning her when I came in.

Q What happened then?

A She was taken by ambulance to Annapolis Hospital. I rode in the ambulance and I was put in the waiting room once we arrived there. My aunt took my husband up there. My mom and some other family met us up there. I got to see her for a second. She was life flighted to U of M Motts Children's Hospital in Ann Arbor. We drove out there and at first we weren't allowed to see her and then I stayed at her bedside. I couldn't leave her side.

Q By that time had the doctors told you anything about her condition?

A She was being life flighted because possibly surgery might do something but her brain was nothing but blood around her brain.

Q What time was it that she arrived or you arrived at the University of Michigan Hospital? Do you remember maybe roughly what time it was?

A It was roughly maybe 10. I know at seven I left to go to the scene. I don't know exactly how long from that to the hospital.

Q So you were at U of M some time during the late

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evening hours?

A Yes, late evening.

Q On the 10th?

A Yes, on the 10th.

Q And during the course of the night, did your daughter's condition -

A Worsened. She had not quality - there was nothing left. She coded and then she came back, you know, they brought first because they were going to do a CAT scan that morning, but from what they had already seen there was nothing that could be done.

MR. CRIPPS: Judge, I hate to interrupt, but she's talking - what medical opinions here that are beyond her scope to testify.

THE COURT: I would agree. I think this is hearsay at this point. I'll strike those answers.

MR. CRIPPS: Thank you, Your Honor.

BY MR. WOODYARD:

Q What happened in the morning?

A She passed away at 6:28 on the 11th of October she passed away.

Q What did you do after that?

A I sat there with her as long as I couldn't give

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her up.

Q At some point in time did you then return to your home or your mom's home?

A Yes, I finally left the hospital and went back to my parents house.

Q Who was there with you?

A My family, my husband, my mother-in-law.

Q And this would have been some time during the day on the 11th; is that correct?

A This is in the afternoon.

Q Did you go any where at day?

A I never left.

Q Were you there that evening?

A Yes.

Q Like late in the evening?

A Yes, I was.

Q Did anybody come over to your home late in the evening?

A Officers came to the door 11:20 that night.

Q How do you know that?

A Me, myself and my husband were getting ready to lay down to go to bed and there was a knock on the door. I went upstairs and got my mom.

Q Where were you laying down getting ready to lie down?

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A In the livingroom.
Q Okay.
A On an air mattress.
Q So, did you hear something?
A I heard a knock on the door.
Q And what did you do?
A I got up to get my mom because I was in no condition to answer the door. My mom answered the and there was officers from the police station.
Q Were they dressed in plain clothes or uniforms?
A Uniforms.
Q When you saw those officers at the door, where was your husband?
A He was standing in the livingroom and then he backed up into the family room and they went to enter the house because we opened the door for them to enter the house.
Q You say he backed up.
A Yes, he stepped backwards. He stepped backwards into the family room, into the darkness.
Q Did the police tell you why they were there?
A They wanted to question -
MR. CRIPPS: Objection as to hearsay.
MR. WOODYARD: Judge, it's being offered

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simply to show that it was said. To show some indication of a state of mind.

MR. CRIPPS: Of whose state of mind?

MR. WOODYARD: It's not offered for the truth of the matter. It's simply offered to show that it was said.

MR. CRIPPS: I don't know her state of mind is really that relevant in what she did in response to what the police had to say.

THE COURT: I'm going to receive it not for the truth of what was stated, but just that there was some statement made by the officers and it may give some explanation as why certain actions may have occurred afterwards. So for that limited purpose I'll receive the answer.

BY MR. WOODYARD:

Q Ms. Lemons, did the police say why they were there?

A Yes, they were there to question my husband.

Q Did they

A They stepped in and they stepped back out with him once they realized that my oldest daughter was laying on the couch.

MR. CRIPPS: Objection as to her speculation as to why they did what they did.

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THE COURT: I agree. I'll strike that answer.

BY MR. WOODYARD:

Q You've already testified that Mr. Lemons stepped into a darkened room?

A Yes.

Q Is that the room where you --

A That is no where we were sleeping. No.

Q The police took Mr. Lemons with them?

A Yes, they did.

Q During the course or during the time when you arrived at your home and you saw the paramedics working on your daughter.

A Yes.

Q Up until the time that she passed away at 6:28 the next morning, did you ever see anybody with your eye, did you ever see any move her arm in a fashion that didn't look normal to you twist her, pick her up by the arm, anything like that?

A No.

MR. WOODYARD: Thank you.

THE COURT: All right. Let's take 10 minutes.

I have a couple of other matters to take care. I don't

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want to break up the cross-examination.

Ms. Lemons, you can step down for about 10 minutes and then we'll resume.

(Court in recess.)

* * *

(Court in session.)

THE COURT: Mr. Woodyard, I think you had finished your direct examination; is that correct?

MR. WOODYARD: Yes, Judge, we have no further questions at this time.

THE COURT: All right. Mr. Cripps, whenever you're ready.

CROSS EXAMINATION

BY MR. CRIPPS:

Q Good morning, Ms. Lemons.

A Good morning.

Q Now I believe you described some contact that you had with the police, was that October 11, 2005; is that right?

A Yes.

Q You had further contact with the police when you went to the police station on October 12, 2005 when you and your mother went into the Wayne Police Department; is that correct?

A Yes.

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Q Did you do that pursuant to a phone call request by the police?

A I called the police to find out what was going on and Chief Sumarocki at the time told me to come in at nine o'clock. We met in his office.

Q All right. So it was pursuant to a police request that you came in to the police station; is that correct?

A Yes.

Q Okay. And did you go by yourself?

A No, my mom came with me.

Q The two of you went together; is that right?

A Yes.

Q And that's when you came in contact with this Sergeant Williams; is that correct?

A Yes.

Q And Sergeant Williams had a number of questions that he wanted to ask you about regarding your child, Nikita; is that right?

A Yes.

Q Your contact with Nikita; is that correct?

A Yes.

Q And Mr. Milton Lemons contact with Nikita?

A Yes.

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Q (Inaudible) as to her; is that right?
A Yes.
Q And you gave honest answers to those?
A Yes.
Q And one of the things Sergeant Williams wanted to know is whether you had ever shaken your child to stop her from crying.
A And I said no.
Q I'm sorry?
A No, I never did.
Q I mean he asked you that question; right?
A Yes.
Q And you said that you didn't; is that right?
A No, I didn't.
Q All right. And the Sergeant also asked you whether your husband, Mr. Lemons, had ever shaken Nikita Lemons to stop her from crying; is that correct?
A Yes, and to my knowledge no.
Q And you said no to that question, too; right?
A Yes.
Q You didn't say not to my knowledge. Your specific answer was no; is that correct?
A Yes.
Q And that was an honest answer; is that right?

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A Yes.

Q Okay. So at no time from the time of your young child's birth all the up until the time of October 12th, was there ever an incident that you ever saw Mr. Lemons shake the child; is that correct?

A No, I had never seen him.

Q And obviously you yourself didn't either; is that right?

A That's right. I never did.

Q However, the Sergeant went on to ask you about any further medical conditions that you were aware of or concerned about regarding Nikita Lemons since her birth; is that right?

A Yes.

Q Okay. And you responded to that question; is that right?

A Yes.

Q And when Sergeant Williams asked you about the child's medical condition, you had told him that the victim - you remember the victim having at least two incidence during the summer where she appeared to stop breathing; is that correct?

A There was two episodes. The second one I did not witness. I have not home for it.

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Q Thank you for that, but that's not what I was asking.

It was your response to the sergeant when he asked you about whether you were aware of any medical conditions could you state that your child did have two incidents during the summer where she appeared to stop breathing?

A Yes.

Q All right. Thank you.

And you described the first episode then you told the sergeant about had occurred not too long after she was born; is that right?

A That's correct.

Q Okay. And that first episode that you described you said that your daughter was having trouble breathing; is that right?

A Yes.

Q Okay. And you went on to tell the sergeant it was to such an extent regarding that first episode that in terms of difficulty of breathing that your mother had to use an aspirator to clear out fluid in the victim's mouth; is that correct?

A Yes, she came over. My husband called her.

Q What's your mother's name by the way?

A Pamela VanMeter.

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Q So regarding this first incident you said your husband had called her; is that right?
A Yes.
Q All right. That would be Milton Lemons, the baby's father?
A Yes, that is correct.
Q Okay. And in response to that call your mother came over; is that correct?
A That is correct.
Q And had to use an aspirator.
A A bulb syringe.
Q And that's the first incident when she noticed she had stopped breathing; is that correct?
A Yeah, because she was gagging.
Q Is that correct?
A Yes.
Q Okay. And you describing that clearly to the sergeant regarding medical conditions; is that right?
A Yes.
Q Okay. And in fact even after that first episode it caused you concern to the extent that you decided to take the child to a doctor, to a pediatrician; is that right?
A Yes, we took her.

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Q And when you say we, I'm assuming you're referring here to the defendant, Milton Lemons?
A Yes.
Q So Milton Lemons was involved in that concern, too; is that correct?
A Yes.
Q Okay. And then you went on to describe to Sergeant Williams that there was a second episode when your daughter appeared to stop breathing; is that correct?
A Yes.
Q All right. And that's when your daughter was about five weeks old; is that right?
A Approximately. I wasn't home.
Q Well, did you tell the sergeant when the sergeant asked you, did you say the second episode happened when the victim was about five weeks old; did you say that? I'm just asking is you said it or not.
A Yes.
Q Did you say that?
A Yes.
Q Thank you. And there was a third area of concern, medical concern that you described to Sergeant Williams regarding your daughter; is that correct?
A Hum, refresh me.

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Q You don't remember?
A (Inaudible.)
Q Did you describe some concerns you had regarding your daughter just recently as two days up to this incident? In other words, October any where between October 8th and October the 10th, 2005?
Q You don't remember telling him anything regarding that?
A No.
Q Okay. Do you remember telling Sergeant Williams that over the past - on October 12th when you were talking to him, that over the past two days the victim had been acting fussy from your observation of her?
A Yes.
Q You do remember?
A Now I do. Now that you - yes, she was a tad on the fussy side.
Q And you told him about those three areas in response to his questions about her medical condition leading up to October 11, 2005; is that correct, ma'am?
A Yes.
Q Okay. And on the day of October 11, 2005 you testified that you had left for work; is that

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correct?

A October 10th.

Q October 10th. Roughly what time was it that you left on October 10th?

A Two-thirty in the afternoon.

Q And when you left, you had placed your daughter on a swing; is that what you said?

A I placed her in her swing. Put the pacifier on the tray of the swing. I turned it on. I turned the music part on.

Q Who else was present in the home at that time?

A My husband, my son and my aunt.

Q And what's your aunt's name?

A Tina Barber.

Q I'm sorry? Tina Barber?

A Uh-huh.

Q Is that a yes or a no?

A Yes.

Q Okay. So there were two adults there when you left the home; is that right?

A Yes, my aunt left with me. She came to pick me up for work.

Q There were two adults there when you left the home is my question.

A When I left the home, no, there was only one adult

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left in the home.

Q Tina Barber?

A No, Milton Lemons.

Q I thought -

A Tina Barber came to pick me up for work.

Q Okay. I misunderstood what you said. I thought you said that Tina Barber was there at the house when you left for work.

A She came at 2:30 to pick me up for work. She was the house when I placed my daughter in the swing and I left out. We left out together.

Q All right. And then nothing unusual happened that day until you received a phone call about 7:00 o'clock; is that correct?

A That is correct.

Q And in fact the phone call was from Mr. Milton Lemons, your husband; is that correct?

A Yes, that is correct.

Q And the first thing that Mr. Lemons said on the phone to you was, you need to get home; is that correct?

A Yes.

Q All right. And he also said on that phone that the child was breathing; is that correct?

A He mumbled something about aspiration and in the

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process I hung up the phone because I was in the main dining room. I just wanted to get home.

Q Your husband said that the child was breathing; isn't that correct?

A Yes.

Q I'm not putting words into your mouth. That's what he is; isn't that right?

A Yes.

Q All right. And the response to that understandably then that you heard and then left your place of employment; is that correct?

A That is correct.

Q And came to the house?

A Yes.

Q And I believe you came to the house by yourself; is that right?

A No, my aunt drove me.

Q The same, Ms. Barber?

A Yes.

Q Was she at work also with you?

A Yes.

Q All right. Then you arrived back at the house; is that right?

A Yes.

Q Okay. Now also in relation to - before I forget -

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In relation to that phone call you got from husband, by the way, how long have you been married to your husband at that point?

MR. WOODYARD: Objection, relevance, Judge.

MR. CRIPPS: Fine.

BY MR. CRIPPS:

Q How long had you know your husband?

THE COURT: I'll take the answer.

BY MR. CRIPPS:

Q How long had you known your husband?

A Over two years.

Q And obviously the two of you were close; is that right?

A Yes.

Q Okay. And you see him in different - well, let me rephrase that. At the time that you got the phone call, did you describe that he was acting like as if he was in a panic when you received that call?

A Honestly, I don't know voice wise.

Q Honestly, did you tell the police that?

A It sounded he was upset, but I hung up the phone. I did not go into further talking with him

Q Did you remember talking to Sergeant Linberg at the Wayne Police Department?

A Yes, I do.

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Q And do you remember telling Sergeant Linberg in relation to the phone call that you had with Milton Lemons, quote: "Lorie Lemons said the defendant was in a panic." Did you say that to Sergeant Linberg?

A Yes. Okay.

Q Thank you. And then when you arrived there you saw at your home after the phone call, is that when you saw the fire trucks and the police vehicles outside of your house; is that right?

A Yes.

Q And you came into the house at that point; is that correct?

A Yes.

Q When you came into the house, you saw Mr. Lemons; is that right?

A Yes.

Q Okay. And you saw Mr. Lemons in terms of what he was doing and how he was appearing; is that correct?

A Yes.

Q And when you were talking to the police, did you describe that Mr. Lemons appeared as if he was blank?

THE COURT: He was what now?

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MR. CRIPPS: Blank, b-l-a-n-k.

THE WITNESS: Yes.

BY MR. CRIPPS:

Q Did you use that term to described how your husband appeared when you came into the house?

A Yes, I did.

Q Okay. And he appeared as if he had a blank look just standing there when I came into the house; is that right?

A Yes.

Q Okay. Did you also observe that my client, in your words, turned into a basket case after you had arrived?

A Yes.

Q And did you describe what you meant by basket case. Could you describe that to the Judge?

A He went into full-blown tears and just hollering not again - can't be happening.

Q Not again, is that what you said?

A Yes.

Q And then you have already described to the Judge at what you saw going on. Obviously with the CPR treatment and things like that; is that right?

A Yes.

Q Now you said that after whatever treatment was

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occurring that the child was taken to Annapolis Hospital; is that right?

A Yes.

Q And you went to Annapolis Hospital obviously; is that correct?

A Yes.

Q And so did Milton Lemons; is that right?

A Yes.

Q He was there at the hospital?

A Yes.

Q And then you described how the child was taken to the University of Michigan Hospital; is that right?

A Yes.

Q And you drove to the University of Michigan Hospital; is that correct?

A I didn't drive, but yes, we drove to the University.

Q And when you say we, Mr. Lemons also?

A Mr. Lemons, my other family, my mom, my aunt. We all went.

Q You all went, but the group that went also included Mr. Milton Lemons; is that right?

A Yes.

Q And when you were there at the hospital describing

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all the things you went through in terms of talking to the doctors and staff, Mr. Lemons was there also; is that correct?

A Yes.

MR. CRIPPS: Thank you. I have no further questions, Your Honor.

REDIRECT EXAMINATION

BY MR. WOODYARD:

Q Ms. Lemons, do you remember in your mind as you sit there the conversations that the doctors were having with you and with Mr. Lemons concerning your daughter?

A Yes.

Q And you remember earlier when Mr. Cripps asked you had ever seen anybody shake your daughter?

A Yes, I remember.

Q Do you remember Mr. Lemons ever telling anybody that he had shaken his daughter?

A Yes, when we were sitting in the lobby of the U of M Hospital, he stated that I hope it's not because I shook her to wake her up.

Q When he said that, had you ever heard him say that before that before that moment?

A Yes, at Annapolis Hospital. I did hear some - saying that, you know, he shook her awake because

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she wasn't responding. I hope it's not because I shook her.

Q Do you remember if he said that to you on the telephone when he spoke to you at your work?

A No, he did not.

Q You met with Sergeant Williams, right?

A Yes.

Q And you spoke with him about how Nikita had been acting between the eight and the 10th, the most recent couple of days before her death?

A Yes.

Q And do you remember how you described her?

A She was a tad on the fussy side. She was fussy.

Q And aside from being fussy, do you recall any other descriptive words that you used?

A She cried, but you know, just fussy.

THE COURT: And what do you mean by fussy?

THE WITNESS: She would - she liked to be held. She wanted attention. She had gas so she was irritable from gas.

MR. WOODYARD: May I approach?

THE COURT: Sure.

BY MR. WOODYARD:

Q Ms. Lemons, I'm just going to had you a copy of a

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report and I've highlighted a portion of that. Would you just read that quietly to yourself? And when you're done, if you would just look up?

Does that refresh your memory about something that you may have told Chief Williams?

A Yes.

Q What else did you tell him?

A It was after, you know, she was fussy after she drank her formula, but you know, she's still alert and responsive, but you know, she was gassy is what it was.

Q But she was also alert and responsive?

A Yes, she was alert, responsive. She would play. She would cry a little bit because she was gassy. If you burped her, she was fine.

Q You heard Mr. Lemons when you were at the Clark Street home with the paramedics. You heard him saying something. You told the Judge it was, not again?

A Yes.

Q Do you know to what that referred?

MR. CRIPPS: Objection as to speculation.

MR. WOODYARD: I asked her if she's knows to what that referred?

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THE COURT: Let me take the answer subject to a motion to strike. Go ahead. You can answer.

Do you have personal knowledge what that was referencing?

THE WITNESS: He said that he had lost a daughter in the past. So I would say it was in regards to losing a child.

MR. CRIPPS: Motion to strike.

MR. WOODYARD: Judge, I think it's relevant to this case because in the event that the argument is made that that comment was referencing, oh, she's not breathing again. She's not breathing again. I think that perhaps it was referring to this other incident.

MR. CRIPPS: What other incident? This is the first time I've ever been apprized to this and she's speculating that it refers to something else as opposed to the episodes that had occurred in the five months leading up to this. That's pure speculation on her part.

THE COURT: I think it does call for speculation. I'll strike the answer.

MR. WOODYARD: I don't have any further questions.

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RE-CROSS EXAMINATION

BY MR. CRIPPS:

Q Ma'am, just to clear up a few things. This is the first time ever, ever that you've ever said about any statements you heard Mr. Milton Lemons say at Annapolis Hospital; is that correct?

A Yes.

Q I mean, when you were interviewed thoroughly, I assume thoroughly by Sergeant Williams at the police station, you never told him about that, did you?

A No.

Q When you testified at the preliminary examination under oath and I was asking about those very same statements, you never said it then, did you?

A No.

Q You were just kind of like saving it for --

MR. WOODYARD: Judge, I object to that. The last comment is argumentative. And the question before regarding what Ms. Lemons may have testified to at the preliminary exam, there were pages and pages of preliminary exam testimony and I would ask the response to the question be stricken or that Mr. Cripps be more specific.

MR. CRIPPS: Pages one through 16,

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I mean I'm just trying to bring up - ask her whether she ever brought that out before at what she was asked about that area of the examination.

THE COURT: Well, first of all, let me ask you to rephrase the question you were going to ask because I do think it is argumentative. And that with regards to the issue of what was said or not said at the preliminary examination, the witness may not have brought it up at the preliminary examination, but she may not have been asked the question. So I think if you want to point to a portion of the exam transcript that may reference, did Mr. Lemons ever say anything regrading this particular incident - I think you need to rephrase the question as it applies to what the witness may or may not have said at the preliminary exam.

BY MR. CRIPPS:

Q At the preliminary examination on page 16, line 10, do you remember me asking you, again when you are talking to Sergeant Williams, Sergeant Williams asked whether you or Mr. Lemons had ever shaken Nikita before to stop her from crying. Do you remember that question he asked you?

A Yes, I do.

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Q Answer: yes and no. Question: And your response was --

A No.

Q No. Answer: No. Question: As to either your shaking the child or Mr. Lemons, is that correct? Yes, neither one. Did you testify that way under oath?

A Yes.

Q Now you never at any time volunteered, oh by the way, Mr. Lemons had talked about this at Annapolis Hospital or O or M Hospital or did you?

A No.

Q When Sergeant Williams was asking you about that you did mention something but you said it slightly different than what you said today; isn't that right?

A Yes.

Q And how is it different?

A I'm not remembering all of it.

Q You're not remembering all of it.

A As to what I said.

Q You're having a little difficulty remembering exactly what you said to Sergeant Williams regarding this very same area that you testified to under oath today?

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A Yes, and it is difficult to remember.
Q Well you know the way you described this as if Mr. Milton Lemons were just talking with family members and made a passing comment according to you, oh, it's not because I shook her. Remember you said that?
A Yes.
Q That's not exactly what was occurring at the hospital at that time; was it?
A There's was a bunch, you know, there was a group of people. The doctors came to question about her.
Q All right. So really what you're telling us, it wasn't Mr. Lemons like talking just with family members. He was specifically talking to a doctor, isn't that right?
A I don't know if he said it to the doctor.
Q But that's what you told Sergeant Williams; isn't it?
A I did not say to the doctor. It was when the doctor was present. I didn't say he was talking to the doctor.
Q Well, isn't it - what was occurring here at the U of M Hospital is Mr. Lemons was specifically talking to a doctor at U of M describing how he

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was trying to shake this child awake when this happened; isn't that what really happened here in terms of that comment at the hospital?

A Yeah, we were talking to the doctor.

Q So it's not as if he's trying to hide things from the doctors or anything like that. He's explaining to them exactly what occurred from that conversation; is that right?

A Yes.

Q Thank you.

MR. CRIPPS: Nothing further, Judge.

THE COURT: All right. Thank you, Ms. Lemons. You can step down. You can remain in the courtroom if you'd like.

PAMELA ANN VANMETER,

having been duly sworn by the court, was examined and testified upon her oath as follows:

DIRECT EXAMINATION

BY MR. WOODYARD:

Q Good morning.

A Good morning.

Q Would you tell the Judge what your name is please?

A My name is Pamela Ann VanMeter.

THE COURT: Ms. VanMeter, would you pull the mike a just a little closer to you please.

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THE WITNESS: Okay. THE COURT: Thank you.

BY MR. WOODYARD:

Q Do you have a daughter named Lori?

A Yes, I do.

Q All right. Lori is married - was married?

A Yeah.

Q And do you know to whom?

A To Milton Lemons.

Q Okay. And you just kind of nodded and looked in the direction. Is that Mr Lemons in court there?

A Yes, it is.

Q Ms. VanMeter, I'd like to ask you about your granddaughter, Nikita. Well actually I'll ask you about Lori's younger children, Milton, Jr. And Nikita.

A All right.

Q Was there a time when you lived across the street from Lori and Milton and their children?

A Yes.

Q When was that?

A Well, from the time they got married until just after Nikita was born. So, a year.

Q Okay. During that time, do you know who cared for the babies?

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A Lori did, I had MJ often when Lori was at work.
Q And MJ is - what is his real name?
A Milton, Jr.
Q Milton, Jr. And you call him MJ?
A Uh-huh.
Q I'm going to ask you about the evening of October 10th of 2005. Do you remember that evening?
A Yes, I do.
Q Where were you that evening?
A I was at home.
Q Do you remember getting a telephone call?
A Yes, I do.
Q Who called you?
A Milton Lemons called.
Q Okay. Do you remember what he told you or what the conversation was about?
A He told me that Nikila stopped breathing and that was pretty much it. I said I was on my way and I left the house.
Q And where did you go?
A I went the house on Clark Street where they lived at that current time.
Q When you arrived what did you see?
THE COURT: Could I interrupt for just a moment before you move on?

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Ms. VanMeter, can you tell us at the time that you received this phone call, how far away from your daughter, son-in-law and grandchildren did you live?

THE WITNESS: About five minutes away. Between three and five minutes away.

THE COURT: Okay. Thank you. Go ahead.

BY MR. WOODYARD:

Q And when you got the call, did you go directly there?

A Yes, I did.

Q So it just took a minute or so?

A Yes, it didn't take long at all.

Q Okay. So when you arrived, what did you see?

A Mr. Lemons was standing in front of the door talking on the phone, his neighbor was sitting on the couch at the head of Nikita and Nikita was laying on the couch motionless.

Q Did Mr. Lemons say anything to you?

A She's not breathing.

Q And what did you do?

A I went over and I tapped her foot. I called her name. I rubbed her belly. I couldn't get no response from her. I started to do infant breathing for her but -

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Q What is infant breathing?
A Small short breaths through the nose and mouth with my mouth covering. I wasn't getting no response. I was telling him to tell them to hurry up because the EMS - the EMT weren't there yet.
Q Was Mr. Lemons on the phone?
A Yes, supposedly with 9-11. I don't know who he was talking to. They said to tap her back. I tapped her back. I picked her up. I just couldn't get her - anything from her.
Q Okay. What happened then?
A Next the EMT's came in and they took over. They put her on the floor and started trying to revive her.
Q Okay. And were you there for the whole time that she was being worked on?
A Yes, until she left with the ambulance.
Q Now, Ms. VanMeter from the time that you arrived until the time that Nikita left in the ambulance did you ever see anybody do anything with her arms like bend them or pick her up by the arm or do anything like that?
A No.
Q Did you do anything like that with an arm or pick her up?

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A I picked her up under her arm supporting her head and called her name and then I laid her on my lap. But I picked her up supporting her head under her arms, but not with the arms just the arms.

Q Did you go with your daughter and her husband to the hospital?

A Yes. Well, to Annapolis first. I took my grandson to my house and dropped him off with my husband and other children and then went from there to Annapolis. And then when she left to go to the University we drove out there and I was with them.

Q Who is we then?

A My sister, myself, Mr. Lemons and my daughter Lori.

Q Were there times when you were at Annapolis and at the University of Michigan when as a family you would speak to a doctor or a nurse about what was going on?

A There was one time that the nurse came to get a history out in the waiting room when we first go there, but other then that I didn't talk to the doctors after that.

Q During that conversation, did you hear that conversation?

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A Bits and pieces of it.
Q All right.
A Not all of it.
Q Did Mr. Lemons speak during that conversation?
A Yes.
Q Did you hear anything that he said regarding the child?
A Hum, not that I can really come up with other than, you know, this has happened to me before. Why is it happening again? You know, I've lost a child before, why am I losing a child again?
Q Did he say anything about how Nikita may have come to stop breathing?
A Hum, what he told me and that was in travel was that she was drinking a bottle and that it came back up through her nose and mouth and that's how she stopped breathing.
Q Did he say anything else to the doctors or the nurse that you heard regarding that?
A Hum, no. He just said that it happened twice before.
Q During the time before the Nikita was born, to your knowledge, were there times when Mr. Lemons would watch his son?
A Yes.

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Q How is it that you know that was going on?
A Because Lori would be at work that day because I would take her work or he would take her work or, you know, one of us would take her to work.
Q Do you remember ever getting phones from Mr. Lemons during those times?
A Yes.
Q What would those phone calls be about?
A Well, sometimes he would ask me if I would come get him because he needed to just, you know, he's just too antsy and doesn't want to lay down. He needs to rest. Would I come get him?
Q You said sometimes that was the nature of the conversation. Were there other times that it was different?
A Sometimes he would just call and say, what's going on over at the house. Normal chit chat.
Q Do you remember speaking to Sergeant Williams about this?
A Yes.
Q Okay. And during that conversation, do you remember talking to him about Mr. Lemons caring for his son?
A Hum, that I would sometimes have him.
MR. WOODYARD: Judge, may I approach?

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THE COURT: Yes.

BY MR. WOODYARD:

Q Ms. VanMeter, I am going to hand you a copy of a police report. There's a portion of it that I've just circled down here.

A Uh-huh.

Q Would you just read that to yourself please and when you're done, just look up.

Have you read that?

A Yes.

Q Does that help you to remember -

A Yes, a lot of times he would say he couldn't handle his crying. He just could handle the crying. He would turn the radio up and if that didn't help, you know, he would talk about his crying. He would call and just say I can't take the crying. He cries all the time.

Q These were things that Mr. Lemons said to you?

A Yes.

Q Do you remember before Nikita died, do you remember times when she stopped breathing?

A Just one and that was after my daughter's birthday party over at the park. That evening I got a phone call and they said that she was having difficulty breathing. She wasn't breathing and I

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went over there.

Q Over there to their home?

A To the apartment across the street because at that time they still lived across the street in the apartment.

Q Did you see your granddaughter Nikita then?

A Yes.

Q And what did you see?

A I seen her struggling for breath. I suctioned her mouth and her nose and I was able to get her - she was attempting to try to cry and she couldn't cry. And I was able to get her to cry after suctioning her nose and mouth out a few times.

THE COURT: Can we get to the time frame please as to how old the baby was?

THE WITNESS: She was a week old.

BY MR. WOODYARD:

Q If you were to compare that behavior to how you saw your granddaughter on the 10th of October, how would compare the two?

A It was totally different. She was struggling for breath when I seen her on July 31st when she had her first episode with the formula. On October 10th she wasn't moving at all.

Q Thank you.

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CROSS-EXAMINATION

BY MR. CRIPPS:

Q Ma'am, did you make any signed statements in this case?

A Signed statement?

Q Statement that you signed?

A Not that I recall. Not that I remember.

Q You don't recall. Did you ever write a statement out?

A No.

Q Did an officer ever write one out and had you sign it?

A I don't remember. I don't remember signing it, but it's possible that I in the time frame.

Q So really all you're really testifying to is just your memory as to certain things you may have said or may have heard over time; is that right?

A Yes.

Q Okay. Now we do know for sure that Nikita had some health concerns; is that right?

A We finally determined that she was allergic to her formula.

Q You determined that?

A Well, the doctors and I changed her to soy formula since she didn't -

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Q You're the person that spoke to the doctors?
A Talked to Dr. Coe about our concern about her not being able to tolerate her stomach the formula.
Q How about the concern about not breathing
A I didn't talk to him about that, but Lori did.
Q You never brought that up?
A I didn't not with Dr. Coe. No.
Q Because as I understand this one week after she was born you get a phone call; is that correct?
A Yes.
Q Who called you?
A Mr. Lemons did.
Q Milton Lemons himself; is that right?
A Yes, he did.
Q Okay. And was he upset when he called you on the phone?
A Yes.
Q Okay. And she Nikita is having difficulty breathing; if I heard you correctly; is that right?
A He said, she's not breathing.
Q Not breathing.
A She's not breathing.
Q Okay. And in a response to that then you immediately went over to the house?

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A Correct.
Q And in fact, she couldn't even cry at that time according to you; is that correct?
A That is correct. She wasn't able to cry. You could see that she was attempting or trying to cry, but she wasn't able to let any sound out.
Q Okay. Did she have difficulty too breathing at that point?
A She was turning colors. She was struggling with breath.
Q Turning bluish; is that right?
A I don't know - she was reddish. She wasn't blue.
Q Turning red.
A She was turning red.
Q Okay. And you immediately suctioned her; is that correct?
A Correct.
Q And nose and mouth -
A To open her -
Q To open up her breathing, ability to breath; is that right?
A Correct.
Q Okay. Is that the only incident that you were personally involved in?
A Yes.

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Q And were you informed by Mr. Lemons of any other incidents?

A Yeah, he said that there was one more.

Q One more?

A There was one more and that's when I said, well, maybe we need to look at her formula and switch the formula.

Q And in fact the day of this incident itself, did he call you again?

A He called my daughter because we work together, but no he never

Q I thought you testified that on the evening November 10, 2005 -

A October 10th he called me on that incident.

Q Right. That's what I was asking you about.

A Oh, I'm sorry. There was an incident before that.

Q The incident before that you were talking about that one week after; is that correct?

A Correct.

Q Her birth?

A All right.

Q I was asking you - when I said the incident itself, I should have said I'm talking about October 10, 2005.

A Yes, he did call me.

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Q He called you again and again he said that Nikita had stopped breathing; is that right?
A Correct.
Q So this is the second time at least with you that he's called you about a breathing incident; is that right?
A Right.
Q Okay. And so you immediately went over there; is that right?
A Correct.
Q And you said when you came in the house, you saw Mr. Lemons on the phone; is that right?
A Yes.
Q And you saw another person there in the room?
A Correct.
Q Where was Nikita?
A On the couch.
Q With the other person?
A Yes.
Q What was the other person doing?
A Just sitting like up above her head. Just sitting on that part of the couch above her head.
Q Did she have the child in her hands?
A Not that I recall. Nikita was laying on the couch.

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Q And the neighbor was sitting right next to her?
A Right.
Q You don't know the neighbor's name; is that right?
A Her name was Rene.
Q Did you know her from the past then?
A I had met her once.
Q Did you see Rene perform any kind of attempt of CPR or anything in relation to the child?
A No.
Q All you saw was that she was sitting next to the child; is that right?
A Right and she said, I'm sorry I don't know anything about CPR.
Q What did you do?
A I went over and sat at the foot of Nikita and tapped her foot, rubbed her belly, called her name. I picked her up and called her name. I laid her on my lap.
Q How did you pick her up?
A I picked her up supporting her - my hand supporting her neck under the arms and picked her up and laid her on my lay.
Q And then what did you do?
A I tapped her back.
Q How did you - you turned her over then; is that

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right?

A I turned her - yeah, turned her on her stomach and tapped her back.

Q And then you started do CPR?

A I attempted to do some infant breathing.

Q Did you describe that as CPR?

A Yes.

Q That's what you told the police. You said you were doing CPR.

A Yeah, started doing infant breathing. I hadn't done any chest compressions or anything. I just started infant breathing.

Q When you spoke with the officer regarding this incident, did you say that when you arrived, you started assisting doing CPR on Nikita until rescue arrived?

A I did not say I started assisting. No.

Q If I were to show you Officer Emmerit's police report, when she says that you said that, would that refresh your memory?

A I don't remember saying assisted. I said I started CPR.

Q Would that refresh your memory if I showed you Officer Emmert's (Ph.) report and what she said that you said you had started assisting doing CPR

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until rescue arrived?

A Who was this, officer who?

Q Officer Emmert (Ph.) of the Wayne Police Department.

A I don't remember talking to that officer, but you can show it to me.

Q Do you remember on October 11th going or being on 3906 Clark Street?

A That evening, yes, I do.

Q And do you remember a Wayne police officer arriving?

A I remember that the Wayne police were there when we got there.

Q Okay. And do you remember talking to the police?

A Yes.

Q I'm asking you to read this over to yourself, just to yourself and I'll ask you a question when you're done reading it.

A Okay.

Q Did you have a chance to read that over?

A Uh-huh.

Q Is that a yes?

A Yes, it is.

Q Did you understand what you read?

A Yes.

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Q In fact, do you remember telling Officer Emmert that you rushed over to the house to help Milton Lemons?

A Said rushed over to the house? Yes.

Q Do you remember telling Emmert when you arrived, that you assisted doing CPR on Nikita until rescue arrived?

A I don't remember saying assisted, but I do remember saying I started CPR.

Q Do you deny you used the word assisted?

MR. WOODYARD: Objection, that's not what the witness said.

MR. CRIPPS: I'm laying a foundation for when he gets on the stand.

THE COURT: No, I understand that, but I think the witness's answered several times that she doesn't remember saying that. So we'll have to leave it up to Officer Emmert???

BY MR. CRIPPS:

Q Who were you assisting?

A I wasn't assisting anybody. I was just doing CPR on my granddaughter.

Q Now you've testified about a number of conversations that you heard bits and pieces of while at Annapolis Hospital; is that right?

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A No, at the University of Michigan.
Q So you weren't at Annapolis Hospital?
A I was at Annapolis for a brief moment before they took her by helicopter to the University.
Q And you also said that you heard some conversations while in the car; is that correct?
A No, we talked in the car. I didn't say anything, you know, we talked on the way there, but -
Q You never told the police about these conversations in the car before, have you?
A No, conversations in the car weren't anything other than just general talk. It wasn't anything leading to anything else.
Q I thought you testified that you heard Mr. Lemons says this has happened -
A That he stated at the University not inside the car.
Q That was at the University?
A Yes.
Q To the doctor?
A To the nurse or whoever was doing the report.
Q That this has happened to me before. Why is this happening to me again?
A Right.
Q Those are the exact words you heard?

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A Yes.
Q There's another time when you went to the police station, Wayne Police Station; is that correct, with Ms. Lemons?
A Correct.
Q Okay. When Sergeant Williams was interviewing Ms. Lemons, you kind of spoke up and said a couple times; is that right, regarding what you heard Mr. Lemons say at the hospital?
A The only think I remember telling them at the hospital was about me, him and MJ -
Q I guess what I am asking is you remember telling Sergeant Williams you did hear Mr. Lemons tell the doctor at the hospital that he tried to shake her awake when this happened?
A Yes.
Q But you never said a single thing to Sergeant Williams during that same interview about ever hearing Mr. Lemons say this had happened before why is this happening to me again. You never told Sergeant Williams you heard that; did you?
A Probably not that day, no. I can't say that I ever said that.
Q You maybe just forgot?
A It was a very stressful time, a very emotional

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time.

Q And that was all that you heard Mr. Lemons say; is that right?

A At the hospital about why is this happening again?

Q Yes. That is all you heard him say is what I just read to you?

A Correct.

Q Now you said that after EMS arrived they tried to revive Nikita; is that correct?

A Correct.

Q Okay. What did you see them do?

A They started CPR I guess. They tried to get a pulse. They tried to open up her air way, start breathing tried to get it and then shocked her.

Q Did you see them lift her up. Do you see them -

A Well, they moved her from the couch to the floor.

Q Okay. Mr. Lemons had told you that - or you heard Mr. Lemons say to the doctor that this has happened twice before and that was at the hospital, too?

A Uh-huh.

Q All right.

THE COURT: That's a yes?

THE WITNESS: Yes, I'm sorry. Yes.

THE COURT: Thank you.

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BY MR. CRIPPS:

Q Just a couple other areas and then I'm finished. You said when you came in the house, you saw Mr. Lemons on the telephone, is that right?

A That is correct.

Q And how long a time was he on the phone; if you were there. If you remember.

A Until either the EM people showed up or just before. Probably two or three after I got there I know he was still on the phone.

Q You don't know if he was on the phone with 9-11 or you don't know who he was on the phone with?

A No, I can't say who he was on the phone with.

Q I believe you told us either that in the past you heard or Mr. Lemons said to you about his son's crying; is that right?

A That's correct.

Q When was that time frame wise?

A A few months.

Q 2003, 2004 if you even know?

A Well, MJ was born in 2004.

Q All right.

A He always from the time he brought him he would say, you know, he's just a cry baby. He cries all the time.

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Q Who said that?
A Mr. Lemons did.
Q But I was asking for a time frame. So in 2004 sometime is that what you're saying?
A And in 2005.
Q All right. And obviously have you ever heard parents before complain about -
A Oh, yeah, I never really gave that much of a thought because -
Q You probably see some children cry.
A Right, some children cry and some children don't. I've had, you know, my share so I've had both, you know, criers and non criers.
Q So you didn't find anything unusual about that conversation?
A Not really, no, I didn't think nothing of it.

MR. CRIPPS: Thank you. Nothing further, Judge.

MR. WOODYARD: I have nothing further.

THE COURT: Thank you, Ms. VanMeter, you can step down.

THE WITNESS: Thank you.

JEREMY TIMA,

having been duly sworn by the Court, was examined and

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testified upon his oath as follows:

THE COURT: Please have a seat and pull the microphone in front of you if you would please.

DIRECT EXAMINATION

BY MR. WOODYARD:

Q Would you please tell the Judge what your name is?

A Jerry Tima.

Q What do you do for a living, sir?

A I work for the City of Wayne Fire Department, Fire Fighter Paramedic.

Q Fire Fighter Paramedic.

A Yes.

Q Do you recall going to a home on Clark Street back in October of last year?

A Yes.

Q All right. Now I am going to ask you some questions about that. Okay. Do you remember the run? Like as you sit here do you remember going there?

A Yes.

Q Okay. What happened when you arrived at that house? Would you tell the Judge what the first thing you remember seeing was? What the first thing you remember doing was?

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A The first thing I remember seeing is the infant laying on the couch unresponsive.
Q What did you do?
A Me and my lieutenant went in and assessed the patient's vitals. That was initially the first thing we did and found the patient to be pulseless and apnick??
Q What does aptnick mean?
A Not breathing.
Q Did you leave the child on the couch?
A No at that time we initiated CPR.
Q What did that involved then fighter Tima?
A We started CPR and started breathing for the patient. We used devices, medical devices to breath in the patient a bag bell mask also supplement to with the oxygen.
Q And what was the response if any?
A Let's see.
Q Did you make a report of that incident?
A Yes, I did.
Q Okay. And I see you've got the papers in your hand. Is that your report there?
A Yes, it is.
Q If you were to look at that, would that help you to remember what happened next?

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A I have documented everything that we did to that patient on here.

Q Okay. So if you would look at it, that would help you remember?

A Yes.

MR. CRIPPS: Could the record reflect what he's looking at so I -

THE COURT: Can you identify the documents that you're examining please?

THE WITNESS: This is the Wayne County EMS run report for this patient.

BY MR. WOODYARD:

Q How many pages is it?

A I have four here.

Q What were the results of your efforts?

A At that time, there was no changes.

Q Did you remain at that location on Clark Street or did you take the child somewhere?

A Yes, after we began advanced life support we then proceeded on to Annapolis Hospital.

Q All right.

A There's some other things that we did before we transported also.

Q And those other things were medical procedures?

A Yes.

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Q In the nature of advanced life support efforts/
A Yes, that's correct.
Q Okay. During the course of those efforts Fight higher Tima, do you ever lift the patient up by her arm?
A Hum, I can't recall if it was me or my lieutenant that picked her up and put her on cot. I can't really remember.
Q Okay. So somebody actually picked her up and put her on to some other device?
A Yes.
Q Or a cot that you described?
A Yes or stretcher.
Q A stretcher. In doing so do you remember if the child was like picked up by one arm or was the child picked up in some other fashion if you remember?
A No, I can't recall. I know that our procedure is not to pick up patients by one arm it's to pick them up to cradle them in your arms.
Q And for the record, you just held both of your hands in front of you palms facing up.
A That's pretty much how we do it.
Q As though there were a little baby laying on them?
A Yes.

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Q Okay. And that is - are you trained to do that?
A Yes.
Q Do you recall doing anything different with this patient?
A As far as?
Q Lifting her up?
A No, I can't even recall if I was the one or somebody else that was there did it.
Q Did you see any adults while you were there at the location?
A Yes, actually there was one male there believed to be the father.
Q How did you know that?
A That's just what I believed to be the father.
Q Okay. Thank you, sir.

CROSS-EXAMINATION

BY MR. CRIPPS:

Q You didn't remember seeing two other females there?
A Hum, no, initially, no.
Q No. Do you have a good memory of this or maybe some of it because you've done so many runs it's kind of vague.
A It could be just kind of vague.
Q You don't know whether you picked up the child or

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whether your partner picked up the child; is that correct?

A That's correct.

Q You don't know how the child was picked up based on any specific memory of this incident; is that correct?

A That's correct.

Q Okay. You know your standard procedure but you don't even know if you're the one that picked the child up or your partner; is that right?

A That's correct.

Q Okay. What you do know is or you remember according to your testimony is you remember seeing a child that wasn't breathing?

A That's correct.

Q Okay. Do you remember conducting some CPR on the child?

A Yes, I was part of it.

Q Okay. Do you have a specific memory of it or are you just going by what your standard procedure is?

A No, I was part of it.

Q Okay. So part of it, do you remember whether the child was on the floor or on the couch when you arrived?

A The patient was on the couch.

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Q Okay. Do you remember whether there was a large amounts of white fluid coming out of her mouth?

A Yes, there was.

Q You remember seeing that; is that correct?

A Yes.

Q And did the child have to be suctioned? Did you have to suction the child to get rid of that fluid?

A Yes, we did.

Q Okay. Was it easily done one time or did you have to do it multiple times?

A My report states that I had to do it multiple times.

Q You had to do it multiple times to get all the fluid out.

A That's correct.

Q Okay. And then CPR was it initiated immediately at that time; is that right?

A That's correct.

Q You didn't do that, did you?

A No, I did not.

Q Your partner Latan Streger??? did that; is that right?

A Lieutenant Stroger. Yes.

Q But you don't remember exactly what he did; is

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that right?

A As far as what?

Q Like doing CPR?

A Do I remember him starting CPR?

Q No, doing exactly what he did was what you meant by CPR?

A Yes, he did start CPR if that's what you're asking.

Q Does that mean that he lifted the child up, did he put tubes in the child, did he move the child around, do you remember specifically what he did?

A Initially, it was on the couch. He had checked his vitals. The patient pulse less and apnick??? He initiated CPR starting on the couch.

Q What does that mean? When did he initiate CPR and -

A He started breathing for him and also doing chest compressions.

Q And how did he do that? You were moving your hand up and down. Just tell us what he did.

A Started compressions with three fingers.

Q With both hands or one?

A No, just one with basically three fingers.

Q Pushing down on where?

A Right here.

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Q I'm sorry. On the chest of the infant?
A That's correct.
Q Okay. How many times was he pushing down on the infant's chest if you remember?
A Let's see there's two - I don't know. I mean I couldn't count. I mean, standard procedure is we two breaths for every 10 compressions and repeat that after checking the vitals.
Q There was an attempt to administer oxygen, too; is that right?
A Yes, yes.
Q And how was that done?
A With a bag-held mask. It's called a bebe ??? it's a device we use to help given oxygen to the patient.
Q Was there a tube used also?
A Yes, we did. We eventually had an endo-tracheal tube inserted.
Q It didn't work the first time though, did it?
A The first attempt was yes, we did not get it the first attempt.
Q Do you know why?
A No, I do not know why.
Q The report indicates that there was an unsuccessful attempt at first use of the tube

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though. We know that; is that right?

A That's correct.

Q Then it goes on to say via ET however it was not given due to the large amount of fluid in mouth and lungs.??? See that part of your report? Can you explain that?

A I'm looking for it. One second.

Q Your page six.

A You mean the first round of epi?

Q Yes.

A Yes. There's large amounts of fluids in the mouth and lungs at that time. And we did not give her that because it's - you can give that via ET tube but it would just create more fluid in the lungs and mouth.

THE COURT: What do you mean by ET tube?

THE WITNESS: Endo tracheal tube.

THE COURT: How is that administered for those of us who aren't medically orientated?

THE WITNESS: An endo tracheal tube is inserted through your mouth into your lungs, into your trachea and that's like a tube that goes right directly into your lungs which connected the Bebedium bag-held mask and you can give direct to the oxygen.

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BY MR. CRIPPS:

Q Suctioning in this situation had to be done several times throughout the incident because of this fluid problem; is that correct?

A That's correct.

Q Was there any problems regarding any of the procedures that were carried out here?

A Were there any problems?

Q Yes, that you remember?

A No, not that I recall.

Q Does your report indicate regarding this incident that it was discovered that there were times on cardiac monitors that were used that they were incorrect?

A I'm sorry? What?

Q Were any cardiac monitors used by you or your partner at the scene or on the way to the hospital?

A Yes.

Q Were there problems concerning this emergency procedure here?

A Problems?

Q Well, I'm looking at your report it says upon review of this incident it was discovered that the times on the cardiac monitor used for this

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incident were incorrect.

A The times?

Q Yes.

A Yes, the times on the monitor were - well I don't remember anything on the cardiac monitor being wrong.

Q Did your report say that upon review of this incident report it is discovered that the times on the cardiac monitor used for the incident were incorrect.

A I don't see that on here.

MR. CRIPPS: May I approach, Your Honor?

THE COURT: Sure.

BY MR. CRIPPS:

Q Can you show me what you're looking at first? All right. Let me show this to you. Upon review of this incident report it was discovered that the times on the cardiac monitors used for incident were incorrect. Do you see that, sir?

A Yes, I do.

Q Okay. So there were problems with this incident; is that correct, regarding the use of the cardiac monitors?

A Not the - well, yes, I guess you can say that.

Q Well, one of your diagnoses here was that there

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was cardiac arrest in relation to the child; is that right?

A Yes, there was cardiac arrest. Yes, this is the times that the monitor - when you turn on the monitors it shows what time the monitor was turned on.

Q The complaint you were dispatched was the child was not breathing due to choking; is that correct?

A Correct.

Q Okay. And when you arrived at the scene what you perceived there was cardiac and respiratory arrest; is that right?

A Correct.

Q Okay.

THE COURT: You're talking about a problem with cardiac monitor, am I understanding you correctly to say that the problem was that the time that showed up on the cardiac monitor was not the accurate time of day?

THE WITNESS: That's correct.

THE COURT: All right. Okay.

BY MR. CRIPPS:

Q At the scene, you were told that the patient had breathing problems and had choked on some formula before; is that right?

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A That's correct.
Q That certainly was somewhat confirmed by the problems had in clearing the formula out of the child's mouth and throat?
A Well, there was white fluid in her throat. Yes.
Q That you admitted earlier that took numerous times to completely clear that by suctioning; is that correct?
A That's correct.
Q And lastly, I may have said this out I don't remember but, after the multiple suctioning that you just made reference to throughout the incident you had to continually make attempts to keep the airway clear; is that right?
A That's correct.
Q To the point that you had to insert the IV into the child itself while transporting to the hospital; is that right?
A That was another procedure we did.
Q On the way to the hospital; is that correct?
A That's correct.
Q In the report that you prepared you said child not breathing and then you wrote down here as far as history there's a history of breathing problems; is that correct?

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A That's what I wrote.

MR. CRIPPS: Thank you. Nothing further, Your Honor.

REDIRECT EXAMINATION

BY MR. WOODYARD:

Q This time issue is that a diagnostic function of this machine?

A Yes, it has to be calibrated every so often to keep the times when you turn on so it's the right time of the day, the date has to be calibrated every so often to keep up with it.

Q Okay. Does that affect the machine's ability to monitor or to do what it is that the machine does?

A Not at all.

Q Thank you.

MR. WOODYARD: Nothing further, Judge. Thank you.

THE COURT: All right. Let me just ask you, I believe I heard you indicate that you applied some advanced life support procedures before the infant was taken to the hospital.

THE WITNESS: That's correct.

THE COURT: Can you tell me what types of medical procedures you're referring to make you make reference to advance life support as opposed

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to - I assume that falls outside of what the initial CPR efforts were.

THE WITNESS: That's correct.

THE COURT: Okay.

THE WITNESS: We started advance life support when we put the patient on the monitor and then also when we did put the EI tube in. That's also considered advanced life support procedure.

THE COURT: Okay.

THE WITNESS: Also in route we started ???pincheroxious IV.

THE COURT: What does that mean?

THE WITNESS: It's a type of IV that you can put right into the child's bone and it's in the bone instead of breaking in the vein.

THE COURT: And what's the purpose of that?

THE WITNESS: It's pretty much - in infants they're hard to start IV's on and when you worried about time and you need an IV quickly that's one way to do it.

THE COURT: Okay. And what kind of IV was that?

THE WITNESS: Intraoxyous.

THE COURT: What kind of fluids were you

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-

THE WITNESS: Normal saline.

THE COURT: Anything further?

RECROSS-EXAMINATION

BY MR. CRIPPS:

Q Where in the body was that inserted?

A Into the right proximal tibia?

Q In the back?

A No, into the front.

MR. WOODYARD: And for the record, the officer just touched his shin, his right shin.

THE COURT: Right.

By MR. CRIPPS:

Q Where was the child - did you insert that yourself?

A Yes, I did.

Q And where was the child when you inserted that tube?

A We were in route to the hospital laying on the cot.

Q On the cot?

A Yes, sir.

Q All right. So you had the child on its back?

A Yes, I believe so at the time. That would be how we would do it.

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Q And you probably did it as quickly as you could and while the vehicle is moving; is that correct?
A As quickly as possible.
Q Can you explain to me how this was done? Were you holding the child when you inserted it into this bone?
A No, the patient was laying on the cot.
Q Okay.
A And we supported the leg while the patient was laying flat and you go in and insert the needle into the bone until you hear a pop and then you go and you unhook the stylec and take that out and you go in and insert your normal saline.

MR. CRIPPS: Nothing further, Judge.

THE COURT: Any further, Mr. Woodyard?

MR. WOODYARD: No, Judge. Thank you.

THE COURT: All right. Thank you, sir. You can step down.

(Off the record.)

* * *

(Back on the record.)

THE COURT: We've had a side bar conference and Mr. Woodyard you indicated that you wished to recall Ms. Demons?

MR. WOODYARD: Judge, with the Court's

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Permission, there is a brief area that I neglected to go into on direct and redirect and recross, and I would ask the Court's permission to recall Ms. Lemons for a brief moment.

THE COURT: Mr. Cripps?

MR. CRIPPS: I have no objection to that reserving all rights to whatever it is.

THE COURT: Sure. That's fine. Of course.

(Mrs. Lemons resume the stand.)

CONTINUING BY MR. WOODYARD:

Q Mr. Lemons, thank you for coming back in. I forgot to ask you a couple of questions?

A Okay.

MR. WOODYARD: Judge, may I approach the witnesses?

THE COURT: Yes.

CONTINUING BY MR. WOODYARD:

Q Mr. Lemons, I'm going to hand you three things. Do you recognize what those are?

A Yes, I do.

Q That was marked on the back. I believe they're marked People's Proposed Exhibit Number One, Two and Three, those are photographs?

A Yes, they are.

Q Do you recognize what is depicted in those

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photographs?
A Yes, I do.
Q Have you seen the things that are depicted in that photograph, have you seen them before in your life?
A Yes.
Q Okay, the photograph that's on the back it's written People Exhibit Number One?
A Okay.
Q What is that?
A That is a picture of our house.
Q Is that the house you live in with Nikita Lemons when this incident happened?
A Yes.
Q Does it fairly and accurately show what the house looks like or looked like at that time?
A Yes.
Q Okay.

MR. WOODYARD: I move to admit People's Number One, Judge.

MR. CRIPPS: No objections.

THE COURT: All right. People's proposed exhibit number one will be received.

CONTINUING BY MR. WOODYARD:

Q Now, the photo -- that's written on the back, People Proposed Number Two, do you recognize what that is?

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A Yes.
Q What is that?
A It's picture of my daughter's bedroom.
Q There is crib in that picture?
A Yes, there is a crib, her dresser, the dirty laundry hamper and little -- our son's Greg as well ?
Q And does that fairly and accurately show what your daughter's crib and surroundings room looked like at that time?
A Yes.

MR. WOODYARD: I move to admit Number two as well, Judge.

MR. CRIPPS: No objection to Number Two.

THE COURT: All right. Two will be received.

CONTINUING BY MR. WOODYARD:

Q Now Mrs. Lemons, earlier when you were testifying, you said you had fed Nikita before you left for work?
A Yes.
Q Do you remember that testimony?
A Yes, I do.
Q Now, looking at People's Proposed Number Three, do you recognize what's in that picture?
A Yes.
Q What is that?

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A The bottle that I fed her that morning. It's the picture of our sink. It's got some dishes, and a bowl spoon, a cup, and cookie sheet and a bottle.
Q Okay. Is that -- do remember putting a bottle there?
A Yes, I put the bottle in the sink.
Q Is that the bottle that, in fact, you used to feed Nikita?
A Yes, that's the bottle that I used that morning at 11:30 when I fed her.
Q Did you feed her again before 2:30 when you went to work?
A No.
Q Is that the way it looked, does that photograph fairly and accurately show what the sink looked like before you left for work?
A Yes.

MR. WOODYARD: Judge, I move to admit People's Number Three.

MR. CRIPPS: No objection to Three.

THE COURT: All right. Three will be received as well.

CONTINUING BY MR. WOODYARD:

Q Mrs. Lemons, on the 12th of October, did you go back to your home?
A Yes.

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Q Did you look around your home?
A Yes, I did.
Q Was there a police officer there?
A Yes.
Q At that time, did you notice anything, did anything strike you as unusual about -- specifically about that bottle?
A Yes, that that's the only -- the only bottle there, that there was no other bottle used.

MR. CRIPPS: Objection as to her speculation.

THE COURT: Well, let me just see if I understand the answer: Are you saying, Mrs. Lemons, that there were no other used bottles in the sink?

THE WITNESS: Yes, there was no other used bottles to be found.

MR. CRIPPS: I have no objection to that, obviously. I was objecting to her speculation about what was happening while she was gone.

THE COURT: I understand. I think the nature of her answer though was such that I think that clarified that.

MR. CRIPPS: Thank you, Judge.

CONTINUING BY MR. WOODYARD:

Q Mrs. Lemons, how long did you live with Mr. Lemons?

A Almost two years.
Q During that period of time, did you have occasion to see Mr. Lemons keep house and doing chores around the home?
A Yes.
Q And did you have occasion to learn what his habits were regarding dishes?
A Yes, he didn't like to see anything in the sink. He would wash all of the dishes if I didn't get to them. There would be nothing left.
Q That was his general habit?
A Yes.
Q So, on the 12th when you went back -- that photograph actually shows dirty dishes?
A Yes.
Q Is that consistent with what you understand his habits to be?

MR. CRIPPS: Objection to the form of that question. That's her dirty dishes. Objection to the form of that question.

THE COURT: No. I will allow it. I think it goes to habit or customs. This is a household. I'll allow the answer. Overrule.

CONTINUING BY MR. WOODYARD:

A No. This is not how he would normally keep it. The

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dishes would have been washed. I didn't get a chance to them, he didn't wash them either. This pile wasn't the way I left out for work.

Q And you saw no other evidence of a used bottle?

A No, no other evidence in the house.

Q Thank you.

RECROSS EXAMINATION

BY MR. CRIPPS:

Q Now, Ms. Lemons, you don't know what happened or when you were gone at work, obviously, right?

A Right.

Q And you said Mr. Lemons had a common habit of cleaning up after himself; is that correct?

A Yes, he would wash dishes. He would clean house.

Q You wouldn't know if you're not there whether in fact he used some dishes and bottles and cleaned up after himself, would you, based on your own personal knowledge?

A Yes, I do. He's not one. He's not one to leave one dish. He would not wash just one dish or one bottle. He would wash them all?

Q You wouldn't know if you weren't there as to whether he cleaned up after himself and left when you did yourself, would you, if you weren't there?

A Yes, I do. He would not do that. He would clean it.

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Q Are you saying it out of anger towards him?
A No. I'm not. That is how he is.
Q Because, obviously, you weren't there to know; isn't that correct, ma'am?
A No. I was not there, but he is not want to clean up just his stuff.
Q I'm asking you about a specific date and time when you weren't even present, ma'am. I'm not asking about what you believed his common practice was. Do you understand my question?
A Yes, I do.
Q And you wouldn't know on this given day on that given time, when you weren't there whether he used some other dishes and bottles and clean up after himself, would you?
A No, I don't.

MR. CRIPPS: Nothing further, Your Honor.

THE COURT: All right. Thank you, Ms. Lemons, you can step down.

I think we'll break at this time. I understand we're waiting on another witness that is not here. We have a matter to take up over the lunch hour as well. So we'll have to recess until two o'clock.

(Off the record.)

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(Back on the record.)

THE CLERK: Back on the record on Lemons

MR. WOODYARD: People Call Renee Zdye to the stand.

(The witness is sworn.)

R E N E E Z D Y B

Was called to the stand at the instance of the People after first being duly sworn, testified as follows:

D I R E C T E X A M I N A T I O N

BY MR. WOODYARD:

Q Good afternoon?

A Hi.

Q Will you tell the Judge what your name is please?

A Renee Zdyb.

Q And Mr. Zdyb, what city do you live in?

A Wayne.

Q What street?

A Clark Street.

Q Did you used to be neighbor with this man, I am pointing to the defendant?

A Yes, I did.

Q Do you know what his name is?

A Milton.

Q How did you know Milton?

A He was my neighbor.

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Q Where did he live in relation to you?
A A joining houses. I live in a duplex.
Q How long were you next door neighbors?
A Maybe two months.
Q Do you remember October 10th of 2005?
A Yes, I do.
Q Do you -- did something happen that day?
A Yes.
Q I'd like to direct your attention to sometime in the evening and ask, do you remember what time this occurred.
A No, I don't?
Q Okay. What was it that happened?
A There was a knock at the door. I was taking a nap, and Milton had asked my husband if I was home and he said yes. I was taking a nap. He said he needed to see me. So I got up and went over there and knock on the door. He came to the door with the baby in his arms, formula pouring out of her mouth. He said that she was choking on her formula. She was drinking her bottle and she started choking. I told him he needed to call 911 because I don't know child CPR.
Q Did you call 911?
A He asked me to hold the baby while he called 911, and I took the baby, and he took the phone into the

bedroom and called his wife.
Q How do you know he called his wife?
A I heard him talking to her -- by name?
Q Then what happened?
A And he came back out, and I told him she's still not breathing, he needed to call 911. He went back into the bedroom and called his mother-in-law.
Q How do you know he called his mother-in-law.
A Because I heard him screaming. I didn't know it was his mother-in-law at the time.
Q Okay.
A But I found out later it was her that he had called.
Q What happened next?
A Then he came back out and I told him you have to call 911, I don't know CPR. He said I know CPR. He took the baby from me and put the baby on the couch, and I proceeded to call 911?

MR. WOODYARD: Judge, may I approach the witness?

THE COURT: Yes.

MR. WOODWARD: Your Honor, at this point, I'm going to offer People's Proposed Exhibit Number Five

THE COURT: Have you had heard it, Mr. Cripps?

MR. CRIPPS: Yes.

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THE COURT: Is there an objection to Number Five.

MR. CRIPPS: No.

THE COURT: Proposed Exhibit Five will be received.

CONTINUING BY MR. WOODYARD:

Q Ms. Zybd, I am going to ask you, can you hold this on your lap?

A Hum hum.

Q It's going to be a couple minutes.

(Whereupon the tape, Exhibit Five, is played.)

(Tape stops.)

CONTINUING BY MR. WOODYARD:

Q Ms. Zyde, was that your voice at the beginning of that tape?

A At the beginning, yes, it was.

Q What did you do after EMS arrived?

A I went outside to watch for the EMS.

Q After?

A After I stayed on the porch. I wanted to give the family time with the baby. I didn't know what was going on. I wanted to be out of the way so they could work on the baby. So, I stayed on the porch.

Q While you were there in the house, did any other

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adults come into the room, into home?
A Yes?
Q Who?
A The baby's grandmother, Lori's mother.
Q And while you saw the child for the entire time that you were actually able to see Nikita, did you see anybody do anything with the child's arms like lift the child up or do anything with the arms?
A No.
Q Thank you.
MR. WOODYARD: I have no further questions.
C R O S S E X A M I N A T I O N
BY MR. CRIPPS:
Q Ma'am, you testified that you were lived in the adjoining duplex, is that right?
A That's correct.
Q And on the day in question you heard a knock on the door?
A Yes, sir.
Q You didn't answer the door, but your husband did?
A That's correct.
Q But eventually, you came to the door?
A I went next door.
Q Okay. And when you went next door, did you go right

into the house?
A I knocked on the screen door.
Q Did somebody answer the door?
A Milton answered the door with the baby in his arm.
Q So he answered with the baby in his arm at that time?
A Yes.
Q And you said, I think you told the Judge earlier that when you saw the baby, formula was pouring out of her mouth?
A Yes.
Q Large amounts?
A Large amounts. There was puddle on the floor, a pretty big puddle.
Q And in fact, I think it was at a point in time where you called 911; is that right?
A That's correct.
Q And you said that you she was choking on some formula and she's not breathing?
A That's correct.
Q That's the observation that you personally made; is that right?
A That's what I was told that she was choking on the formula so that's what I relayed to them.
Q When you saw her?
A I saw the formula coming out of her mouth, yes, I did.

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Q Now, did you come immediately into house after he answered the door?
A Yes.
Q What did you do?
A I told him he needed to do call 911, and he asked me to hold the baby while he did that.
Q And you did you do that?
A Yes, I did.
Q How were you holding the child?
A I was holding the baby in my arms.
Q And indicating for the record, your left arm?
A My left arm.
Q What were you doing with your right arm?
A I turned her slightly on her stomach, pulled her arms gently up and was rubbing her back to try to get any formula that was in her lungs out. That's the only thing I could think of to do?
Q You're rubbing her on the back?
A I was rubbing her gently on her back, yes, I was.
Q And while you're doing that Mr. Lemons got on the phone; is that right?
A Yes.
Q And you said that he called his wife?
A Yes.
Q And what did you hear him say?

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A I just heard him screaming into phone, Lori, you got to come home. She's not breathing.
Q Lori, you come to come home. She's not breathing. That's all you heard?
A Yes. Due to my recollection, yes.
Q So, it's a very short conversation?
A Yes.
Q And then after after that call ended, you said to him again, you've got to call 911; is that correct?
A Yes, I did.
Q And you got on the phone again?
A Yes, he did.
Q Now, again, while he is on the phone a second time what are you doing?
A I'm still just rubbing the baby trying to get some formula, trying to see if she will breathe and all I could get was air out of her. She was not taking any air in?
Q So, you're still rubbing her on the back?
A I was rubbing her like this on the back. I wasn't doing circles. I was rubbing her like this.
Q Indicating for the record, pushing up in an upward motion?
A Right.
Q Were you pushing hard?

A No, I was not pushing hard.
Q But you're obviously pretty nervous at that time?
A I was nervous at that time and I'm very nervous now.
Q You're not trained in CPR or anything?
A No, I'm not. I do have two children though.
Q You do the best you could?
A Yes, I did.
Q Then you said that when Mr. Lemons got on the phone call -- excuse me --on the phone a second time, he was screaming again?
A Yes, he was.
Q Did you hear what he was screaming?
A I don't remember what he was screaming.
Q Okay. So you don't know who he was talking to the second time?
A I believe it was his mother-in-law, but I'm not positive.
Q You wouldn't know if (inaudible) or said it; is that right?
A Right. I could hear a bunch of screaming, but I don't remember exactly what was said. It was almost a year ago.
Q So it could have been 911 that he was calling on the second phone call?
A I don't believe it was.

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Q But you don't know?
A At that time, I must have heard something because at that time, I did tell him once again to call 911 and that's when he handed me the phone.
Q What did you when you got the phone?
A I dialed 911.
Q And that's when you said we heard the voice on the phone said I need EMS right away at 3906 Clark Street. I got a baby that's not breathing?
A That's correct.
Q She's like two months old?
A That's correct.
Q So she wasn't breathing at that point?
A Right. She was not breathing when I walked into the house.
Q And they told you not to hang up, stay on the line, right?
A I don't remember if they told me that or not. They asked me if I knew child PCR and I told them no.
Q Before I get to that point of the tape, you said, quote, she's not breathing. She choking on some formula. She's not breathing. Do you remember saying that?
A Correct. Yes, I do.
Q They say have you been able to get anything out of her

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at all or seen anyone do anything, and your answer to that was, got some milk out of her?

A Yeah.

Q So, you got --

A I used the word got the milk that was in her mouth and around her mouth is what I had gotten, nothing actually came up.

Q But you said you got some milk out of her, that's what you said on tape; is that right?

A Yes.

Q That's what I just heard?

A That's what I heard too, yes.

Q Then you went on to say every now and then she let out like a little yuk and that's it. She can't -- she's not -- her chest is not moving at all. She lethargic. She is not responding.

A Actually, it was a little ka-a-a-a-a.

Q That's what I said on tape; is that correct?

A I said Ka-a-a-a-a. If you listen I said a little ka-a-a-a.

Q And then they asked whether the dad was there and you said the dad is right here. Did you want to talk to him then Mr. Lemons got on the phone; is that correct?

A That's correct.

Q And then you heard Mr. Lemons say after there's a

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reference, do you know anything about CPR and a baby, Mr. Lemons said, no, I don't. I know how do it or an adult, but I can't do it on a baby. You heard that?

A Yes, I did.

Q And then you heard the dispatcher say over and over again, be very very careful because it's a child, right?

A Right.

Q Now, there comes a point where the dispatcher said --

MR. WOODYARD: Judge, I'm going to object to what the rest of the people said on the tape. The Court has heard the exhibit. It has been admitted into evidence. This witness was not a party to that conversation. And I'll object to its relevancy as hearsay.

MR. CRIPPS: Well, it's an exhibit in the case.

THE COURT: Well, I think since the exhibit has been received, the witness can be asked about the contents. She can't speculate. Can't answer about things that she didn't hear, but as it give rise to some other responses or observations that she made, I think it's relevant, and I'll allow her to testify. Go ahead.

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MR. WOODYARD: I guess my concern is that we wishes simply to go through line by line and ask the witness whether she heard this person say this and and that person say that.

MR. CRIPPS: I don't care to do that.

THE COURT: Cross examination he can ask however he wants. Go ahead.

Continuing BY MR. CRIPPS:

Q You heard the dispatcher on the tape say can you pick her up, do you remember that part?

A Yes.

Q And then you heard Mr. Lemons say, she got up her up, remember when he said that?

A No.

Q At that point in time you were holding the child; is that right?

THE COURT: You have to answer yes or no for my Court Reporter.

CONTINUING BY MR. CRIPPS:

A I held the baby until I called 911, and I did touch the baby after I called 911.

Q You're the only she there at that point?

A Yes, unless the mother-in-law was there at that point. The mother-in-law did get there before the ambulance did.

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Q Do you know her name?
A No, I don't. Sorry.
Q And so did you hear Mr. Lemons say she got her up?
A On the tape I didn't hear that. I'm sorry. I missed that.
Q Well, did you hear the dispatcher said, okay, try to hit her a little bit in the back, not hard?
A Yes. I heard that.
Q Who had the baby at that point in time?
A He did.
Q Did you hear Mr. Lemons say, yes, she got her in one arm. Did you hear that part?
A No.
Q You didn't. When you were sitting there, did you hear the tape say -- the dispatcher say, okay, well I got the ambulance on the way. I just want to stay on the phone with you and try to help you through this, okay?
A Yes, I did hear that.
Q And Mr. Lemons said all right.
A Yes.
Q Did you hear the dispatcher say hold the baby in one arm?
A I heard that.
Q Did you hear Mr. Lemon say, yeah, she got her in one arm.

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A Apparently I missed that. I did not hear that.
Q You didn't hear that on the tape?
A No, I didn't. I'm sorry. I missed that.
Q If I were to show you transcripts, would that refresh your memory that that was said?
A I didn't hear it.
Q Well how many she's are in the room at this point, was it you and another woman, right?
A When I handed him the phone to do the CPR, I walked out onto the porch twice for the ambulance. I did not have her in my arms at that point. I did not have her in my arms. After I called 911, I told them the father is right here. Would you like to talk to him. I put him on the phone and I walked out. He had the baby on the couch.
Q But there is another woman in the room at that point?
A If there was, it was Lori's mother. It was not me. Either that or may be because I was going in and out. Maybe I was in the room, but the baby was not in my arms.
Q Well, let's use our common sense here. Mr. Lemons is saying, yeah, she's got her in one arm?
A Then he must be referring to me, but I did not have the baby in my arms.
Q Or it could have been the other mother?

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THE COURT: Speculation on everybody's part.

MR. CRIPPS: Okay.

CONTINUING BY MR. CRIPPS:

Q Did you hear the dispatcher say, okay, put her head down lower. Did you hear Mr. Lemons respond to somebody, put her head down lower. Did you hear that part of the tape?

A No, I didn't.

Q Okay. Now, did you make a statement to the police?

A Yes, I did.

Q Did you make a signed statement where you wrote it down?

A No.

Q Did the police officer write something out and have you sign it?

A No.

Q Just made a verbal statement; is that right?

A Just a verbal statement.

Q At no time when you make a verbal statement to the police, did you ever say, you heard Mr. Lemons say I know CPR, did you?

A No. He said that say that in the house when he took the baby from me though. For me to call 911. He said I know CPR. Put her down here on the couch. He took

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his hand and was just pushing on her whole torso with his hand like this. The whole baby was bouncing on the couch. Right then I thought that's not child CPR. I don't know child CPR, but know that was not child CPR?

Q Who was doing that?

A Milton was.

Q All right. So he's pushing on her chest?

A Right.

Q How many times?

A I couldn't tell you how many times.

Q Forcefully?

A No, just like bouncing her on the couch.

Q Bouncing her on the couch when he's doing that.

How times did you ask him to --

A Maybe three or four times.

By that time I had the operator on the phone and --

Q Did you remember Mr. Lemon saying something about flushing the baby with water?

A I do remember telling the people on the phone, I believe, on the phone, that he flushed her with water. He might have told me that too. I'm not sure.

Q Did you remember told the police that you remember Mr. Lemons telling you something about flushing the baby

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with water?
A That's what I'm saying, he might have told me that too.
Q You don't remember that part?
A I don't believe he did.
Q You're not sure?
A I'm not quite sure.
Q Do you remember telling the police that though?
A Yeah.
Q So even though you told the police that you're not sure?
A I repeat what he told me, that he had flushed her with water.
Q Well, you remember that?
A Yeah, I do.
Q By the time you were rubbing the child to try and get formula, there was formula out of the child. There was formula coming out of the victim's nose and mouth; is that right?
A I think so.
Q That's what you told officer Emerick when you were interviewed on October 11th, 2005, is that correct, ma'am?
A It's been almost a year.
Q If I were to show you a police report which indicates

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that you said there was formula coming out of the victim's nose and mouth, would that refresh your memory?

A If I said that to a police officer then that's what had happened.

Q Okay. And you also told the police there was so much formula coming out of the victim's mouth and nose that you had to wipe it with a cloth?

A Yes.

Q At some point in time, you described somebody as my client's mother-in-law came into that location; is that correct?

A That's correct.

Q And she was attempting to do some kind of CPR?

A Yes, she was. She tried to give the baby some breath.

Q How was she doing that?

A With her mouth over the baby's nose and mouth?

Q How was she holding the child?

A She was on the couch, or on floor. I don't remember. I think she was still on the couch when mother-in-law came in.

Q Nikita Lemons you are talking about now?

A Nikita was on the couch, right.

Q And while the mother-in-law was -- what did you say she was doing?

A She was trying to give her CPR
Q While she's doing that, Mr. Lemons is still doing chest compressions that you described?
A No. He moved away to let her in there.
Q That's what you told the police though in your statement, isn't it?
A No.
Q Did you remember telling officer Emerick -- Zybd?
A Zybd.
Q Thank you. Zybd stated she observed Vanmeter give the victim one breath and Milton Lemons doing chest compression several times until rescue arrived.
Did you say that to the police?
A I don't remember saying that to the police, that's not correct.
Q If I were to show you statement would that refresh your memory?
A It's still not correct. You didn't write it down right, because Milton walked away to let the mother-in-law get in there.
Q When was he doing the chest compressions?
A That was before the mother-in-law got there. That was right before I handed the phone to him with 911.
Q The bottom line is that they're both taking turns doing whatever chest compressions or whatever?

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A Once when his mother came in, I stepped on the porch.

Q Nothing further, Judge.

MR. WOODYARD: I have no further questions. All right.

THE COURT: Thank you, ma'am. You can step down.

MR. WOODYARD: The witnesses that I have remaining are scheduled for Monday morning.

THE COURT: All right. And that would be Dr. Casin and Chief Williams?

MR. WOODYARD: There is also one other witness on the amended witness list. His name is Sergeant Patrick Lindberg. I asked counsel whether he would stipulate to the waiver of that witness. And this point, that's where we're at.

THE COURT: Just so that we get our lineup of witnesses set, Mr. Cripps, at this point, do you know whether or not you want Sergeant Lindberg?

MR. CRIPPS: Judge, I was asked that earlier and a review of the file, I don't see a need for Sergeant Lindberg. I'm prepared to waive him.

THE COURT: All right.

MR. WOODYARD: So we will waive him then.

THE COURT: So Sergeant Lindberg will be waived and just remaining two witnesses.

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THE CLERK: This is Case NUMBER 06-4818, PEOPLE of the STATE of Michigan versus MILTON LEMONS.

He's here today for continuation of a trial.

THE COURT: Appearances please.

MR. WOODYARD: Good morning. Michael Woodyard on behalf of the People.

MR. CRIPPS: David Cripps on behalf of Milton Lee Lemons, Sr.

We are ready to continue. Thank you.

THE COURT: All right. Mr. Woodyard, I understand you have another witness?

MR. WOODYARD: We do, Judge. We call Dr. Bader Casin to the stand.

(Witness is sworn.)

D R. B A D E R C A S I N,

was called to the stand at the instance of the People after first being duly sworn, testified as follows:

D I R E C T E X A M I N A T I O N

BY MR. WOODYARD:

Q Good morning.

A Good morning.

Q Would you just state your name for the record please?

A My name is Bader Casin.

Q What do you do for a living, sir?

A I'm a physician. I practice pathology, and specifically, forensic pathology.

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Q And where do you do that?
A I do that in Ann Arbor. I'm on staff of the University of Michigan in the Department of Pathology where I teach, and also Washtenaw County Medical Examiner.
Q How long have you been with the University of Michigan?
A Since 1995.
Q How long have you been the Washtenaw County Medical Examiner?
A Same time.
Q Where did you work before then?
A I was in Wayne County in Detroit. I was the chief medical examiner in Detroit since 1988.

MR. CRIPPS: Your Honor, if these questions are for the purposes of establishing credentials for his expertise and ability to testify as an expert in the field of the forensic pathology, I'm more than prepared to stipulate to that. I have cross-examined Dr. Casin countless times and I'm aware of his

credentials, and I have no objection to him being qualified as an expert in that field.

THE COURT: Mr. Woodyard, unless --

MR. WOODYARD: Unless the Court has something to add we would --

THE COURT: I have known Dr. Casin for some time. He has appeared numerous times. So if there is

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a stipulation by the People as well, I will permit Dr. Casin to testify as an experts in the field of forensic pathology and to give his opinion in that area.

Go ahead.

MR. WOODYARD: Thank you.

CONTINUING BY MR. WOODYARD:

Q So Dr. Casin, in the course of your work, I would like to direct your attention back to October of last year, specifically, October 11th, and ask whether you recall performing an autopsy on that date?

A I did.

Q And did you perform more than one that date?

A I don't recall.

Q Do you recall performing an autopsy on a small baby?

A I do.

Q Do you remember the name of that baby?

A Nikita Faith Lemons.

Q Do you know why you were asked to perform an autopsy on that child?

A The death was reported to our office, and it was reported to our office because it was believed to either be the product of trauma or, at least, the cause of death was not known?

Q In circumstances such as that, Doctor, where a death is referred to your office for those reasons, what do you generally do, or what is generally done?

A Our procedure is to investigate or initiate an

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investigation. We do this through an investigator. At the University of Michigan a couple pathology residents, that is to say, young physicians who are training in pathology, work for me as investigators and they do initiate an investigation by phone call to various agencies. If a police agency is involved, they call them. If an ambulance run is involved, they get that record. And if the patient has been in the hospital, which was true in this case, they access the medical records and speak to at least the principal physician.

They accumulate that information and then dictate a report and give it on to me. At the same time, as calling me to alert me that a certain case is in process.

When the body comes to me and the time for examination occurs, and in this case, it was later that same morning. I then examine the body as well as the investigator's report and look at the outside surfaces of the body and then proceed if necessary to an internal examination, which is typically called an autopsy.

Following that, I assemble my thoughts and conclusions and begin to document those.

THE COURT: So, before we proceed any further, can I see both sides at Side Bar.

(Counsel approach the Bench.)

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(Off the record.)

(Back on the record.)

THE COURT: Go ahead, Mr. Woodyard.

CONTINUING BY MR. WOODYARD:

Q Now, as it relates to these general procedures, do you know, if, in fact, these procedure were followed as it relates to Nikita Lemons?

A Yes, they were?

Q So, I'd like to then start from the moment when you conducted on external exam of the child's body, and do you remember seeing anything remarkable at all about that?

A There was nothing remarkably abnormal. The child

appeared to be well fed and cared for. The child was described to me as approximately 2 1/2 months in age and did appear to be that age?

Q Do you remember if you saw any external signs of trauma, any cuts or bruises.

A I did not?

Q So you said the next step is to proceed on to what is referred to as an autopsy?

A Yes. I did so because it was not apparent to me what the diagnosis was at the stage we're speaking now. So I proceeded to an internal examination?

Q During the course of that examination, did it become apparent, to your opinion, what in fact, had caused the death of Nikita Lemon?

A Yes.

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Q And in your opinion what was that?
A I found brain swelling with blood on the brain surfaces as well as in the nerve sheaf of both eyes and recognized this as an organization of findings in the absence of any other thing of phenomenon called Shaken Baby Syndrome.
Q You say you recognized this group of symptoms or conditions. Let's go further, if you will.
The brain swelling and the bleeding in the brain and the optic nerve bleeding. What sort of --

describe for the Judge what this shaken baby is.
A It is understood in our field that shaking or rapid oscillation of the head of a child, which in fact, happens because the child's neck muscles at this age are insufficient to control a shaking back and forth, causes the brain to follow the shaking motions of the head whipping back and forth, but slightly behind it. And so the brain, the soft brain, is striking the internal surfaces of the skull.
At which time, it begins to swell, which is what a brain does when it is abused in this way, and the surface vessels that bridge between the internal skull surface and brain surface, are tearing. These are small bridging veins, and they deposit a surface of blood on the brain top. And at the same time, there is a stretching of some of the nerves of the brain.

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The two largest nerves in which this is evident are those that go to the eyes, and there is bleeding therefore in the nerve sheaf or covering of those two large nerves.

Q Is this a natural phenomenon that might occur?

A It's not a natural phenomenon. We don't find it, for instance, in falls, that sort of thing, or in dropped children. We do not find it in when children run into

objects or, for instance, or even when they are struck by automobiles.

Q So these were all findings that you made actually in the child's head?

A Correct.

Q And did you make any other findings as you continued your duties?

A The other findings were essentially normal. There were normal organs in the torso and all of the findings there were as expected in a healthy two and half month old child.

Q Did you x-ray this child's body?

A Yes.

Q Why did you do that?

A It is our routine to do full body series of films so as to pick up any subtle things in the skeleton, for instance, that we may not note at the time of our examination.

Q Do you recall what, if any, findings you were able to make as a result of that x-ray series?

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A Yes. There was an abnormal finding. It was small fracture that was present at the top of the right shoulder.

Q Based on what you had learned about this case at the time you did those x-rays, I suppose up until now, you have an opinion about how that fracture may have been sustained?

A That fracture is an usual fracture. It is traumatic and it is associated with an extension of the arm beyond usual range of motion in an infant. And it usually means that either the arms is being pulled very hard, or that the arm maybe flailing about when child is in motion.

Q Now, you have indicated that you performed this autopsy sometime in the late morning of 11th of October; is that correct?

A Yes, I believe so.

Q Do you know what time the child actually died?

A The child was actually pronounced dead that morning. It was approximately 6:30 or 6:20, in that range.

Q Now, were you able to develop an opinion about when the injuries that caused the child's death were inflicted?

A I was, but not entirely from the autopsy. From the autopsy, it was apparent to me that these were fresh injuries. Bleeding was slight. The swelling was well developed. The character of the blood was fresh, but

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the history that I received helped somewhat.

The ambulance call, for instance, approximately 12 hours before, gave me a good

indication of the time. Also, the investigator's report indicated to me that the child had been apparently well the preceding afternoon?

Q So, with that additional information, what was your opinion about when the injuries may have been inflicted?

A With that additional information, my estimate is that this injury occurred about 12 hours prior to the time of death. So late in the afternoon of October 10.

Q What does a body do when its brain is traumatically injured, what are some of the normal symptoms or responses?

A Depending on the type of injury. If blood vessels are broken or sheared, they bleed. If the brain is injured it swells as does many other soft tissue areas of the body. If organs are opened, they bleed as well, skin, liver, heart, that sort of thing.

If lungs are compressed they collapse. If bones are broken, they separate.

Q What might you expect to see occur in a child whose brain has been injured?

THE COURT: Could I just ask you to clarify that question. I mean, are you asking the Doctor, what would you expect to see immediately or what would you expect to see before death or whatever.

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MR. WOODYARD: I'll try.

CONTINUING BY MR. WOODYARD:

Q Dr. Casin, the injury that you observed was a swelling of the brain; is that correct?

A Yes.

Q And again, along with others?

A Yes.

Q Now, this particular swelling and injury that you observed that in your opinion caused the death of Nikita Lemon, what do you believe the child's symptoms may have been upon receiving that injury both immediate and over time.

A Immediate symptoms are fairly routine in brain injury of this sort. When the skull remains in tact and the brain swells and therefore is compressed inside the still fairly rigid bony box even at the age of two and half months, the body revolts. And that revolt is manifested typically and this is in both infants as well as adults, there is vomiting, regurgitation of whatever is in the stomach. In other words, controls in the body of certain impulses are loss by pressure on the base of the brain.

As I said, if blood vessels are sheered or broken they also bleed in the brain.

Q What is about an infant's state of consciousness?

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A A state of consciousness is rapidly loss in brain swelling in infants more rapidly than in adults, and I expect that the child would have loss consciousness quite soon. And by that, I mean within a minute or so of the time of this injury.

Q What about the vomiting or regurgitation, how quickly would that --

A That would happen as the brain swells, so it would happen at virtually the same time.

THE COURT: Doctor, why does the loss of consciousness come more rapidly to an infant than child or an an adult?

THE WITNESS: The brain swells more rapidly first of all.

Secondly, and so the speed of swelling is more enhanced and therefore the full affect is manifest sooner. That's probably the best answer.

THE COURT: Okay.

CONTINUING BY MR. WOODYARD:

Q Dr. Casin, did you learn anything about this child's previous medical history, or do you remember if what, anything you read about that?

A I did at the time review that and my recollection now is that the child had had some difficulty breathing on a previous occasion or perhaps several. That was

manifested by gas pain I believe. I'm not quite sure

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of more of that, but that was a part of the review that I had.

Q So would that occurrence, would that circumstance, does that at all factor into your opinion about the child's cause of death, does it change it. If I told you, in fact, the child had gas and appeared to lose consciousness of breath when the child was one week old and when the child was five weeks old?

A It wouldn't change my opinion about the cause of death because first of all, I did not find anything in that review both grossly and microscopically that would explain such a history. And everything that I did find was of an acute nature. Something that had happened just before death.

In other words, I found no evidence of tumor. I found no evidence of malformation, and I found no evidence of (inaudible) bleeding or any previous injury.

That does not rule out -- if I might continue -- that does not rule out things I might not find evidence of such as a seizure that the child may have had, it couldn't change my opinion about the cause of death because seizure was not a part of this injury issue. This is an external force that caused

this injury.

Q Clarify that for me will you. Could a seizure -- if the child had suffered a seizure could she have

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displayed the symptoms that were presented?

A I think possibly. I have not mentioned evidence of a seizure such as sudden rigid or abnormal behavior, loss of control of the body, but that would be manifest in a seizure. But it may be the symptoms may be or misinterpreted or interpreted as due to a seizure.

Q During the course of your examination, do you also then microscopically examine parts of the body?

A Yes.

Q Did you examine the child's eye balls?

A Yes.

Q Do you remember, if anything, you saw during that course of that examination?

A Yes. I confirmed that the hemorrhage and nerve sheaths were there and were acute. I also found that they were in both nerve sheaths. I found in the retinas of both eyes hemorrhages that were likewise acute. The retina is in the back of the eye.

Q Is retinal hemorrhage consistent or inconsistent with your opinion thus far?

A It's consistent.

Q During the course of your professional efforts in this case both during the autopsy and at trial, is there anything that you have learned that would cause you to change your opinion?

A No.

Q Did you talk to the police during the course of your

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autopsy during the course of that day or the following day, do you remember?

A Yes, I usually do. I'm not sure if the police officer was present at that time, but I don't believe so. However, I did speak to a police officer from Wayne afterwards and I did so by making that phone call probably to report my findings.

Q Do you know whether before or during the course of your autopsy, actually, during the procedure, do you remember whether you had spoken to police or was it only afterwards?

A Could I check my report?

Q Of course?

A My report indicates only one witness and that would have been my assistant, and had a police officer been present, I would have named him or her.

MR. WOODYARD: Just one moment, Judge?

THE COURT: Sure.

(Off the record.)

(Back on the record.)

CONTINUING BY MR. WOODYARD:

Q Just one more area if I might: We talked about the various way in which a body might respond to this type of injury. How would this type of injury affect a child's breathing?

A As we said by way of summary, the child would vomit as the brain could swell. The child would lose

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consciousness at the same time breathing would diminish, it would become irregular, faint, and then disappear. But breathing is the last thing to go as is the heart rate. So if the child is resuscitated, the breathing and heart rate may continue for awhile. And I believe that would be the case in here with this child survived for 12 hours during which the heart did continue to beat and the breathing did continue at least with diminished but still an effort.

Q Thank you, Doctor.

THE COURT: Mr. Cripps.

MR. CRIPPS: Thank you, Your Honor.

C R O S S E X A M I N A T I O N

BY MR. CRIPPS:

Q Good morning, Dr. Casin.

A Good morning.

Q Now prior to this day, you obviously had seen cases of

Shaken Baby Syndrome in other autopsies that you've done; is that correct?

A Correct.

Q Sometimes this is a syndrome that become readily apparent upon examination of a child; is that right?

A There is a fairly consistent series of findings which, in fact, we demand for diagnosis to be made.

Q And sometimes there really is a serious question presented whether in a given case where there is one of shaken baby as opposed to an accident cause of death?

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A That is correct.
Q Or a natural cause of the death?
A Yes. We teach a fairly rigid protocol about making a make decision regarding this.
Q In reference to this particular case, you told us that you received the case -- first of all, you received the child from another hospital; is that correct?
A That's correct. The child was transferred from Annapolis Hospital the previous evening.
Q And so there was some initial work and examination was done presumably by the doctors at that hospital?
A Yes.
Q And then the child was transferred to your hospital; is that correct?

A Correct.
Q When you initially received the case yourself, that you received the case after there was some initial examination done by other doctors even at U of M Hospital; is that correct?
A That's correct.
Q In fact, the child was initially examined by a Dr. Jeffry Fleming?
A That's right.
Q A resident physician at U of M Hospital?
A Yes. Pediatric.
Q Pediatric resident physician.
And also and even before you saw the child

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there was some work done by a Dr. Alisha Wilson?
A Dr. Alisha Wilson, she is a pathology resident who is my investigator.
Q Right. She did some work on this case before you even came into it?
A Correct. She assemble the information.
Q So initially what you know when you received the examination of Nikita Lemons as you explained to the Judge, you received it as an unidentified cause of death reported to you for further investigation; is that correct?
A Yes.

Q Now, one of the first things that you received here was in relation to this case was a document from Alisha Wilson; is that right?
A Yes.
Q That's Dr. Wilson?
A Correct.
Q As again as you said, she works for you; is that correct?
A Yes.
Q And one of the thing that you examined and received was the U of M Hospital Death Notice in relation to Nikita Lemons; is that correct?
A Yes.
Q And what Dr. Wilson had wrote down is that this case presented an unknown cause of death; is that correct?
A That's correct.

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Q So that's the initial perspective that you came from in this case; is that right?
A Yes.
Q And in fact, on this standard form that's used at U of M Hospital there is a number of indications that a Doctor can give as to a cause of death, everything from accident, bone fracture, crime, drowning, drug overdose, homicide, suspected child abuse, all the way down to sudden unexpected or unexplainable death. Do

you know which form I'm talking about ?
A I do.
Q In this particular case, the box crime, or the box homicide, or the box suspected child abuse, none of those boxes were checked office in relation to the investigation; is that correct?
A I believe that's correct. It's been a long time since I've seen that.
Q And the one box that was checked off by Dr. Wilson was sudden unexpected or unexplainable death; is that correct?
A That's my understanding, yes.
Q If I approached you with the death notice, would that refresh your memory?
A Yes. Thank you.
Q Would you identify this for Judge Kenny, please.
A This is a form. It is called the death notice. It goes on the front of the chart on all patients who die

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in the University, and it has some of the components of a death certificate. And purpose is to communicate whether or not it is referred to the medical examiner and if not, what the cause of death is. But even if presented to the medical examiner a proposal as to the cause of death.

Q Proposal cause of death is that what that is?

A Yes.

Q And which proposal cause of death did you receive?

A The proposal here is unknown cause.

Q Sudden unexpected and unexplainable death is the box that's checked at the --

A That's the category and there is the proposal there.

Q Thank you very much, Doctor.

Of course, that that certainly doesn't end any inquiry as far as you're concerned, that's really the beginning; is that right?

A That's right.

Q But you did have a couple other things at your disposal, first of all, you told the Judge about the external exam; is that correct?

A Yes.

Q And that was pretty much unremarkable as far you were concerned; is that correct?

A Yes.

Q Not likely you saw any obvious evidence of any sort of child abuse being inflicted on Nikita Lemons from an external examination; is that correct?

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A That's correct.
Q But you also had the benefit of medical examiners investigator report prepared by Dr. Alisha Wilson of your office; is that right?

A I do.
Q And that report if I understand it, correct me if I'm wrong, basically, she's like the work horse for you that does all of the prior investigation whether it be an examination of what other doctors have done at the hospital or police reports or whatever, it gives you kind of like a frame work to work from when you do your examination?
A Yes. She presents a report which is essentially her summary of the accumulation materials that she's been able to get.
Q And her summary is known as medical examiners investigative report; is that correct?
A It is.
Q And in this particular case, Dr. Wilson prepared one in relation to Nikita Lemons; is that correct?
A Yes.
Q In this particular case one of the persons interviewed by Dr. Wilson for preparation for you was an interview with Dr. Jeffrey Flemings; is that correct?
A Yes.
Q And you've already told the Judge that Dr. Jeffrey Fleming is a resident physician specializing in

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pediatrics; is that correct?

A Correct?

Q And as part of the investigative report -- this investigative report by the way -- was contained within your file; is that correct?

A It was.

Q It was something you relied upon one way or another for whatever weight, for your final opinion in this case?

A I do.

Q And you note in this report, the investigation shows first of all, as we briefly went over, that this was a two-month old infant with a past medical history of two episodes of gagging and gasping for breath in the past associated with (inaudible) occurring at one week of age, and at one month of age, presenting to medical care and cardio respiratory arrest. That was part of the examination, correct?

A Correct.

Q And I think Mr. Woodyard already went over that with you briefly and you would agree that's an abnormal feature of this child; is that correct?

A It is.

Q Now, combined with that and maybe even more importantly, you talked about what's important in this case is some hemographing that you saw in the brain of the child; is that correct?

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A Correct.
Q And in addition, some damage, and correct me if I'm using the wrong terminology, some damage to the nerve endings that led to the eye sheath, correct?
A They were the nerve coverings.
Q Nerve coverings?
A Are the nerves which are an extension of the brain and go to orbits and connect to the eye ball.
Q Quite honestly, you would agree, those are differences of opinion between Dr. Flemings and you about whether there was injury to the nerve coverings in this case; is that correct?
A Well, Dr. Flemings couldn't see those. He could look into the eyes from the front of the body, as doctors often do, and look into the eye grounds, and he could examine those for abnormality.
Q At the exam when I cross-examined you there, would you agree there was difference of opinion between Dr. Flemings' diagnosis as to this area and yours.
A Yes.
Q And this report, the medical examiner investigative report, Dr. Flemings -- after Dr. Flemings' examination of the child and the retinal area and the nerve coverings -- first of all, Dr. Flemings noted, quote, no external injuries were identified on

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physical examination; is that correct?
A Yes.
Q Which you agree with that obviously?
A I do.
Q And he goes on to say or tells Dr. Wilson, quote, no retinal hemorrhages were identified on opthalmologic examination by admitting physician. End of quote.
Is that correct?
A Correct.
Q So obviously, Dr. Flemings examined retinal area for hemorrhages and found none; is that correct?
A That's right.
THE COURT: Mr. Cripps, could I ask, what was -- there was a word describing the examination that the Doctor used --
MR. CRIPPS: I will spell it for the record. O-P-H-T-H-A-L-M-O-L-O-G-I-C-.
THE COURT: Perhaps that's a term that term you know, Mr. Cripps, I do not.
Doctor, can you describe for me what type of examination is that?
THE WITNESS: It is the examination as I have described as looking through the eyes into the back of the eye, and that is done through an opthalmaloscope, which is a funny looking disc like

structure that's got little light and it shoots the light into the eye. And in the structure there is

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also a lens. And the Doctor gets up close and looks through lens as the light goes into the back of the eye.

THE COURT: Okay. Thank you.

CONTINUING BY MR. CRIPPS:

Q And that examination was conducted by according to the records at least, by Doctor Jeffrey Flemings in the pediatrics ICU at U of M Hospital; is that right?

A I'm not sure where it was conducted, but it was done.

Q Now, you would agree that the records show that upon arrival at U of M Hospital, Nikita Lemons was taken directly to the pediatrics ICU?

A Yes. That's what the history is.

Q And that's presumably where Dr. Flemings would have conducted this examination; is that correct?

A Most likely.

Q Now, for the record, show in relation to Dr. Flemings' examination at the hospital that the child had a five millimeter non-reactive pulp il; is that right?

A I don't recall now, but if you're reading from his record then I would accept that.

Q From his record which is from the U of M medical record.

A Okay.

Q Is there anything unusual about that observation?

A No. Five millimeters is a little bit wide, but otherwise, no.

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Q The records also further indicate upon examination oft Nikita Lemon -- and again, I'm going to spell this into the record, there was a negative, O-C-C-U-L-O-C-E-P-H-L-I-C, reflex?
A Yes.
Q Did that assist you in any way in terms of what he was looking at that time?
A He was looking at an eye that was less than normally reactive. He was talking about a reflect that if you touch or scrape or just briefly hit even with a speck of water, the outer portion of the eye, the eyelids will blink.
Q So, these are all things that are routinely done at the hospital, is that right?
A Yes.
Q Now, so I guess so just to sum that area up, Dr. Flemings saw one thing and you saw another in relation to the eyes, the retinal coverings?
A He looked at an eye of a person who wasn't dead yet. I looked at the eyes of a dead baby. I found something that he didn't see and specifically he said

he couldn't see, and that is the retinal hemophage.
Q Now, in relation to the -- to the bleeding itself, you said that was as result of the brain swelling?
A No. The bleeding as the result of the motion of the brain within the skull and stretching of the bridging veins between the two structure thereby causing them to break.

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Q Now, the timing of that injury in terms of what amount of time it would take a cause of injury like that could even be a matter of seconds; is that correct?
A Yes, it can happen in seconds.
Q So even given your diagnosis here, let's say somebody did shake a child within just a matter of three to four seconds, it could cause that kind of bleeding as to what you saw?
A I'm not sure I understand your question.
Q I don't want -- I want to clear up the idea that I am thinking here is that somebody wouldn't have to be shaking somebody for 5 -- 10 minutes for the injury that you saw here?
A Then you are correct.
Q It could be just a matter of seconds?
A Yes.
Q Now, as far as even the time of death here, part of that you admitted was based on the time that cause of

death -- excuse me -- the time the baby was pronounced dead; is that right?
A The time that the baby was pronounced dead was the time that all vital signs were loss.
Q You also said you based on reading some investigative report and some other information received, what you put the time frame about 12 hours; is that right?
A Yes.
Q Quite honestly it's could have been several hours

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longer than 12 hours in this given case, is that fair to say?

A I'm unable to say exactly the duration of time between the injury and the death.

Q But it would be fair to say that you have testified before it could be several hours longer than 12 hours as the time of this injury was inflicted?

A That's correct.

Q Well, when you did what you did -- and by the way, I think the big difference -- let me rephrase that -- when you did what you did you still prepared some kind of report yourself; is that right?

A I did.

Q It was a preliminary report, I understand that, but it still was a report; is that right?

A Yes.

Q And in that report, I believe you were still uncertain as to the cause of death at that point in time; is that correct when you complete the autopsy?

A I believe I had the cause of death, but I hadn't completed my investigation. I wanted to do a toxicology. I needed to get a hold of the radiology report. I wanted a radiologist to look at it as well at the films made, and I wanted to look at the microscopic slides. So, I put death certificate into pending status awaiting review of those materials.

Q All right. So one of the things that a medical examiner has to do is prepare what known as a

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certificate of death; is that right?
A Correct?
Q In relation to the certificate of death that you prepared for Nikita faith Lemons, there is a section noted as the cause of death on it; is that right?
A Yes.
Q In this particular case what you indicated it was pending?
A I did.
Q And not only that, but you also told the Judge that you placed a phone call to Sergeant Williams of the Wayne Police Department; is that correct?
A I did.

Q And that was probably a response to a phone call that he may have made trying to find out what your preliminary diagnosis was?
A That could be. I'm not sure.
Q To assist him in his own investigation that he was conducting, I assume; is that right?
A I would assume that too.
Q And in relation to the phone call that you made that, in fact, you informed or tell Sergeant Williams on the phone that in relation to your examination of this case that the injuries that you saw could have been intentional or they could have been accidental injuries in relation to the death of Nikita.
A That sounds like something I might say.

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Q That is, in fact, what you did say; is that right?
A I don't know.
Q You would agree that although you may not remember specifically, you would agree that you probably did say that to Sergeant Williams?
A Sure.
Q And just to kind of sum this up here, you already indicated to the Judge that you believe, ultimately, after looking at the microscopic slides that you reached this conclusion, as you've labeled it, shaken baby syndrome, you reached that conclusion in this

case?
A I did.
Q But there are based on your examination and experience in these sorts of things, there are different explanation for how that can have occurred; is that right?
A Well, I am not in doubt that it could have occurred from shaking, but I'm not always prepared as I just indicated and you quote me, to interpret the intent under and the circumstances under which that happens.
Q But you have testified that even in relation to this case that the shaking of an infant can be done naively, is that right?
A Yes.
Q Without any sort of intent or purpose to injury a child?
A Yes.

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Q Now, you did examine the scalp area of the child; is that right?
A I did.
Q There was no showing of a hemorrhage; is that correct?
A Correct.
Q There is no showing of subjacent skull fracture; is that correct?
A Correct.

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Q Does that undercut in any way the syndrome that we're talking about here, because you -- you didn't expect to find either?
A Not necessarily. In my practice I find sometimes relatively small but still present injuries in the scalp, in many cases none.
Q But isn't that something you expect to want to find in a shaken baby diagnosis?
A No. And I'm not sure why I would want to because strike the head is not an issue here, it is the shaking that does the damage?
Q Except you talked about it yourself that you want to exclude if you could a seizure as a possible cause here; is that right?
A Correct.
Q And obviously, a finding of hemorrhage or subjacent skull fracture would have helped you exclude a seizure?
A It would have helped, but the hemorrhage that I found

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inside helped me as well.
Q Also, Doctor, there was no showing of any distinct hemorrhages of the neck; is that right?
A That's correct.
Q And that's something that you'd want to find too in terms of a diagnosis of shaken baby because --

probably you can phrase it better than I can, because of the weak muscles in the neck of an infant, right?
A In some cases you may find that, in many cases not.
Q We didn't find in this case either, die you?
A We did not.
Q So we have both combination of a lack of finding of a hemorrhage, of a lack of the finding of a subjacent skull fracture, and a lack of finding of any distinct hemorrhages of the neck?
A That's correct.
Q Which again makes this case a little bit closer question, would that be fair to say?
A Not to me. The essential findings in shaking are the subdural hemorrhages, and the nerve sheet hemorrhages, and the retinal hemorrhage and a swollen brain.
Q Let's talks about the small fracture to the right shoulder that you talked about in relation to the arm of child?
A Yes.
Q Now, that's obviously something that could have been caused by CPR; is that correct?
A I don't think so. This is A bone at THE top of the

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shoulder and again would come from an external stretch upward and outward stretch of the arm. I don't know how it was sustained, but I'm not aware that CPR could

do that.
Q But it's a possibility; is that correct?
A There are a lot of possibilities.
Q And I asked you the same question at the preliminary examination. Remember we went over this area?
A Yes.
Q And I asked you a question in terms of your testimony regarding the injury of the shoulder of the child, is it is possible that it could have been done at the scene by excessive CPR in a small little infant. Answer -- page 84 --I have to say I don't know. I wouldn't want to say how the injury was sustained. I just found it. Do you remember testifying that way?
A I do now, yes.
Q That's a fair summary of what you said then and would it be fair to say that's your conclusion now; is that right?
A Correct.

MR. CRIPPS: Nothing further, Judge.

THE COURT: Mr. Woodyard.

MR. WOODYARD: Thank you, Judge.

R E D I R E C T E X A M I N A T I O N.

BY MR. WOODYARD:
Q Doctor, I just want to go over a couple points, if I

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may:

In relation to the shaking, you remember Mr. Cripps asking you about how long the child may have been shaken for, the duration of the shaking?

A Yes.

Q Is there some correlation, some direct correlation between the duration of the shaking and the nature of the injury, or a correlation between the forces applied and the nature of the injury. Could you describe that for the Judge? Do you understand what I'm asking?

A I think so. Let me give you an answer and see if I get to it:

There is a relationship, not so much to the duration, but to the forces. In other words, the injury itself is the product of forces of back and forth oscillation of the head. That can happen over a period of a few seconds, or many seconds, or a minute even or so; or as suggested, four or five minutes. But it takes only a few seconds for that damage to occur.

Q If forcefully in place?

A Yes. Excuse me. Yes. The point here is that the force has to be sufficient in order for the damage to occur?

Q Doctor, there were some questions about Nikita's

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presentation at the University of Michigan and various next negative reflect responses. I can't pronounce the words, but no gag reflect. Pupils were fixed. What does all of that suggest to you about the state of the child at that time?

A The child is comatose. The child is less than normal. As I indicated it is not reacting normally. Doesn't mean the child is dead, but the child is definitely comatose. Not reacting. Not reacting in medical terms means producing normal reaction to various stimuli.

Q Thank you, Doctor.

THE COURT: Mr. Cripps?

MR. CRIPPS: Nothing further, Judge. Thank you.

THE COURT: Doctor, I have a couple questions if I could:

Based on your examination here, the internal examination, your autopsy, the swelling and hemorrhaging that you detected. Can you offer an opinion as to whether or not this type of damage was caused by one or multiple shaking movement -- do you know what I mean -- could one shaking cause this severe damage or is this --

THE WITNESS: One motion back or forward

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would not do this. It has to be repeated. Now how many, is a matter of force, but it has to be a repeated back and forth. And that's why we call it shaking. In other words, it not a sudden jerk motion. It's not a sudden impact motion such as falling off a couch onto a floor. That sort of thing, or child falling down; or a drop of a child. It is a repeated back and forth motion. It's the oscillation that causes the skull to move first and then the softer brain slightly following it. And then on the reversal, banging, so to speak, inside.

That banging has to occur several times before that brain will, first of all, first of all swell. Secondly, bridging veins stretch enough to break to cause hemorrhage under the surface.

THE COURT: Okay. The other question that I have for you is that you described a number of symptoms that you talked about. The fact that there would be vomiting. You talked about a loss of consciousness, and breathing becoming more and more irregular, and things like that.

Can you give me some idea in terms of when these symptoms would manifest themselves in relation to the time of the injury. By that, I mean, could would you expect to see these symptoms manifest

themselves almost immediately or would a baby be shaken maybe four or five hours earlier and then four to five hours later start to manifest these symptoms.

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Can you shed any light on that for me?

THE WITNESS: I will try. The shaking causes, as I say, the swelling of the brain. The brain is the first of the reactions to occur. The stretching veins break and then they ooze because they're small. They ooze and as I found in this case only 15 millimeter. That's like three teaspoon or tablespoons of blood was found on the brain surface. But the brain was very swollen. And brain was very swollen any way earlier, because that's what gave all of these neurologic reflects and the fact that the child was unconscious.

So the first thing that happens is the swelling of the brain, and that is a reaction that occurs, starts immediately. And I indicated before, it happens rapidly. It is the manifestation of the force of the injury. A slight shaking of a child, you know, like shaking the shoulders of a child with the child standing upright in front of you without this whipping motion of the head will not cause that. It is the whipping motion of the head that causes this. And it has to be enough times to causes that to occur.

But then the swelling occurs and it occurs very rapidly. Those who have testified to this have told us almost uniformly, in fact, uniformly, that the loss of consciousness is very rapid. It's almost immediate as they understand it. And this would make sense,

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because the first and most remarkable change to this trauma is the swelling of the brain. So I would say that it would not happen as a delayed reaction of a hour or two or three, etc, it would happen within seconds of time that it actually occurred.

The vomiting is a manifestation of the loss of control, and that happens when the swelling is sufficient to cause pressure on the brain stem. That would interrupt breathing to some degree, and it could interrupt the nerve that goes to the -- the Vegus nerves specifically that go to the stomach, and would interrupt that nervous control so there would be the regurgitation of food or stomach contents. What they are.

THE COURT: Thank you.

Any follow up question from either side?

MR. CRIPPS: Yes, Your Honor.

C R O S S E X A M I N A T I O N.

BY MR. CRIPPS:

Q As to that first area that you went over with the

Judge regarding what you would expect to find in terms of examination of the skull area, that's where I'm confused, because you said that if he had a rigorous shaking back and forth, you would expect to find more blood than what you did find.

Did I understand you correctly?

A I don't think so, Mr. Cripps.

Q You said you saw three tiny drops?

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A No. No. Like three tablespoons of blood on the surface of the brain and that's from sheering of those blood vessels right in the center.
Q When you combine that with the fact that you said in this case, you didn't see any hemorrhaging?
A That is the hemorrhage that I'm talking about.
Q But I thought in this particular case you didn't find any hemorrhaging, or am I misreading your autopsy report. You did do a report of autopsy.
A Yes. Yes.
Q And in this report you did an internal examination?
A Correct.
Q And specifically you had a part of the report that says had central nervous system examination; is that correct?
A Correct.
Q And you said the scalp is reflected from a coronal

incision; is that right?
A Yes. There is neither hemorrhage nor subjacent skull fracture, correct.
Q That's in your report.
A Yes. It's after semicolon and it is in the description of the scalp. So the scalp has no hemorrhage. The scalp is reflected from a coronal incision meanings one between the ears. There is neither hemorrhage nor subjacent -- there is neither hemorrhage in the scalp. Perhaps I should have

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repeated those words, nor subjacent to the underlying structure of the scalp, nor did I find any skull fracture.

Q So you found nothing there?

A Nothing there.

Q That is something that sometimes is found in shaken baby syndrome?

A Sometimes, yes.

Q But your report goes further and then the skull was opened in the usual manner?

A Yes.

Q Then you wrote epidural hemorrhages are absent?

A Yes.

Q What's an epidural hemorrhage?

A An epidural hemorrhage is a hemorrhage between the

dura, the thick covering that is applied to the under side of the skull and the skull itself. Epidural hemorrhage typically occur in fractures when you separate the skull bone it bleeds into that space between the dura that it's stuck to. I didn't find any fracture, nor did I find any hemorrhages typically associated with fractures.

Q And typically also associated with shaken baby syndrome?

A No. Some dural hemorrhages are typically associated with shaken baby syndrome.

Q The droplets that you did find there, was that in the subdural area?

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A Yes.
Q And even then it was not an excessive amount of blood that was found?
A No. It's a signal. Fifteen milliliters. It's approximately three tablespoons as I said.
Q Which is not an excessive amount?
A Not an excessive amount, no. Nobody would bleed to death from that.
Q Wouldn't you expect to find more blood than what you did find in relation to this area where, I guess, a perfect example of shaken baby syndrome?
A Not necessarily. I often find a small amount of

blood. And I would propose to you that the reason, and I believe I have written about this, is that the brain swells, in swelling of the brain and it's rapid, the swelling of the brain serves to compress those vessels against in tact skull, thereby doing what compression of open vessels would do, it tends to starch the flow of blood?

THE COURT: Kind of like was tourniquet does for bleeding?

THE WITNESS: Yes.

THE COURT: Okay.

CONTINUING BY MR. CRIPPS:
Q Just to leave this, you made this case of shaken baby syndrome even more clearer had there been more hemorrhaging found, is it fair to say, well, in this

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particular case?
A A small amounts of subdural hemorrhage is always necessary for diagnosis. Sometime we have more than that.
Q And in this particular case in direct response to the Judge's question about the number of times an infant would have to be shaken, this certainly would not suggest an excessive amount of shaking?
A I can't say how many times it would occur.
Q Well, let's combine that with what you didn't find in

the neck though because you've already agreed there wasn't a lot injury, if any, to the neck; is that correct?
A I did not find injury in the neck which indicates to me that the head was going straight back and forth as opposed to side ways.
Q Did you find any injury to the neck at all?
A No.
Q And your report says there was no distinct hemorrhage there at all there; is that correct?
A Correct.
Q The various cartilage around the neck had no fractures or deformities at all; is that correct?
A Correct.
Q And the pharynx and Larynx were unobstructed and were in tact; is that right?
A Correct.
Q Any of those in front of the neck in any of those

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areas that I mentioned?
A Yes. The larynx is you can feel the atoms apple which is the front part of it. You can feel the cartilaginous rings, that is the air way. There was no problem.
Q There was no problem and no injury there at all that you can see?

A No.
Q No. And the major blood vessels of the neck were also normal upon your examination; is that correct?
A Yes.
Q So there is nothing in terms of looking at the neck that would suggest this syndrome at all is there from looking at the neck?
A Correct.
Q And again, it's something that you would hope to find in terms of a showing of shaken baby syndrome?
A No. I often don't find anything. Finding something in the neck is not common, but it is found in some cases. That's why I look.
Q It certainly would be helpful in a diagnosis of shaken baby syndrome?
A Depending on where the injury was and what it was.
Q And it would help in terms of answering the question like Judge Kenny asked about how many times, hypothetically, potentially, a child could have been shaken?

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A Again, it's the number of times, but it might help a question, help answer a question, what direction was the flailing of the head, was it directly on center, or perhaps off center, which is when you would expect to have little more of that.

Q You have excluded in this case for sure it sounds like if there was any shaking of the baby from side to side?
A Yes.
Q Lastly, in terms of -- this is a hypothetical question, but let's say somebody inartfully did CPR after a baby had some other complication like a seizure, could that have, now that we know that there is back and forth. If the baby were turned over and moved around when someone is pat and given excessive CPR to chest or back, could that have caused these injuries here?
A I don't think so. It's the oscillation that causes the injury. Admittedly, you've said inartfully.
Q Yes?
A So it would depend on was there oscillation, was part of the CPR unfortunately, a shaking of the child to see if that might elicit some response just to propose another -- then I would say I couldn't exclude that possibility.
Q Thank you.

MR. CRIPPS: Nothing further, Judge.

THE COURT: Mr. Woodyard, anything else?

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MR. WOODYARD: No, Judge.
THE COURT: All right. Thank you,

Doctor.
MR. WOODYARD: May the Doctor be excused.
THE COURT: Yes. Your Honor.
THE COURT: Mr. Cripps, did you want to take a moment to take quick call.
(Off the record.)
(Back on the record.)
THE CLERK: Back on the record on Milton Lemons, File Number, 06-4818.
Do you have another witness, Mr. Woodyard?
MR. WOODYARD: People would call John Williams to the stand.
(The witness is sworn.)

J O H N W I L L I A M S,

Was called to the stand at the instance of the People after first being duly sworn, testified as follows:

D I R E C T E X A M I N A T I O N

BY MR. WOODYARD:

Q Good morning to you, sir.
A Good morning.
Q How are you?
A Very good.
Q Would you state your name for the record please?
A John Williams.
Q And where do you work?

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A City of Wayne Police Department.
Q In what capacity, sir?
A I'm the Chief.
Q I'd like to direct your attention to the month of October of 2005, and ask what was your assignment, were you working with the Wayne Police Department then?
A Yes, I was.
Q In what capacity?
A Detective Sergeant.
Q And in that capacity then do you recall working on a case involving deceased infant named Nikita Faith Lemons?
A I do.
Q Did you recall interviewing somebody in relation to that death?
A Yes, I do.
Q Who is that person?
A Mr. Lemons.
Q Did you see Mr. Lemons in Court?
A I do.
Q Would you point to him please?
A He's wearing a tan color shirt and khaki pants.
Q Thank you.
For the record, Judge, the witness has

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identified the defendant?

THE COURT: All right.

CONTINUING BY MR. WOODYARD:

Q Chief Williams, will you please describe to the Court how you first became involved in this case?

A I believe the day after Nikita had passed away, I had received some information. I believe I was just in passing, I was down at chief level, and I had heard about it and because I was an investigator, we had not heard anything about it in the Investigation Bureau. I began following up to try and find out what had happened.

Q And what would that following up, what form would that have taken, what kind of things do you remember doing?

A Initially, I wanted to find out what the cause of death was, so I contacted Washtenaw County Medical Examiners Officer to speak with whoever conducted an autopsy if one was done.

Q Why did you call there?

A Because I knew that at that time Nikita had been Med Flighted out to the University of Michigan Hospital in Ann Arbor. And at that time, it was my understanding that anything that would have been done there as far as an autopsy would have been conducted by Washtenaw?

Q Were you able to speak to somebody at the Washtenaw

County Medical Examiner's Office?

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A I believe I spoke with the secretary there.
Q Were you given some information that allowed you to go forward with your work?
A I asked if an autopsy had been done, and they indicated that -- this person I spoke to said, yes, and I ask if they could fax a copy of the results to me.
Q And did you actually get something?
A Yes.
Q Were you able to read that? I mean, you were able to read it, were you able to understand it.
A No. I was able to read it, I wasn't able to understand it.
Q What did you do then?
A I called the Washtenaw County Medical Examiner Office to speak with Doctor Casin. He was the doctor who performed the autopsy.
Q Were you able to speak with --
A Not originally, no.
Q What did you do then?
A Well, I still didn't know what the cause of death was. This was toward the end of my shift. I get off at 5 o'clock, and all this information started coming in around 4:30 that afternoon. I didn't want to home

until I had some sort of concrete answer one way or another whether it was an accident, natural, or was it homicide.

So I contacted Wayne County Medical

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Examiner's Office and asked to speak with a medical examiner at that office.

Q Did you speak to someone who identified themselves as a medical examiner?

A I did. I do not know their name, no.

Q What was the nature of that conversation, if you recall?

A I had the -- actually what I had was a pre-post mortem report from Dr. Casin's office, and I provided them with the terms that Dr. Casin had written down and wanted to know what they would interpret those terms as being.

Q Okay. And did that information then cause you to continue your investigation?

A Yes.

Q What was the next step in your investigation?

A I went to Officer Emrick who had responded during the initial call for rescue for the baby who wasn't breathing. He responded to that scene. I went to him because he was working that night and asked him to do some follow up work and to generate a report because

one wasn't written.

Q Why wasn't one written, if you know?

A After the fact, it was because they had a baby that wasn't breathing who was transported to the hospital and they just didn't feel one was necessary at that time. I think it was being ni eve.

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Q So when this additional information was learned you directed Officer Em irk to do some follow up and draft a report?
A Correct.
Q What happen then?
A I went home for the evening,and subsequently later that evening Officer Emrick contacted me at my home --

MR. CRIPPS: October as to any hearsay, Your Honor.

THE COURT: Response?

MR. WOODYARD: I'm not sure that that was hearsay, but I can move right on.

THE COURT: It does sound to me like it hearsay, but I'll take the answer not for the truth of what's contained in what Officer Emrick had said, but only has it gives some explanation as to what the Chief might have done as a result of that conversation.

Go ahead. You can answer that question.

CONTINUING BY MR. WOODYARD:
A Officer Emrick informed me that he spoke with the mother-in-law, I believe, of Mr. Lemons and a neighbor. Through his conversations, he informed me that the neighbor had originally gone to the house because Mr. Lemons had gone over there, he handed her the baby and she told him to call 911. He then called his mother-in-law or his wife, I'm not sure. The neighbor told him again to call 911. Again, he called

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either his mother, mother-in-law, or his wife, and finally he took the baby back from the neighbor and she ended up having to make the call to 911.

Q And was this information somehow significant in the course of your investigation?

A Yes, it was.

Q What did it cause you to do?

A Well, in conjunction with some information that I found out from Dr. Casin as to the result of his autopsy, and the fact that the defendant was reluctant to call 911, I advised Officer Emrick that when Mr. Lemons returned home to arrest him on probably cause.

Q Do you know whether he was, in fact, arrested?

A He was.

Q Did you have an opportunity after that to speak with Mr. Lemons?

A I did, yes.

Q Do you remember when that was?

A It would have been the following morning, October 12th, I believe?

Q Do you remember what time, roughly?

A Approximately 11:30 in the morning.

Q Do you remember actually seeing Mr. Lemons for the very first time?

A I don't know if I remember -- I remember being in the interview room with him, but I don't remember the specific meeting.

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Q All right. You said you remember being in the interview room with him. He was, in fact, in custody at that point in time?
A Yes.
Q What I'd like to do is --
MR. WOODYARD: Your Honor, this has been marked as People's Proposed Exhibit Number Eight. I've shown it to counsel.
CONTINUING BY MR. WOODYARD:
Q Chief Williams, I have handed you that document. It consist of several pages. Do you recognize that paper?
A Yes, I do.
Q Why do you recognize it? Have you seen it before?

A Yes. This is the Miranda Rights Notification Form that I used prior to my interview with Mr. Lemons and a hand-written statement by Mr. Lemons and an additional question and answer statement that I took from Mr. Lemons.
Q Let's talks about the Miranda Rights Notification, if you will. What is that?
A This is a form that is provided in our police department. Prior to interviewing anyone we read them their rights. We go through each right, ask them if they understand them. If they do, they initial the right at they are being read, and they also sign the form acknowledging that they understood their rights.
Q Is this the actual form that you'd use?

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A Yes, it is.
Q How do you recognize it as being the actual form?
A It had my signature on it and it's also in the remark section and the bottom portion where it's the date and place. It's all in my writing.
Q Do you remember filling that out?
A Yes.
Q The rights that you're referring to they're numbered one, two, three, four, five, is that correct, at top of the page?
A That's correct.

Q Next to each of those numbers are initials. What are those initials there for?
A Again, as each right was read, Mr. Lemons initialed them. If he understood them, he acknowledged that by initialing each right as we went.
Q Did you offer him that direction?
A Yes.
Q And in fact, there's another signature on this form also, is there not?
A That's correct.
Q And whose signature is that?
A Milton L. Lemons, Sr.
Q Did you watch Mr. Lemons put this signature on this paper?
A Yes, I did.
Q Did he do that for any particular reason?

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A Once again, to acknowledge that he understood the rights.
Q In addition to the five numbered rights, there is also two sentenced paragraph there; is that correct, would you read that please?
A Yes.
I understand these are my rights under the law. I have not been threaten or promised anything.
Q And there are some initials there?

A Mr. Lemons also initial that, those lines.
Q You indicated remarks, what those remarked? What are the remarks?
A Prior to reading him his rights, I asked him how far he had gone through school, just to get an idea if he could read or interpret things. And he acknowledged that he had completed two years of college.
And I also had Mr. Lemons read the first right out loud just so I knew that he could read. So I wrote that down in the remark section that he read number one out loud.
Q And then what follows in People's Proposed Exhibit Number Eight, there are five pages there; is that correct?
A Yes.
Q What are those five pages?
A The first page is a hand-written statement by Mr. Lemons himself. The following four pages are a question/ answer form of the statement that I wrote

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down the questions in a Q and A form, put his answer down.

Q Do you recognize each of those five pages as the actual pages that were produced during that interview section?

A Yes.

MR. WOODYARD: Judge, I move to admit People's Number Eight.

MR. CRIPPS: No objection, Your Honor.

THE COURT: All right. Proposed Exhibit Number Eight will be received.

CONTINUING BY MR. WOODYARD:

Q What I'd like you to do Chief Williams, if you -- how did Mr. Lemons come about writing down the statement?

A Well, initially, after I had read him his rights, I asked him what had happened referring to with his daughter. And he provided -- initially, began giving me a verbal statement. He informed me that about 2:30 his wife had gone to work and shortly right around four o'clock the victim was sleeping, and he heard her fussing at that time.

At around 5:30 I believe he said he got her out of bed or fed her a bottle, burped her and around 10 to 6, I think he said that he laid her back down to go to bed. And shortly after that, he heard his son one and half year old son banging on the wall. And the son also sleeps in the same room as the victim.

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So he went in there -- and at that time, that the victim was having trouble breathing, I believe, were his terms. And at that point, he went to his neighbor's. Asked him neighbor to call 911.

Went back in and started doing CPR on the baby. At point, he told me he didn't know if he shook her to hard when he was trying to wake her up.

Q What happened then during the course of your interview?

A At that point after what is he had told me, I confronted him with the fact that I had the results of the autopsy and the autopsy showed that Nikita had died as a result of being shaken. Something along those lines.

And at that point, he got very quiet and he provided me with a different version of what had happened.

MR. CRIPPS: Objection to his speculation, Your Honor.

THE COURT: I'll take the answer.

Overrule.

CONTINUING BY MR. WOODYARD:

A He provided me with the version that is now in his handwriting, and it page one of five.

In the upper left hand corner of the statement is my writing. It say Milton Lee Lemons, Sr., statement, October 2th, 2005, at 11:28 a.m., Case Number C05-22318. Upper right hand corner is also in

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my in my writing one of five.

In Mr. Lemons' writing: On October 10th, 2005, my wife left for work at 2:30 p.m., which I dreaded because I didn't like to be left alone with her. At four p.m., I fed my son and laid him down for a nap. About 4:40 p.m., Nikita was in her swing fussing at this time. About 5:34 p.m., I fed her a bottle and laid her down. At about 6:20, my son started fussing and then she started crying also. I went into the room to get him out, but picked her up instead. She wouldn't stop crying and he was still crying too. So I shook her three or four times to get her to be quiet. She stopped crying and started spitting up formula, but was unresponsive.

I ran next door with her to the neighbors. She took her from me and called -- and I called 911. Then I took her and was still trying to do CPR. While the neighbors gave them the address, I called my mother-in-law and my wife from work. My mother-in-law got there first and started CPR. Then the ambulance got there and then my wife. They took her to the hospital.

And it's signed Milton Lemons, Sr., dated object 12, 2005.

Q You said Mr. Lemons had in fact, himself written that document?

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A Yes, sir.
Q What did you do after that?
A I went right into the question/answer format of the statement.
Q Why did you that?
A I just wanted to clarify and ask him any additional questions that I may have had at the time.
Q And you reduced that question and answer to writing?
A I did.
Q And is that then what is contained on pages two through five of People Number Eight?
A That's correct.
Q Then Chief Williams, what I would like you to do is read through the statement, question and answer portion, if you will please.
A Okay. In the upper right hand corner it says, two of five: Question, what is your full name. Answer, Milton Lee Lemons, senior. Question, are you currently under the influence of alcohol and/or drugs? Answer, no. Question, Did Sergeant Williams read you your rights? Answer, yes. Question, did you understand your rights? Answer, yes.

Question, did you provide a written statement to Sergeant Williams. Answer, yes? Question, is that statement the truth. Answer, yes?

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Question, on October 10, 2005, at approximately 7:30 p.m. where were you at? Answer, I was still in my apartment. Question, had you been watching your children that evening? Answer, yes. Question, what are your childrens' name? Answer, Milton Lee Lemons, Jr., and Nikita Faith Lemons. Question, was anyone else home with you when you were watching your children? Answer, no. Question, did something happen while you were watching them? Answer, yes. Question, what happened? Answer, I picked her up because she was crying. I Patted her. I held her in front of me and said be quiet. I shook her three or four times and she stopped.

Question, on a scale of one to ten, ten being shaking her very hard, how hard did you shake Nikita? Answer, seven. Question, what was Nikita's head doing as you shook her. Answer, back and forth. I went blank. I just wanted her to stop crying. Question, how old is Nikita. Answer, two and a half months. Question, when you shook Nikita and she stopped crying, was she breathing when you stop shaking her. Answer, she was breathing shallow. I checked her and she was breathing, and her breathing started to get shallow.

Question, how did you feel when you were

shaking her? Answer, very angry, depressed. It was a combination of things. Question, what did you think

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of Nikita? Answer, I loved her, but he cried a lot. Question, how do you feel about being left alone with her? Answer, at first it didn't bother me, but as time when by, I started getting nervous. Question, why were you nervous. Answer, I just didn't want to do something wrong. I use to pinch my son when he cried? Question, did you intend to kill Nikita. Answer, no, not at all. Question, what did you intend to do when you shook her? Answer, to quiet her up.

I'm sorry. I forgot to tell you on each page there is page three of five. Four of five, and this last one is page five of five that I've written in the upper right hand corners.

"This is on page five of five: Question, do you know shaking an infant can be fatal. Answer, yes. I've seen it on TV and heard about it. And you're statement you said after you shook her, she was unresponsive. What did you mean. Answer, she was not saying anything with her head to the side and milk was coming out of her mouth. Question, why didn't you tell anyone what happened? Answer, I didn't want anyone to be disappointed in me. Question, are these statements the truth. Answer, yes? Question, were

you threaten or promised anything to make these statements. Answer, no? Question, are you sorry for what happened. Answer, yes.

In my writing at the bottom it says interview ended at 12:43 p.m. with my signature and

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Mr. Lemons' signature is in the lower right hand corner dated October 12th, 2005.

Q Chief, after each and every answer, this question and answer form, pages 2, 3, 4, and 5, that's written in whose handwriting?

A It's all in my writing except for the initials at the end of each answer. Those are Mr. Lemons' initials.

Q Why did Mr. Lemons put his initials after each answer?

A After I was done with the question and answer form, we went through each question to make sure those were his answers. He acknowledged that those were his answers by putting his initials after the end of each answer.

Q Was Mr. Lemons given an opportunity to change or correct or amend an answer?

A Again, I asked him if those were his answers. If he wanted to do change it, he would have had the opportunity to.

Q So at this point, Chief Williams, you told the Judge about your conversation and interview with Mr. Lemons. During the course of that interview were any other

things said that did not become part of that question and answer form?

A Throughout the course of the interview, there was a lot of just talking back and forth. He informed me that his relationship with his wife -

MR. CRIPPS: Your Honor, I'm going to object to this area. I have an objection as to

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relevancy in this area.

MR. WOODYARD: Judge, I think it's our burden to show the defendant's state of mind, and I think what the Chief will say will directly illustrate the defendant's state of mind. So I think for that reason, it is relevant.

MR. CRIPPS: I just note my objection. I don't think this is relevant for the Court's consideration.

THE COURT: I'm not sure that the state of mind is - well - maybe his intent obviously is relevant, but the state of mind at the time of the incident is relevant, but I'll take the answer subject to a motion to strike.

Go ahead. You can answer the question.

CONTINUING BY MR. WOODYARD:

A He informed me that his relationship with his wife was more sexual than an actual relationship. He told me

that he - when his wife first got pregnant, he resented the fact that she was pregnant with their son -- he resented their son. I'm sorry, when she was pregnant with him. He discussed being afraid to be left alone because he was afraid he was going to do something bad. He also said he didn't want to be a father. He said he originally with his son, he hated it when his son cried, but he's got a better relationship with him now.

And he also hated -- he liked being around

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the victim when she wasn't crying, but he hated to be around her when she was crying.

THE COURT: I'll allow that portion to stand. I'm to strike the rest. Okay.

MR. WOODYARD: The very last?

THE COURT: The last part about not wanting to be around the victim when the victim was crying, but did like being around her when he was not crying. But the other portions I'll strike.

CONTINUING BY MR. WOODYARD:

Q Now just, Chief Williams just in terms of how you went about doing this, would you tell the Judge, please, did you take handwritten notes while you were conducting this interview, was it audio taped, video taped?

A The only thing that was in writing is what's on the statements and the question and answer form, were either in his writing or in mine. And, no, we don't record our interviews, and I didn't take any notes during the interview.

Q So the last thing you talked about is his expression concerning his feelings toward Nikita. That's in your report is that correct?

A That's correct.

Q So how did it end up in your report?

A After we finished the interview, I put him back in his jail cell then I went directly back to my desk and

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started typing what we had discussed and his statement.

Q And you did that from your memory?

A That's correct.

MR. WOODYARD: Judge, may I have just one moment?

THE COURT: Sure.

MR. WOODYARD: I have no further questions at this witness at the time.

THE COURT: Mr. Cripps, thank you, Your Honor.

C R O S S E X A M I N A T I O N

BY MR. CRIPPS:

Q Chief Williams, I believe you testified that your motivation for taking my client into custody was revolved around two different issues in your mind; is that right?

A That's correct.

Q One had to do with conversations with Dr. Casin?

A Correct.

Q And the other one had to do with this business about 911 calls; is that right?

A That's correct.

Q First of all, in relation to Dr. Casin, he sent you a pre post-mortem report; is that right?

A Correct.

Q And there was some confusion on your part as to what the report actual said?

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A That's correct.
Q But you eventually did have a phone calling with Dr. Casin; is that correct?
A I did.
Q And the Doctor made it clear to you that the cause of death could have been intentional; is that right?
A That's right.
Q But he also told you it could have been accidental?
A That's correct.
Q That was very clear in terms of what he said to you on

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the^ on phone; is that fair?
A That's correct.
Q Prior -- are you saying that prior to that you had considered the death of Nikita Lemons to be a natural cause of death?
A I didn't know. This all happened like I said at the end of my shift.
Q But it was going through your mind that this could be sudden infant death syndrome or natural cause of death?
A I wanted to find out what it was. That was possibly one of the things, sure.
Q Now, in addition to that, you said that you wanted Officer Emrick to follow up, I guess, interviewing everyone about Mr. Lemons; is that correct?
A I wanted him, I believe, I told him to talk to the parents as well and to find out basically what had

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happened, but I don't think they were there when he went out there.

Q And you had a concern about Mr. Lemons as to who he was calling or who he wasn't calling right after the incident occurred it sounds like, is that correct?

A Yes.

Q In other words, whether there was plea for assistance or not in term of what was happening?

A I'm sorry. I don't understand.

Q You said that you were concerned about a reluctance on his on his part to call 911, the way you phrased it; is that correct?

A That's correct.

Q In the incident we're talking about was there a plea on the part of Mr. Lemons for assistance in relation two Nikita or not. That's what we're talking about; is that correct?

A I don't know. I don't know what you're asking.

Q Using your common sense, that's really why people call 911 is to get assistance in relation to an emergency, right?

A Yes.

Q Or am I wrong about that?

A No. You're right.

Q However, you were aware of the fact that Mr. Lemons initially called Lori Lemons his wife as soon as he saw something may have been a mist; is that correct?

A I was concerned after a neighbor told him to call 911

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and that was his response.
Q I'm not there yet.
You were aware by looking at Officer Emrick's report and your own investigative report that the first thing that Mr. Lemons did was call his wife

Lori Lemons at work when he saw something wrong; is that right?
A I am aware of that by speaking with Officer Emrick and reviewing the reports, yes.
Q And that's what is you asked Officer Emrick to do was look at that report; is that correct, to interview Lori Lemons to see, in fact, if my client called her or not?
A Well, I asked him to go out there and talk with him to find out what was going on.
Q And you found out what happened was the first thing he did was to call his wife, right?
A Again, I don't know if it was his wife of his mother-in-law, but that was after the neighbor was telling him to call 911.
Q Did you prepare a report in this case?
A I did supplements to the report, yes.
Q And you also prepared an investigator's report; is that correct?
A Yes, that's correct.
Q And you prepared a summary of what Lori Lemons would testify to; is that correct?

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A Yes.
Q And in the summary, you put in there that about 7 o'clock that Mr. Milton Lemons called Lori Lemons at

work and told her that the complainant was not breathing; is that right?
A Okay.
Q That's what your report says, at least, that you signed off on; is that correct?
A I am not doubting that.
Q That was based on the information that you got from Officer Emrick, you didn't talk to Lori Lemons; is that correct?
A Well, by the time I wrote that investigators report, I had talked to Lori Lemons, yes.
Q So you confirmed Officer Emerick's report to you that Lori Lemons received a phone call, that's all I'm trying to establish?
A Yes.
Q Now, in addition to that, your report indicates that Mr. Milton Lemons had gone next door to a neighbor by name of the Renae Zeeb; is that correct?
A Yes.
Q And told her that the complainant was not breathing and in respond to that, she came over to the house to give assistance to you; is that right?
A I believe that's correct.
Q So at this time I believe we have at least two pleas for help by Mr. Lemons, one to his wife when he told

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her to come home, correct?
A I don't know that he called prior to Ms. Zeeb coming over there.
Q Around 7 o'clock right around the same time according to your own report; is that correct?
A I guess my -- I had no knowledge of whether he called his wife prior to Mrs. Zeeb coming over there.
Q But your report indicates around 7 o'clock, it would be roughly about the same time that he called his wife?
A Everything was right around that time, yes.
Q So, you agree with that, you had knowledge of that; is that correct?
A I had knowledge of what?
Q That Mr. Lemons not only called his wife to come home but he also went next door to Mrs. Zeeb to get her assistance?
A Yes, but I don't want to say that it was done prior to going to Mrs. Zeeb.
Q But you would agree roughly around the same time?
A Yes.
Q In addition to long after that, Mr. Milton Lemons then called his mother-in-law, Mr. Pamela Vanmeters (ph); is that correct?
A Again, I don't know if the order was different or not.

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It could have been the first mother-in-law then the wife. I'm not sure exactly what order it was but, yes.

Q And he asked her to come over and explain -- to give help in relation to the situation; is that correct?

A I don't know what their conversation was, but I know that she came over.

Q And were you aware and this is all -- you're aware of all of this information before you had Mr. Lemons arrested; is that correct?

A Again, some of that information was provided to me like the statement from Lori Lemons. I spoke with her after his arrest.

Q I didn't ask you when you spoke to her, I asked you when you received --

MR. WOODYARD: Judge -- when he spoke to her.

MR. CRIPPS: Then I will rephrased it then.

THE COURT: All right. Rephrased it.

CONTINUING BY MR. CRIPPS:

Q I asked you what information you received from your police officers at your direction was prior to the time that you had Mr. Milton Lemons arrested; is that right?

A From Officer Emrick, yes.

Q And Officer Emrick told you -- we've established --

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told you about a phone call to Lori Lemons and the visit by my client next door to get assistance with Renae Zeeb?

A Yes.

Q And in addition, Officer Emrick told you about the phone call my client made to Mr. Vanmeter; is that correct?

A Yes.

Q In response to the phone call that Mr. Lemons had made, officer Emrick informed you that Mr. Vanmeter had rushed over to the house to help Milton Lemons; is that right, based on what Officer Emrick told you?

A I know that she came over. I'm not sure if that's what Officer Emrick told me, but I know that she came over.

Q You would agree that Officer Emrick's report said Vanmeter stated she rushed over to the house to help Milton Lemons?

A I wouldn't disagree with her.

Q And you would agree that Officer Emrick told you that Ms. Vanmeter when she arrived -- Ms. Vanmeter, excuse me, when she arrived stated that she assisted doing CPR on Nikita Lemons until recuse arrived?

A Yes.

Q Now, you would agree that the report also indicates that Renae Zeeb actually called 911; is that correct?

A That's correct.

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Q And were you aware of the fact that Mr. Lemons got on the phone during the 911 call to receive information in terms of assisting him, in assisting his child at that time?
A I want to say I believe that happened, but I think it did, yes.
Q Based on all that, on those four different things that we just brought out, you're saying that based on that there was a reluctance, in your opinion, a reluctance on Mr. Lemon's part to seek assistance that lead you to arrest him?
A It was in combination of him after his neighbors telling them repeatedly to call 911 and he decided to call two different people before 911, and the fact that I had a medical examiner telling me that this was a result of a baby being shaken.
Q Is that right, I thought he told you that it could have been accidental. I thought you just told us that?
A He told me it could have been intentional or accidental.
Q Or it could have been intentional, and it was a result

of a baby being shaken? Are you sure that Dr. Casin actually said it could be the result of the baby being shaken on that phone call?
A I believe he told me shaken baby. He said subdural hematoma I believe it was, and his words were shaken baby, yes.

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Q Isn't it, in fact, what he told you was that he was uncertain as to the cause of death and that it was pending in his opinion regarding further examination in this case on his part?
A No.
Q He didn't tell you that?
A No. He told me that it was a result of a subdural hematoma, and in layman's terms that would be shaken baby, and those are the results of his preliminary post mortem report.
Q And you remember testifying before under oath regarding this phone call from Dr. Casin when you testified on April 20th, 2006 before Judge Lori Matte (ph) at the 29th District Court?
A Yes.
Q And do you remember on Page 42, you were asked this question and giving this answer: Question, and what did you say to Dr. Casin. Answer, I believe I asked him about this findings and what they meant.

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Question, all right. So you asked the Doctor what his findings were, and what they meant; is that correct. Answer, correct. Question and you're obviously trying to make a determination as to whether somebody, whether there is probable cause to arrest somebody or not at this juncture, is that -- answer, yeah. Well, to see if he had an accident -- excuse me. I will read that again -- well, to see if we had an accident,

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natural death, you know, anything along those lines.

And Doctor Casin informed you that the death here could have been accidental, is that correct. Answer, or intentional. He said both. Question, so it could have been intentional, but it could have been accidental is that -- answer, that's correct?

Question, that was based on all of the information you had given him up to that point, is that correct. Answer, no, it was based on his findings."

Is that what you testified to under oath as to what your conversation with Casin?

A Yes.

MR. CRIPPS: Nothing further, Your Honor.

THE COURT: Mr. Woodyard.

MR. WOODYARD: Just one moment.

THE COURT: Yes.

MR. WOODYARD: We have nothing further, Your Honor.

THE COURT: Thank you, Chief. May the Chief be excused?

MR. CRIPPS: Yes, Your Honor.

MR. WOODYARD: Judge, I think the only thing remaining pending matter is as it relates to People's Proposed Exhibit Number Six.

THE COURT: All right.

MR. WOODYARD: May I approach?

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DIRECT EXAMINATION

BY MR. KRAMER:

Q. Doctor, could you please state and spell your name for the record?

A. John Gilbert Galaznik.

Q. I'm sorry. Could you please repeat that one more time?

A. John Gilbert Galaznik. I need to put this on mute. I'm getting a background.

John Gilbert Galaznik, G-A-L-A-Z-N-I-K.

Q. Thank you, Doctor.

Good morning. Could you please tell the Court your occupation?

A. I'm a physician.

Q. Are you a board certified pediatrician?

A. Yes, I am.

Q. And what state are you certified?

A. What state? I'm licensed to practice in Alabama, Board Certification is national.

MS. PLUMMER: Excuse me, your Honor. He needs to be sworn as a witness.

THE COURT: I think that is probably true.

MR. KRAMER: Doctor, we're going to swear you in at this time.

THE COURT: Doctor, would you raise your right hand for me if you would please.

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JOHN GILBERT GALAZNIK,

called as a witness by the Defendant, having first been duly sworn by the Court Clerk, was examined and testified upon his oath as follows:

DIRECT EXAMINATION (CONTINUED)

BY MR. KRAMER:

Q. Thank you, Doctor.

Can you please, can we start at the beginning here? Are you a board certified pediatrician?

A. Yes, I am.

Q. And in which states are you certified?

A. Certification is national. I'm licensed to practice medicine in Alabama.

Q. Doctor, can you please briefly summarize your educational background?

A. Yes. I graduated from the University of Texas in Austin in 1970 with a degree in zoology. I have been attending medical school at the University of Texas medical branch in Galveston from 1970 through 1974. The last year of my medical school was entirely pediatrics.

I then did a straight pediatric residency at the University of Utah in Salt Lake. That was all primary pediatrics.

And at that point in time to become Board

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Certified in pediatrics we took part one of the board certification exam during our residency, which I took and passed. Then we were required to practice for two years before taking part two of our board certification exam.

So in 1977 I finishing my residency. I volunteered for service in the United States Air Force, and from 1977 until 1980 I was one of the two basically of Einstein Air Force based in Germany.

Did the pediatric practice, diaper changing, immunization, giving cold, flue, respiratory infection type of pediatric practice. At that clinic we had on-site X-ray and on-site lab, and so all X-rays that were done we would review before they would be over read by a radiologist.

And in 1979 I took and passed part two of my board certification exam. So, I am board certified in pediatrics.

After 1990 the new pediatric pediatricians have been required to recertify, but the older guys who were board certified prior to that were grandfathered. So, I am board certified in pediatrics, and it is current.

Q. Doctor, after you left the Air Force in 1980, what did you do for work?

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A. After 1980?
Q. Yes. After you left the Air Force.
A. Yes. I wanted to go into the area of college student health, which we consider older age pediatrics. So I applied to every university in the southern half of the United States, and in 1980 I took a job at the University of Alabama in Tuscaloosa where I have remained since that point in time.

I'm not a professor. I do not teach. We provide care to active, vigorous college students. We have on-site lab and on-site X-ray, and I still work there.

Over that time frame I have had various positions from Acting Director, Chief of Medical Services and Medical Director. And, however, in 2001 when I had 25 years of credible service with the university, I elected to retire from full-time employment, and I now work there on a part-time contract basis during their big semesters covering weekend clinics and filling in when people are sick and out.

I work four days, the last four days, and I work again tomorrow. So I still practice medicine, but my clinical practice is hands-on with the area of the 18 to 22 year old crowd today.

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Q. Doctor, what is the American Academy of Pediatrics?
A. American Academy of Pediatrics is the national organization of pediatricians. I think there is maybe 60,000 or so pediatricians in the country, and there are national organizations like the American Medical Association. It is for pediatricians. And I'm a member of the American Academy of Pediatrics, and I'm also a member of the subsection on child abuse and neglect.

The academy is divided into various subsections complaints like nutrition, breast feeding to infectious disease to all kinds of subgroups of interest, and there is a section on child abuse and neglect.

Q. Doctor, how did you come to be interested and involved in the field of physical injury of small children, infants?
A. In 1999 I had a case involving the death of a child. After that experience I decided it interested me, and I might have something to offer. So that's why in 2001 when I had 25 years of credible service with the university, I retired from full-time employment so I could draw retirement income to support my development of my interest in the area of physical injury of infants and small children.

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I had done this by reading. No one can read everything. I tried to read the most relevant and keep up with that I could find. I had attended meetings. I started interacting with colleagues involved in this area and gradually got into consulting on cases of alleged physical injury of infants and small children.

And gradually from there I started to testify when I was called upon if I might have something to offer to the courts.

I would point out that the area of child abuse is very broad, and I'm only interested in the specific area of physical, of allegations of physical injury of infants and small children, which actually is --

Q. Sorry, Doctor. We lost you a little bit there.

Can you go back? The last thing we heard you were explaining that physical injuries of small children accounts for a small amount of general pediatrics?

A. Yes. The estimation of abusive head trauma cases is maybe a thousand to 1200 cases a year in this country, so that a busy pediatrician could have a long clinical practice and never see a case.

A child abuse pediatrician may only have a couple of cases of this kind of presentations per year,

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but it's the kind of case I am interested in.

I do not engage in the evaluation of sexual abuse, neglect, emotional neglect or foster care issues, which comprise of the bulk of what most child abuse pediatricians are engaged in.

I'm most interested and focused on cases involving allegations of physical injury of infants and small children, almost usually either head injury or multiple fracture cases in infants generally less than a year of age, some two year olds, and an occasional three year old will be a case I might look at.

Q. Doctor, you mentioned that you keep up with the literature in this area. Does that include literature involving cases of alleged abuse of small children and including SBS cases?

A. Yes. The shaken baby literature, abusive head trauma literature I do. I can't read everything, of course, but I think I tried to familiarize myself with the most relevant literature in the ever evolving literature in this area. As you know, it is --

Q. Sorry, Doctor.

THE COURT: Hold on. Let him finish his answer.

MR. KRAMER: Please finish your answer.

WITNESS GALAZNIK: That is an area of change,

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and it's an area of a great deal of controversy, and so, but I try to keep up with the relevant clinical and biomechanical literature relevant to this area.

BY MR. KRAMER:

Q. Can you please explain what biomechanics is?

A. Biomechanics is actually the specialty which actually, it's primary focus is the investigation and study of mechanical forces potential to injure living tissue.

It applies the principles of engineering into the study of forces acting on living tissue. It actually is the specialty which is probably in my opinion most relevant to many of the issues in these cases.

You would think that the pediatrician might be the most relevant from a clinical background, but remember the doctor in the hospital does not see the injury, does not see the event. He simply gets some history, which may or may not be totally accurate, and he has no capacity to really investigate the forces involved in an injury.

So that a doctor's assessment of what happened and its effect is largely dependent on the history that comes in with the child and is subjective in that he is not actually investigating the forces that of let's say a two-foot fall or three-foot fall or

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an impact to the head or forces on the chest that might be necessary to break a rib or these kinds of things. He's not in a position to do that kind of research.

Q. Doctor, in addition to keeping up with the literature in this field, have you given presentations on subject matters that are relevant in this case?

A. Yes, I have.

Q. Can you please tell us some of the areas you have presented on?

A. I presented on the area of --

Q. Doctor, you cut out again. I think I'm not -- we got you back now. You were talking about which areas you presented in.

A. Yes, I'm going to hold it up like this. Hope this gets me closer to you. This is the microphone.

I have presented What Stops Breathing, potential for choking event to proceed to death, and unfolding or findings after that.

I've presented in the area of hemorrhaging.

I've presented in the area of The Evolution of the Position Statements from the American Academy of Pediatrics between 2001 and 2010, and in the area of abusive head trauma.

Like I said, it's an area of significant change and controversy over that period of time.

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Q. Doctor, what are position statements issued by the AAP?
A. Position statements are not new research. They are a review, a compilation, a statement of the current thinking on a specific question at a given point in time. They come out of either policy statements or clinical statements or technical reports, and they are specifically to serve as guidance for pediatricians to attempt to get some understanding of the current fault.

They are not absolute and forever built into the whole system, is that starting three years after publication they are supposed to start being reassessed in light of emerging literature. And at five years they are either to be renewed, retired, revised, or they will automatically expire and need to be redone.

And every section of the American Academy of Pediatrics will put out various position statements, and the Committee on Child Abuse and Neglect has put out a series of position statements outlining the current thought from the Academy in this area.

But remember just because the Academy puts it out does not mean it has to be universally accepted. But if you're going to challenge it, you need to have some quality evidence-based literature to base your opinion on.

And remember that what we thought in 2001 is

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not necessarily what we think in 2010.

If you have cancer, you don't want to be treated by 1990 standards, you want to be treated by 2017 standards. So that it's important to recognize how our thoughts in this area and our understanding of the issues in this area are evolving.

Q. Doctor, you mentioned the concept of evidence-based medicine. Can you please explain what that is?

A. Evidence-based medicine is a system which tries to look at the quality of research that is published, and some research has high quality and others have lower degrees of quality.

Prospective well-designed studies with proper controlled groups and well laid-out criteria have a high level evidence quality. Opinion cases, where someone says in my clinical experience after 20 years this is what I think, has a very low level. Just because you thought something for 20 years and think you have been seeing something for 20 years does not mean it is true.

Small case series where you have a published series of maybe three or four cases that you think show something are a lower level of evidence based, and single-case reports again are low level until they clearly establish a contradiction to a previously held

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position.

An example of that would be in 2001 the American Academy of Pediatrics' position was that the constellation of the triad does not occur in short falls period. Absolute statement without exception.

And then we have the publications of a video-taped shortness of fall producing precisely those symptoms. That one case report was enough to render the prior statement from the Academy obviously incorrect.

Q. Doctor, have you written any literature in fields that are relevant with our case here today?

A. Yes. I have three published and either authored or co-authored peer review articles in the literature.

I should explain peer review to you as well I think. That just because someone writes an article does not mean it's automatically published.

What the editor will do is to send the article to people in the field, who have been identified as having an interest and a capacity to evaluate the article. Then they will look at the article and either critique it, approve it, recommend changes, recommend rejection and then give their recommendations back to the editor.

And then a dialogue occurs, and if it is

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ultimately felt that the article should be published, it is then published.

That does not end the process once published. Articles then become open for review and critique either in support of or challenge to the conclusions from the general medical community.

So after publication you will have a dialogue of letters to the editor what's called post publication peer review. These are not automatically published either. Once they're written, and you submit to the journal, the journal will then send your response to the author, who is given a chance to respond. Then if the editor feels that this dialogue is worthy of publication --

MR. KRAMER: I'm sorry, doctor. You cut out again.

WITNESS GALAZNIK: The editor then decides if it is worthy of publication, and then it is published. And in this area of recognized controversy, you know, almost every article or many articles will be challenged from both sides, and the dialogue continues.

That is how medical knowledge advances. Just because if there is a published article does not mean it's settled science, and the debate ends for everybody.

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BY MR. KRAMER:

Q. So, Doctor, specifically which area have you written literature about?

A. I have an article, I'm one of the co-authors on an article what's called "The Choking ALTE, where a child chokes to the point of a toxic brain injury and could that then unfold to have findings that would be mistaken for or continually mimic what is being felt to be abusive head trauma.

Q. So, Doctor, I lost you again.

I'm sorry, Doctor. You cut out a little bit there. You were just finishing up speaking about your choking ALTE literature.

Can you hear me?

A. I can hear you now.

Q. Okay. We lost you when you were finishing up talking about your choking ALTE literature.

A. The next article I am an author on is a case report of making A case for an in utero origin of a condition called chronic subdural collections and infusions of infancy, which is present in many of these cases. That two to three months of age decompensates.

The third article I was able to go into a professional grade biomechanical laboratory with other doctors and investigate the levels of rotation

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acceleration that are generated in activities of daily living. So that article was directly relevant to the abusive shaking argument.

Again like I said, all of these articles when they get published get attacked. Doctor Lloyd on the active daily living was challenged because they thought he overstated his credentials, but no one has challenged the data or bothered to reproduce the data.

The article on choking has continued to evoke debate, even through 2016 we post a publication dialogue.

Q. Doctor, in addition to directly contributing to this literature, do you also serve as an advisor peer reviewer?

A. Yes, I have probably 15 or 16 or so of post publications or letters to the editor that were felt worthy of publication, and I have been an invited peer reviewer. That means that an article was submitted, and the journal sent it to me for initial peer review in the area of biomechanics of retinal hemorrhaging and in the area of multiple fractures in infancy.

Q. Doctor, what sort of experience do you have in dealing with bone fractures and disorders?

A. Well, you know, everywhere I ever practiced we have also had on site X-ray, and you can imagine we see a

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lot of questionable injury coming in to the clinic. So in terms of ordering X-rays and looking at X-rays for fractures, I have a lot of hands-on experience there.

I am not a radiologist, and every X-ray we order is over read by a radiologist in case we miss something, but that is nothing I'm doing on a very regular basis.

Q. What is a CT Scan?

A. A CT Scan is X-ray technology, but it can look at any part of the body. But in these cases it's going to either be looking primarily at the head or the chest.

They put you in a big machine which then sends X-Ray beams through the head from all different angles, and then the computer picks this up and then puts together or reconstructs like baloney slices through parts of the body, like starting at the heels and going up, or the chest and getting down and showing you like slices of the anatomy of that area.

CT technology is based on X-Ray. So on a CT bone is white, water is black. Air is black. Brain is gray, and blood product is going to be part of the brain, and color in the brain is darker depending on its age.

Q. Doctor, what sort of experience do you have with reviewing CT Scans?

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A. Well, since I have been engaged in this area of reviewing and consulting on cases of alleged physical injury of infants and small children, I have probably reviewed more 300 cases, almost all of which come with CT Scans.

I'll review the CT Scans. Again I'm not a radiologist, but I review the CT Scans and compare it with the report in the chart. If what I see agrees with the report in the chart, then I'm very comfortable with that.

If I have questions, or either I felt that something was not addressed, or I am disagreeing potentially with what the official reader of the image stated, then I will recommend that additional opinions be sought.

Q. Doctor, you mentioned that you have consulted on about 300 cases involving allegations of abuse in small children and infants. Have you ever testified in any of these cases?

A. Yes. Over the last what 15, 16 years I've looked at probably more than 300 cases, and I probably testified about 100 times. I do not testify on all the cases I review. Only if it's felt that I might have something that would be of benefit to the court. And some of the cases I review, I have to say that I don't find

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anything defensible to even challenge the allegation that is coming forward.

In a lot of cases I will review, send back some significant initial input and literally never hear again. I have no idea if they were dropped, settled, dismissed, or they didn't like what I had to say. So that I just never get any feedback.

And about the hundred or so times I testified, some of these cases I would testify on several times in the same case. So I probably testified in about a quarter of the cases I review.

Q. Doctor, have you ever been requested to testify for the prosecution in one of these cases?

A. No, I have not. These cases will not come forward unless you have treating doctors bringing the allegation. So the prosecutor would have no reason to consult someone like me. So I have no objection to reviewing a case for a prosecutor, but I never been approached by a prosecutor to review a case for the prosecution.

Q. Doctor, have you previously been qualified as an expert before?

A. Yes. I have given testimony, expert testimony in I think 29 states. I think the CV you have has 28, but in at least 28 states. I have given expert testimony

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in Canada and New Zealand. I have reviewed a number of cases for the United States military, and I testified at court marshal proceedings in Stuttgart Germany, Fort Hood Texas and Fort Worth, Washington.

Q. Doctor, have you ever failed to qualify as an expert?

A. No. I've always been allowed to testify. I'm a board certified pediatrician. So that I've always been allowed to give my testimony.

Q. Have you been previously qualified as an expert in the State of Michigan?

A. Yes.

Q. And in which area of expertise have you been qualified?

A. Generally in pediatrics. I'm a board certified pediatrician. Sometimes they will say with special interest in physical injuries of infants and small children.

Before for the days of the quote "child abuse subspecialty" before 2009, I was sometimes qualified as an expert in child abuse. I don't consider myself an expert in the totality of child abuse.

Like I said, the kind of cases I'm interested in really only a very small percentage of what a child abuse doctor is actually required to deal with.

Q. Doctor, are you being paid to testify here today?

A. No, I'm not. When I do reviews and work with Innocence

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Projects, I do not charge for review, consultation or for time involved in testifying.

Q. Have you reviewed the documents and associated medical records in this case?

A. Yes, I have.

Q. Specifically what have you reviewed?

A. I'd have to get to my notes.

Let's see what I got here. My notes indicate the birth records. I was missing the outpatient pediatric records. I reviewed the Emergency Medical Service records, the 911 call, records from Oakwood Hospital. I was missing the chest X-ray from Oakwood ER.

I reviewed the transfer flight records to Michigan. I reviewed the University of Michigan medical records. I reviewed the autopsy. No photos were available. I reviewed the testimony of the medical examiner. I also reviewed some of the care giver accounts, and I reviewed the radiology imaging on the infant, specifically the head CT, the chest x-rays and the skeletal survey.

Q. Doctor, do you believe you have applied your experience and knowledge in your field to your review of this case?

A. Yes.

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Q. I would like to note that Dr. Galaznik's CV is entered into evidence as Defense Exhibit One.

At this time, your Honor, I would like to have Doctor Galaznik qualified as an expert in pediatrics with a special interest in physical abuse of small children and infants.

MR. HEBEL: The People have just a couple of questions.

THE COURT: All right. Go ahead.

VOIR DIRE

BY MR. HEBEL:

Q. Yes. My name is Dan Hebel. I'm the Wayne County Prosecutor. How are you doing today?

A. I'm pretty good. I can't see you.

Q. All right. I've got just a couple of questions for you. I'm going to grab my notes here.

My first question is do you have any sort of degree whatsoever in biomechanics?

A. No, I do not. However, I would comment that a number of child abuse pediatricians along the research I'm relying on is child abuse pediatricians are participating in. So they are using and working with biomechanical people. So it is very relevant to the area, but I've not gone to college in biomechanic engineering though.

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Q. Absolutely. I completely agree that the biomechanics should interact with pediatricians and glad of that. That makes sense.

I've got another question for you.

You discussed that you were certified by the American Board of Pediatricians; correct?

A. American Academy of Pediatrics.

Q. Right. The ABP maintains lists, and your certification is grandfathered in because you have been practicing a considerable amount of time; correct?

A. I'm old. Yes.

Q. I was avoiding it. Are you aware that the ABP strongly encourages pediatricians to recertify even though --

A. I'm aware of that, but at age 69 and having limited my practice to what I'm doing, I have not felt it necessary.

Q. And also are you aware that there's a maintenance of certification that is across all members of the ABP? However, of course, it will not terminate grandfathered in licenses, certifications, excuse me.

However, are you aware that there is this maintenance requirement?

A. I'm aware that I'm required to do a certain amount of continued medication each year in order to maintain my medical license, which I've done throughout my career.

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Q. Are you aware that there is a maintenance and certification required by the ABP?
A. What I'm aware of is that I'm grandfathered in and that as long as I maintain my license and keep up my CME credit, that is what I'm required to do.
Q. Are you aware that there is a statement on the American Board of Pediatrics website that says all members are strongly encouraged, regardless of whether or not they are grandfathered in of meeting the requirements of maintenance and certification?
A. I would not doubt that, but they cannot require it.
Q. And currently on that website would you disagree that statement says that says no, you're not meeting those requirements?
A. I can't understand. Can you get closer.
Q. Is this any better?
A. That's a lot better.
Q. I'm having to hold up the phone when I look at something. So if at any point, Doctor, now or sometime later you can't hear me, just let me know, and I will speak louder. I have one of those voices that scales well.

So are you aware that on the American Board of Pediatrics website where there is a section that says whether or not any member is meeting the

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requirements of maintenance of certification in this area for pediatrics certificate, it says no, you're not meeting those requirements.

Are you aware of that?

A. I'm not aware of that. No.

MR. HEBEL: The People have no other questions at this time.

One moment.

Pardon me.

BY MR. HEBEL:

Q. Just a couple of quick questions.

Now you said in your Affidavit and then also here that you don't charge for your services. Are you being given any financial resources whatsoever from providing these services at all?

A. On cases when I'm working on, not the Innocence Project, I don't charge anything. For new cases coming forward where I'm working for public defenders and court-appointed attorneys, my usual fee schedule is I request $3,000 for review and consultation, regardless of whether the case goes to trial.

And then if it's felt my testimony might be a benefit to the Court, I simply request a thousand dollars to cover time away from home and expenses. Time away from home could be anywhere from two to

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four days of my time for a thousand dollars.

Many cases that I review I give significant input and never hear anything back from. For those I don't collect. So there is many, many cases going into a deadbeat file, whatever you want to call it. I just never hear back.

Q. Well, we're glad that we have you here today.

So this one is going forward at least.

Why you do this if there is no compensation involved?

A. Oh, why do I do the Innocence Project for no fee?

Q. Yes.

A. Well, I think that it's an area of interest to me, number one. That's why I retired from full-time employment to pursue this interest. And I think that if the literature has advanced to the point that it would suggest that there has been prior convictions which may have been inappropriate, I think I have an ethical duty to participate in the process of those conviction reviews.

I have testified in Wisconsin and New York from the Innocence Projects. I review cases for a number of other projects across the country.

Q. Are you intending to use this case as a case study for future literature or writings?

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A. No.
Q. Okay. By which I am actually referring to Texas being Zavion Thomas. Do you recall that case?
A. Yes. I recall that case.
Q. Do you remember writing a paper based on that case?
A. I recall writing a paper based on the issues raised in cases like that. We avoid trying to specifically name the case that it arose from, but I will point out about that case that the purpose was not to retry the case but to start thought in terms of the potential for a choking ALTE to lead to the unfolding of events, and the post publication dialogue on that case has continued.

As you know, if you look at my CV in 2016, we were still writing response letters about that case.

Q. I understand. From a legal standpoint though that case is closed; correct?
A. Yes, it is.
Q. The jury convicted the defendant?
A. Yes.
Q. The Court of Appeals affirmed?
A. I assume so. I didn't follow it.

MR. HEBEL: I have no further questions at this time.

WITNESS GALAZNIK: Thank you.

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MR. HEBEL: At this point, your Honor, the People would object to any specific specialty because the witness at this point has established that he is a pediatrician, and he is board certified. He's a practicing physician. However, he's not a practicing physician in child abuse.

This is an area that he reads and writes about. It's not an area that he practices, and as such the People would object to a specific specialty beyond simply pediatrics.

THE COURT: Response?

MR. KRAMER: Your Honor, clinical experience is just one form of experience. Doctor Galaznik is intimately familiar with the literature in this field, has actually contributed to that literature and conducted research in this field.

We believe that he is very qualified to speak to a specific area of physical injury with small children and infants. So this is what he had dedicated his career to.

THE COURT: A portion of his career.

MR. KRAMER: Yes, since about 2001, 1999.

MR. HEBEL: The reason why a medical expert is brought in, your Honor, is because they the experience in the field in the medicine, not because

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they have experience reading and writing about it, your Honor.

And at this point I would say that Doctor Galaznik has more than established his credentials in medicine. He has pediatrics and family practice all over the globe. However, he has not treated child abuse cases. He reads, he writes, and, your Honor, this would be no different if we were specializing in reading and writing about child abuse to having an attorney who specializes in child abuse come in because he reads and writes about the same thing.

MR. KRAMER: Your Honor, if I may.

THE COURT: Yes.

MR. KRAMER: Academic researchers are admitted as experts routinely, and that can serve as a basis of his expertise in this area.

THE COURT: What do you base that on?

MR. KRAMER: One moment, your Honor.

Your Honor, there is nothing in Daubert or any other rule that requires specific clinical experience. It just requires that they have enough expertise to speak to this area and speak to the literature and truth provided within it.

THE COURT: All right.

Mr. Hebel, I do take your point with regards

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to Doctor Galaznik's expertise in the field of pediatrics, and he has in fact I think been involved in writing in this area.

He does not hold himself out as an expert in child abuse, and I will not accept him as an expert because he has admitted himself that that's not his area of expertise.

But I will permit him to testify as an expert in the area of pediatrics.

Go ahead.

MR. KRAMER: Thank you, your Honor.

BY MR. KRAMER:

Q. Doctor Galaznik, the medical examiner in this case testified that Nakita had died as a result of abusive shaking.

Are you familiar when SBS first emerged as a diagnosis?

A. I missed the last part of that. Are you familiar with what?

Q. When SBS first emerged as a diagnosis?

A. I think the idea of SBS has grown out of the research out of the sixties about inducing concussions without impact. The idea then came forward that if the child was shaken, and the head was violently rotating from front to back, that the child would experience

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rotational injury to the brain. And this took over in the, it was accepted in the medical community.

I specifically start my point up here with the 2001 position statement in the American Academy.

There was one from '93 as well which basically asserted the abusive shaking hypothesis, rotational claim of injury as established science.

Q. Was that position statement the controlling or the last statement from the AAP in 2006 at the time of the trial in this case?

A. Yes. It was published in 2001, and it was left in effect supposedly until May of 2009. So at the time of the 2006 trial, pediatricians looking to the Academy for guidance would have, and maybe the medical examiner would have found the 2001 position statement.

Q. Did this 2001 position statement say whether the triad should be diagnostic of shaking?

A. What it said was that and in the pile of paper was Shaken Baby Syndrome, rotational cranial injury as opposed to impact is the rotation of the head, a technical report. And what it said in the second sentence was that while it is not advanced to the point that the diagnosis of rotational cranial injury is no longer a diagnosis of exclusion, which means nothing else really had to be ruled out.

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And the pediatrician was guided to make a presumption of abusive injury when certain findings were found. Retinal hemorrhaging not defined as number, location or quantity but simply retinal hemorrhaging, subdural, subarachnoid bleeding and some kind of encephalopathic presentation.

And then it went on to say that the constellation of these findings does not occur in short falls period, absent statements to be made without exception.

So that basically at that point in time if one were assuming a mechanical trauma resulted in the child coming to bear while the child had those findings, the pediatrician was guided to make a presumption of injury by abusive shaking, and that the history of a short fall or something else was offered that the child had to have been shaken in addition to some kind of impact injury from a fall to account for those findings.

Q. Could you please very briefly summarize how under the 2001 statement shaking was thought to serve as the mechanism of injury?

A. Yes. The classic shaking hypothesis is that the care giver grabbed the child by the chest and violently shakes the child backward and forward. It is not the

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movement of the head forward and backward that is thought to be damaging. It is the rotation, the head flipping from the front of the body to the back of the body.

That in that process the hypothesis was that the brain might swirl around inside the skull like a bell climber ripping and tearing on itself causing injury to the axon, the fuse axonal injury.

Those are the branches coming off of the nerve cells that the big veins going from the surface of the brain over to the big vein collecting systems attached to the skull like a superior sagittal sinus, is the medical name for it would be stretched and torn causing subdural bleeding.

The idea was that the clear jelly inside the eyeball attached to the retina would be swirling at a different rate than the retina itself, ripping and tearing that retina causing the retinal bleeding. That is the classic abusive shaking hypothesis of the time.

Q. So, Doctor, while the AAP did not updates its stance between 2001 and 2006, are you familiar with any challenges that came about to this diagnoses between 2001 and 2006?

A. Yes, well back in '87 a biomechanical engineer and a neurosurgeon had done some research and questioned

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whether the levels of rotational acceleration, deceleration could be generated that would be adequate to cause thee findings. But the American Board of Pediatrics persisted in its belief.

Biomechanical article in 2003, the claim Doctor Duhaime was part of that research as well. She was a neurosurgeon. Constructive models to try to predict at the highest level of this rotational acceleration that might be generating abusive shaking of a ten pound infant and felt that the levels were not high enough to be a primary cause of brain injury or of subdural bleeding.

So that was a major challenge and felt that the term shaking baby syndrome or any terminology referring to the shaking mechanism should be dropped.

That was 2003.

But again the American Academy of Pediatrics persisted. Other research was done that would indicate that no matter what models you created, that you would not be predicted to reach levels that would be predicted to cause primary brain injury, primary subdural bleeding.

But like I said, the American Academy of Pediatrics did not change its 2001 position statement.

Other research that came forward was in 2001.

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John Plunkett published his witness short distance fall article, one of which was a video taped short distance fall where the child subsequently died of subdural bleeding, died with brain injury, of course, and had retinal hemorrhaging.

So the statement made as an absolute in 2001 constellation of these findings did not occur in short falls, would clearly be rendered absolutely wrong. But again the Academy did not change its position on that until 2009.

Q. Doctor, who is Carole Jenny?

A. Carole Jenny is child abuse pediatrician. She's old like me, and she has been involved in research and some of the position statements through the years.

Q. Did she publish anything or write anything during this time period between 2001 and 2006?

A. Yes. She got together with Aprica, which is a Japanese manufacturer of I think infant seats, and between with her collaboration they constructed two very sophisticated you might call them test devices or shaking dummies.

That medical term is antimarket test device, ATV. These are not Walmart dummies. They are very sophisticated measuring instruments.

One weighed less than five pounds, and one

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weighed a little less than eight pounds and shook these models to see what levels of rotational acceleration, deceleration could be produced.

And the numbers that fell out of that was shaking an eight pound model, she was reporting only 1436 radiants per second square, which was way below what would be predicted to be necessary to cause primary brain injury and primary subdiffusion.

Q. So, Doctor, while the AAP hadn't updated its official position on SBS before 2006, has it since updated its position?

A. Well, in 2009 the American Academy of Pediatrics was almost put in position to make revisions, number one.

In 2007 they had been challenged to defend the role of retinal hemorrhaging in cases of an alleged abusive shaking. And by 2009 confronted with the video taped short distance fall, which they could not deny, crush injuries, which they could not deny, and the emergence of concern over medical mimics, in 2009 they published a new position statement.

And in that they make the statement that while shaking has the potential to cause neurologic injury, blunt force or blunt force plus shaking does cause injury.

But what's common about that comment first of

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all it acknowledges that blunt force can clearly cause neurologic injury, and the second thing is in 2009 they avoided defining injury.

In 2001 it was very clear retinal hemorrhaging, subdural bleeding and encephalopathy. In 2009 they left it vague as an injury.

I believe you can injure a child by shaking. I think you can break its neck and kill a child by shaking, but the question was in the absence of those kind of findings, can you really cause primary brain injury and primary subdural bleeding and primary retinal hemorrhaging by the shaking mechanism.

They went on to knowledge that the biomechanical literature had both challenged that some might be taken as supporting the abusive shaking hypothesis, but the only real evidence that might be taken as supporting the abusive shaking hypothesis was the what is called the confession literature and that from that it could be assessed that shaking was associated with or occurred in some of these presentations.

But association is not causation. Just because you have a history of possible shaking, which you have a hard time defining, occurred in a child's presentation, does not establish that whatever occurred

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absolutely caused the finding. And then they went on in that statement to say that controversy remains.

So it was an acknowledgement of controversy.

In 2001 there was no acknowledgement of controversy.

In 2009 they are acknowledging it is now controversy.

And then they go on to state that they do not no longer recommend the use of the term shaken baby syndrome because it implies a specific mechanism of injury; i.e., shaking, and they recommended adoption of a much broader term to be inclusive of all potential mechanisms by which an abusing care giver could cause neurologic injury to a child.

So they were aborting declaring whether they thought an injury was shaking versus impact versus suffocation versus strangulation versus some other way that a care giver could cause injury.

Because remember they did not have inclusive any experimental evidence confirming that abusive shaking was absolutely a cause of a diagnostic constellation.

They went on then further to say in 2009 that the American Academy recommends adoption of the term abusive head trauma for the constellation of findings

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of cerebral injury, cranial injury and spinal injury.

Notice there that it was retinal hemorrhaging, subdural bleeding and subretinal bleeding and brain injury.

In 2009 they did not specifically mention retinal hemorrhaging, but replaced it with neck injury or spinal injury, and that's because the biomechanical studies were indicating that if you actually violently shook a small infant, that it would be predicted that you would break the infant's neck, literally cause ligament structural failure of the neck before you would potentially reach a level that would cause any primary brain injury or primary retinal hemorrhaging.

Q. Doctor, if I could just briefly summarize what you said so far. Please tell me if my summary is correct.

That in 2001 the AAP's official position was that SBS was a settled science?

THE COURT: I think I already heard this. I'm paying attention too.

Let's move along.

BY MR. KRAMER:

Q. Doctor, after the 2009 statement did the academy say anything about regarding retinal hemorrhages?

A. Yes, in 2010. Remember in 2007 they had been specifically challenged to defend the assumption that

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retinal hemorrhaging was a direct primary mechanical cause of shaking that would allow it to be served as a finding of great significance in these cases, since retinal hemorrhaging was then being reported in fatal short distance falls and in medical conditions.

In 2010 what they were forced to acknowledge, what they acknowledged is that while retinal hemorrhaging in the past had been an indicator of abusive head trauma, that retinal hemorrhages also occurred in many other conditions as the recognition that retinal hemorrhages are none specific and can occur in a variety of situations.

And so they would not be unique to shaking and could not be asserted as establishing shaking. They did, however, try to assert in 2010 that but if retinal hemorrhages were extensive in all four quadrants extending to the far periphery, particularly if associated with what's called a retinoschisis or a pole, that abusive, that repetitive acceleration, deceleration was the most supported hypothesis.

Now when I say repetitive acceleration, deceleration, the only situation that would occur in would be an abusive shaking. There would be no single impact, would not be rapidity and medical conditions would not be competitive, but certainly retinal

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hemorrhages occur in medical conditions from child birth. 40 percent of all babies in the nursery can have retinal hemorrhaging just from being. There is no shaking going on there.

We clearly know in impact injury it can occur. We know and the literature of the text books has long recognized that increases in cranial pressure can cause retinal hemorrhaging. Coagulation problems can cause retinal hemorrhaging. There are lot of causes of retinal hemorrhaging.

But unlike in 2001 where the American Academy was basically saying any retinal hemorrhage was adequate to satisfy the triad constellation leaving the, guiding the pediatrician to presume abusive shaking.

By 2009 they acknowledged that retinal hemorrhaging can have many causes and that, but still try to assert that. But if they are extensive, that abusive shaking or repetitive rotational acceleration would be the explanation that one should look to.

Q. Doctor, were there any developments in this field since that 2010 statement?

A. Yes. Then the question really becomes in 2010 is abusive shaking, which would be the only real cause of rapidity rotation acceleration, deceleration, is it

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really a valid, unique cause of these retinal findings.

And since 2010 we have had first of all a clinical case report in the year of 2011 where an infant had a ruptured aneurism, which is a blood vessel that popped inside the head causing an acute increase in pressure inside the head, and that infant had retinal hemorrhages.

Q. Doctor, can you hear us? Can you hear me?

A. Yes.

Q. I believe you cut out when you were speaking about the relation between increased intercranial pressure and severe retinal hemorrhages.

A. Backing up a little bit there. Increased pressure inside the head even in the literature and even in textbooks of child and adult neurology and opthalmology has long recognized increased pressure inside the head can --

Q. Sorry. We lost you again.

Doctor, we're going to upgrade our connection here. We'll be right back with you.

A. I stay put like I am; right?

MR. KRAMER: Yes.

BY MR. KRAMER:

Q. Hi, Doctor. We're back. Okay.

Do you remember where you were?

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A. Yes. I think I do. I was saying that increased pressure inside the head has long been a recognized cause of retinal hemorrhaging, but the child abuse community was asserting that it would not be extensive.

But with the publication of the Mena Case Report, a seven month old who had a ruptured aneurism which caused an increased pressure inside the head. The infant had died with extensive retinal hemorrhaging with no question, no assertion that the child had been shaken or abused.

So that was the medical diagnosis that resulted in an extensive retinal hemorrhaging. So then the question became is abusive shaking, this rapidity rotational acceleration actually a cause of any grossly visible retinal findings.

Remember, the child abuse community was asserting that it was the, could be caused but nothing else. And since 2010 we have had four major experimental efforts with animals, and we have had emergence of real human data, which has failed to suggest that the rotational accelerations that could be achieved in abusive shaking would actually even be a valid primary mechanical cause of any grossly, visible retinal findings at all.

And these studies were involved in 2010, 2012

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and the coast, Bennabahm, Cindy Christian, a child abuse pediatrician of 2016 collating that with the Bushon Data of 2009, the Daniels' data of 2012 and the Lloyd data of 2011.

Q. Doctor, are you familiar with the 2016 study from Sweden entitled Traumatic Shaking, the Role of the Triad in Medical Investigations of Suspected Traumatic Shaking?

A. Yes. I'm aware of it.

Q. Doctor, did that study say anything about the quality of evidence supporting the notion of shaking can cause that triad at all?

A. Yes. That study set out to look at the body of medical literature through 2015 which would, whether that literature actually was of a quality that would support one diagnosing abusive shaking based on the triad of retinal hemorrhaging, subdural hemorrhaging and brain injury.

And in that review they, I think went to the literature and found 3770 articles and applied, some of them were clearly involved cases which were not in the less than 12 months of age, or they were not, didn't involve at least ten patients in the report and various exclusion criteria.

And it ultimately came down to about 1,070

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which they thought needed to be reviewed.

So they reviewed all of these articles, and out of that they only found 30 that were of --

Q. Sorry, Doctor. We lost you a little there. You were discussing the 30 articles that they first identified?

A. Down to 30, and of those 28 of the 30 had a high level of inherent bias and circular reasoning, which could not about relied on, and they only had two that they felt were moderately of, only a moderate set of quality still infected with some bias and had shortcomings.

So of their review they found no studies, no clinical-based studies which were clearly of a high quality which were not infected.

Q. Sorry, Doctor, you cut out again.

You have not come back yet.

MR. KRAMER: Your Honor, do you prefer that we switch to phone at this point?

THE COURT: Yes. It doesn't seem to be working.

MR. KRAMER: Doctor, we're going to switch you to the speaker phone in here.

So can I give you a call back?

WITNESS GALAZNIK: Yes.

MR. KRAMER: And we will give you a call back.

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BY MR. KRAMER:

Q. Doctor, I think before you cut out, you were discussing the quality of evidence that the Swedish study, which is Defense Exhibit Four, The quality of evidence that that study found supporting the idea that shaking can cause the triad?

THE COURT: That's no good.

Let's take a couple of minutes. You can get it going.

(Whereupon a recess was had by all).

THE COURT: Mr. Hebel, are you okay?

MR. HEBEL: The People are ready.

BY MR. KRAMER:

Q. Doctor Galaznik, can you hear us?

A. I can hear you just fine now.

THE COURT: Hold on. We don't have your client.

All right, Mr. Kramer, go ahead.

BY MR. KRAMER:

Q. Sorry about that, Doctor. We were discussing the SBU study. Can you tell us the quality of evidence that was found confirming that shaking could cause a triad, et al?

A. Their conclusion that there is insufficient scientific evidence on which to assess the diagnostic accuracy of

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the triad in identifying traumatic shaking, very low quality evidence.

That would mean that the evidence that they found that is out there is of low quality and is insufficient to lead one to conclude that the presence of the triad is diagnostically accurate enough to assess, where the shaking clearly did not occur is the way I understand it.

Q. Doctor, earlier you mentioned that there were some circularity problems in the confession literature. Can you please elaborate on that?

A. Well, the problem with circularity is that if the doctor is of the mindset that all cases with subdural bleeding and retinal hemorrhaging can only be from shaking, then the diagnosis that is made is going to be shaking.

So you have built into your diagnostic criteria a finding, and that's circular reasoning. Your research then comes, just mutually reinforces a bias that you have built into your research.

Q. Doctor, in 2015 the Michigan Supreme Court stated that there was a quote "prominent controversy within the medical community regarding the reliability of SBS/AHT diagnosis."

Do you agree with that statement?

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A. Yes. I agree on several reasons that first of all the literature supporting that the triad can be taken as diagnostic of abusive shaking is not there, low quality.

In addition to that, I would say that the biomechanical studies with the animal studies coupled with the human data has failed to confirm that the levels of rotational acceleration that could be achieved in abusive shaking of a 10, 12, 15 pound infant would actually produce primary brain injury, primary subdural bleeding in a previously normal child or primary retinal hemorrhaging.

And if they cannot do those things, then the whole diagnoses of injury by abusive shaking has become suspect. That's not to say that shaking is benign. That's not to say you can't injure a child by shaking. That's not to say that you can't --

Q. Doctor, I believe you cut out again. I'm sorry.

We're going to try and get you back here.

You're back right now.

A. Okay. That's not to say that abusive shaking is benign. That's not to say that you can't injure a child by shaking. Not to say you can't kill a child by shaking. But to make a diagnosis of injury by abusive shaking based on the presence of those three findings

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is first of all there is no, the SBU study concluded that there was insufficient evidence to make that conclusion. And the forthcoming biomechanical animal and human data that we have has failed to confirm that abusive shaking would be a primary mechanical cause of any grossly visible retinal findings or be predicted to be a primary mechanical cause of brain injury, but it would predict that it would destroy the neck.

Now if you destroy the neck, if you injure the spinal cord, if the child then had neck injuries to the point of not breathing --

Q. I'm sorry. You cut out one more time.

You're back right now.

A. Okay. I'm back right now. But not to say if you destroy the neck, and the child then basically could not breathe, and then the brain died from lack of oxygen because the neck was destroyed, and then the brain became swollen, and then the pressure went up and then increased pressure caused retinal hemorrhaging or other findings, that could occur in an abusive scenario.

But in that situation those findings are what we call secondary, not primary, and anything which set that motion could get you to the same findings in the end.

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So the diagnosis of abusive shaking and accusing the last man with the child of doing it based on the triad of retinal hemorrhaging, subdural bleeding and brain injury I don't think is supported in the clinical literature or in the experimental literature.

Q. Doctor, the medical examiner in this case testified that Nakita died as a result of abusive shaking and did not suggest any neck or impact injury.

In your review of this case did you notice any evidence that would indicate a neck or impact injury?

A. I seen very much 2006 in terms of his end.

Q. I'm sorry. I think we lost the first couple of words of your response.

A. I did not find anything in the record to suggest or neck injury or significant neck injury, and his testimony appeared to be very much in line with the 2001 position statement from the American Academy of Pediatrics and appeared to be making the diagnosis --

MR. HEBEL: Objection.

MR. KRAMER: I'm sorry, Doctor. We have an objection.

MR. HEBEL: Objection, your Honor. I just ask for it to be in question and answer format rather than a narrative.

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THE COURT: Response?

MR. KRAMER: This is an expert witness. We'd ask for a little bit of latitude to allow him to fully explain himself.

THE COURT: I think you had a lot of latitude. I'm going to sustain the objection.

BY MR. KRAMER

Q. Doctor, you still with us?

A. Yes.

Q. Okay. What significance does a total lack of neck or impact injury have in this case?

A. Well, if there were impact injury, then impact would conceivably account for the findings in this case, but there was no history of impact and no remote findings to confirm or indicate impact.

In terms of neck injury, there was no documented neck injury either. So that given that the biomechanical research is indicating that if you shook a child to the point of neurologic injury, that you would be predicted to cause structural failure of the neck. Then the absence of documented --

Q. I'm sorry, Doctor, you cut out again.

Doctor, we lost you again.

We're back.

A. That given that the biomechanical research, including

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that if you apply the numbers out of Carole Jenny's research, would indicate that you predict neck injury and neck failure with the shaking, and in the absence of documented neck injury, would lead me to conclude that that is no support for neck injury in this case as would be expected with a significant shaking.

Q. Doctor, in your review of this case did you notice any subdural hemorrhage or any evidence of that?

A. Well, in my review of the case it is interesting that the initial presentation and the initial CT Scan only called subarachnoid hemorrhage and did not appear to show or document any subdural hemorrhage. By the time of autopsy when the child died 12 hours after the initial 911 call, the medical examiner --

Q. Doctor, we lost you again.

A. By the time of autopsy the medical examiner reported finding only 15 cc's, which is one tablespoon of subdural blood and then scattered subarachnoid hemorrhaging. So there was very little subdural blood in the head, and it was not documented or visible on the first CT Scan.

Q. What is the significance of the low amount of subdural blood?

A. Well, to me the significance of that is that in the conditional assumption in 2006 that the source of

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subdural bleeding would be from a tear and an abusive shaking. That it would be if from a tear, a rupture of a bridging vein spilling blood into creating an subdural compartment.

Now there is about 15 to 20 or so bridging veins running from the surface of the brain over to the superior sagittal spine, which would be theoretically stressed or stretched in an abusive shaking, and each of those veins is predicted or estimated to be carrying five to 10 cc's of blood per minute.

So if you ruptured one of those, I would anticipate significant amount of subdural blood visible on the CT Scan by the time of the first CT Scan, and we do see cases where the history is short distance fall impact where they do a CT Scan and document significant subdural blood, and the neurosurgeon goes in and documents a torn bridging vein. But the amount of blood is significant, and it's there fast.

So in this case where the CT Scan failed to demonstrate significant subdural blood, I saw no evidence to confirm that a bridging vein had actually been torn.

Q. Doctor, did you find any evidence in the records suggesting think Nakita was hypothermic or anthropomorphic?

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A. Yes. On presentation at Michigan Nakita's body temperature was about 89 degrees, and she was anthropomorphic, which means without a period of lack of oxygen, the body goes in anaerobic metabolism and becomes anthropomorphic.

The significance of that to me is that blood clotting is enzyme driven process which is temperature dependent. So when the body is cold and anthropomorphic as perpetuated even more by acidosis. So when the body is cold and anthropomorphic, blood is not able to clot sufficiently, and in that situation one might predict that any bleeding from any source or any cause would be exacerbated.

Q. I'm sorry, Doctor. You cut out again.

Doctor, can you start that sentence again?

A. So when a child presents, an infant presents with acidosis and severe hypothermia, they will be unable to effectively clot, any source of bleeding from any cause that breathing should be magnified and increased because of the inability to effectively clot.

So in this case where there was almost, there was no --

Q. Sorry. You cut out again, doctor.

Try saying something.

A. Okay. I'm connected again.

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Q. You're back, Doctor.
A. Okay. So to me that point is if an infant is hypothermic and asobotic for an hour or two or three around the time of presentation, and there is a return of spontaneous circulation with blood flowing back through structures that have not been injured from lack of oxygen, that one could, might anticipate exacerbated bleeding from those structures.

And so in this case where there was no subdural bleeding documented --

Q. We lost you again, Doctor.
A. Okay. This is frustrating. I never had this trouble before with what the issues are.

Can you hear me?

Q. You're coming through.
A. I'm coming through. Okay.

So that and the amount of subarachnoid breathing was spread around from different locations, which would not be what you predict with rupture of a bridging vein. I see no evidence of a -- I see no evidence of a torn bridging vein as would be hypothesized in abusive shaking in 2006.

Q. Doctor, at trial the medical examiner theorized that the small amount of bleeding could be explained by sort of a self tourniquet ing mechanism where the brain

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swelled, and when it swelled, it got pressed up against the skull and thus closed off those bridging veins.

What's your opinion on that explanation?

A. Well, I would offer to that discussion is that in each bridging vein is carrying one to two teaspoons of blood per minute. In three to five minutes I would expect significant subdural blood, and certainly 10 or 15 minutes I would expect significant blood.

So I don't see the brain swelling would occur fast enough to produce the effect that he was talking about.

And I also defer to radiologist review, but on my review of the CT Scan there is still some preservation of subarachnoid space at the time of the CT Scan. I know the pressure was already up because of the full fontanel and clinical documentation, but the brain was not so swollen at that point that it had obliterated the subarachnoid space. So I don't know that I can agree with that.

Q. Doctor, are you familiar with the term of lucid interval?

A. Yes, I am.

Q. Can you please explain what that is and how it's relevant to cases of suspected shaking?

A. Well, in terms of the basis of the shaking hypothesis

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which came out of the compression research and concussions are produced by rapid rotational cranial injury.

When a boxer is hit, his head spins. The brain has not been hit. The skull has not been hit, but it's the spin of the head. In football where you have contact to, helmet contact where somebody comes along like a battering ram and hits the side of the opponent's head, the guy that is hit is inside, his head spins. He's the one that has the concussion.

So if you have rotational cranial injury as hypothesized in abusive shaking, if it were valid, one would predict immediate onset of symptoms. With impact injury it is long been recognized that you can have an impact of the head, appear fine and then decompensate later.

So that would be that period of where you appear fine would be the lucid interval, and then you can subsequently decompensate. And when you get into medical problems, which might cause a child to collapse and present, some of those processes could have been in works for a period of time before the child collapsed and presented.

But if you're assuming the abusive shaking hypothesis, and you're assuming that it's valid, then

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the traditional assertion would be that symptoms would be immediate and that last person with the child would be the one inflicting the shaking injury.

Q. Doctor, can you please explain what a differential diagnosis is?

A. A differential diagnosis is where someone presents symptoms and findings, and the doctor then makes a list of all the potential explanations which could lead to that presentation those findings. Then he starts to order tests and evaluations to rule out the things, the conditions that he can rule out.

And if he can rule everything else out and has strong evidence or in that effort, if all tests which confirm one of the conditions on that list, then he can diagnose that condition.

But remember, in the 2001 the position statement, the second sentence was that basically it is no longer a diagnosis of exclusion. So pediatricians were being guided to make definitive diagnoses without having to rule out anything else. It was no longer a diagnosis of exclusion. It was to be a positive diagnosis made on those findings of retinal hemorrhaging, subdural bleeding and brain injury on an infant.

Q. But has the AAP since updated its stance on whether the

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SBS should be a diagnosis of exclusion?

A. Well, by 2006 they were saying that most of the recent advances, not in particular shaking baby, but in terms of child abuse in general, have come in the recognition of mimics, which means by 2006 they were starting to recognize that there are conditions, didn't say specifically abusive shaking, but conditions which could present and look abuse and not be.

And since the 2009 statement is saying that a thorough workup needs to be done to rule other potential causes.

Q. So having reviewed the record in this case, do you have a differential diagnosis that you believe is more likely to have caused Nakita's injuries than shaking?

A. Yes. When I look at a case, I generally try to start, I start with the history that comes through the chart. And in this case the history through the chart to the 911 operator and the Emergency Medical Service responders, why that this child has been fed, laid down, had had two prior episodes or choking type of events, and that the care giver heard the child gasping with formula and vomit is kind of coming out of the mouth. The formula in the mouth was confirmed by EMS. They had to do repeated suctioning's, and it was further confirmed in the emergency room.

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So starting with that history, then I start to say that is the history that is awkward.

Q. So after you see that history, what's sort of your next step in pursuing a diagnostic strategy?

A. I think that that is the history that's on the chart. One might consider trauma or one might consider infection, or one might consider other medical conditions.

But when I encountered the chart then as a reviewer, I start with that history and see if that history and the clinical unfolding that caused can account for all of the findings in this case.

Q. Was there any other evidence in the medical record that indicated to you that Nakita suffered a choking aspiration event?

A. What I found in the records was first of all that was the history that was offered, plus two prior episodes of certain, and that was formula, a vomitus, excess secretions documented by EMS and the hospitals and that there was evidence of infiltrates on the right side of the lung more than left, and most aspirations go toward the right lung as opposed to the left.

And so I thought that the X-rays were consistent with an aspiration event. And the autopsy also documented early bronchial pneumonia which would

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be at least consistent with an aspiration event.

Q. Doctor, could this choking aspiration event be lethal?

A. It is recognized by a literature from the American Academy of Pediatrics. A choking aspiration event can be devastating, and they can be lethal, and it doesn't require a ton of formula getting into the lungs.

But if it sets off a reflex closure of the airway, then it can cause a devastating outcome.

Q. How could this choking event cause death?

A. Cause death?

Q. Yes, or brain death.

A. Well, if breathing and oxygenation of the blood is interrupted for an extended period of time, the child then proceeds to facing death. The heart stops.

And in this case by the time Emergency Medical Service arrived, the child was in a-systole, meaning there was no pulse and no heart rate, and the child was without any spontaneous circulation for more than 45 to 50 minutes.

So this child, the brain was getting no circulation or no oxygen for more than 45 minutes. So that it gets you to brain damage.

Now the question then comes does that, can you get from point of brain death from any cause to the retinal hemorrhaging, the optic nerve sheath

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hemorrhaging and the brain swelling and the intercranial hemorrhage. And my opinion there is that when the brain has been injured severely from lack of oxygen, and then after 45 minutes circulation is restored, and the blood came back in this case as hypertensive levels for an infant.

So you have suddenly blood surging back to the vessels and structures which have been damaged by lack of oxygen, and then you have coagulate hypothermic, acidotic coagulopathy on top of that.

The brain begins to swell, and this was clinically evident on physical exam by a full firm fontanelle, that's the soft spot to top of the head.

And it was further confirmed on the imaging by loss of bright light and on the seat of brain edema, which would indicate injuries fresh inside of the brain, and increased pressure inside the head would have been rapid because these findings were being documented within an hour of two of presentation.

And the rapid increase in intercranial pressure is a recognized cause of retinal hemorrhaging even extended retinal hemorrhaging.

It is also a recognized cause of optic nerve sheath hemorrhaging. That's hemorrhage in the optic nerve right behind the eyeball, and this would count as

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an asphyxial death, and text books of forensic pathology for years have recognized that in asphyxial death small amounts of subarachnoid hemorrhage can be found. That's not just in babies. That's in adults or whoever can after an asphyxial death small amount of subarachnoid hemorrhage is not an unexpected finding, and in this case the CT documented subarachnoid hemorrhage as opposed to subdural.

So from my perspective if you had a choking event that got you to a brain lethal period of hypoxia; i.e., the heart stops for more than 45 minutes, and then the child's heart was resuscitated followed by a rapid increased pressure compounded by coagulopathy, that would account for retinal hemorrhaging, optic nerve sheath hemorrhaging and potentially a subarachnoid hemorrhaging that was observed on the CT Scan.

It could also account for the onset of potentially some subdural breathing, but that was not documented until autopsy.

Q. Doctor, can you please briefly explain the difference between subdural hemorrhage and subarachnoid hemorrhage?

A. Yes. If you put your hand up on your head, you feel the scalp, and under that you have the skull, and right

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on I guess the inside of the skull is a membrane called the dura. In an infant it is very vascular, and it is fairly firmly attached to skull. And right underneath the dura you have another membrane called the arachnoid, which is loosely attached to the dura, and then has no blood supply.

But then between the arachnoid and the brain you have about three to five millimeters, which is about a fifth of an inch space caused by valves and valves of little threads called the arachnoid trabecular arteries, and this space is called cerebral spinal fluid which looks like water if you tap it and look at it.

Now subdural blood is blood or fluid or oxygen that accumulates is abnormal bleeding between the dura and the arachnoid. Subarachnoid blood is bleeding between the arachnoid and the surface to the brain into that fluid, the subarachnoid, the cerebral spinal fluid, that space between the arachnoid and the brain.

And traditionally a torn bridging vein as alleged in abusive shaking is supposed to cause subdural bleeding, which was in this case not documented on the initial CT Scan, and the scan would cause widespread, some arachnoid bleeding spread all

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over, which was not really what you would expect with the torn bridging vein.

Q. Thank you, Doctor.

I would like to direct your attention over to your skeletal review of this case.

In your review did the medical examiner in this case identify any possible fractures on Nakita's body?

A. Yes. The survey read the death called a fracture, the report called a fracture of the core cord process, and the medical examiner picked that up and put that in the autopsy report. The only fracture that was documented was of this right shoulder area.

Several, I note some weeks later indicated that the fracture location had been misidentified, and it was not in the core cord process but was in the acromial process.

So the initial reader who documented it put it in the wrong place, and it appears that the medical examiner was unaware of the proper location of the finding.

At autopsy the medical examiner did not dissect down to the area to confirm the presence or absence or location of the fracture. I think the call was simply made on X-ray.

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Q. Doctor, in your experience can a fracture diagnosed on X-ray later be found to be nothing or just not a fracture upon visual inspection?

A. It can, and it can also on visual inspection have been found to be older. And let's say is it truly a fracture or not. I'm not saying it is not a fracture, but if it is a fracture, is it consistent with having occurred on the day of presentation or could it be five, seven, ten days, or two weeks old.

And without autopsy if there is no visible call up, and we got autopsy going down and actually looking at the location and possibly looking at it with a microscope, one has not fully evaluated for its age and its or how old it, is, whether it's a true fracture.

The problem with pediatrics is that infants have growth plates and growth centers which can be confused with fractures. Now I'm not saying it's not a fracture. That's not my point. My point is there was an X-ray finding that it was not confirmed physically at autopsy. It was simply an X-ray reading, and the initial identification and the identification of its location by the medical examiner was not properly labeled.

Q. Doctor, if this fracture did exist, in your opinion is

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it indicative of abuse?

A. In my opinion it would be an inflicted fracture, but in this case the care giver by the 911 operator was instructed to turn the child over, put the head down and deliver back blows to the infant, which is standard procedure if the child is trying to choke.

But in that procedure would be delivering blunt force trauma over this child's back at the instruction of the 911 operator, and on the 911 tape. They say clearly, you know, be careful don't break anything I think was the actual wording.

So that when I then look at this location of this fracture of this finding at the pulmonary process, in my mind if I execute the back blows, and we are taught in basic life support where you turn the child over, you'd be supporting the child's chin and head between your thumb and index finger, and the remaining three fingers would be stabilizing probably the right shoulder if you're right handed.

And then you'll be delivering a blow with your fist between the scapula there. In my mind I can see the acromia process being stabilized by the fingers of your left hand and the blow driving the body of the scapula forward, which would be a stress exactly to the location where this defect is being noted.

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So that if it's a fracture and looks like a fracture, potentially a fracture in my opinion it could be an inflicted injury, but given the history where the care giver --

Q. I'm sorry, Doctor. We lost you.

MR. KRAMER: Your Honor, while we're waiting for him to come back on, I'll say there's only a few more questions, and we can wrap in just a few minutes.

THE COURT: I also want you to be mindful of the fact that the doctor is allowed to testify with regards to the area of pediatrics, which is his expertise but not a myriad of child abuse because from his own words he is not an expert in child abuse.

So phrase your questions accordingly.

BY MR. KRAMER:

Q. Doctor, can you hear now?

A. Yes.

Q. Doctor, having reviewed the records in this case, do you believe that shaking could have caused Nakita's injuries and death?

A. The shaking could have caused these injuries?

Q. Yes.

A. In my opinion that I see no evidence that convinces me that this child was abusively shaken. There was no neck injury. And given the current state of our

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medical biomechanical and human data and literature, I do not believe that abusive shaking would be a primary mechanical cause of retinal hemorrhaging, optic nerve sheath hemorrhaging or brain injury that would be expected to account for this child's death.

Q. Doctor, after a police interrogation in this case Ms. Lemons gave a statement in which she said she had shaken Nakita before she became unresponsive. In your opinion does the medical literature support the notion that that shaking could have caused Nakita's injuries?

A. In my opinion the medical literature has not established that abusive shaking in the absence of neck injury would be a primary, valid mechanical cause of primary brain injury, primary retinal hemorrhaging or primary subdural bleeding in a previously normal child.

So that's my opinion.

Q. Doctor, in your opinion are there any issues with relying on a confession with the scientific data --

MR. HEBEL: Objection, your Honor. I believe this is far beyond the scope of the witness' expertise.

THE COURT: I agree.

Sustained.

MR. KRAMER:

Q. I just have one last question for you, Doctor. After reviewing this case do you believe that a choking or

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aspiration event was a more or less likely cause of Nakita's injuries and death?

A. I think that as the history offered, I think it can account for the findings in this case. I think it is more likely an explanation than that of an abusive shaking because I have no neck injury. And when I couple that with the current literature, I think that a choking event would be a more likely explanation in this case.

MR. KRAMER: Thank you, Doctor.

Can you hold on for one moment?

THE COURT: Sure.

MR. KRAMER: Your Honor, I have nothing further, your Honor.

Thank you, Doctor.

THE COURT: All right.

We need to break.

We will break until 2:30.

(Whereupon a recess was had by all).

THE COURT: All right. Back on the record. People versus Milton Lemons.

MR. KRAMER: We don't have any further direct examination.

THE COURT: Whenever Mr. Hebel is ready for cross-examination, we'll go with that.

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CROSS-EXAMINATION

BY MR. HEBEL:

Q. Good afternoon.

A. Good afternoon.

Q. Once again I'm just going to introduce myself because we only talked briefly earlier. My name is Dan Hebel. I'm the assistant prosecutor in this case, and I just want to start off by going through some of the preliminary matters and then from there we'll get into your testimony and your Affidavit.

So preliminary matter is we've been having a lot of technical issues today, and just as a preventative if for any reason you don't hear a question that I ask, or you don't understand it, could you please tell me about that.

A. Okay.

Q. So you will let me know?

A. I will try. Yes.

Q. And then the second is please only ask the questions that I ask you, or excuse me. Only answer the questions that I ask you. Is that going to be doable as well?

A. All right. If I wander off, you remind me then.

Q. Sounds perfect to me.

You mentioned that you testified for the

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defense approximately 100 times; is that correct? Some of those were twice in the same case; correct?

A. Correct. Some would be like Daubert Hearings and this kind of stuff, but about 100 times.

Q. And during those hundred times have you ever testified that either shaking baby syndrome or abusive head trauma were the cause of injury or death of a victim?

A. I've never testified that shaking baby syndrome was the cause of death of an infant in any case that I felt was abusive head trauma from blunt force or something else.

The defense attorney did not call me to testify. So the answer to your question is no.

Q. Do you know defense counsel, David Moran?

A. If I do, it does not ring a bell.

Q. Have you worked with him before on any projects?

A. I do not know. I'm not that big with names. I talk to a lot of people. If you can refresh me more than that.

Q. How about defense expert witness Patrick Barnes?

A. Yes. I know, I work with Patrick Barnes.

Q. In what projects?

A. Well, I consulted with him. He served as an expert witness as cases where I have served as an expert witness. He is Chief of Neuroradiology at Kilpatrick at Stanford, and he has taught me a lot about neuro imagining, and he is one of the authors on the choking

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article that we published.
Q. And how about defense expert witness George Nicholas?
A. I know George and interact with him through E-mail. I have met him. Off the top of my head I do not recall having a case with him, unless you know otherwise.
Q. All right. Thank you.
Now one of the things I noticed in your direct, is that you spent a long time talking about the 2009 AAP, which is the American Academy of Pediatrics, the Council on Child Abuse and Neglect. They issued a statement in 2009, and you discussed that at length; correct?
A. Correct.
Q. And one of the things that you talked about was the AAP itself and the mindset shift that the AAP underwent between the 2006 and then all the way to 2009; is that correct?
A. Correct. 2001 to 2009 was a big shift with the articles in between was not specifically directed at abusive head trauma. It was directed at child abuse in general.
Q. And then in 2009 of the things that you discussed was that they took retinal hemorrhaging out of the constellation of abusive head trauma; correct?
A. Correct. With the listing of the compilation of

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findings abusive head trauma is cerebral, spinal and cranial. They did not specifically mention retinal hemorrhages. I don't know what their mindset was, but the reasoning behind, but in 2001 it was fairly clear, and by 2009 it was a noticeable shift in the three findings of three areas they listed.

Q. Now who was the author of that 2009 statement? Who's the primary author? I know that there was an entire committee.

Do you recall the primary author?

A. Yes. The primary authors were Doctor Cindy Christian and Doctor Robert Block in coordination with the whole committee on child abuse and neglect.

Q. Are you familiar with the 2015 statement and publication on this topic made by the AAP?

A. Is that not the one by Cindy Christian from 2015?

Q. Correct. Are you familiar with that?

A. Yes, I am.

Q. And in that particular document do they make clear that retinal hemorrhaging is still within the constellations of injuries that constitute AHT?

A. I would have to go back and read the whole 20 page article. That I think I'm sure they still consider it, retinal hemorrhaging if it's their finding in their cases, but I don't, but it was dropped in the 2009 from

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the "constellation."

Q. So in 2015 if I were to quote from the 2015 document that says "when severe retinal hemorrhaging is identified in a child, the cause is almost always severe trauma, severe head trauma leading to neurologic compromise in brain injury like subdural hematoma. Robust literature supports the association of severe RA and AHT, and although there are medical diseases that can rarely led to extensive RH, there is no published literature that refutes the association of severe RH and AHT."

Would that be a correct statement?

A. Yes, and I have no problem with that statement if I can dissect it for you how I can agree with that.

Q. I did ask for just answers to the question that I was asking not for pontification at this point.

All right?

A. Correct.

Q. So thank you very much for the answer. And I would actually like to go back and discuss a little bit further the statements in 2015 because in 2015 they made a statement directly addressing the 2009 statement; is that correct?

THE COURT: Who is the they you're referring to?

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WITNESS GALAZNIK: You'll have to refresh my memory of the direct statement you're referring to.

MR. HEBEL: Absolutely. Your Honor, I'm referring to the AAP and it's understanding abusive head trauma in infants and children.

And, Doctor, I'm going to take one moment to offer into evidence understanding abusive head trauma in infants and children. I'm going to provide a copy to defense counsel. I'm sure you guys have already seen it. It was in my pleadings.

And, your Honor, if I may approach.

THE COURT: Sure. Are you proposing to introduce it?

MR. HEBEL: I'm proposing to introduce this as People's Exhibit Two.

MR. MORAN: No objection, your Honor.

THE COURT: All right. Two will be received.

BY MR. HEBEL:

Q. And the discussion of that is on page two, your Honor.

Unfortunately Doctor, I cannot just hand you the Exhibit. I wish we were able to do that or something, but it's very difficult without even being able to see each other.

So instead I will read, and I'm sure defense counsel will read along with me to make sure I get the

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quote correct.

A. What page are you reading from if I can ask?

Q. I'll be reading from page two, and probably part of the fourth bulleted paragraph. And the fourth bulleted paragraph is in fact very long. The entire thing relates to 2009.

THE COURT: Mr. Hebel, if I could for the benefit of the doctor if we could identify that on page two, the paragraph of the bullet point paragraph you're referring to is under the page heading of What Is Abusive Head Trauma (AHT). That may be helpful to the doctor.

Q. Doctor, did you hear the Judge, or would you like me to relay it?

A. You'd better relay it because I am not seeing what you're talking about.

Q. The title of page two is What is Abusive Head Trauma AHT, and in that page of the statements I'll be quoting from paragraph number four.

A. Well, first of all, we got a problem because I am holding in my hand the official clinical report from the American Academy of Pediatrics, and part of the evaluation of suspected child physical abuse, it's 20 pages long, and page two does not say what you're saying.

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Q. Then I think we may be looking at --
A. I don't know what you are referring to.
Q. We may be looking at different documents. The document I am holding in my hand was published by the American Academy of Pediatrics, and it's entitled Understanding Abusive Head Trauma In Infants and Children.
A. That's an opinion page. It's not the official clinical report.
Q. And who is it written by?
A. I have no idea who that's written by. It may have been written by Cindy Christian, who is the author of the official clinical report for guidance and rendering pediatric care I am looking at.
Q. The authors of this are, it says authors based on AAP, and this is on page one at the bottom of this particular document that I'm referring to.

Based on AAP policy and the most up-to-date research on this issue, this research was developed by Doctor Cindy Christian, and this is the piece that is published by and put out by the American Academy of Pediatrics.

The official statement is something separate, at least the statement that you are referring to.
A. Yes, I am familiar with and rely on the official statement. I'm willing to try to engage what you are

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referring to, but it's not the official statement that carries the weight of a position statement, but go ahead.

Q. This 2015 piece published by the AAP says the goal of the, and this is referring to the 2009 statement.

"The goal of the statement was not to distract from shaking as a mechanism of AHT, but to broaden the terminology to account for the multitude of primary and secondary injuries that result from AHT, some of which contribute to the often permanent and significant brain damage sustained by abused infants and children.

This policy statement has been mischaracterized in subsequent legal and medical literature and in court testimony to suggest that the AAP no longer recognizes shaken baby syndrome as a legitimate diagnosis?

On the contrary the AAP reinforces the fact that shaking is an important contributor to abusive head injuries and that shaking baby syndrome is a subset of AHT."

Would you agree that that's the AAP's position?

A. I don't disagree with that, but again I would have to explain to you how I can agree with that and still hold

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fast by my testimony, but I assume I'll do that during redirect.

Q. That would be correct. And quite frankly all I am interested is that you acknowledge the contrast?

A. Okay. I acknowledge the contrast given that my reservations or my position is noted.

Q. Your position is noted.

Would you agree that also in that statement the AAP made sure it was obvious the constellation included, and I quote, and I'm going to have to go to the page for those of you who have the document.

I'm looking at page five. Page five discusses specifically retinal hemorrhages.

Pardon for the delay. I'm looking at two different documents than the ones that I was originally looking at.

I'm going to skip over that question. We can get it later on.

I would like to actually turn to right now your Affidavit, which you were kind enough to provide ahead of time which had numerous citations.

A. If I can get to it.

Q. Absolutely. Tell me when you have it, and we will be ready to go at that point.

A. I was provided a binder. Is it in the binder with a

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tab number?
Q. It is not in the binder unfortunately.
A. Okay. Then I'll see if I can find it somewhere else. Here it is. I believe I'm holding a copy.
Q. All right. I would like to direct your attention to point 20 and 23.
A. Yes.
Q. And there you indicate that Wolfson Study predicted that there would be little developments in the area of confrontational modeling beyond training biomechanical model and computer modelling.
A. By 2005 it would probably in the future. Okay. Yes the conclusion was if you make a better model, you will not get higher levels of professional acceleration, deceleration.
Q. And would you agree that Wolfson specifically warns against using the models that were derived such as his, and Prange's and Duhaime's that were derived from this specific, the same monkey injury model study that was done, and he said, and I will quote that article from Wolfson:

"Conversely in SBS the head is subjected to cyclic low energy loading without impact. In essence by using these criteria SBS is studied as a single impact and any effects of cumulative loading are

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ignored. Although more suitable criteria based on cyclic loading are not available, it is inappropriate to apply current injury criteria scaled or otherwise to the syndrome."

Would you agree he said that?

A. It sounds like something he would say, and I agree with what he said because our cyclic studies have come after 2005.

Q. Oh, what study?

A. If you go to my Rashon, 2009, Lloyd, 2011, are the human data that we have, and if you go to the biomechanical studies.

Q. I'm actually going to slow you down a little bit, and the 2005 study was by who?

A. The 2005 was the Wolfson you were quoting to me.

Q. Did you say 2009? I must have misheard.

A. 2009 was the Bushon study. 2011 was the Lloyd study, and then what you have at this specific eye study of cyclical motion, which be the Finnie, 2010 and the Finnie 2012 and quite specifically that then involved Cindy Christian, 2016.

Q. And the Doctor Bennabon that was the animal model to set retinal hemorrhages in a none impact brain injury. That was one of those Doctor Bennabon's?

A. Yes. His 2010 was a single acceleration, deceleration.

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His 2016 in corporation with Cindy Christian was a typical study.

Q. She gets around. Do you know any of her credentials by any chance?

A. Yes. She is a board certified pediatrician. She's a child abuse expert, and she is the author of probably or co-author of all of the last five or so position statements relevant to this area.

Q. All right. Are you aware of well, first of all do you know or have you heard of the Journal of Biomechanics?

A. I'm not sure. I don't remember the journal title specifically. I know the Journal of Forensic Biomechanics. I don't know which journal you're specific referring to. Are the articles that you are concerned about, can you tell me the articles you are concerned about in particular?

Q. Yes. I have a particular article that I would like to ask you if you had a chance to review, and that is biomechanical studies in Ovine Model of none accidental head injuries by W.G. Anders et al., a 2014 article?

A. I'm not familiar with that. Doctor Anders is a child abuse pediatrician, and The Ovine Model that I'm aware of is the Finnie 2010 and 2012 I referred to.

Are you sure that's not responding to the Finnie 2010 and 2012?

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Q. This is its own Ovine study, and it actually concludes the exact opposite that the animal models do support subdural hematomas based on shaking alone.

So I'm actually going to move to offer this into evidence as I believe People's Exhibit Four.

So, Doctor, if you will just give me one moment. I'm going to -- I can't give you this one. That one. They are all the same, just that one is not marked. And I'm going to offer that into evidence.

MR. KRAMER: No objection, your Honor.

THE COURT: All right.

MR. HEBEL: Your Honor, may I approach?

THE COURT: All right. Four will be received.

Yes. Absolutely.

BY MR. HEBEL:

Q. I'm going to move to point number 24 now.

You were one of the co-authors of the jump-a-roo study with John Void, and that you cited that; correct?

A. Correct.

Q. And that was actually the one that you described that you went into the biomechanical lab and all that which actually was very interesting to me, but that's the one you were discussing; correct?

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A. Yes.
Q. And just so that we're all on the same page because honestly I had no idea what a jump-a-roo was. That's all about to change in October when, you know, my dependence status changes. But for now I had no idea what a jump-a-roo was.

So we're on the same page. A jump-a-roo is a device where children are old enough to hold up their own head but not quite old enough to walk, can sit in, and they kind of bounce on their feet; correct?
A. Correct.
Q. And those devices are used starting from four to 12 months; correct?
A. Correct.
Q. So since Nakita is not, she was 2.5 months old. Now I know you're making a point, but would you agree that the jump-a-roo age range is different from the victim in this case?
A. Oh, yes. That was not my point, but yes. A two and a half month old would not be in a jump-a-roo.
Q. Let's also go to the citations from the Bushon and Daniels' studies. One is jumping rope, and the other is use youth football impacts; right?
A. The Bushon is the jumping rope. The Daniel 2012 is the football.

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Q. And in both of those the children that would be in those studies would be nowhere near 2.5 months; correct?

A. That's correct.

Q. Let's jump to point 25. Now this is a very serious point claiming that shaking cannot cause subdural and retinal hemorrhages without first causing a structural failure of the neck.

You didn't provide any citations on that point. What's your authority to that?

A. Let me read it, but let me.

Q. Point 25.

A. Let me read it. My point 25 says biomechanical studies predict that even if the adult could shake an infant of Nakita's size, that the force required to cause primary subdural bleeding and primary retinal hemorrhage, there would first be a structural failure of the neck and spine.

The biomechanical studies I would rely on that would be Carol Jenning's data where shaking of an eight pound model, she was getting nine G's of linear acceleration. And then if you extrapolate that to the study, they look at the strength of the infant's neck, which I believe is Luck's finding, 2006, I believe.

Q. Can I have that one again. It got a little garbly.

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A. Luck was the lead author on an article where they actually got infant's necks and stretched them to the point of failure, I believe it was 2006.

There is also I think a prime 2000, there is another article where the auto industry predicts neck failure before head injury, but I don't have the citation on that.

Q. I'm going to jump down to point number 27. This one I'm actually going to have to refer to that. You say that each bridging vein is expected to carry a blood flow of five to 10 millimeters per minute.

What's your citation of authority on that statement?

A. That again becomes an extrapolation because the blood flow to brain tissue is 50 cc's of blood for every hundred grams of brain, and an infant brain like Nakita's brain was 600 grams. That's per minute, and there is about 15 to 20 bridging veins to the superior sagittal sinus. This is a mathematical calculation.

I'm getting a lot of feedback from your end.

Q. Doctor, you were sounding great over here. We can hear you loud and clear.

A. I won't worry about the feedback then.

From the one predicting then at least 300 cc's of blood per minute to the infant brain, and if

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even half of that blood were going through the bridging vein to the superior sagittal sinus, you would get a number of five cc's of blood per minute.

I don't have the reference at my finger tip giving me that 50 cc's of blood per hundred grams of brain, and the 15 to 20 bridging veins to the superior sagittal sinus. It's just anatomy.

Q. So would you qualify that question as a question in general pediatric medicine, or is that really a biomechanical question?

A. The number of bridging veins from brain to the --

Q. Not the number. I'm specifically talking about the five to 10 millimeters per minute. That's really a calculation not a medicine question.

A. That's not a biomechanical calculation. That is a medical psychology question.

Q. Okay. Let's stay on point 26 and 27. And this is one of those areas where I would just like to make sure that we are both on the same page.

In 26 and 27 you discuss and also in your testimony you discuss how much bleeding there should have been in the child's brain if a bridging vein was torn from shaking; correct?

A. Yes. I would phrase it that in cases that I know mere surgery documented a torn bridging vein there was

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substantially more blood than that.
Q. In the brain, the bridging veins flow into the superior sagittal sinus; is that correct?
A. Yes.
Q. And in layman's term the bridging veins are the smaller veins that flow into the large vein, and the large vein is at the very top of the head, and it essentially covers all the front to the back with the single vein, which is the, as we called it earlier the superior sagittal sinus; correct?
A. Correct. The superior sagittal sinus is a triangulated structure within the dura. It starts in the middle of forehead, goes completely over the top of your head, hits the back of your head where it bifurcates into the right and left transverse sinus, and then each of those ducts, veins would take the blood back to the heart.
Q. Exactly. And one of theories of subdural hemorrhaging from shaking baby syndrome is that a bridging vein or veins are torn through the shaking.

Is that your understanding of the theory; is that correct?
A. That's my understanding of the traditional shaking hypothesis, yes.
Q. It's your conclusion that there would have been more subdural blood if one or more of these bridging veins

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were torn; correct?
A. It's my conclusion that in cases I've seen where a torn bridging vein is documented, there is substantially more blood.
Q. And one of other things that you also talked about was that swelling to the brain was the victim's ultimate cause of death in the case; correct?
A. That's not totally correct. What I testified to was that I think the cause, the primary cause of death was eventually the brain for lack of oxygen. I think the brain was basically dead, at least by the time the child got to the hospital, and the swelling then coming on as a rapidly, a product of the brain injury from lack of oxygen.

I think I agree with what you're saying. I just, the brain is definitely swollen. The brain was definitely dead.
Q. Okay. So we're on the same page. The brain was definitely swollen?
A. Okay.
Q. All right. I'm going to jump to points 35, 39 and 40. These points make the claim that the subdural hemorrhages and retinal sheath hemorrhages can be caused by a choking aspiration event.

And just so that we are on the same page, you

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agree that the victim did have subdural hemorrhaging; correct?
A. I agree the autopsy found 15 cc's of subdural hemorrhage, yes.
Q. And the victim had retinal hemorrhaging?
A. That was documented in the autopsy, yes.
Q. And the victim had had retinal nerve sheet hemorrhaging?
A. Correct.
Q. Now as a definitional matter, aspiration is the inhalation of foreign bodies into the lungs; correct?
A. Or the irritation of the larynx. That the larynx slams shut without, and stuff does not necessarily have to get all the way into the lungs.
Q. Formula contains milk and other ingredients?
A. Yes.
Q. Formula would constitute a foreign body; correct?
A. Yes.
Q. Death from aspiration causes a condition called Hypoxic-Ischemic Encephalopathy; correct?
A. Yes.
Q. And that's basically a fancy medical term for lack of oxygen to the brain for all of us lay people; correct?
A. Correct.
Q. And this is the same final cause of death when a child

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dies from SDS, choking, drowning intentionally or accidental suffocation, asthma; et cetera; correct?

A. Correct.

Q. It is also what you described as brain lethal hypoxic insult; correct?

A. Correct.

Q. Now points 35, 39 and 40 give no citations, any authority for the proposition that subdural hemorrhages and retinal sheath hemorrhages can be caused by choking.

What studies support that?

A. Well, in my direct testimony I pointed out that the choking simply gets to Hypoxic-Ischemic brain injury. The development of those findings and my position is a secondary phenomenon that comes on afterwards.

I contend that the moment of the choking itself is what causes retinal hemorrhaging and causes subdural bleeding. What I'm saying is theory of the death, the hypoxic event injures the brain, and then anything that causes a hypoxic event to the brain causes the brain to start swelling and the pressure to go up and the increased pressure causes the rectal hemorrhaging.

In terms of reference, that increased intercranial pressure is a recognized cause of retinal

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hemorrhaging.

I would start with Walls, 1951, Mere,1974, Mickie's textbook of child neurology through eight editions, drowning, Roper's textbook of adult neurology, Albert's text book of ophthalmology, Gall's 2003 as a case report, and I will also then cite the Mena 2011 that we mentioned during the direct examination.

Q. How do you spell Mena?

A. M-E-N-A.

Q. Perfect. We'll, look at them.

Do you know of any studies that show a consistent correlation in numerous infants between aspiration and both subdural hemorrhaging and retinal hemorrhaging?

A. No, I do not. But remember we're talking about an event to get you to brain death and then subsequent finding after that.

Q. That wasn't my question. But I do appreciate the answer that you did give to my question.

So there is no studies that directly link aspiration, but let's jump to HIE because specifically HIE, and I'm going to state it that way from now on. I already showed I couldn't pronounce it once, and I don't want to embarrass myself in the future, but HIE.

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There are hundreds or even thousands of child deaths annually caused by HIE. Do you know of any studies that have studied numerous infants to see whether there is a causal relationship between subdural hemorrhage and HIE?

A. The Coral Mack literature, the Shonberg literature addresses of a finding of interdural bleeding in infants who died from lack of oxygen. There is also an animal study out there, Howser, 2001 where they exhibit asphyxiated modus in a chamber of CO2. So they were not traumatized. They were simply asphyxiated by CO2 or lack of oxygen, and at autopsy they had bleeding in the dura.

Q. That's Howser, 2001?

A. Yes.

Q. And you were also speaking of the Max and Shonberg literature?

A. Yes.

Q. That's from what year, sir?

A. Goodness probably about I think 2009 on, but I can't put my hand on it right off.

Q. All right. Have you heard of the Journal of Pediatric and Developmental Pathology?

A. I don't remember the journal names, but if you are referring to an article in it, I might be able to bring

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up the article that you're referring to.
Q. All right. This particular article that I'm referring to is entitled The Lack of Evidence For Causal Relationship Between Hypoxic-Ischemic Encephalopathy and Subdural Hemorrhage in Fetal Infancy and Early Childhood. It's by Roger W. Byard, et al.
A. Byard?
Q. Byard, B-Y-A-R-D.
A. Correct. I'm not familiar with that article right off.
Q. We're going to pause, and I'm going to do the intro into evidence once again. Copy to the defense.

MR. HEBEL: The People would ask to present this article into evidence, People's Exhibit Proposed Exhibit Six.

THE COURT: Any objection?

MR. KRAMER: No objection, your Honor.

THE COURT: All right. It will be received.

BY MR. HEBEL:
Q. Since you are not aware of this, this one studies 82 infants deaths died of hypoxic incidents, and in none of them were found subdural hemorrhaging. In the one there was found an intradural hemorrhage. Originally it was diagnosed as a slight subdural and found out that that was inaccurate.

The author's conclusion was obviously that

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there was no causal connection. So that is opposite to your theory. But obviously we can't discuss it because you don't have it yet.

So let's go ahead and go on.

With your discussion about the differences between 2006 and 2009 stance and the different types of diagnoses that could have resulted other than child abuse, you would agree when I'd say that it is important to look at the totality of the circumstances in a case like this; correct?

A. Yes, I agree if you're trying to get to a final diagnosis.

Q. And you're required as an expert witness to provide information without any bias towards either party or position; correct?

A. Correct.

Q. You're obligated to tell the truth about the current beliefs of the scientific community and not to mislead by any act or omission; correct?

A. Yes. I'm obliged to present my beliefs if I can support it with current literature. Now I'm not, and you're saying I'm required to echo the person with the person with the American Academy of Pediatrics.

Q. I'm certainly not requiring or asking that you be a parrot. I'm just asking if you're aware that there are

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numerous professional organizations that disagree with your opinions on subdural hemorrhaging, retinal hemorrhaging and just the shaking baby syndrome in general; correct?

A. I'm aware that is a controversial area, and there are those that disagree.

Q. That wasn't my question. You're aware of numerous professional organizations that disagree with your opinions that you presented here; correct?

A. Yes. I think I am.

Q. All right. Further questions on the totality of the circumstances include the facts of this specific case.

You did review this case; correct?

A. I reviewed the medical records in this case and the imaging.

Q. You also reviewed the transcripts of this case; correct?

A. I reviewed the transcripts of the medical examiner, and I don't remember how closely I may have reviewed the interrogation of the defendant. I got this case first in 2015, and it has been two years. I've not reviewed anything of those recently, but if you want to question me, you need to refresh my memory.

Q. That's perfectly fine. We're not going to go that far back. Did you ever interview the defendant in this

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case?
A. No.
Q. I notice in your Affidavit that you never discussed the defendant admitted to shaking the victim at a seven out of ten, where 10 was the hardest shake and that the victim stopped responding immediately after shaking.
You didn't discuss that in your Affidavit at all; is that correct?
A. Correct.
Q. And the fact that the defendant admitted to roughly shaking the victim did not merit discussion in your Affidavit and the Court; correct?
A. Correct. Because in my opinion I commented this from what's in the medical records. That was not in medical records, and then I find again public literature, and my role is then to say even if a shaking --
Q. That wasn't the question.
THE COURT: Let him finish.
BY MR. HEBEL:
Q. You can go ahead and finish.
A. Okay. The trouble with the shaking is number one how effectively can it be quantitated, how appropriate was the interrogation, and if it was there, does it explain the findings. And I'm in no position as a reviewer of these records and these cases to provide opinion as to

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the believability of the quote a confession or its implication. I come at this from the medical records and from the history provided to the doctors, through the doctors.

And in this case the history that I found important was what was offered to the 911 operator, offered to the first ER and then to the second hospital.

Q. So basically what you're saying is it's your job to decide which statements of the defendant are useful for your position. Because you just told me that the 911 statements were relevant when he said one thing happening, but when the defendant said shaking, that one was irrelevant. So you made the determination right there what statements were important or not?

THE COURT: That's several questions, Mr. Hebel.

WITNESS GALAZNIK: I think you're mischaracterizing what I said because I, like the 911 statement and the first ER statement because allegations of abuse and suggestions of how that abuse might have occurred have not yet been made. Once the --

Q. The Judge asked me to break down that question because he felt that that was too many questions, and quite

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frankly he was right.

So, I'm going to go ahead and withdraw that question, and I'm sorry if it has caused any confusion. But maybe I can make it really simple. Just ask one simple question. It should be very easy. The fact that the victim stopped responding immediately after shaking doesn't actually change your view of what happened; is that correct?

A. It doesn't change my testimony.

Q. All right.

A. But remember, I am not here to swear this is or isn't abuse. I'm here to say that the findings in this case are consistent with a history of a choking event, and the clinical unfolding I find in the medical records. And I'm here to say that the current medical literature in this case would in my opinion not support shaking in the absence of demonstrated neck injury in this case.

I am not here to tell you this is or is not abuse. I'm not here to tell you for sure exactly what happened. I'm here to tell you what the findings I see in this case in my opinion coupled with the current literature would support that it could all have occurred as a choking event as originally offered.

Q. At this point I think you have answered the question significantly more, and I get the impression that the

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defense is going to want to ask a bunch of questions on redirect so you can explain further then.

But right now I have no further questions at this time.

THE COURT: All right. Mr. Kramer.

REDIRECT EXAMINATION

BY MR. KRAMER:

Q. Hello, Doctor Galaznik.

A. How are you?

Q. I'm doing well.

How about you?

A. We're fine.

Q. So the prosecution just brought up some articles discussing retinal hemorrhage in AHT cases.

Can you clarify the distinction between SBS and AHT?

A. Absolutely. That's the problem. If it is shaken baby syndrome applies a specific mechanism injury which is abusive shaking, and as hypothesized in the 2001 position statement, and as rapidity rotational acceleration, deceleration.

In 2009 given the challenges to the pure shaking hypothesis and the emergence of cases of blunt force and other causes causing the finding, the American Academy of Pediatrics recommended that term

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not be used because it implies that specific mechanism injury, and to call it shaken baby syndrome and apply that specific mechanism injury was becoming, was detracting in court because the defense was demanding that that mechanism of injury be defended as valid.

And therefore they recommended a broad term, abusive head trauma, to be inclusive of all mechanisms of injury by which an abuser could cause head injury in a child, it is none specific.

And the problem with that is that when they start writing subsequent articles and start writing subsequent position statements using the term abusive head trauma to be inclusive of all mechanism of injury not specifically the abusive shaking mechanism, then we don't know what they are talking about, and they become very general.

One example I frequently use with every attorney I talk to and in court is to call a case abusive head trauma none specific for mechanism of injury is the equivalent of an adult murder trial where the prosecutor comes in and says we found a dead body in the ditch. We don't know if it was shot with a gun, stabbed with a knife, beat to death or strangled, poisoned or suffocated, we simply know he's dead. We say the defendant did it.

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The defense says he couldn't have shot him because there is no gun. They say, well maybe he stabbed him. The defense says, but there is no hole in body. The prosecutor says well, maybe he was beat to death with a club. The defense says --

MR. HEBEL: Your Honor, objection.

MR. KRAMER: Sorry, Doctor, we have an objection.

THE COURT: I think this is a speech.

MR. KRAMER: I'll move on, your Honor.

BY MR. KRAMER:

Q. Doctor, we're going to move on.

The prosecutor just mentioned a 2015 AAP article that claimed that there was severe retinal hemorrhages were associated with shaking. Were there documented severe retinal hemorrhages in Nakita's case?

A. To my knowledge no, and what the prosecution offered was it associated with the baby's head trauma or associated with specifically with shaking. I'm a little fuzzy at this point.

Q. It was abusive head trauma?

A. Correct. That's the point. I believe you can slam a head on a table abusively and cause massive subdural bleeding and brain swelling and have massive retinal hemorrhages, but that's not shaking. That is an impact

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abuse, as that's the problem with the term abusive head trauma specifically.

THE COURT: Let's have a question.

BY MR. KRAMER:

Q. Doctor, I'm going ask one last question. In 2006 did the AAP believe that any retinal hemorrhages regardless of severity were indicative of shaking?

MR. HEBEL: Objection. Beyond the scope of this witness' knowledge.

A. My opinion, my basis for that --

THE COURT: Hold on.

MR. KRAMER: Doctor, can you hold on?

Your Honor, it is the position of the AAP as of 2006 Doctor Galaznik is a certified pediatrician. He's a member of the AAP and has spoken to the position statements issued by this body.

MR. HEBEL: There's a difference between position statement and beliefs.

THE COURT: Rephrase the question.

If you want to ask about what the official position is, I'll take that answer.

BY MR. KRAMER:

Q. Doctor, I'll rephrase the question.

In 2006 was the AAP's official position that any retinal hemorrhage regardless of severity were

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indicative of shaking?

A. In 2006, the 2001 statement was in effect, and the 2001 statement did not quantify the distribution of number of retinal hemorrhages. It simply included it as the constellation along with subdural bleeding. So I think my answer to your question is that was, I have to accept that that was the mindset of that time.

THE COURT: Is that a yes?

MR. HEBEL: Objection, your Honor, because the witness used the term that was the mindset at the time. That's beyond the scope of this witness' knowledge what the mindset of all pediatricians and for that matter pathologists was.

THE COURT: Mr. Kramer, I'm going to strike that portion of the answer. If you want to ask it again, I think that if you want to elicit what was the Academy's position in 2001, 2006, 2009, et cetera, that's fine.

But I think when we start wandering into the issue of what were mindsets, that's kind of getting off course. So if you want to circle back and try again, I'll let you do that.

BY MR. KRAMER:

Q. Doctor, can we just keep to a simpler answer of a yes or no and stick to what the AAP's official position was

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versus a mindset at the time of trial.

Would you like me to re-ask the question?

A. Yes.

Q. At the time of the trial in this case in 2006 was the AAP's official position that retinal hemorrhaging, regardless of severity was indicative of shaking?

A. Yes.

Q. Thank you, doctor.

The prosecution mentioned a study by Byard which found that no evidence correlating HIE with subdural hematoma. That was published in 2007. Have there been any advances in the field since 2007?

A. Yes.

Q. Could you please briefly summarize those advances?

A. I would be fighting the work Square, Mack, Shonberg and Cohen, and I do not have those references at my fingertip, but the publications came after 2007.

Q. And did cases show a link in HIE and subdural hematoma?

A. They were documenting bleeding in the dura with some extravasation into the subdural compartment.

MR. KRAMER: Can I have a moment, your Honor?

THE COURT: Sure.

BY MR. KRAMER:

Q. Doctor, I just have one last question for you. While I think we all agree that a child in Nakita's age

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probably wouldn't be playing peewee football, or jumping rope or being in a jump-a-roo, how are the studies discussing those still relevant issues of this case?

A. Because they show that at least we human data that levels of rotational acceleration in excess of what could be generate with abusive shaking is apparently producing no injury, and that's as close as to the two and a half month old crowd as we currently have data, and the corollary of that. Then do we have data, experimental data, that the level of rotational acceleration that could be generated in abusive shaking does cause the injury, and the answer to that is no pretty much.

But the best data we got, and it can be presented because it has to be dealt with. There is no experimentally demonstrated data that the level of rotational acceleration, deceleration that can generate an abusive shaking would be cause, could be predicted to cause primary brain injury and or primary retinal hemorrhages in a previously normal infant or child.

MR. KRAMER: Thank you, Doctor.

Your Honor, I have nothing more.

THE COURT: Mr. Hebel?

MR. HEBEL: The People have no further

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questions as well.

THE COURT: All right. Thank you.

Let me see counsel at sidebar.

MR. KRAMER: Thank you so much, doctor. We're going to hang up right now.

WITNESS GALAZNIK: Before I hang up, can I say something?

THE COURT: No. No.

MR. KRAMER: Sorry, Doctor.

THE COURT: We will be in recess until the 19th.

Let me check. I'm going to check with the jail, and if they do a fast turn-around on a writ, I will send your client back.

What's the facility?

MR. KRAMER: Carson City, your Honor, Regional Facility.

THE COURT: Yes. That's north of Lansing.

(Matter concluded).

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06-4818, People versus Milton Lee Lemons.

Both sides ready to resume?

MR. HEBEL: Yes, your Honor.

MS. PLUMMER: Yes, your Honor.

At this point we're going to call Doctor George Nichols, and student attorney Andrea Scanlan will be doing his direct examination.

THE COURT: All right. That's fine.

We'll swear Doctor Nichols in first.

Doctor Nichols, can you hear me, sir?

WITNESS NICHOLS: Yes, I can, your Honor.

GEORGE R. NICHOLS,

called as a witness by the Defense, having first been duly sworn by the Court Clerk, was examined and testified upon his oath as follows:

DIRECT EXAMINATION

BY MS. SCANLAN:

Q. Good morning, Doctor Nicholas. Can you hear me all right?

A. Yes, just fine.

Q. Thank you.

Could you please state your name and spell your last name for the record?

A. I'm George Riley Nichols. N-I-C-H-O-L-S, the second.

Q. And can you spell your last name?

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A. N-I-C-H-O-L-S.
Q. Where are you testifying from today?
A. 6013 Brownsboro Park Boulevard, Suite A, Louisville, Kentucky, 40207.
Q. Doctor Nichols, what is your profession?
A. I'm a physician, a consulting forensic pathologist.
Q. And what does a consulting forensic pathologist do?
A. Well, the usual activities of a forensic pathologist, but I am asked to do an investigation or evaluation of the matter dealing with forensic pathology issues generally by orders, sometime by families, sometimes by interest groups, but that's what we do.

Forensic pathologists, the vast amount of their professional time is spent in an attempt to determine, if possible, how a human being goes from alive to dead.

Q. During Nichols, can you summarize your education?
A. Certainly.

I graduated from the University of Louisville undergraduate school with a BA in of all things American History in 1968.

Following that I completed four years worth of medical education also at the University of Louisville, graduating in 1972.

Following that I pursued training in the

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specialty of pathology from 1972 to '76, also at the University of Louisville, affiliated hospitals.

1976, '77 I completed a Fellowship in forensic medicine at the Institute of Forensic Medicine, Toxicology and Criminalistics in Cincinnati, Ohio.

Q. Are you presently licensed?

A. Yes, Ma'am. I'm licensed in the states of Kentucky and Ohio.

Q. And do you have any professional certifications?

A. Yes. I am certified by the American Board of Pathology in three fields of medicine. First is anatomic pathology. This is the structure of the organs, the cells and the tissues of the body and how that relates to disease or to health.

Clinical pathology. This is basically the study of human biologic fluids and how that relates to disease or to health. Clinical pathologist is the doctor who is in charge of the laboratory or the blood that's taken through your arm is sent and is tested, and last I'm certified in forensic pathology.

Q. Doctor Nichols, do you hold any teaching positions during your career?

A. Yes. For 40 some odd years I was a member of the faculty of the University of Louisville either as a

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clinical faculty member or a part-time faculty member ending at the level of clinical profession.

Q. Did you hold any leadership or board positions in the field?

A. Well, I was the Chief Medical Examiner For the Commonwealth of Kentucky for 20 years and two months serving at the pleasure of six consecutive governors.

I have on two occasions been a board member of the National Association of Medical Examiners, and for one year when I missed a nominating election meeting, I became the President of the State Society of Pathologists.

Q. So you said you served as Chief Medical Examiner. How many autopsies would you estimate you've conducted in your career?

A. I quit counting at 5,000. So somewhere above 5,000. The last one I did was yesterday.

Q. And how many of those would you estimate were infants?

A. That are estimated infants, at least more than a hundred.

Q. Doctor Nichols, you also started a clinical pathology cross training program as a medical examiner?

A. Clinical forensic medicine cross training program as opposed on clinical pathology. Clinical forensic medicine is the study of injured people or people who

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are allegedly injured in an attempt to scientifically determine if the injury is real. If it is real, how long it has been there, and of what legal significance the injury is to the court system. It's called police surgeons in the rest of the English speaking world.

Q. And what is purpose of that program?

A. Well, it was to, it was established to train emergency physicians and pediatricians primarily in injury evaluation. Very few physicians are actually well trained in injury causation. The most physicians are, the thrust of their training is to make an assessment of an injury, formulate a plan to evaluate the extent of the injury and formulate a treatment plan and repair the injured, not how did the injury come to be.

Q. Doctor, you published 24 articles on the subject of forensic pathology; is that right?

A. Yes, Ma'am.

Q. And two book chapters?

A. Yes, Ma'am.

Q. And about how many presentations or speeches have you given?

A. I have no idea. I quit counting a long time ago.

Q. Doctor Nichols, how many times would you estimate you have been admitted as an expert during your career?

A. In trials over a thousand for sure.

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Q. And how many of those times were you admitted for the prosecution?
A. The vast majority in the first 20 years that I was a forensic pathologist. Since I have become a consulting forensic pathologist, the majority is for the defense in criminal actions.
Q. And in which fields have you been qualified as an expert?
A. Forensic pathology, issues dealing with impairment, intoxication due to drugs and other chemicals, including Ethel alcohol and injury causation analysis.

MS. SCANLON: Your Honor, I will note for the record the CV dated July 13th, 2016 has been stipulated for court admission and marked as Defense Exhibit Three.

We would move to admit that at this time.

THE COURT: Mr. Hebel, any objection?

MR. HEBEL: No objection.

THE COURT: All right.

It will be received.

BY MS. SCANLON:
Q. Doctor Nichols, the only change in the intervening months since July, 2015 is that you are no longer teaching; is that correct?
A. That is correct.

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Q. Doctor Nichols, how did you become familiar with this case? Were you contacted by the clinic?
A. I was contacted by a student lawyer from the Michigan Innocence Clinic.
Q. When were you contacted?
A. I received a telephone call sometime before I received written materials. I had no idea exactly when I was called. I do not track telephone calls. I received written materials beginning on the 20th of October, 2015.
Q. Doctor Nichols, can you repeat the date again? We lost you for a moment.
A. 26th. Excuse me of October, 2015.
Q. What materials did you review?
A. Well, I began that on that date I received the records of Wayne Police Department, medical records from Oakwood Hospital and Medical Center in Dearborn. Medical records from the University of Michigan, City of Wayne Fire Department incident report, Emergency Medical Service, Life Flight records.

Records from the office of the medical examiner, including autopsy report 05-627.

I also received on that same date testimony of Doctor Bader Cassin, testimony of Lori Ann Lemons, testimony of Pamela Ann VanMeter, testimony of Rene

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Zupta, I guess. Transcript of the 911 call and a CD containing hospital radiographic images.

On the 28th of October I received four autopsy slides, one of which was unstained.

On the 23rd of November, 2015 I received 13 autopsy slides from Medical Examiner 05-627 labeled one through eight and A through E. Slide Number Six was received broken, which was repairable, and I could examine.

On the 7th of December, 2015 I received a certificate of death, a redundant autopsy report, a medical examiner's office investigation report, AIT toxicology reports.

On the 18th of December I received images from Doctor John Galaznik.

On the 29th of December, 2015 I received a report from Doctor Patrick D. Barnes.

On the 7th of February 2017 I received the defendant's motion for relief from judgment.

On the 4th of April 2017 I received a binder that contained Doctor Galaznik's Curriculum Vitae, Doctor Barnes' Curriculum Vitae and Doctor Nichols' CV.

A copy of the SBU Assessment, 2016.

Thereafter noted the Swedish Report. The birth records of Nakita Lemons, the 911 call

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transcript, Emergency Medical Service records, Wayne County Police Department narrative report, and handwritten statements from Milton Lemons.

The Oakwood Hospital medical records, the University of Michigan medical records, the Life Flight records, the medical examiner's investigation and autopsy report, chest X-ray, head CT, skeletal survey, images of autopsy slides.

On the 18th of April 2017 I received my final Affidavit.

MS. SCANLON:

Q. Thank you.

Are these the kind of materials that pathologist would use to review a case such as this one?

A. Yes.

Q. Were those materials adequate for you to evaluate the cause of death in this case?

A. Yes.

Q. Were you able to come to an opinion about the cause of death in this case?

A. I did.

Q. Doctor Nichols, do you believe you have knowledge and standards in your field in a reliable manner to the facts in this case in formulating your opinion?

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A. That would certainly be my attempt. Yes.

MS. SCANLON: Your Honor, at this time we move to admit Doctor Nichols as an expert in forensic pathology.

THE COURT: Any voir dire or any objection, Mr. Hebel?

MR. HEBEL: No objection to the expert being qualified in forensic pathology as an expert.

THE COURT: All right.

He will be recognized as such and can give his opinion.

Go ahead, please.

MS. SCANLON: Thank you, your Honor.

BY MS. SCANLON:

Q. Doctor, you've seen many cases involving infant injury or death. Are you familiar with the medical diagnosis about shaken baby syndrome?

A. Of course.

Q. Are you familiar with the current literature of shaken baby syndrome?

A. Yes. Now known as abusive head injury or none accidental head trauma, yes.

Q. Does that literature include biomechanical research?

A. Yes.

Q. From your perspective as a medical examiner and

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forensic pathologist, can you explain briefly what the shaken baby syndrome hypothesis is?

A. Well, the theory is that an adult, or I guess a minor of adult stature can grasp an infant by the chest, or I guess maybe by the arm and vigorously shake the child back and forth.

The motion that is produced is sufficient to cause tearing of veins that run from the upper surface of the brain through the dura, which is the outer membrane over the brain to enter into a big vein called the superior sagittal sinus. The rupture of the bridging vein results in bleeding into a potential space within the head called the subdural space.

There is a bleeding in the subdural space, which is associated with damage, functional damage to the brain with alteration in mental status and also the finding of retinal hemorrhages. So that's the triad that composes SBS. Subdural bleeding and encephalopathy of some type and retinal hemorrhages.

Q. Doctor, does your understanding of the current literature support the hypothesis that the triad can only be caused by abuse?

A. There are certainly reviews that state that that is not correct. That there are other causes of the triad to occur that are unrelated to shaking.

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Q. Doctor Nichols, have you ever concluded during your career as a medical examiner that shaking was a cause of an infant's death?

A. Of course. Early on it was the conclusion in which the triad was there. I actually used as a part of reviewing records SBS as a diagnosis for the first time in the history of this state in 1983. The deceased was Amanda Carroll. She had the triad. So I made a diagnosis of shaken baby syndrome, but she also had impact injuries to her head resulting in a skull fracture, scalp contusion and primary brain contusion.

So she was impacted, whether she was hurled, thrown or beaten, I can't tell you the instrumentation, but that was in my opinion what actually caused the triad to be present.

Q. And has your position on the shaken baby hypothesis evolved over time?

A. Absolutely. It was an almost religious canon if we found that the triad alone, that it had to have been caused by shaking is the only explanation. That's no longer my position.

Q. When did your position change?

A. It began to change when I was seated with the Commonwealth Attorney listening to the testimony of a forensic pathologist concerning a surviving child who

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had a head injury, including the triad, and the other pathologist testified that the injury that occurred resulted in the triad was not due to shaking. It was rather due to a short fall, and he quoted authors that I never heard of.

He referenced papers that I had and journals I never even seen, and this is at the very end of my career as the medical examiner. I began to eventually collect literature concerning shaken baby syndrome and other injuries to the head and spent quite some time learning the literature and having to relearn enough physics so that I could basically at a minimal level understand what the biomedical engineers were trying to tell me or tell themselves.

I had to learn at least part of a new language so that I could understand an entirely new hypothesis. So that's when it began to change, and there were a series of events that happened. That probably the most seminal was the publication of a paper by Donohoe in the American Journal of Clinical Forensic Medicine and Forensic Pathology, which is the highest journal of the National Association of --

Doctor Donohoe questioned the evidence in the papers that had been used to support the theory of shaken baby syndrome as causal.

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He used the principles defined by a Doctor Sackett, who was the father of evidence-based medicine to actually dissect the methodologies employed.

Doctor Donohoe found that there was deficiency in all of the literature that had been published to that point, to 2003 that he reviewed, that the papers supporting the science behind shaken baby syndrome were not of scientific quality. There have been others. Excuse me.

Go ahead.

Q. May I go back and just get the dates of some of these events?

So you mentioned that you had attended a trial. Do you recall what year that trial took place in?

A. '96 or '97.

Q. And the article by Donohoe, in what year was that published?

A. 2003.

Q. Thank you.

Doctor Nichols, in your opinion is the hypothesis that only shaking can cause the triad supported by evidence?

A. No, it is not.

Q. Shaking an infant could be dangerous; is that correct?

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A. Of course.
Q. And do you believe that a child could die from shaking?
A. Yes. In fact, I have seen I believe two cases in which the findings were I think diagnostic of the shaken baby syndrome. In each case there was an injury to the neck of the child, a mechanical injury had occurred to the upper cervical spine resulting in injuries to the spinal nerve roots and to the cervical spinal cord.

These in combination would cause apnea or cessation of breathing because the neuro pathway to stimulate the movement of the diaphragm was interrupted. So the diaphragm would not move.

Q. And so you agree that shaking a baby or impacting a baby's head is harmful or fatal, but you disagree with the shaken baby hypothesis.

Can you explain what the difference is?

A. Impact is certainly a causal for fatal injury in children. I don't know that I understand your question.

Do you want to repeat that for me again? I mean I've seen it. I think shaking killed two children. So I think I'm professionally sure that it cannot only be harmful. It can be fatal.

I think, however, that the majority of the shaken baby syndrome cases, at least the ones that I

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have reviewed, do not have the neck injury, and there is no evidence that shaking caused the death.

Q. Thank you.

Doctor Nichols, among medical examiners was the diagnoses of shaken baby syndrome controversial before 2006?

A. Yes. And clearly it was discussed more frequently after Donahoe's paper was accepted and published in a peer review journal.

Q. Has the National Association of Medical Examiners published a position on the controversy?

A. Yes, they have.

Q. And who is the National Association of Medical Examiners? What do they do?

A. Well, it's obviously an association of people who have an interest in the medical examiner's programs throughout the country. It's primarily composed of forensic pathologists, an occasional forensic anthropologist and forensic dentists, as well as the investigators in the various offices throughout the United States.

It does educational seminars for students. It does educational seminars for forensic pathologists and their staffs, and it is the, it publishes a peer review journal.

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Q. And so you said that the National Association of Medical Examiner's had taken a position before 2006.

What was that position?

A. Well, it was 2001 when a committee by the Board of Directors included that they supported shaken baby syndrome as a prudent theory of child fatality.

Q. And is that still the position of the National Association of Medical Examiners?

A. That paper had a five-year limitation upon its circulation, and the five-year interval lapsed, and there was no reissue of any physician paper for the National Association of Medical Examiners concerning the validity of shaken baby syndrome.

Q. And so when did the position officially change?

MR. HEBEL: Objection.

THE COURT: Hold on.

I don't think the position changed. You need to rephrase the question. If I heard Doctor Nichols correctly, I think he indicated that there was a position paper in 2001, and after a five-year period there was no reissue or no reaffirmation. There was silence on the issue.

Did I hear you right?

WITNESS NICHOLS: You're correct, your Honor.

THE COURT: All right.

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Go ahead.

MS. SCANLON: Thank you, your Honor.

BY MS. SCANLON:

Q. Doctor Nichols, let's talk about changes in the shaken baby hypothesis then since 2006. Has the medical community learned anything about -- strike that.

Doctor, can you define hypoxia?

A. Well, it's a less than normal amount of oxygen contained within the blood stream of a person. Its effects depends upon how much the oxygen is lowered and for how long the person is subjected to the lowered oxygen.

Q. And has the medical community learned anything about the relationship between Doctor Roblies (ph) and hypoxia since 2006?

THE COURT: Do you want to define which medical community you're talking about please?

Rephrase the question.

BY MS. SCANLON:

Q. Has the community of forensic medical examiners learned anything about the relationship between these beliefs and hypoxia?

A. Well, the work I believe you're referencing was actually by a neuropathologist in England, two groups of them in which they looked at infant brains and

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infant dura of children who had known hypoxia, but obviously they were born in hospitals, no trauma to the head.

And most of them, some of them were selected because they were born by C-section rather than by a vaginal delivery, which is a potential for head trauma.

At any rate what the investigators found was that the lowered levels of oxygen, there was actual bleeding occurring from damage due to hypoxia to the lining cells, the small blood vessels within the dura and that the dura vessels would leak, and they would leak and produce a thin subdural hemorrhage or film is what it's usually described as, because it's that thing over the surfaces of the convexity, and that was published in several papers.

Q. And when that was published?

A. I believe starting in 2007.

Q. And has the community of pathologists learned anything about the effects of increased intercranial pressure?

A. Yes. There have been papers that have been authored in which increased intercranial pressure has been described as the cause or hemorrhages in the retinal vessels and within the optic nerve sheath.

Q. And when were those papers published?

A. I'll have to look and see if I have the date on that.

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It's not in my brain, but it was in the two thousands.

Q. Thank you.

Doctor Nichols, are you familiar with the 2016 report from Sweden entitled "Traumatic Shaking, the Role of the Triad in Medical Investigations of Suspected Traumatic Shaking?"

A. I am indeed, the SBU report.

Q. Could you explain what that report is?

A. This is an investigation of taking by a portion of the Swedish government that was in charge of investigating sciences and how science was conducted, and they looked specifically at the literature for shaken baby syndrome, the world literature for shaken baby syndrome.

They reviewed some amazing number of papers. Let's see. It is 3,773 papers concerning shaken baby syndrome, abusive head injury, none accidental head trauma. And out of those 3,773 studies, and these were peer reviewed studies, they found two papers of quality evidence based medicine.

One by Vinchon, and the other by Edmunson, and they came to the conclusion that there is no support. There is insufficient supporting science existing today to conclude that shaken baby syndrome causes infant death.

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Q. Did the report come to any conclusion about the quality of the evidence that had been used to validate the SBS hypothesis?
A. That's primarily what they looked at. They looked at the quality of the evidence due to Doctor Sackett's determination of evidence-based medicine, and they saw that the problems with the papers had to do with risk of bias, with infancy of selection, with imprecision of words and imprecision of goals and a risk of publication bias that there were certain journals that would repeatedly allow the publication of these, according to the Swedes, unscientific, scientific papers.
Q. And we would indicate for the record that the Swedish Study is Exhibit Number Four in the defendant's binder.
THE COURT: All right.
BY MS. SCANLON:
Q. Doctor Nichols, let's turn now to the present case. You looked at the autopsy report and the materials in this case. Could you describe the abnormal, physical findings that were present in Nakita Lemons' brain?
A. She has a massively swollen brain with a thin subarachnoid hemorrhage and very small and thin subdural hemorrhage over the upper portion of the convexity.

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The brain had herniated under membranes that separate the sides and separate the brain from the brain stem. So the brain is massively swollen, and it does not show any evidence of a primary brain bruise or contusion to it.

There was no evidence that was detected of injury to the white matter, diffuse axonal injury. It is a swollen brain with a thin amount of bleeding on its surface and in the subdural space, but there is no description of mass effect by the subdural bleeding.

Q. Doctor Nichols, what does mass effect mean?

A. Well, first of all, the subdural space again is a potential space. It doesn't exist like the real space in your chest where the lungs and the heart are or in your abdominal cavity. It's a potential space.

The membranes should fit together like this. There should be no separation. It is the separation that allows the collection of blood. Mass effect is when subdural bleeding becomes of sufficient quantity that it compresses the nearby brain causing pressure to increase on the brain causing direct damage to the brain in that particular location and initiates brain swelling.

Q. And the findings that you just listed that were found in this case, what in your opinion caused those

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findings?
A. Hypoxia as the result of gagging and being obstructed, and dysphagic choking is the science word for that.
Q. Doctor, can you just repeat that. You cut out for a moment. We want to make sure we got all of it right.
A. I think the brain swelled as the result of hypoxia or lack of oxygen long enough to cause massive brain swelling. The brain swelling occurred because the child choked on its feed, on it's formula resulting in what is called dysphagic d-y-s-p-h-a-g-i-c choking, in which the child could not breathe properly, and presented to the adults that were surrounding the child as an ALTE or apparent life-threatening event.
Q. Doctor Nichols, what evidence in the record leads you to believe that choking caused the hypoxia?
A. Well, the caregiver that was there described a formula to be present in the mouth. When neighbors came to assist, they saw that there was a substantial amount of vomiting and "formula pouring out of the mouth."

When EMS got there, they described a large amount of white fluid in the mouth, and at the initial hospital in the emergency department, there was still what was described as milk in oral pharynx in a baby who is now synotic or blue.
Q. And was there any prior history that might lead you to

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believe that choking caused the hypoxia?
A. Yes. Contained within the medical record was the history and physical examination by the Director of Pediatric & Clinical Care, and he quoted the parents as saying that two prior episodes of gagging and gasping for breath had occurred, one at one week of age and one at one month of age.
Q. And, Doctor, why would those prior incidents be important in your conclusion?
A. Because ALTE's can happen in a recurrent fashion, and the chances of a terrible outcome increase as the number of ALTE's increase.
Q. Doctor Nichols, could the hypoxia explain the subdural bleed?
A. Yes, on the basis of the hypoxic intradural leak that was described in the literature that we discussed.
Q. And could the hypoxia explain the retinal hemorrhage and nerve sheath hemorrhage?
A. Yes, because it certainly is responsible for a cerebral edema. Cerebral edema, brain swelling with increased intracranial pressure has been proposed as a mechanism by which retinal hemorrhage and optic nerve sheath hemorrhages will occur.
Q. Doctor Nichols, was there evidence in this case of any injury to the neck?

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A. No.
Q. What is the significance in your opinion of a lack of a neck injury?
A. As I said, at this point I don't know how many cases I've looked at of alleged shaken baby syndrome, but it's multiple hundreds. I've only seen two cases with neck injury, with which I am confident that those children were shaken.
Q. Doctor Nichols, was there evidence in this case of external injury to the head?
A. No. No bruising, no hemorrhages seen on the outside. No description of bruise on inner surface of the scalp or on the galea, which means helmet, is a membrane that holds the scalp to the outer surface of the cranial bones. So there is no evidence of head injury.
Q. Was there any evidence of direct traumatic injury to the brain?
A. No. No description or cerebral or contusions diffuse axonal injury.
Q. Was there evidence of any primary traumatic injury?
A. No. Described are a few abrasions on the skin of the upper medical, insignificance.
Q. Doctor, may I interrupt you for a moment. You cut out. Could you begin that answer again?
A. Yes. The pathologist who performed the examination,

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Doctor Cassin, described two small areas of very minor skin injury called abrasions not on the head.

Q. And what is the significance in your opinion of the lack of external and internal traumatic injury?

A. Well, the child was not beaten or thrown, hurled, stomped on by anybody or anything. The child did not suffer an abusive event resulting in physical injury due to impact.

Q. And why is that lack of impact significant?

A. Well, in the brain injuries the forces that are generated with an impact are great. They are far greater than can be achieved with a shake alone.

Q. Now the medical examiner in this case concluded that Nakita had died of shaken baby syndrome. You reviewed his conclusion. Can you comment on whether you agree or disagree with his conclusion?

A. Well, I disagree with the conclusion. I do not believe the shaken baby syndrome existed in this case. That one must take into account history and alternative explanations for a disorder. That is still a theory only.

Q. Can you comment on any deficiencies in your opinion in the investigation by the medical examiner?

A. Well, I don't know exactly how much the medical examiner had to do with the interrogation of any of the

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witnesses at the scene, which would be of importance. Usually at least the investigator will be there to find out what has occurred. But sometimes the medical examiner investigator will allow the local police department to carry out the witness interrogation.

Q. Were there any deficiencies in the autopsy process itself?

A. Well, the eyes weren't examined for one thing. There was no examination of the retina to prove whether or not the retinal hemorrhages existed. So the only description here is of "bleeding behind the eyes" which I presume means that the hemorrhage beneath the sheath of the optic nerves. So that's a deficiency.

The other deficiency is the fact that the skeletal survey, which is routine practice in pediatric forensic pathology, was performed not before but after the autopsy.

Q. And to discuss that skeletal survey, did the medical examiner identify any fractures?

A. Medical examiner did not explore the right shoulder joint, which there is a description of a bony abnormality described as a coracoid process fracture or an acromial fracture, but there is no description of expiration of the joint to see (a) if that really is a fracture or not, (b) if it is a fracture, how long it

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has been there by examining the bone and studying it to see what if any healing had occurred in the bone fracture.

Q. And, Doctor Nichols, how would be the practice of pathologists to examine that area?

A. Well, after you would remove the tissue from the neck and the chest, you would use a series of surgical instruments. You would open up the shoulder joint and examine the bursa, which is the sack that covers the joint, the fluid within the bursa and the bone.

Q. Could you repeat that? You cut out for a moment.

A. You will take surgical instruments, and you would explore the shoulder joint by exploration. You would look at and examine the sack that surrounds the joint, the bursa, the fluid contained within the bursa, the articular surfaces of the various bones in the shoulder joint. And also while you are there, you can look at some ligaments which are of importance.

Q. The medical examiner also concluded that the suspected fracture was caused by abuse. Assuming this was a true fracture, do you agree it had to be the result of abuse?

A. It doesn't have to be. There are other explanations for boney abnormalities.

Q. Could you give an example of what those explanations

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may be?
A. Well, there are all sorts of pediatric bone disorders. They are basically clustered into metabolic disorders, and sometimes there are deficiency disorders of vitamins and other nutrients.
Q. Could resuscitation ever cause fractures in the area where there was suspected fracture in this case?
A. I have never seen one in an area due to CPR.
Q. And, Doctor Nichols, is the amount of blood that was reported in the subdural hemorrhage relevant to your conclusion that the shaken baby diagnosis was erroneous?
A. Yes. The amount of blood that is there is what one sees with the things that cause cerebral hypoxia. It is not what one sees with a fatal subdural hematoma. What is described as in an estimate is a combined 15 milliliters or three teaspoons full, total on both sides of the cerebral hemisphere.

For a mass effect to occur, there would have to be substantially more than 15 milliliters. I can only estimate in the neighborhood of at least 25 milliliters if not more, and that would be on one side not on two.

You have to remember for subdural hemorrhage to cause symptoms, it must produce mass effect. So

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mass is critical.

Q. The medical examiner in this case suggested that the small amount of bleeding could have resulted because the brain swelling cut off blood flow to some of the veins.

Do you agree with this conclusion?

A. I disagree with that. The brain swelling would have had to occur almost instantaneously to produce a tamponade effect from a bleeding blood vessel is cerebral edema takes a while to occur. It requires actual swelling of the neurons to occur, and fluid has to be delivered from the blood vessels to the nerve cells to allow them to swell. So it takes a while for cerebral edema to occur.

MS. SCANLON: Thank you, Doctor.

We have no further questions at this time.

THE COURT: Mr. Hebel.

MR. HEBEL: Thank you, your Honor.

CROSS-EXAMINATION

BY MR. HEBEL:

Q. All right. I wanted to get that right. So I guess it is still good morning, Doctor?

A. It is good morning.

Good morning, sir.

Q. My name is Dan Hebel. I'm the Wayne County Prosecutor,

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and I'm going to ask you a few questions. The first is as always with any electronic connection, if you don't understand my question either due to the content or due to losing me for a moment, could you please tell me?

A. Yes, sir, I will.

Q. And then second is can you answer only the questions that I ask you? Can you promise to do that?

A. Yes.

Q. Perfect. All right.

I want to ask you a few questions about your perspective. First is you retired from your position at the Kentucky Medical Examiner's office about 19 years ago?

A. Yes.

Q. And since then you've stayed active. You've held teaching positions. You also run a company that provides expert testimony in legal cases and consultation; right?

A. Yes.

Q. And it does primarily civil cases, but then you also do defense cases as well in criminal matters?

A. Well, actually I've done some work for prosecuting attorneys also both in the Commonwealth of Kentucky and several Attorney General Offices and the United States Attorney.

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Q. Not on shaking baby cases with this consulting firm?
A. No, not with shaking baby cases. That is correct, sir.
Q. In fact, you were discussing your opinions on shaken baby cases during direct, and one of things that you said was that you saw two cases both with neck injuries that you think that the baby was shaken; correct?
A. Yes, sir.
Q. And without that, you categorically disbelieve all other shaking baby cases; correct?
A. Yes. There must be some explanation for the findings of the dead child. Sometimes we just plain don't know.
Q. According to the Washington Post you went so far as to tell the Kentucky Public Defenders to call you any time they had SBS cases where you previously testified on behalf of the People; correct?
A. Yes. That is correct, and amazingly enough nobody came to me and had me reverse myself. So I hadn't been using SBS terminology.
Q. I'm going to ask a follow up question to something that was asked on direct, and we went through it real fast, and I want to back up.

That is you said that there was some articles, some literature about intradural hemorrhages leaking into the subdural space, and do you know what article that intradural leak theory was brought out?

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A. Squires and Mack.
Q. Yes. Squires and Mack. Squires is a pediatric neuropathologist, and Mack is of all things a radiologist.
MR. MORAN: Mr. Hebel, we do have that article.
THE COURT: Do you need a copy of that made, Mr. Hebel?
MS. SCANLON: That would be ideal so we can have our copy back.
MR. HEBEL: Yes, I would. I'm just checking it.
BY MR. HEBEL:
Q. Was this article based on the study that was done by Doctor Geddes?
A. I don't think the author stated it was based upon anybody's theory or previous studies.
Q. I'm going to change places now. Let's go to your Affidavit because I think that would be the easiest way to go through the testimony once again since unfortunately I don't have an identic memory.
And let's start once we get into the meat of things around points 24 through 28.
A. Okay.
Q. Just so that we are on the same page, you agree that

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the victim had some subdural hemorrhaging; correct?
A. Yes. As seen on the autopsy, yes.
Q. And you agree that the victim had brain swelling; correct?
A. Yes. Absolutely.
Q. And retinal nerve sheath hemorrhaging?
A. Well, optic nerve sheath hemorrhaging, but okay.
Q. You agree that the victim had what you described as a hospital-acquired pneumonia?
A. Yes.
Q. And you would agree a hospital-acquired pneumonia is usually caused by bacterial infection?
A. Yes.
Q. All right. Going on jumping on down to points 37 through 39. And in this you are discussing the Duhaime Study, which you cite in 1987 as one of the first times that SBS was called into question by a biomechanical study; correct?
A. Correct, sir.
Q. And you would agree that technology has developed dramatically since 1987; correct?
A. Yes.
Q. Are you aware of the comprehensive biomechanical study by Doctor Carole Jenny that was published four days ago in the Journal of Neural Trauma?

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A. Yes. I had a copy of it three days ago.
Q. Excellent. And that study was conducted using a far more advanced dummy model than the one that was featured in Duhaime's; right?
A. Right. One of the co-authors is also a member of the faculty of the University of Louisville. So that's how I knew about it.
Q. Excellent. And this study found that shaking alone did exceed the brain injuries threshold; correct?
A. Yes. May I? It's my turn. But the impact point where the threshold was, at least from my interpretation of the data where the threshold was exceeded was when the model's chin struck the chest of the dummy. It wasn't until that impact happened that the forces exceeded the force necessary to tear a vein.
Q. And that was without any impact outside of the chin striking the chest; correct?
A. Yes. But if a child's chin strikes its chest with that amount of force, one would expect at least some bruising either on the chin or on the skin of the chest where it was struck.
Q. Something else about that Carole Jennings study. The author criticizes the current published injury threshold criteria as not taking into account the differences in the human infant's brain and the

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probability that the threshold should actually be much lower.

Do you agree with that statement?

A. I don't know. That's for those who possess skills that I do not. That would be more biomechanical than it is physician.

Q. Fair enough. Thank you for acknowledging the difference.

I will move to a different section. But first I would like to introduce People's Exhibit Number Seven, which is the Biomechanical Response of the Infant Head to shaking; An Experimental Investigation by Carole Jenny, and the defense did receive that by E-mail pretty much as soon as I got it.

THE COURT: Any objection?

MS. SCANLON: No objection, your Honor.

THE COURT: All right. Seven will be received.

MR. HEBEL: Thank you very much, your Honor.

May I approach, your Honor?

THE COURT: Yes.

BY MR. HEBEL:

Q. All right. Going to move to point 39 of the Affidavit, and that is where you discussed Bandak's Computational model, and particularly this is where we are getting

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into the issue of neck injury, and Doctor Farris Bandak provided a mathematical computation of shaken baby syndrome, a claim that shaking could not cause typical SBS injuries without causing catastrophic damage to the neck; is that correct?

A. According to Bandak's study, yes.

Q. And Bandak's article was published in Forensic Science International, that's a scholarly journal; correct?

A. And peer reviewed. Yes.

Q. And the reason for publication in these types of journals is so that other doctors can read the study, review it, repeat it to confirm or refute the result; correct?

A. That's part of the scientific methodology; yes, sir.

Q. Are you aware that Bandak's conclusions have been refuted by doctors writing to the very same journal not once but twice?

A. I'm aware of that.

Q. And Bandak published this article in February of 2005; correct?

A. Yes.

Q. And in July of 2005 a panel of doctors, including distinguished bioengineer Susan Ragolis, Michael Prange and pediatrician Cindy Christian provide a response that shows Bandak's conclusions of force on the neck

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were ten times higher than they should have been?
A. That's correct.
MR. HEBEL: Your Honor, I'm also going to move for admission of Exhibit Eight, Shaken Baby Syndrome; A Biomechanical Analysis of Injury Mechanism and that the Susan Ragolis, and once again the defense has a copy of that.
THE COURT: That's Proposed Exhibit Eight?
MR. HEBEL: Proposed Exhibit Eight, your Honor.
THE COURT: Any objection?
MS. SCANLON: No objection, your Honor.
THE COURT: Eight will be received.
WITNESS NICHOLS: May I ask a question, sir?
MR. HEBEL: At this point I'm handing out evidentiary Exhibits. So it will be just a moment Okay.
WITNESS NICHOLS: Sure.
BY MR. HEBEL:
Q. Next, I would like to jump to the August of 2005 where once again in the same journal two more doctors found serious flaws with both the model that was used and Doctor Bandak's calculations, and they noted that Bandak cited preliminary data from a workshop that expressly warned against using this data as references.

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Are you familiar with that letter?

A. I'm familiar with that. I don't know why we're discussing Bandak. If you look at my Item 39, the reference there is to Ommaya, Goldsmith and Keith and Teabo not Bandak.

Q. Bandak is not in your references?

A. Not in my references. In the affidavit. If you look at the bottom of page six it says site eight Ommya, Goldsmith and Teabo, and that is what is contained in paragraph number 39.

Q. And at the end Bandak's Shaken Baby Syndrome of Biomechanics Analysis of Injury Mechanisms, Forensic Science International 151, colon '71 through '79, 2005.

Is that in there too?

A. That's there too. It shouldn't be together like that, but that's the way it is. But Goldsmith and Ommaya and Teabo were the reasons that sentence was in there.

Q. I knew Bandak's study had been attacked like crazy.

MR. HEBEL: Your Honor, since it is in there, I'm still going to offer it for evidence, Exhibit Nine, which is the second paper disproving the Bandak.

MS. SCANLON: Your Honor, we're going to object to the characterization of that Exhibit.

THE COURT: Why would that be?

I think it's referenced in the Affidavit. I

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assume that Doctor Nichols has given an explanation. But the fact of the matter is it's cited in his Affidavit as the source of authority. I think it's fair game.

MS. SCANLON: Your Honor, we agree to the admission of the Exhibit, but we would just argue that it has not disproved the study. We just object to that characterization.

MR. HEBEL: Your Honor, the People withdraw that characterization. Instead we would say that this says that the model was flawed and calculations were flawed and methodology was flawed, not disproven, just flawed.

THE COURT: All right. I'll let everybody have their editorial comment in closing argument.

All right.

Nine will be received.

THE COURT: Doctor, you doing okay? If you need a break just for five minutes or whatever, give a holler. All right?

WITNESS NICHOLS: Thank you, your Honor. I'm okay. You have been on the bench longer than I have.

THE COURT: I'm doing fine too.

Go ahead, Mr. Hebel.

MR. HEBEL: Thank you very much your Honor.

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BY MR. HEBEL:

Q. I'm going to move us right along. We're going to jump down to point number 42, and that is where you criticize the medical examiner for not doing a differential diagnosis; is that correct?

A. Yes.

Q. But at the same time you weren't present for this autopsy; correct?

A. I was not, sir.

Q. And you don't know which supervisors the medical examiner consulted with; correct?

A. I do not.

Q. And you don't know which treatise the medical examiner referenced before making his decision; correct?

A. I do not, sir. I do not.

Q. And you do not know which illnesses, diseases or injury mechanisms the medical examiner considered as potential causes and then eliminated by deduction; correct?

A. True.

Q. I'm going to continue, and I'm going to actually reference the Affidavit again. One moment.

You say that there are several causes for ALTE, that it's a relatively common problem during infancy. That's in point 46?

A. Yes.

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Q. And three of these causes that you list out were gastroesophageal reflex disease?
A. Yes.
Q. Seizures and respiratory tract infection; correct?
A. Correct, sir.
Q. What evidence did you see that the victim had any of those?
A. I have no evidence of either. I just came from a meeting last month, the American Academy of Forensic Sciences where a dentist of all professionals studied deaths occurring in children under one year of age and looked at whether or not they were tongue tied.

And it may be that some of these kids are what is call tongue tied, and they have consistent and persistent feeding problems. I personally have never examined the phenol (ph) to that, the tongue of an infant.

I always look at the top and the bottom because they could be injured. But she had a study showing a child trying to feed who was tongue tied at the tongue, and the child was taking in a little bit of formula and lots of air, which can cause all sorts of problems that can mimic gastroesophageal reflex.
Q. Interesting. But we don't have any evidence in this case that that happened?

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THE COURT: Is that a question or a statement?

MR. HEBEL: It was a question.

WITNESS NICHOLS: He who did the autopsy just like Doctor Nichols didn't examine that, that phenol.

BY MR. HEBEL:

Q. Jumping to point number 49. You claim that subdural hemorrhaging, retinal hemorrhaging and HIE can be caused by ALTE, and as your authority for this cite, you cite a case study by Patrick Barnes and John Galvani, which is it's a life threatening event; correct?

A. Yes.

Q. Are you aware that Barnes and Galaznik based this study on their experience as defense experts in Texas versus Zavion Thomas?

A. I didn't know where they developed their expertise, no.

Q. Would it be of any relevance to discover that outside the physicians that wrote the article in fact were all defense experts in that case, that all the other physicians disagreed with their conclusions in that case?

A. Would I be surprised? Is that what the question is?

Q. Would it be relevant to your citation of that authority?

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A. No, because sometimes the outlier is correct. I was a young resident in 1973 at a meeting of the International Academy of Pathologists when an old pathologist got up before several thousand learned pathologists and said I have reason to believe scientifically that human papillomavirus causes cervix cancer in human beings.

He was hooted off the stage, but he was right.

Q. Would it interest you to know that in addition to not being believed by the other physicians that the jury didn't believe them either? The defendant was convicted, and the conviction was upheld on appeal?

A. That's the process in criminal trials.

THE COURT: Just so that we're clear, Doctor Nichols, I don't want to put words in Mr. Hebel's mouth, but I think he was asking whether or not those other factors had any relevance for you in weighing how much you should rely on that particular study.

Is that the essence of the question?

MR. HEBEL: Yes, it was.

WITNESS NICHOLS: I don't think the outcome of a trial, criminal or civil should be weighed, should influence me about the science that I think Barnes and Galaznik cited in their paper.

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There clearly is a peer reviewed paper and a peer reviewed journal.

BY MR. HEBEL:

Q. Just so that we're on the same page using evidence-based medicine as a group, there is four different tiers, and in tier one and tier two you have prospective studies, tier one being a much broader prospective study, tier two being a much narrower prospective study; right?

A. Yes.

Q. And then all the way down to tier four single case studies that rely on potentially biased individuals; correct?

A. You are correct. Doctor Sackett would grade this as a four.

Q. So basically all the evidence that Donohue excludes which was three's and four's this is also right there with the bottom of the tier?

A. Correct, sir.

Q. Speaking of Donohue that -- you know what? We'll skip that for now.

I'd rather continue with the point. We're almost done. We're to point number 50. You suggest that choking and ALTE brought on the Hypoxic-Ischemic Encephalopathy and caused the subdural hemorrhage?

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A. I'm sorry?
Q. Encephalopathy. I said it wrong again. Let's just do HIE. I'm sorry. I'm choking here too. That's part of my problem. Encephalopathy. I just have a tendency to choke.

All right. So the ALTE brought on the HIE; correct?

A. Yes.
Q. And the HIE then caused the subdural hemorrhage?
A. In my opinion, yes.
Q. Are you familiar with the 2010 article in the British Journal of Radiology that studied 50 children who died of HIE and found no related subdural hemorrhages?
A. I just saw that paper this morning. I read it for the first time, yes.
Q. I'm actually going to proposed that as Exhibit 10, and defense also has a copy.

MS. SCANLAN: No objection.

THE COURT: All right. Ten will be received.

MR. HEBEL: Pardon me once again, Doctor. I'm going to dance up there and hand out some copies.

BY MR. HEBEL:
Q. Would you agree -- this is once again shifting focus. But would you agree that it's important to look at the totality of the circumstances in a case like this?

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A. Of course.
Q. And you've thoroughly researched this topic. In fact, you listed out earlier all the different items that you looked at; correct?
A. I asked for everything that was available about the collapse of the child, the child's treatment and evaluation. There may be more material out there, but I'm unaware of it.
Q. And the totality of the circumstances includes the specific facts of this case; correct?
A. Yes.
Q. And did you interview the defendant at all in this case?
A. Of course not.
Q. I notice in your Affidavit you never discussed the fact that the defendant admitted to shaking the victim at a seven out of a ten, where ten was the hardest shake, and that the victim stopped responding immediately after the shaking; correct?
A. That's in one of the police reports, yes.
Q. And did you discuss that in your Affidavit?
A. It's not discussed. No.
Q. And in contrast you found that it was relevant that the defendant said that formula was coming out of the victim's mouth during the 911 call; correct?

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A. Yes, supported by other testimony.

MR. HEBEL: No further questions.

MS. SCANLAN: One moment, your Honor.

THE COURT: Sure.

MS. SCANLAN: Thank you.

MR. HEBEL: I do have a couple of more questions.

THE COURT: Go ahead.

BY MR. HEBEL:

Q. Sorry, Doctor, it's me again.

I got more than one more brief series of questions, and that's about the SBU paper. I haven't really discussed that a lot before. But let me back up. Get some background here.

Articles in scholarly journals are subject to peer review to prevent errors and receive criticism before they are published; correct?

A. That's correct; sir.

Q. And the SBU paper was in fact published in a small peer review journal in Sweden; correct?

A. That's correct, sir.

Q. And were you aware that before the SBU article was published, an international group of experts requested the opportunity to peer review the article but were denied?

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A. I am.
Q. And the reason why they were denied is because the SBU said that peer review wasn't required since they were just doing a review; right?
A. Correct. And they were a government agency.

MR. HEBEL: All right. I'm going to offer into evidence Exhibit Number 11.

MS. SCANLAN: No objection.

THE COURT: Which is?

MR. HEBEL: Exhibit Number 11 is the letter written, the Initial Response of the European Society of Pediatric Radiology and Society for Pediatric Radiology to the Swedish Agency for Health, Technology Assessment and Assessment of Social Services' document on the triad of shaking baby syndrome.

It's the letter that was published by the Pediatricians, radiologists and biomechanists asked to peer review the SBU article and were denied.

THE COURT: All right. Okay.

It will be received.

MR. HEBEL: Thank you, your Honor.

As of now, your Honor, I have no further questions.

THE COURT: All right.

MS. SCANLAN: Just one moment, your Honor.

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Thank you.

REDIRECT EXAMINATION

BY MS. SCANLAN:

Q. Hi, Doctor Nichols. You were asked about criticism of the Jenny study. Do you have any response?

A. No.

Q. In that article what was the weight of the dummy?

A. It was two and a half kilograms.

Q. And about how many pounds would that be?

A. About five.

Q. And is that significant in your opinion to the results of the study?

A. It certainly doesn't have much mass to be able to move it around pretty easily.

Q. And, Doctor Nichols, I would ask you in the Jenny Study if you could turn to page 1587, the last page and just I'm going to read the last sentence of the article. "Although biofidelic ADT can improve our understanding of the mechanics during shaking, infant neuro pathological response to measured acceleration the velocity still remains unclear."

Can you explain that in lay terms?

A. Well, that's a hitch. In lay terms that means that they still don't know conclusively exactly how long, what it actually does and how long it takes for it to

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happen.
Q. And why is that significant?
A. They admit that they don't absolutely know. The study was not absolutely conclusive as to how shaking would cause an injury.
Q. Thank you.

Now you said that you were not present for the autopsy. Is it common for doctors to review each others' conclusions even if they haven't examined the patient themselves?
A. Yes. I did that when I was in charge of the Medical Examiner's Office here. I reviewed at least two percent if not five percent of all the autopsy reports done by the other pathologists employed by the state to insure the tax payers that their money was being well spent.
Q. Was there any evidence in the medical examiner's report in this case that suggested that the medical examiner performed a complete differential diagnosis?
A. There is nothing, anything referable to a differential diagnosis, discussion of this case with another staff person, consultation with a neuropathologist or anything else.
Q. And would documentation of a differential diagnosis be the sort of thing that a medical examiner would usually

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document in a report such as this?
A. It may not be in the report. It would certainly be in the notes that accompanied the work product that is kept in the file.
Q. Thank you.
We talked a little bit about Sackett's evidence-based medicine. And what is the significance to you about the case study?
A. Of the life study?
Q. What is the significance of a case study?
A. Well, frequently it's an usual finding which you attempt to publish so that other others can weigh in on it and help you, help the authors explain what they think they're seeing.
Q. I would like the turn now to the Hurley Article I believe that is Defense Exhibit or Prosecutions Exhibit 10. Did any of the children in the Hurley Study have subarachnoid hemorrhages?
I would direct you to page page 739, the first full paragraph.
A. Thank you for the direction. You're talking about under the heading of other findings?
Q. Yes.
A. Well, there is one case in which they saw subarachnoid hemorrhage, no subdural hemorrhage in a five month old

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baby.

Q. And then did anyone cause subdural hemorrhage in the case study, and I will direct you to the next paragraph under discussion, the second full paragraph.

A. One child had an identifiable subdural hematoma thought to be unrelated and separate in time from the demise of the baby.

MS. SCANLAN: One moment, your Honor.

BY MS. SCANLAN:

Q. Doctor Nichols, I'm going to read the last two sentences of that same Hurley Study to you, the last one sentence, pardon me.

"In such cases an underlying cause for both the collapse and the subdural hemorrhages needs to be found, and the possibility that the observed hemorrhage may be traumatically inflicted must be considered."

Now, Doctor, do you agree with that?

A. Of course, you have to consider it.

Q. Thank you. And do you need to consider it none traumatic as well?

A. Yes.

Q. Thank you.

Is there anything else about the Hurley Article that you would like to respond to?

A. Well, there is evidence that they found, microscopic

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evidence of intradural hemorrhage in two or three other cases. So the leaking dural vein theory pops up again with hemorrhage localized only into the dura rather than extradural.

Q. And, Doctor Nichols, did that happen and in this case, in Nakita's case?

A. Let me look at my notes from the autopsy.

Q. If I may rephrase, it might be helpful. Do you believe there was an intradural hemorrhage?

A. I'm looking at the microscopics here. That's the only way I can answer the question. In the section of the dura I see no evidence of intradural hemorrhage in a section of dura that is probably about as big as the end of a pencil and structure as big as my hands together.

Q. And so why is that finding significant?

A. All it does is tells you what that section of that structure looks like. It doesn't tell you whether it's representative of all of the tissues that could have been examined. Remember, you may not be able to see it with your naked eye. So sometimes you only find things that by pure luck of sampling.

Q. Doctor Nichols, I want to turn your attention to People's Exhibit Number 11, which is the response to the Swedish Study.

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Is it surprising to you that they were denied the opportunity for peer review?

A. I have no idea what rules that small journal has or what its editors have to say and why they made that decision. Editors do things because of what they want. They have their own intrinsic biases or basis or disbeliefs.

Q. And, Doctor Nichols, in this case did you end up with a differential diagnosis?

A. I did.

Q. And what was the leading cause?

THE COURT: He already testified to that, hasn't he? Why are we going over that again?

Thank you. Next question.

MS. SCANLAN: We have no further questions, your Honor.

THE COURT: Anything else Mr. Hebel?

MR. HEBEL: We're all set.

No further questions.

Doctor Nichols, I have a few questions for you.

WITNESS NICHOLS: Certainly, your Honor.

THE COURT: And correct me if I misheard you, but my understanding is that in examining all of the information that was made available to you, that one of

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the things that you considered was the fact that there were indications from the parents of the infant that the child at one week and at one month had had some choking or swallowing problem with regards to taking formula.

Did I hear you right on that?

WITNESS NICHOLS: It was a choking event, yes, and gasping for breath, at least that's the way it's described.

THE COURT: And if I'm correct, there was testimony from multiple sources that you found that witnesses both at the hospital and first responders and even a neighbor found that there was formula in the infant's mouth and had even spit up some at the time that there was this intervention to try to help the baby.

Is that also correct.

WITNESS NICHOLS: Correct, sir.

THE COURT: It is my further understanding that the defendant in this particular case in a statement to the police indicated, and I think it was referenced a shaking of the infant at a level seven on a scale of one to 10 on a severity scale, and that the infant then stopped responding after the shaking had stopped.

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If the child was choking or gasping for air, what significance if any would you attribute to the shaking?

What would that do.

WITNESS NICHOLS: It may not do anything. I have no idea how the person who gave that statement can assess the vigor of shaking in one to 10. I know of no way I could apply that, and I know a bit about science, and I've help raise three kids.

But I have no idea how if I ever shook somebody, how I would scale. That's the first thing, how vigorous is it.

THE COURT: Well, would it be fair to say, Doctor, I mean as a doctor you know I mean when you go to the, you go to the hospital, they ask you what's your pain level on a scale of one to 10, and medical people act accordingly; right, whether they're going to give you a Tylenol or tell you to tough it out?

WITNESS NICHOLS: That may be one of the reasons why we have an opiate epidemic.

THE COURT: Well, the response of seven to 10 as I understand it came from the defendant; right?

WITNESS NICHOLS: I understand that, yes, sir.

THE COURT: And so I guess my question for

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you is if an infant is choking, what significance if any does shaking a choking infant have?

WITNESS NICHOLS: I don't know.

THE COURT: Is it of no event? Could it be are you saying it might possibly be beneficial that that would be the response of choice or --

WITNESS NICHOLS: I don't know.

THE COURT: Okay. Okay.

Thank you. I have nothing else.

WITNESS NICHOLS: Okay. Are we done?

THE COURT: Hang on just a second.

WITNESS NICHOLS: Okay.

MS. SCANLAN: Just one follow-up to your question.

REDIRECT-EXAMINATION

BY MS. SCANLON:

Q. Doctor Nichols, just one further question. As a medical examiner evaluating a case, what significance does confession have in your conclusion?

MR. HEBEL: Your Honor --

THE COURT: No. I want to hear this.

WITNESS NICHOLS: A confession is only in my experience loosely associated with the truth. The illustration is the guy who claims to have raped and killed Jon Bene Ramsey, when he actually was in

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Thailand. People say weird things for reasons that I do not understand. Maybe I should have become a psychiatrist.

MS. SCANLAN: No further questions, your Honor.

THE COURT: Very good.

MR. HEBEL: No further questions, your Honor.

THE COURT: Thank you, Doctor. We're done. Thank you so much.

WITNESS NICHOLS: You're welcome.

THE COURT: 8:30 tomorrow.

MR. MORAN: Your Honor, I think we told Doctor Barnes he's in California 9:00 o'clock.

THE COURT: 9:00 o'clock.

(Matter concluded).

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joining us so early from the West Coast.

Would you raise your right hand for me if you would, sir.

PATRICK D. BARNES,

called as a witness by the Defense, having first been duly sworn by the Court Clerk, was examined and testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. LINDGREN:

Q. Doctor, could you please state and spell your name for the record.

A. My name is Patrick David Barnes. The last name is spelled B as in boy, A-R-N-E-S.

Q. And what is your profession?

A. I am a pediatric radiologist and a pediatric neuroradiologist.

Q. And what is it that a pediatric radiologist and a pediatric neuroradiologist does?

A. Well, in the field of medicine, there is the discipline of radiology where we use imaging technologies such as ultra sound, CT, X-rays, MRI for diagnosis of conditions of the human body.

A subspeciality of that is pediatric radiology where we apply those technologies to children, that includes the fetus, the neonate young

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infant all the way through the adolescent years.

A further subspecialty of that is pediatric radiology where we apply those technologies to brain and spine problems in children, including all the age groups that I described earlier.

Q. And are you currently practicing as a general radiologist as well as a neuroradiologist?

A. Primarily pediatric neuroradiologist, but I am the pediatric radiologist and pediatric neuroradiologist consultant for our Child Abuse Team.

Q. Okay. Doctor, in which states are you licensed to practice medicine?

A. Previously Oklahoma, then Massachusetts, now California.

Q. And do you have Board Certifications?

A. Yes, sir. American Board of Radiology & Diagnostic Radiology, as well as certificate of added qualification in neuroradiology.

Q. Could you describe your educational background?

A. Certainly. Graduate of University of Oklahoma, College of Medicine 1973 with a MD Degree. Followed by residency training in diagnostic radiology also University of Oklahoma. Completed 1976.

Fellowship training, and my specialty pediatric radiology, emphasis on pediatric

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neuroradiology at the Boston Children's Hospital in Harvard Medical School in Boston, Massachusetts. Completed in 1977.

Then at that time I was certified by the American Board of Radiology in 1977, and then in 1995 when first offered, also certified in neuroradiology by the American Board, which covers also pediatrics.

Q. And, Doctor, could you briefly sketch your employment history for us?

A. Yes. After completing fellowship training back to Oklahoma, where for the next nine years at the Oklahoma Children's Memorial Hospital I was a practicing pediatric radiologist section chief, pediatric neuroaudiology. Became an associate professor, University of Oklahoma, College of Medicine.

Then in 1986 invited back to Boston, and over about the next 14 years became Chief of Pediatric Neuroradiology, as well as Chief of the Pediatric MRI and CT Center at the Boston Children's Hospital and associate professor of the Harvard Medical School.

Then in 2000 was invited out west, and over the past 17, going on 17 years I've been Chief of Pediatric Neuroradiology also Director of Pediatric MRI and CT Center here at the Lucille Patrick Children's Hospital and Professor of Radiology at the Stanford

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School of Medicine.

I'm also the co-founder of Northern California Child Abuse Task Force which resulted in the formation of our Child Abuse SCAN Team that is spelled all letters capitalized. S for suspected, C for child, A for abuse, N for neglect. Co-founder of that in 2008 and have been a member of that SCAN Team ever since.

Q. Doctor, what does the SCAN Team do?

A. The SCAN Team makes regular monthly meetings but also members of that team will meet whenever we encounter a suspected child abuse case that either comes through our Emergency Room through the Intensive Care Unit, and we work with the County of Santa Clara County, San Mateo County, Santa Cruise County.

Then we also do consults from other counties for suspected physical abuse, neglect and sexual abuse.

Q. And what specifically do you do as a member of the SCAN Team?

A. I'm responsible for reviewing the imagining radiologies, imaging studies of children with suspected abuse, presenting those to the SCAN Team and discussing those with the SCAN Team regarding findings, either suspicious for abuse or findings that may represent what we call mimics of abuse. In other words, other conditions that can look like abuse but may be due to

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accidental trauma or certain medical conditions.

Q. Do you have experience dealing with cases of children who have sustained serious brain injury that leads to death?

A. Oh certainly for going on my 40th year post training.

Q. And do you teach?

A. Yes. I teach locally on-the-job training to our medical students, radiology residents, Fellows in radiology, visiting doctors on the service every day regarding the supervision, interpretation of imaging of the brain and spine of children.

That includes also consultation with doctors in training of other specialties and obviously includes our consultations on child abuse cases.

Then beyond that essentially on service training additional teaching in a classroom and beyond, actually local regional meetings, national meetings and so forth.

Q. Have you done any research related to child abuse and head injuries in children?

A. Yes. In fact, the kind of focus of my career, particularly since the mid nineties is injury to the developing brain, spine and body of the fetus, the new-born infants to include trauma in child abuse.

More recently my research has been primarily

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with the NIH, the National Institute of Health, the NICHD, the National Institute of Child Health & Development, and particularly the neonatal research network on perinatal injury in premies, in term babies, the types of injuries that can carry over from the perinatal period into early childhood that can be mistaken for abuse.

Q. And, Doctor, if you could estimate how many peer review articles have you had published related to child abuse and head injuries to children?

A. I submitted my full CV and my so-called Child Protection Service Resume to you. So you can see there. I'd have to look at it, but certainly several scientific articles, reviews, chapters, case reports, editorials that you can see listed there.

Q. And for the record Doctor Barnes' Child Protection Services CV is in the binder as Defence Exhibit Two. He has a much longer CV that we have not, it's 100 pages. We have not submitted that.

Doctor, do you have experience in diagnosing injuries to bones other than the skull?

A. Oh certainly. As a practicing pediatric radiologist for the first nine years of my career, subsequent more part time pediatric radiology coverage for the next 14 years in Boston, and now for the past 17 years here at

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Lucille Packard Children's Hospital.

It's from that past experience research and pushing that I am a primary consultant for the SCAN Team, not just on brain and spine injury, but injury to other body parts and particularly bone or skeleton.

Q. Doctor, do you have experience diagnosing bone abnormalities or bone fragility disorders in children?

A. Yes. In fact I've not only had experience in terms of the clinical realm working with other pediatric radiologists but also in a teaching realm and research realm and have published on certain bone fragility disorders that can by way of imaging or X-rays can mimic abuse.

Q. Doctor, have you presented any of your research at scholarly conferences?

A. Yes. Over the years many numbers of conferences, whether they be visiting professorships at medical schools, children's hospitals at national and international meetings.

In fact in 2007 I was the Chair of the National Child Abuse Task Force for the Society for Pediatric Radiology. That is the sister society that works with the American Academy of Pediatrics in COCAN, the Committee on Child Abuse & Neglect, devise standards guidelines for the utilization of imaging and

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interpretation of imaging with regard to child abuse and the mimics of child abuse.

Q. Are you a member of any professional organizations?

A. Certainly. Not only the Society for Pediatric Radiology, but the American College of Radiology, which are two of the governing societies for standards and guidelines that work with the American Academy of Pediatrics and the Committee on Child Abuse & Neglect or establishing standards for the utilization of imaging and evaluating children with suspected child abuse, including the mimics.

Q. Have you previously been qualified as an expert witness in court?

A. Yes, I have.

Q. How many times have you been qualified as an expert?

A. Hundreds of times over my 40-year career.

Q. And have you ever failed to qualify as an expert?

A. Not that I have been made aware of.

Q. And in what areas have you been qualified as an expert witness in court?

A. Pediatric radiology, pediatric neuroradiology, imaging of child abuse to the mimics.

Q. Have you previously testified as an expert in cases involving infant brain injuries?

A. Certainly. Both in child abuse cases as well as in

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other causes of fetal neonatal young infant brain injury.

Q. Have you previously testified as an expert in cases involving injuries to bones other than the skull?

A. Certainly, yes.

Q. Doctor, are you being paid for your testimony today?

A. I'm not submitting any billing for this type of work. I usually do this work for pro bono.

Q. Why do you do this work pro bono?

A. It's part of the responsibility, particularly for those of us encouraged by the American College of Radiology, the American Medical Association to do expert work in these particular areas.

So I see it as service oriented, number one.

Number two, it does assist me in my duties teaching and research duties also.

Q. Are you familiar generally with the literature surrounding what is known as shaken baby syndrome?

A. Oh, certainly.

Q. And does the literature surrounding shaken baby syndrome discuss biomechanical studies?

A. Yes, it does.

Q. Are you familiar with those biomechanical studies?

A. Many of them, yes.

Q. And do you conduct research and write about issues

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surrounding shaken baby syndrome?

A. Yes, primarily from the imaging standpoint.

Q. Has your political work involved children who have been diagnosed with SBS or suspected of having shaken baby syndrome?

A. Certainly in the past, but in the past decade following guidelines from the American Academy of Pediatrics, the Society for Pediatric Radiology, Committee on Child Abuse & Neglect, we tried to avoid that particular term and use more generics less biased terms that have a much stronger scientific basis at this time because of the emerging controversies.

So kind of following the guidelines you'll hear terms abusive head trauma for instance, and those types of terms instead of using the term SBS or shaken baby syndrome.

Q. Have you also consulted on cases where shaken baby syndrome has been the diagnoses?

A. Oh certainly, not just in my clinical work every day, but in my consulting work with regard to outside of our SCAN Team, police investigators, criminal prosecutors, defense attorneys, also our County agencies in three states, Oklahoma, Massachusetts and now working with Child Protective Services.

So yes, I have done a lot of consulting over

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the years and continue to do that, including in criminal and family cases.

Q. Have you published specifically on the history of the shaken baby syndrome diagnoses?

A. From an imaging point of view, yes. I have had a series of publications starting probably in about 2000 with one of my very first reviews of kind of what was going on in 2000. And then followed up after that with publications in 2007, general reviews, evidence-based medicine reviews of kind of the state of the art or the state of the practice in terms of evaluating child abuse.

More recently publications in 2011 and 2012 particularly from an imaging point of view.

Q. Doctor, could you please generally describe the method you use when analyzing a case of suspected child abuse?

A. Certainly. It's the same method that I use for analyzing any child injury case from any cause. That is my job look at the imaging, try to look at the imaging as objectively as I can. Tell the doctors what the abnormalities are on the imaging. See if those abnormalities may fit a particular pattern that may suggest the cause of the injuries.

Then generate from that a list of those potential causes often in order of what is most likely,

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but also what's most important to evaluate for and maybe exclude and then to do our best if we can to provide some timing parameters for those abnormalities. In other words, when did the injury actually occur if we can.

The fourth part or fifth part of that is then correlating it with clinical findings. For instance, that's usually working with the doctors that are taking care of the child.

Q. Now that process that you just described is that a differential diagnosis?

A. Yes, exactly. That would be the list of potential causes with possibly from an imaging basis, only some level of probability. But we know now that many times the findings that we're seeing we can't really often raise it to a level of probability, one choice over the other, because abnormalities on imaging can be due to any of the major considerations in cases like this and can't be readily distinguished.

For instance, abusive injury versus accidental injury versus medical causes.

Q. Doctor Barnes, what materials have you reviewed in this particular case?

A. I have reviewed all the imaging studies submitted on this particular child, including X-rays, pre-mortem and

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post-mortem as well as a brain CT examination on the child pre-mortem.

Q. Any other materials?

A. I've also reviewed, and you'll find in my report under materials I reviewed a detailed list of the dates and times of those different radiology imaging studies, but I also reviewed, after I review the imaging studies some of the background clinical information you'll find listed in my Affidavit where --

Q. Doctor Barnes, actually your Affidavit has not been submitted as an Exhibit. Your testimony will be taking the place of your Affidavit. So we need more specifics.

A. Okay. I've reviewed the medical records, particularly the Pediatric Intensive Care Unit, clinical notes on this particular child, the radiology reports, the emergency medical team report on this particular child.

I've also reviewed a death summary, as well as the medical examiner's report.

Q. Doctor Barnes, did you receive a binder in the mail from the Michigan Innocence Clinic?

A. I certainly did.

Q. Have you reviewed the material in that binder?

A. Yes, I have.

MR. LINDGREN: That binder is identical to

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the binder that we have in court.

THE COURT: Okay.

BY MR. LINDGREN:

Q. Doctor, do you believe that you have reliably applied the principles of evidence-based medicine and the generally accepted principles in your field to the case at hand?

A. Yes, as best we can where that principle applies, yes.

Q. At this time I'd like to move to have Doctor Barnes qualified as an expert in radiology with a specialty in pediatric neuroradiology.

THE COURT: Mr. Hebel?

MR. HEBEL: Couple of voir dire questions.

THE COURT: Go ahead.

VOIR DIRE

BY MR. HEBEL:

Q. Hello, Doctor. My name is Daniel Hebel. I'm the assistant prosecutor on the case.

A. Nice to meet you.

Q. Nice to meet you.

I got a couple of questions. The first is you said that attached to your Affidavit was a list of references that you relied upon; is that correct?

A. That I reviewed.

Q. Okay. The list of references that you reviewed, not

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for the list of references you relied upon?
A. Oh, you're talking about references from the --
Q. Citations to authority.
A. Evidence-based medical literature?
Q. Yes.
A. I don't know if that was attached to my original Affidavit. I certainly submitted extensive references since that Affidavit.
Q. Interestingly I don't think we received that.

MR. LINDGREN: Your Honor, Doctor Barnes did send us very extensive bibliography that covers the whole gambit of these issues, but Doctor Barnes specifically testified to what specific articles and reference he has been using to --

THE COURT: Why didn't you turn it over to the prosecutor? That was supposed to be turned over. It was in the Affidavit.

MR. LINDGREN: It's actually not in the Affidavit. The Affidavit kind of, it speaks for itself and does not have any reference to any citations at all. Doctor Barnes just sent those as helpful articles for us.

MR. HEBEL: Your Honor, at this point I would move that this witness either be excluded or delayed until such time as I can look at the bibliography as

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well as what references will be referenced by the expert, because there is no way I can cross-examine an expert when I have no citations to authority whatsoever beforehand.

I didn't realize this document even existed.

MS. SCANLAN: Your Honor, if I could interject. This was an issue that I believe was discussed in some Pretrial motions in terms of the prosecutor filling out the report for inadequate for preparation.

We never received any further request for further citations. We would have been happy to provide that. The list of articles, I believe there are hundreds of articles on it, and it's just a general list of all articles. I mean there was never any specific request made for specific citations.

If that would have been made, we would have been happy to turn it over. There was, a motion was filed I think a few days before the first hearing.

That is our position on that issue.

MR. HEBEL: Well, in background real quick if your Honor will indulge I believe I did ask about the reports at our in-chambers hearing and was told that those were the only reports at the time.

I filed a motion a week before in case there

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was any further information that came in. I was under the impression I would receive it. Hundreds of articles that are loosely connected to shaken baby syndrome probably wouldn't do me any good.

But if the defense's expert intends to reference several of these, cherry pick from it, I think it's only fair that I know which ones beforehand if possible.

I was given this today, which also was in the packet, which I mean I would be fully able to go over this because I've already been given it. Also the article that was attached, I've been given, but outside of those two items, I'm flying blind.

THE COURT: Well, here's what I am going to do. We're going to go forward with Doctor Barnes' testimony on direct examination. But if there is any reference whatsoever to any article that has not been turned over to the prosecution, then I will allow Mr. Hebel the opportunity to get those articles and to review those articles, and we'll recall Doctor Barnes for cross-examination.

But I do think going forward that if there is some knowledge on the part of either party that there is going to be reference to certain articles or journal articles or scientific articles, that that needs to be

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turned over.

If you prepared for it, the other side should have it. Just so that both sides know I don't believe in trial by ambush.

MS. SCANLAN: Understood, your Honor, and I do believe Doctor Barnes will be referencing other articles. So I expect we will be doing the latter procedure.

THE COURT: Mr. Hebel, let me suggest this. What we will do is we'll do the direct examination, and then we'll schedule a new time that is mutually convenient for all parties, including Doctor Barnes.

All right?

MR. HEBEL: The People are satisfied.

THE COURT: Go ahead please.

MR. LINDGREN: So I believe the motion is still out there. I move to have Doctor Barnes qualified as an expert.

MR. HEBEL: The People have no objection.

THE COURT: All right. I just have one question. It's more of a clarification.

Doctor Barnes, you have referred to this SCAN Team that you're an integral part of. Just for my edification could you share with me who comprises the SCAN Team?

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I'm not talking about names, but in terms of, you know, is it, you know, nurses, emergency room doctors, protective service workers, prosecutors, defense lawyers? If you can give me some sort of sense as to what skill set if you will comprises that team.

WITNESS BARNES: Certainly. The team is comprised of one or more child abuse pediatricians. We have had two in the past working with us, now a third. So they lead the meeting.

Then we have myself, the radiology representative, and then when necessary we will imply other specialists. For instance, neurosurgeons, orthopedic surgeons, endocrinologists, opthalmologists or pathologists whenever necessary for particular follow up of cases.

The larger group though are our social workers and our child protection services representatives as part of our SCAN Team Committee, particularly from Santa Clara County, but also occasionally from other counties whose patients come through our process. So that's kind of the main team that we work with.

We review, about most of our cases, about two thirds are neglect and a third is child physical abuse, and then there is a smaller percentage that's sexual

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abuse.

THE COURT: All right.

Mr. Hebel, any objection?

MR. HEBEL: No objection at this point.

THE COURT: Certainly Doctor Barnes will be permitted to testify and give his opinion in the area of expertise, which is pediatric radiology, pediatric neuroradiology.

BY MR. LINDGREN:

Q. All right. Doctor Barnes, let's talk about that history of shaken baby syndrome. When was the shaken baby syndrome diagnosis first theorized?

A. Oh, my goodness. Depending on how far back you want to go, but in the United States certainly as early as 1940's, 1950's, and then from that point on.

Q. Doctor, are you familiar with a Doctor Gulpkelch and his work?

A. Oh, certainly.

Q. What was his role in the history of shaken baby syndrome?

A. He published one of the earliest series on shaking as a potential cause of injury, particularly brain injury in infants due to abuse.

Q. And what was Doctor Gulkelch's finding?

A. His findings were that certain types of shaking could

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lead to what is called a whiplash type injury that can result in brain injury. That is manifested by hemorrhage inside the skull, what we call subdural hemorrhage. Also can be associated with bleeding in the eyes or retinal hemorrhage, as well as brain swelling, the so-called triad.

Q. And what was Doctor Gulkelch basing his theory on?

A. His observations and a series of cases, and then also basing his opinions on some of the scientific work that was being considered and subsequently done and reported by Doctor Ommaya, for instance, in the United States, and Doctor Gulpkelch's work became incorporated by Doctor Cathy with his work in shaken baby syndrome.

Q. Were you trained that the triad was proof that a baby was shaken?

A. Yes, I was in my early training. That's correct.

Q. Did you come to question that theory?

A. Yes, I did.

Q. Was there a precipitating event or case that led you to question that theory?

A. Yes. In the mid to late nineties, the Nanny Case or the Au Pair case in Cambridge, Massachusetts where I was practicing at the Boston Children' Hospital was one of the precipitating cases that started us questioning the validity of shaken baby syndrome.

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Q. And to be clear is that the Louise Woodward prosecution?
A. Yes. That involved an eight month old male infant, Matthew Ethan.
Q. What was your role in that case?
A. In that particular case as the Chief of Radiology at Boston Children's Hospital I was asked by the prosecutors to present to the jury and the judge the imaging findings in that particular case, the CT of the brain, as well as some other x-ray abnormalities.
Q. What was the perspective that you testified to in that case?
A. That this was at the time a shaken baby syndrome, a SBS case, but it also had a fracture of the skull which would also indicate impact injury.
Q. And what did you base your opinion on at that time?
A. The existing knowledge base and literature primarily in the pediatrics literature, the child maltreatment literature and the pediatric radiology literature.
Q. And, Doctor, has your testimony in subsequent cases been different than it was in that 1997 case?
A. Yes. There has been a change in my approach to child abuse. My testimony, particularly as I started reviewing other cases sent to me and when we started using more modern advanced imaging techniques beyond

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X-rays and CT's such as MRI, and particularly in the context of the introduction of evidence-based medicine principles in that particular decade.

Q. Okay. Doctor, I want to turn to the biomechanical studies in SBS research. Have there been biomechanical studies that challenge the shaken baby syndrome diagnosis?

MR. HEBEL: Objection, your Honor. Beyond the scope of this witness' expertise.

THE COURT: Response?

MR. LINDGREN: Doctor Barnes researches shaken baby syndrome. He writes extensively. He teaches in this field, and the radiologists regularly rely on biomechanical studies to create that diagnoses.

THE COURT: I haven't heard that yet.

I'll sustain to the form of the question.

MR. LINDGREN: I can lay a foundation.

BY MR. LINDGREN:

Q. Doctor Barnes, do you use biomechanical studies in your work as a radiologist?

A. Yes, I do.

Q. How do you do that?

A. With regards to interpreting the image in potential causes, particularly if we're talking about trauma and accidental versus non-accidental, a general knowledge

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of biomechanics and trauma biomechanics assist the radiologist in being a more complete consultant, but we do rely on the other specialists who are more qualified in biomechanics to apply those more specifically.

Q. Doctor Barnes, have you written, has your research involved biomechanical studies that challenge or biomechanical studies on the shaken baby syndrome diagnosis?

A. Yes, and evidence-based medicine reviews. I have addressed the biomechanical studies, as well as other aspects beyond imaging neuropathology, et cetera, and how that applies to imaging and how imaging may be able to assist those fields in evaluating a given individual case.

I've also co-authored more specific case reports that included biomechanical analysis.

Q. So, Doctor Barnes, have there been biomechanical studies that challenge the shaken baby syndrome diagnosis?

MR. HEBEL: Your Honor, at this point the People are again going to object because this witness has just said that he leaves biomechanics to more qualified experts and that his contribution is on an imaging basis only.

THE COURT: Response?

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MR. LINDGREN: Your Honor, the prosecutor has introduced a biomechanical article that is also not written by a biomechanical expert, Carole Jenny. So it seems like in fairness we should be able to have a none biomechanical as well.

MR. HEBEL: Your Honor, I believe that is a Carole Jenny, et al. There were several authors on that, and despite the fact she has a reputation in the community as a leading author in these types of studies, that doesn't mean that she is the only expert on that panel.

MR. LINDGREN: First of all, to our knowledge no other of the authors of the Jenny -- these are biomechanical engineers.

Additionally, Doctor Barnes is not testifying as an expert in biomechanics. He is instead just testifying about the literature that involves biomechanical studies that he has said is relevant to his work as a radiologist.

THE COURT: Well, I think in general it is not in his area of specialty and his area of expertise. What I would allow is if in this particular case if Doctor Barnes says that in terms of reaching his expert opinion in his diagnoses as a pediatric neuroradiologist or pediatric radiologist, if in

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formulating his opinion he relied on some biomechanical literature, I'll allow you to make reference to that.

But since Doctor Barnes has indicated that some working knowledge, some general working knowledge is something that he has, but on the more complicated issues he relies on those who have greater expertise, I think he's acknowledged that this is a little bit outside of his area.

I do think that if there is reference to biomechanical literature that he relied on in formulating this opinion in this particular case, he can reference that, and I think, Mr. Hebel, then that goes to the weight that should be given to that, and you're free to cross-examine that, and both sides are free to argue how much weight I should give it, but I'll limit it to that biomechanical topic.

Okay. Go ahead please.

BY MR. LINDGREN:

Q. One moment. Okay, Doctor as a pediatric radiologist do you follow the positions of the American Academy of Pediatrics?

A. In general, yes.

Q. Doctor, are you familiar with the 2001 AAP position paper on shaken baby syndrome?

A. Yes.

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Q. What did that position paper say?
A. That original position paper was one of the first papers written to include biomechanical language, if not data regarding establishing shaken baby syndrome, the mechanism of it as the causes of the triad, the three manifestations that I talked about earlier.

And that was one of the first, if not the first major position statement that did in fact tie together the biomechanics of shaken baby syndrome at the triad.

Q. And did that position of the AAP change?
A. Yes. Since that time it has changed, including up through the last major paper written I think the position statement, if you will, in 2010 with clarifications beyond that.
Q. Doctor, are you familiar with the three Geddes' articles from the early 2000's?
A. Yes, I am.
Q. So it's my understanding that there were two that were submitted or that were published in 2001, and those go by the name Geddes One and Geddes Two, colloquially; is that correct?
A. Yes.
Q. What did Geddes One and Geddes Two contribute to the literature?

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A. At that particular time particularly for in that series infants under nine months of age that the pathology findings, the neuropathology findings and those in that series of children, that one, she undertook the study was regarding shaken baby syndrome.

She had a number or findings that began from a neuropathology perspective, challenged the existing biomechanical explanations for the brain injury, that bleeding in the eyes and the bleeding in the head in those babies.

What in fact she found that a number of those babies had findings of impact. In other words, mechanical impact type trauma as opposed to shaking.

She found that a number of those babies had findings that didn't look like primary or direct traumatic injury to the brain but actually looked like injury due to a lack of oxygen or blood flow to the brain.

And she also found evidence of old prior injury, particularly with regard to the subdural hemorrhage. She found evidence that they were old subdural collections with newer hemorrhage that could date actually as far back as birth.

So it was that series that began to change our thinking a little bit about looking at accidental

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trauma because of the impact and including birth-related issues and so forth.

Q. Doctor, what did the third Geddes' article contribute to the literature?

A. The third Geddes' article, which was the first of its kind actually looked at a, if you will, essentially a control group as part of proper scientific methodology.

She looked at a group then of infants' post-mortem brain injuries that had similar findings in terms of clinical findings like the triad but had similar intercranial abnormalities and cranial abnormalities that were not due to trauma, that were due to other medical conditions.

And so that further raised concern about the scientific basis for shaken baby syndrome is the cause of the triad in all these different babies and started a larger group of researchers looking into number one, the validity of shaken baby syndrome causing these injuries, number one. Number two, the role of other causes, including medical reasons, the so-called mimics.

Q. Doctor, does the Geddes' Three or the third Geddes article have a different level of reliability in the literature than the other two?

A. Well, all three articles had a much stronger quality of

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evidence rating using evidence-based medicine standards now than previous articles had done.

In fact, we didn't really start applying evidence-based medicine standards to the medical literature, particularly on shaken baby syndrome until it was done retrospectively starting in the early 2000's with Doctor Geddes' work and others work to go back and retrospectively look at the scientific basis, the methodology, the biostatistical significance, all of those factors and standards that are important in establishing standards and guidelines in practice of medicine, diagnosis, treatment and forensic work.

Q. Are you familiar with the 2003 Donohue study?

A. Certainly.

Q. Could you explain the findings from that study?

A. Yes.

Q. Please do.

MR. HEBEL: Objection, your Honor. This is outside the scope of the witness' expertise. These studies are not radiological, especially not Donohoe, which is just a review of shaken baby syndrome literature.

THE COURT: Response?

MR. LINDGREN: One moment please.

Your Honor, as a pediatric radiologist

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specializing in child abuse he has to be aware of the literature surrounding shaken baby syndrome.

MR. HEBEL: Your Honor, your ruling was that there had to be a nexus as to this case. We have not seen a foundation that there is any nexus between Donohue and this particular case.

MR. LINDGREN: Your Honor, I can ask Doctor Barnes if this piece is relevant to this case.

THE COURT: Well, ultimately I think that's for me to decide. Let me say this. I'm going to allow the answer in this case. I'm going to overrule the objection, but I'm going to say this.

We had a review, an explanation of some of these sort of foundational pieces of literature that have been gone over by both Doctor Galaznik and Doctor Nichols. I don't think we need an explanation from Doctor Barnes with all due respect to Doctor Barnes as to what the article says.

I think if you want to ask do you agree with it? Do you incorporate that? Do you disagree with it? That's fine. But I think I have given your side I think ample opportunity with two witnesses to go over not only the Swedish Study but the other foundational studies.

If you're going to go into some other ones,

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I'll certainly give you latitude with that, but certainly you're fee to ask Doctor Barnes are you familiar with this particular study.

If we have already covered it, you can ask him, do you follow that? Do you agree with it? Do you disagree with it, and we can move on from there. Okay.

MS. PLUMMER: Just one moment, your Honor.

MR. MORAN: I want to cover something with Mr. Lindgren. We found the bibliography that Doctor Barnes sent us some time ago. It's 20 pages long, has about 230 articles. We can get a copy. We'll be happy to turn it over to Mr. Hebel now.

THE COURT: Okay. We can arrange to do that later. I think that's helpful. I appreciate that, Mr. Moran.

I think also the more pointed question, and I agree with Mr. Hebel, I think the essence is if Doctor Barnes is going to make reference to, you know, six of those during the course of his direct examination and they're not articles that Mr. Hebel has, we want to make sure that those are part of what he can identify.

MR. HEBEL: If I may. I think that a copy of that along with the testimony here, assuming that articles that are mentioned are on there, I think that would be perfect because I can look them up based on

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that.

THE COURT: Sure. That's good. We'll do that.

BY MR. LINDGREN:

Q. Doctor Barnes, are you familiar with the recent Swedish Report, the SBU report on this issue?

A. Yes.

Q. Do you agree with the findings in that report?

A. Yes, I do.

Q. At this time, Doctor Barnes, I want to shift back to the baby in this case, Nakita Lemons.

Doctor, what kinds of images were taken of Nakita Lemons?

A. Nakita had a series of chest X-rays, pre-mortem done on October 10th, 2005 and October October 11, 2005. Also a head CT also done on October 10th, 2005. Then the child had a post-mortem skeletal survey dated October 11, 2005.

Q. Are those the types of images that you normally examine say as members of the SCAN Team?

A. Yes.

MR. LINDGREN: Your Honor, I'm going to be presenting Doctor Barnes a power point. It's made up of images as well as an article that he will be discussing.

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MR. MORAN: We have turned over a copy of that article to Mr. Hebel.

MR. HEBEL: That's correct.

THE COURT: Just so the record can be clear, you want to have these, the power point marked as an Exhibit?

MS. PLUMMER: It is already marked, your Honor, as Exhibit 18. It's not in the binder. We will be moving to admit it at the end of his testimony relative to this.

THE COURT: Okay.

BY MR. LINDGREN:

Q. Doctor Barnes, can you see the presentation on your screen?

A. Yes, I can.

Q. Do you recognize this presentation?

A. Yes. This is the one of the images number eight of 24 images from the head CT on the Lemons baby of October 10th, 2005.

Q. And, Doctor, did you create that power point?

A. I did. I took the images directly from the medical CD and put them into the power point.

Q. And did this contain all the imaging from this case?

A. Not all of it. I just selected particular images that demonstrate the abnormalities that support my opinion.

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So I did not include all of the images.

Q. All right. So looking at this first slide, which is actually the same image as in Exhibit 15, page 31 in the binder, except arrows have been added by Doctor Barnes and some text. It also appears to be of higher quality than our printout in the binder.

So, Doctor Barnes, looking at this first slide, what are we looking at here?

A. What we're looking at is an image of the brain generated by the CT scan, if you will. The baby is lying on its back inside the donut shape machine called the CT Scanner. On one side of that donut are the X-ray sources that then will pass through the donut hole where the baby's head is.

How those X-rays are absorbed will then determine the appearance of the brain and the skull. As those X-rays then go to the other side of the donut where the detectors are, that is electronically connected to a computer that will demonstrate a series of images from the bottom of the baby's head to the top of the head almost like we're slicing an orange, for instance.

The top of the image is the front of the baby's head. The bottom image is the back of the head, and using the medical software here you can see a small

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"R" way over on viewer's left that indicates by that measurement scale that the right side of the head is on the viewer's left. The left side of the head is on the viewer's right by convention.

The white outer ring is the skull of the baby's head, which is made up. That will absorb more X-rays and appear white because of the metal that involves calcium and phosphorus.

When we get inside of that ring, we see varying areas of gray to dark, which is brain tissue, gray matter like computer chips of a computer. White matter, which is the wiring that connects it all. So that's the background brain.

Now I have a number of arrows also pointing to some whiter than normal areas as contrasted against the brain. Any time we see white areas like that, our first consideration is hemorrhage. Our second consideration is a clot or thrombosis.

That is the cause when blood, which is normally circulating in the blood vessels, breaks out of a blood vessel into the brain, for instance or into the spaces between the brain and skull. We call that hemorrhage.

And as it goes from liquid to solid, it turns white, that white which is not as white as the bone of

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the skull, that tells us that that's hemorrhage because it contains a metal called iron. We have iron in our blood.

When we see that particular finding, in this case if you consider this image as a clock, and the top of the image where the top arrow is is pointing to the vertical white line there at about 12, that looks like hemorrhage. That's between the frontal lobes of the cerebral hemisphere.

When you go to about 2:00, or maybe that's more about 2:30, there's a white line there. That's some hemorrhage, and it's between the frontal and temporal lobes.

And then you go to the third arrow on the viewer's left, that's pointing to some very small white areas of hemorrhage between areas of the brain along a membrane, a normal membrane called the tentorium.

And then you to go the last arrow, which is at about 7:00 o'clock, some vaguely white areas. And all of these white areas look like blood or hemorrhage that is between parts of the brain, probably not within the brain, although CT sometimes can't tell us if it's just under the surface of the brain.

And because they are white, we will describe them as recent hemorrhage, acute or even subacute, and

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these are quite small.

Those findings are important. But the major finding actually, which I'm going to go to next is what the first sentence in the annotation is bilateral extensive cerebral edema or darker than normal areas of the brain.

So if you look about 5:00 and go over to or excuse me, 4:00 o'clock and then to 6 o'clock then to 7:00 o'clock, that part of the brain, is in fact the cerebellum, and brain stem is closer to the normal brain.

Everything else in front of that cerebral hemisphere is darker than normal, and we can't distinguish gray matter from white matter. That means there is diffuse edema, and it's quite diffuse.

So the major findings are the diffuse edema plus the second sentence that I have there, small extracerebral, meaning outside the brain hemorrhages as white arrows, and we are going to see this same or similar findings as we go from the bottom of the brain. This is about the level of the ears just above the eyes.

We're going to look at two more pictures, and then we'll put this altogether in terms of what does this look like, what may be causing it, when did it

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happen.

Q. So here is slide two, which is the same image as Exhibit 15, page 35.

Doctor, what is of interest in this image?

A. This image now is slightly higher or above the ears or about the middle of the head. Again those white arrows are showing areas of abnormal white that appear to be in spaces between brain tissue, possibly just beneath the surface of the brain tissue.

You see an arrow at about 11:00 o'clock up there pointing to a white area there. I'm not pointing to all the white areas. When you go down and look about 6 o'clock, there is two arrows down there. One is a squiggly white area, and then that arrow right in the midline at 6 o'clock shows a smudger arrow of white.

Again we look at that. We say those are acute to subacute hemorrhages and/or clots. Another word for that is thrombosis. That can be outside the vessels along membranes.

There is a membrane here called the Falx, F-A-L-X. We mentioned the other membrane, the tentorium, spelled like tent and then orium. So again these are very small hemorrhages. But again the major finding when you go around the clock all the way around

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is areas of a cerebral hemisphere that are darker than normal indicating that there is a diffuse edema, meaning water in the brain, and we can't tell white matter from gray matter, although this is primarily in gray matter.

And as we're going through this, we are also looking at, I'm not showing special views of the skull to see if there is fractures of the scalp, to see if there is swelling of the scalp for potential trauma, and other considerations for what we're seeing here.

Because the first thing we would mention with this type of presentation in an infant just from the imaging is we've got hemorrhage. We got edema in the brain.

First thing we have to rule out is trauma, accidental versus non-accidental. Then we move to the other parts of the differential diagnosis that can cause this that we tell the doctors about. So work up trauma accidental versus non-accidental, and then as we go through the rest of them, we come up with the rest of differential diagnosis.

Q. We'll move to the next slide here. This is slide three, also Exhibit 15 page 38.

Doctor, what is of interest in this slide?

A. Now we're going about two thirds of the way up from the

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bottom of the baby's head. As we're going to the top of the head, you see two white arrows there that are essentially looking at vertical white lines that extend on the clock from 12 at the top all the way down through the brain or between the two parts of the brain, the two cerebral hemispheres, a white line.

Again we look at that. We call that most likely some hemorrhage, maybe clot or thrombosis, but they are very small, very thin. They are not large collections.

And then the other feature there as we look on both sides of the brain, and the brain is darker than it should be because it has water in it. Water will be darker than gray or gray to dark, again diffuse brain swelling in this baby.

I think there may be one more.

Q. Yes. We'll move to the next slide, slide four. This is Exhibit 15, page 43.

Doctor, what is of interest in this slide?

A. Now we are almost to the top of baby's head. We continue to see this white stripe, thin white stripe that goes from about noon to about six. It's between the two darker gray areas of the cerebral hemispheres. It's actually between them. So we use the term extracerebral, meaning they lie outside the brain from

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a CT Scan.

When they lie outside the brain between two areas of the brain, between the brain and the skull, then we have to see if we can decide what compartment between brain tissue or between brain and skull that they actually, this hemorrhage occupies.

That could be very difficult from CT alone to know is that in the subarachnoid space, which is the space between the surface of the brain and the next membrane called the arachnoid, or is it in the space between the arachnoid and the next membrane out that is next to the skull called the dura. That's called the subdural space if you will.

Plus there is, I didn't put arrows on the other smaller areas of white there that you may notice that are much smaller. So we would say that much of this really look likes subarachnoid hemorrhage along where it's running along these dural membranes such as the Falx and tentorium.

Those can be inside the dura. They can be what we can subdural. But again the big picture here is this darker brain than normal on both sides that is relatively uniform for darkness from top to bottom.

And then as I said before, we look at the skull for fractures. Don't find any. We look at the

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scalp to see if there is any swelling. We look for other potential findings. Some of these really small hemorrhages could actually be clots within veins or blood vessels called venous thrombosis.

So we give all of these findings to the doctors, whether this is a child that has come through the emergency room or come from the Intensive Care Unit, we say the major finding here is the dark brain that is diffusely dark.

The number two findings are the hemorrhages, and, of course, we tell them got to consider trauma, accidental versus non-accidental.

What is the third category of possibilities. It is the medical condition that can lead to what we see here.

Number one, with regard to the brain, what can cause swelling of the brain? Probably the most common case of brain swelling in this age group between two and three months of age is a lack of oxygen.

So then we ask did the baby have any breathing problems, either from the mouth, the airway or the lung. Was there any breathing problems.

Number two, not just a lack of oxygen from blockage of the airways or lungs but the lack of oxygen due to no oxygen in the blood where the oxygen gets

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absorbed in the lungs and into the blood. It gets pumped by the heart to the brain and other tissues. Maybe the heart is not pumping normal. So look for a cause for the heart not pumping normally or both.

So one would be called respiratory arrest, baby's not breathing. What caused that. The next thing that the heart stops. That's cardiac arrest. You will hear the term cardiorespiratory arrest.

So that's the leading cause for the brain.

Number two, we also say you got to rule out infection of the brain, encephalitis, inflammation of the brain itself, meningitis, inflammation of the membranes between the brain and skull that can affect the brain. So they have to work that up.

Also look for the cause of bleeding other than trauma. Accidental or non-accidental. Is there a bleeding or clotting problem. You got to work that up. But also consider particularly in known cases of hypoxia-ischaemia lack of oxygen, lack of blood flow.

There can be small hemorrhages, particularly subarachnoid associated with it, but also in the dura.

The last category is blood vessel abnormalities that can bleed that the baby could be born with. That would also have to be looked at. Malformations or aneurisms, those are words for blood

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vessel abnormalities that could cause this particular set of findings.

It could have started with the bleeding, and then you got the dark brain, or it could have started with a dark brain. Then you got the bleeding. CT is not going to tell you. That's why in 2005 the standard would have been MRI, except sometime the baby's too sick, particularly in that early years of MRI to be able to get that. They're dealing with a baby who is actual severely impaired and unstable.

So that's the differential diagnosis for that.

And now you go back to the important aspects of the case. History is the most important.

Q. Right. So, Doctor Barnes, how would you go about narrowing down from that long list of potential diagnoses?

A. It would be history first. Some medical testing of the baby if they can do the testing for infection, do the testing for bleeding or clotting problem. They would certainly want to do all of that, but it's really the history that is critical here because a CT that looks like this most often indicates what we refer to as an ALTE, an acute life threatening event, looking to the potential for an acute life threatening event.

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That's most often a baby this age, a baby that stops breathing for some reason, particularly if there was blockage of the baby's airway that then leads to respiratory arrest. And depending upon the timeliness of cardiorespiratory resuscitation, that can then lead to cardiac arrest. That is a well known sequence of events to look at.

Q. Now, Doctor, was there anything in the medical history that you reviewed in this case that helps you narrow down your diagnosis?

A. Yes. I would offer it as a differential diagnosis. Then as the fourth or fifth part, it would be myself working with the clinical doctors to come up with the most likely cause of what's here.

So the history in this particular case is very revealing as you know, and you can get this from, you know, the medical records and the Pediatric Intensive Care Unit.

Note here just as the caretaker describes events that sound like blocking of the airway, a common cause of that is a baby who is feeding and then chokes on a feeding. And in a particular instance like that we ask the question are there any predisposing conditions that this baby has that would make a baby choke on a feeding. And then once you get the feeding

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into the airway that blocks the airway, and now you start down a cascade of injuries, one piling on the other that can lead to respiratory arrest, cardiac arrest and then even death. So that would be the first thing to look for.

Now also it needs to be investigated as we would because we would not only describe findings to doctors. We would get the social workers involved. We would notify CPS particularly, because we have brain swelling. We have extra cerebral hemorrhage that can be dural hemorrhage, although it looks like subarachnoid to me.

Subarachnoid hemorrhage is really not part of the original triad that at one time we assumed that child abuse or shaken baby syndrome. That's why we consider a hypoxia-ischaemia and these other causes that we talked about, and we would even include accidental injury.

We know that either abusive injury particularly by way of mechanical injury or accidental injury, a baby can stop breathing. Apnea it's called, and there are many causes of apnea, which is the most manifestation of an acute life-threatening event in an infant.

The other is seizures, a baby having

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seizures, but those can occur together. So that's essentially what we would work on in terms of the SCAN Team, the doctors taking care of a child, what we see on the pre-mortem brain CT.

Q. Okay. Doctor Barnes, I think we are going to move on to the next power point slide, which is a little different here. So this is slide five, which is Exhibit 16, page one.

Doctor, what are we looking at here?

A. Now this is an X-ray, post-mortem X-ray of the baby's head or skull, but also the shoulders and chest. The top of the image is the top of the baby's head. The bottom of the image is where the chest is, and then you can see at 3:00 o'clock and at 9:00 o'clock, if you will, areas of the shoulders and bones of the shoulders.

And then I have a small, black area pointing to one of the bony parts of the scapula or the shoulder blade, and now we're going to magnify that with the next image.

Q. All right. Here is slide six, which is Exhibit 16. It's page one, the same page. It's just zoomed in.

A. Yes. So this is magnification, one of 31, and maybe the Judge and everyone else can now appreciate a hair line kind of straight to curved defect in the bone

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there known as the acromion. It's process or projection of bone off the top of the scapula or shoulder blade, and there is a line there. And, of course, we see something like that, the first thing we have to do consider is it a fracture. If it's a fracture, accidental, non-accidental.

And then the third category is when we see something that's a fracture is rule out a bone fragility disorder.

So in the older literature this particular area, if it's a fracture, has been reported to be of moderate to high specificity for abuse.

We now know that there is not a good scientific basis for that as we progressed through the evidence-based medicine literature now that we know, particularly of the bone fragility disorders, and we also know that depending upon the type of resuscitating measures used in this child, whether it be chest impression, back blows or resuscitating shaking or jostling of the child, that we have to consider the possibility that that in fact could be instead of abusive, it could be accidental.

And particularly as the only finding from a fracture standpoint, we don't see anything quite like it on the other side, but we should also consider the

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more modern literature too that once in a while we run into what is incomplete development or bone formation, what we call ossification of the part of the shoulder and the shoulder blade, and that's a well-known issue also.

So from a point of view of just a radiologist just looking at that X-ray, I'm not sure that we can decide among those three possibilities of what caused this. We know that it's a post-mortem X-ray. We would hope that the medical examiner at autopsy would be directed to that area, just like the brain CT finding shows abnormalities that would help direct the medical examiner pathologist to those particular areas to look at specifically both grossly or macroscopically as well as microscopically.

Q. Okay. Doctor Barnes, one more image here of the shoulder. This is slide Seven, Exhibit 16 page 20.

Is there anything further significant in this image?

A. No. Just to confirm that that finding is there by X-ray. Yet I find no other fractures that would be considered in 2005 for instance to be, you know, more concerning for abuse like rib fractures or fractures of the growing ends of bones what some call CML's or classic metaphyseal lesions, although we do have a few

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additional findings on this post-mortem X-ray that would warrant maybe not as much in 2005 as now a bone fragility disorder.

Now that we know that bone fragility disorders, particularly Vitamin D deficiency and other deficiencies that can cause rickets or fragile bones would be a consideration.

Q. All right. Moving on to the next slide.

Doctor, what is on this slide? This is slide eight?

A. Yes. This is just a publication. There is a series of publications on fractures of the acromion that's part of the scapula, that even though the scapula is the shoulder blade, behind the shoulder this process kind of projects toward the shoulder.

And the importance of fractures in young children, but also the importance of identifying what are called variance, meaning developmental variance or incomplete development of ossification or bone formation of the acromion, centers of the acromion in this particular area, how it can mimic fractures.

That's what we may have in this particular case, but we would only be able to confirm that based on microscopic examination by way of post-mortem examination and/or other testing.

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Q. Okay. Here is slide nine. What is on this slide?
A. Several of the cases that are shown here, both fractures as well as defects that are developmental. I think these are pictures of fractures that actually with time heal, which tells us that they are likely fractures, although it doesn't rule out bone fragility disorder that heals, particularly with treatment like Vitamin D.

And if you can go to the next slide, I think.

Q. That's your slide ten. What do you see here?
A. Now talking yes, like I think that's Figure 5a there is now talking about some of the developmental defects or variances that can look very similar to what we have in this particular case.
Q. I believe this is slide 11. What do you see on this slide?
A. Just again comparing one side to the other of Figure 5a, and this is a three month old by the way, and it shows the difference in appearance of that particular bone, the acromion where the bones do separate two centers. The bone hasn't quite formed yet.

So it leaves an area that looks like a fracture, but it's not a fracture. It just incomplete ossification.

Q. Here is slide 12. What do we see on this slide?

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A. This is just a schematic type of picture of development of the scapula or shoulder blade and its component bone centers, including the acromion. With age they ossify or form bone, and how incomplete formation or connection of the bone components or fusion of them to form one solid shoulder blade, those defects and ossification can be mistaken for fractures.

Q. And, Doctor, here is slide 13, which I believe is the last slide in the deck. This is Exhibit 16 page nine.

What is significant on this slide?

A. In this particular slide this I just chose one of the bones, but similar findings are in other bones. This is the right forearm of the Lemons baby, and the arrows are pointing to the bones on the forearm. There is two bones in the forearm, the radius and the ulna.

So those middle white arrows are pointing to the middle of the bones that extend up to the elbow at the top, and down at the bottom is the wrist and then the hand bones. But those two arrows in the middle are showing how these bones are not straight. They are curved.

And at the lower ends of the bones are two arrows that are the growth centers, what we call the metaphyses, and they're kind of chalky and irregular instead of nice and smooth and straight, and that

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finding certainly can be seen with healing rickets in a two and a half to a three and a half month old.

So in this day and age we would point to those findings and say we may have a bone fragility disorder. Some of it looks like it's in the healing phases, but consider that also as part of the differential diagnoses for the chromium defect.

Q. And, Doctor, would the rickets or the potential rickets or bone fragility disorder have any relationship to the brain injury that you saw?

A. Yes, it can. And we now know that you know ten years later we would be doing Vitamin D levels on the child, looking at calcium and phosphorus, if we found severe deficiency, particularly if calcium was low.

Calcium is not just in bones, but it's in brain. It's in the heart. It's in muscle, and it's important such that if the calcium got too low because of Vitamin D deficiency for instance that that can be associated with breathing and swallowing problems with the baby and can even be part of the choking spell and blockage of the airway when part of the airway goes into spasm.

So sometimes babies with rickets, severe Vitamin D deficiency, low calcium levels can present with breathing problems on the basis of that mechanism.

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Q. Doctor, just to circle back for a moment. You mentioned that choking could have caused the symptoms we saw here. Could you explain how choking could be a cause of all of the symptoms present in this case?

MR. HEBEL: Objection. I believe that would be -- I can't speak today. I believe that's beyond the scope of the witness' expertise.

THE COURT: Response?

MR. LINDGREN: This is right within the doctor's expertise as a radiologist who diagnoses injuries.

MR. HEBEL: I believe, if I may continue, your Honor.

THE COURT: Go ahead.

MR. HEBEL: I believe that what the doctor said was that the actual diagnoses was beyond the determination of radiology but rather that radiology would present options.

MR. LINDGREN: This is exactly what Doctor Barnes does regularly as a member of the SCAN Team, and he's not, I haven't asked him like exactly, I haven't asked him if the choking was the only cause. I'm just asking how that would cause potentially the symptoms we see in this case.

THE COURT: I'll take the answer.

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BY MR. LINDGREN:

Q. So, Doctor Barnes, how could choking cause all of the symptoms we see in this case?

A. As one of the possible causes and the leading manifestation of ALT in infants of this age and including associated with predisposing conditions, we know that babies that have trouble with feeding can choke on a feeding. That's known as obstructive apnea.

That is one of the common mechanisms of apnea respiratory arrest followed by cardiac arrest in this particular age group. So that's what we would tell the doctors taking care of the child, and, of course, we are working with doctors in training. We would teach them is look very closely at the ALTE event as causity of the particular brain injury.

So that's a well known correlation on the clinical side with imaging that would be discussed between the radiologist, the doctors in the Emergency Department or in the Intensive Care Unit and as part of our SCAN Team.

Q. Doctor Barnes, how could the choking, how could choking lead to the brain injuries that we saw or that you noted in your analysis?

THE COURT: Well --

MR. HEBEL: Objection. I think that is a

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little beyond the scope.

THE COURT: I agree.

Sustained.

MR. LINDGREN: At this point we would like to admit the power point as Defense Exhibit 18. We've already provided the prosecution with the power point, and the Court has it as well.

THE COURT: Any objection?

MR. HEBEL: No objection.

THE COURT: 18 will be received.

MR. LINDGREN: We would also like to admit the article that Doctor Barnes discussed, the Currarino article entitled Fractures of the Acromion in Young Children and a description of a Variant in Acromial Ossification which may mimic a Fracture from Pediatric Radiology as Defense Exhibit 19.

We provided that to the prosecution as well.

THE COURT: Is that page eight?

MR. LINDGREN: I believe it's the full article. The full article we are also moving to admit into evidence.

THE COURT: Have you seen that article?

MR. HEBEL: I'm holding it right in my hand right now.

THE COURT: Any objection?

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MR. HEBEL: No objection.

THE COURT: That will be marked as 19.

Okay. 19 is in.

BY MR. LINDGREN:

Q. Doctor Barnes, would non-accidental injury or child abuse be an option you would consider in your differential diagnosis?

A. Yes.

Q. And, Doctor, does the fact that Ms. Lemons under police interrogation admitted to shaking the baby before the baby collapsed change your differential diagnoses?

A. No, because we know from past and even the updated literature that shaking is a common resuscitative effort when a baby stops breathing. Pediatricians, that's part of our training and PALS training, pediatric training for radiologist, that if I'm dealing with a child that stops breathing, one of the first things we do is back blows or resuscitative shaking.

It happens to be because of the pediatric advance life training and for a parent. So a resuscitative shake is not a surprise. Back blow is not a surprise, but then the discussion goes --

MR. HEBEL: Objection.

THE COURT: It's a narrative.

Hold on.

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MR. LINDGREN: I'll move on.

MR. HEBEL: Thank you.

BY MR. LINDGREN:

Q. Doctor, based on the imaging and testing done in this case, is it possible to come to a conclusive diagnosis of what caused Nakita's symptoms?

A. Not from the imaging, not from what we know now in 2017, what we knew in 2010 let's say or not from what we know now.

Q. What would have to be done in order to get a conclusive diagnosis?

A. Well, the gold standard at this point well, you know, the gold standard is the post-mortem, the neuropathology and the pathology. That's the gold standard.

Stopping short of that, you know, is clinical laboratory testing because both of those are needed to corroborate what part of the differential diagnosis is relevant based on the imaging.

Q. Based on the records you reviewed in this case, did the doctors here perform a differential diagnosis?

A. You know, I don't remember seeing a differential diagnosis as much as I have laid out here. When you go through the clinical records, they are clearly describing obstructive apnea in this child followed by

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respiratory arrest and cardiac arrest. They're clearly describing clinical features to go along with that.

I mean that doesn't rule out that somehow these are not abusive related, but I'm not sure that I saw a differential diagnoses laid out as I have laid it out from the imaging.

Certainly they did some testing. I saw quite a bit of laboratory testing, and I assume that they were looking at bleeding, clotting problems potentially. There were looking at infection potentially.

Q. Was there any evidence of neck or spinal cord injury in the imaging in this case?

A. No. Now there was not direct imaging of the neck other than the X-rays. Didn't see anything on the X-rays. The CT Scan really didn't cover the neck or the cervical spine. So now we would want to go to the post-mortem exam and see what was found there.

Q. And how is that significant to your differential diagnosis?

A. Well, number one, if trauma is a consideration, we would like to know if there are post-mortem findings for impact, number one.

Number two, we know that in some circumstances that shaking could in fact lead to brain

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injury. You know, the updated literature suggests that we really need to look at the neck and the cervical spine, the junction between the cervical spine and the skull because that's the weak link, particularly if one is invoking shaking or shaking plus impact.

So we would want the, we now know we would want the medical examiner to look at those particular areas for injury.

MR. LINDGREN: May I have one moment please, your Honor?

THE COURT: Yes.

BY MR. LINDGREN:

Q. Doctor, the medical examiner in this case diagnosed shaken baby syndrome. Do you go with that diagnosis?

A. I don't agree with it on the imaging basis and any of the correlations I see between imaging findings and some of the findings that are described on the post-mortem.

From what I see described on the post-mortem and correlating with the imaging is that the brain injury looks like a lack of oxygen or a lack of blood flow, and the bleeding on imaging is mostly subarachnoid.

Now subarachnoid hemorrhage or even dural based or intradural hemorrhage in this age group with

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or without retinal hemorrhaging, we're thinking of causes other than abuse when we see subarachnoid hemorrhage to this degree and this degree of brain injury, but it still remains in the differential diagnosis.

MR. LINDGREN: No further questions, your Honor.

THE COURT: All right.

MR. MORAN: Your Honor, I don't believe Doctor Barnes referenced any articles that Mr. Hebel doesn't already have or have been referenced by other doctors in this case. We are again happy to have this copy and turn it over to him. It's 250 articles listed in the article.

THE COURT: I would like a copy of that specifically for the citations of the Geddes articles that were referenced.

MR. HEBEL: I know about Geddes Three, One and Two. I don't have the citations. If they are there, that would be perfect.

THE COURT: All right.

Well, let's do this. We'll go in the back. We'll compare calendars. We'll get a new date. Okay.

MR. LINDGREN: Doctor Barnes, thank you. You're done for today. We'll let you know what the

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next step is.

WITNESS BARNES: Thank you.

(Matter concluded).

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Detroit, Michigan

Wednesday, July 19, 2017

Approximately 9:15 a.m.

PROCEEDINGS

THE COURT: For the record this is Case Number 06-4818, People of the State of Michigan versus Lemons.

For the record, please.

MR. HEBEL: Good morning, your Honor. For the record Dan Hebel on behalf of the People.

MR. MORAN: Dave Moran from the Michigan Innocence Clinic on behalf of Ms. Lemons, also joined by Rebecca Hahn, who is an attorney in the Innocence Clinic and Farus Abdone, a student attorney in the clinic.

THE COURT: All right.

Doctor Barnes, good morning again, sir.

WITNESS BARNES: Good morning.

THE COURT: I believe we are ready to proceed.

MR. HEBEL: Yes, your Honor. That's correct.

THE COURT: Mr. Moran, whenever you're ready.

PATRICK D. BARNES,

DIRECT EXAMINATION (CONTINUED)

BY MR. MORAN:

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Q. Doctor Barnes, since we last spoke have you had a chance to look at the medical examiner's hospital report which was dated October 11th, 2005, and this was previously admitted, your Honor, as one of the original Defense Exhibits.

A. Yes, I have.

Q. And page two of that report, did you see this notation no retinal hemorrhages were observed on opthalomogic examination by the admitting physician?

A. Yes. I see that.

Q. Could you explain why that observation is significant to you that the admitting physician for Nakita Lemons did not see any retinal hemorrhages when she was admitted?

A. Yes, sir. At that time the theory of retinal hemorrhages associated with shaken baby syndrome was predicated upon the direct traumatic injury causing the retinal hemorrhages, and that the retinal hemorrhages should be immediately present and observable on clinical examination.

Q. So if the baby had been violently shaken before she went to the hospital, under the shaken baby syndrome theory, the retinal hemorrhages should have been there; is that right?

A. Correct.

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Q. If on the other hand the baby suffered increased intercranial pressure eventually causing retinal hemorrhages, could the retinal hemorrhages then have shown up before autopsy?
A. Yes.
Q. Now have you had a chance to review the reports of Doctors Strauss and Christian that were submitted after you last testified?
A. Yes, sir, I have.
Q. Turning to the Strauss Report, which was dated May 22 of this year, paragraph one he concludes therein I'm quoting "an unequivocal transverse fracture of the acromial process."

Do you agree?

A. I don't agree.
Q. Could you explain a little bit why?
A. Yes. There is a defect in the acromion process which I showed you earlier from the imaging. The X-ray does not tell us if that is a developmental defect or if it is a fracture or if it is a defect from an existing or preexisting bone fragility disorder.
Q. And so how should the medical examiner have determined which of those possibilities it was?
A. Well, the current gold stamp is gross examination followed by microscopic examination.

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Q. That wasn't done here?
A. That was not done according to the report that I read.
Q. Okay. Now later in that first paragraph in Strauss' Report he says, I'm quoting "acromial fractures are not reported with cardiopulmonary resuscitation specifically not with back blows."
Are you aware of any literature about that?
A. I am not.
Q. Are you aware whether blunt force trauma can create acromial fractures at least in adults?
A. Yes, it can.
Q. So in adults blunt force trauma can cause acromial fractures?
A. That is correct.
Q. And hopefully you can do this on camera. Can you just point for the Judge's benefit where the acromia is on you?
A. Yes. If I'm pointing to my left shoulder right here. So where the clavicle or the breast bone extends from about right here over to the tip of the shoulder where the clavicle articulates with the scapula is the acromion process of the scapula.
Q. So is it toward the back or the front of the shoulder?
A. Well, it projects from the back to the front to meet the clavicle right where I'm pointing. So that's a

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relatively exposed area, plus the muscles of parts of the shoulder inserts on that bone.

Q. In paragraph three Doctor Strauss writes craniotabes, and correct me if my pronunciation is wrong. Craniotabes is a physical examination finding and not a radiographic finding and thus cannot be discerned from the images. What is craniotabes?

A. Cranial refers to the cranium or the skull. Tabes refers to softening, and that is both a clinical and an X-ray or CT finding in certain types of bone fragility disorders. The classic would be rickets.

Q. Do you agree that they cannot be discerned from the images?

A. I disagree with that. There is plenty of evidence-based medicine, literature regarding skull X-rays and particularly CT scanning. So I don't understand that opinion.

Q. In paragraph four and five of his report Doctor Strauss writes unequivocally the bones show no evidence of rickets, and then he writes later that the bones of the forearm have "no evidence of rickets whatsoever."

Do you believe he's correct about that?

A. I don't, and at this particular age group about two months to two and a half months for this particular form of rickets, the findings can be subtle and in the

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healing phase.

In this case we have findings suggested in the skull of craniotabes on CT. I think even Doctor Strauss mentions the flaring of the anterior ribs. He just thinks they are normal, and there is widening of the growth centers in the bones of the arm, all of which are signs. And in this age group can be quite subtle with this particular type.

Plus Doctor Strauss states there is, I think he says there is no evidence of demineralization or lack of bone formation.

Therefore, he's excluding rickets, and it is well known that X-rays will miss the lack of bone because one can pass to lose somewhere between 50 to 70 percent of bone before it will show up on X-rays, yet it will show up on post-mortem exams, particularly microscopic.

Q. Thank you, Doctor Barnes.

Let me turn to another topic here involving something that is in both Strauss' report and Christian's report. So Strauss on page three, paragraph four on his section about the SBU Report wrote and I quote. "The SBU Report creates a straw man of the triad of subdural hematoma, hypoxic-ischaemic and encephalopathy and retinal hemorrhage.

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Although these findings are highly suggestive to diagnosis of shaken baby syndrome and abusive head trauma always rely own a thorough multi-disciplinary medical examination supplemented by imaging studies, laboratory studies and social evaluation."

Doctor Christian on page 18 also writes, and I quote "this controversy regarding a triad is in fact a straw man created for legal argument against a diagnoses of AHT, SBS."

Is that correct, or have you seen cases in which shaken baby syndrome is diagnosed just from the triad without a thorough multi-disciplinary medical examination?

A. The answer is yes.

MR. HEBEL: Object to the form of the question.

THE COURT: Hold on, Doctor, please.

MR. HEBEL: Object to the form of the question. It was asked have you seen cases where things were judged just on this. We're not talking about random cases. We're talking about this case.

MR. MORAN: Your Honor, Doctor Barnes has been testifying about shaken baby syndrome generally. I'm asking if he's seen cases in which shaken baby syndrome was diagnosed just from the triad.

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The prosecution's report claims that it is a straw man that's never diagnosed from the triad. I'm asking if that is correct.

THE COURT: Anything else, Mr. Hebel?

MR. HEBEL: The lack of relevance is my only --

THE COURT: All right. I'll take the answer. Overruled.

BY MR. MORAN:

Q. Doctor, you can answer the question.

A. The answer is and particularly in 2005 in the last decade, and there is plenty of literature to support this that there was little, if any, multi-disciplinary approaches at that time to the diagnosis of shaken baby syndrome.

And yes, you will find in the literature where the triad has been described as essentially compedeumonic (ph) or unique, and I have referred to you before to the Letter to the Editor by Chadwick, et al, published in Pediatrics in 1998 following the Nanny Case or Matthew Ethan case where the statement is essentially made that the triad is unique and to shaken baby syndrome, and that is published elsewhere, and Chadwack, et al, are a group of forensic pediatricians or child abuse pediatricians that signed on to that

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Letter.

THE COURT: I don't think that was your question.

MR. MORAN: I'm satisfied, your Honor.

THE COURT: Okay. Well, I wasn't. I thought the question was pretty straight forward.

BY MR. MORAN:

Q. I guess the question was have you seen cases then in which the triad alone was used to diagnosis shaken baby syndrome?

A. Yes, I have seen cases in the past. That's how I participated in the diagnosis of shaken baby syndrome was on the basis of the triad.

Q. In this particular case did you review Doctor Cassin's autopsy report?

A. Yes, I did.

Q. Does it appear that he just diagnosed shaken baby syndrome from the triad?

A. Yes. In fact, it's specifically stated in his report.

Q. That he sees these three symptoms, and that's the characteristic of shaken baby syndrome?

A. That's almost exactly what he says in his report.

Q. Now turning to the page 14 on Christian's report. It's not numbered. So I've written in the numbers. On page 14 of Doctor Christian's report she writes the

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rejection that shaking is not harmful to infants is promoted by a relatively small group of physicians and engineers?

And on page 19 of her report she asks why would anyone deny shaking a baby is dangerous.

Doctor Barnes, have you ever heard anyone deny that shaking a baby is dangerous and harmful?

A. I've not heard that ever. It is well known that shaking can potentially or in reality apparently harm an infant. I've never heard experts or anyone else say that.

Q. Is that really the issue that is debated whether or not it's harmful at all to shake a baby?

A. No, that's not the debate. That's never been the debate that I have been part of.

Q. On page 16 of Christian's report two thirds of the way down, she refers to an article that you co-authored about ALTE, and she writes that you and your co-authors, and I'm quoting now "misrepresented the clinical history, the opthalomogic, radiographic and autopsy findings of the case and the legal outcome of the case, this represents falsification of research and research misconduct."

Did Doctor Christian and others make such a complaint to the journal in which this article was

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published?
A. They may have made that complaint.
Q. Did the journal investigate such a complaint?
A. The journal and the editorial board did investigate that complaint.
Q. And can you tell us what the journal found about that complaint?
A. They found no evidence for the basis for that charge.
Q. Was the article retracted or rewritten, resubmitted? Was it corrected in any way?
A. It was not to my memory. Doctor Galaznik, who was a co-author, handled most of that interaction. But my understanding is there was nothing to support that particular complaint as a decision of the editorial board of that particular journal.
Q. On page 16 of Christian's report about 80 percent of the way down she cites an article in footnote 27, the Hansen Article as disproving your article.

Can you comment on that article as it specifically applies to the Nakita Lemons case?
A. Yes. That particular article series --

MR. HEBEL: I'm going to object at this point because I don't believe that the Barnes and Galaznik article has been entered into evidence, and accordingly I don't think that this particular rebuttal has any

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significance at this point.

MR. MORAN: Your Honor, Doctor Christian submitted a report in which she claims that the article co-written by Doctor Barnes and Doctor Galaznik, was false and had been rebutted by a particular article, and I'm just asking Doctor Barnes to comment on whether that is correct.

I don't believe we need to enter the article in evidence. I'm just asking whether her critique of his work is correct.

MR. HEBEL: Objection is withdrawn.

THE COURT: All right. That's fine. I'll take the answer.

WITNESS BARNES: Yes. That particular article addresses ALTE or acute life threatening events with or without association with the triad as I recall, and that particular article was a very select group that essentially excluded infants with certain predisposing conditions as we have in the Lemons' case.

Q. So that article you believe does not apply to this case because Nakita Lemons had pre-existing conditions; is that right?

A. That is exactly correct. In fact, there is a table that they didn't publish with the original article that you can only find on line that lists I think four or

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five cases of ALT associated with the triad or portions of the triad that clearly assumes that the infant was previously healthy.

And this particular baby it's documented in the medical records this is not a previously healthy baby.

Q. All right. And the last question I have about Doctor Christian's report on page 17, top paragraph, when she wrote I'm quoting "in a systematic review of causes and outcomes of ALTES, gastroesophageal reflux disease, a common problem in young infants was the most common diagnoses, 31 percent, and overall death after a diagnosis of ALTE was rare, less than one percent of infants, all of which occurred in infants with an underlying medical condition."

And as I understand you here, Doctor Barnes, you're saying Nakita Lemons is precisely the sort of infant who had an underlying medical condition; is that right?

A. That's correct. That her citation of that article fitted the scenario for this baby.

By the way, Doctor Christian also signed on to that letter that I mentioned earlier by Doctor Chadwick.

MR. HEBEL: Objection.

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THE COURT: Doctor, stop please.

MR. HEBEL: There is no question.

MR. MORAN: I'll continue.

BY MR. MORAN:

Q. Now, Doctor, you have in addition to the attacks on your integrity that were in the Doctor Christian's report and Doctor Strauss' report, have you read Doctor Strauss' editorials about you in Pediatric Radiology?

A. Oh, certainly.

Q. Do you find these kinds of personal and professional attacks pleasant?

A. Not particularly.

Q. Are you profiting in some way from challenging the shaking baby syndrome hypothesis?

A. I am not.

Q. Are you testifying here today for a fee?

A. I'm not.

Q. Do you respond in kind to these sorts of attacks calling for them to be removed in the academic institutions, for example?

A. I do not. This is unprecedented in the field of medicine and evidence-based medicine almost unique to this particular area of controversy.

Q. My last question for you then is why do you continue to challenge the shaken baby syndrome hypothesis ever

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since you changed your mind after the Louise Woodward trial, given that it brings these sort of attacks on you?

A. Because we now have advanced imaging techniques that has now shown that there are a number of true mimics of abuse. We have evidence-based medicine that says we need to approach this area like the rest of medicine with regard to proper scientific methodology and biostatistical significance, and number three at this very high standard at the legal and criminal level and at the Constitutional level we have to get this right.

MR. MORAN: Thank you, Doctor.

THE COURT: Mr. Hebel.

CROSS-EXAMINATION

BY MR. HEBEL:

Q. Good morning, Doctor.

A. Good morning.

Q. Couple of quick preliminary matters. If you don't understand any of my questions, can you promise to say so?

A. I will.

Q. And can you answer only the questions that I ask you?

A. I will try.

Q. Try?

A. If I understand your question, I will try.

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Q. Okay. You have a certificate of avid qualifications in neuroradiology from the American Board of Radiology; is that correct?

A. That's correct. And it has been updated to the current time.

Q. Excellent.

Did you complete a Fellowship in pediatric radiology?

A. I did with emphasis on pediatric neuroradiology. I was a practicing pediatric radiologist for seven years at Oklahoma Children's Memorial Hospital.

Q. Do you have a certificate of added qualifications in pediatric radiology?

A. I do not. My certification is covered by the original American Board of Radiology Certification and diagnostic radiology in 1977.

Q. And you do have one in neuroradiology?

A. That is correct.

Q. How many skeletal surveys for possible or suspected child abuse have you produced the official report on in the last year?

A. I do not produce any of the official reports. That is done by our pediatric radiologist, but I produce those results as part of our child abuse SCAN Team that I think I mentioned in my earlier testimony.

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Q. You did. But the pediatric radiologist handles the skeletal surveys, is what you're saying, the official report; is that correct?
A. They do the official readings, but my additional readings and interpretations are entered into the official minutes of our SCAN Team meetings.
Q. On direct examination you discussed the theory presented by Jennian Geddes, in fact, all three of them one, two and three, the unified theory?
A. I think that is correct.
Q. Would you agree that the Geddes' studies and theories have been heavily criticized?
A. Yes, I do. I agree they have been criticized, yes.
Q. And in the British court case of Crown versus Harris in 2005 there have been some people that have characterized it as Geddes retracted. I'm not going to say that. I'm going to say, however, that Geddes specifically said that she never intended these theories to be used in court, specifically never intended these theories to be used to undercut prosecutions.

Did she say that?

A. Yes, at that time she said that.
Q. And she also noted that her hypothesis was just that, a hypothesis, not a proven fact?

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A. That's true, similar to the shaken baby syndrome hypothesis.
Q. She wasn't addressing that. She was addressing her hypothesis. That was my question.
MR. MORAN: If Mr. Hebel would ask the questions.
MR. HEBEL: If the witness would answer the questions, and I wouldn't have to clarify them.
MR. MORAN: I was objecting to him arguing with the witness instead of asking a question.
THE COURT: No. I'll take it.
Go ahead, Mr. Hebel.
MR. HEBEL: Thank you, your Honor.
BY MR. HEBEL:
Q. And are you familiar with the shaken baby syndrome in the article in the Scholarly Journal Archive of Disease and Childhood, specifically the one referring to the Court of Appeals case that I'm talking about right now?
A. Yes, I have read that. Yes.
Q. That's by Doctor P.G. Redfords, et al?
A. I am familiar with that. Yes.
MR. HEBEL: The people would like to offer the Exhibit Shaken Baby Syndrome per the Court of Appeals as People's Exhibit Number 14.
THE COURT: Mr. Moran, any objection?

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MR. MORAN: No objection.

THE COURT: All right. 14 will be received.

MR. HEBEL: If I may approach, your Honor. I have Exhibit Number 14.

No further questions at this time.

THE COURT: Mr. Moran?

MR. MORAN: Very briefly, your Honor.

THE COURT: Go ahead.

REDIRECT EXAMINATION

BY MR. MORAN:

Q. Doctor Barnes, the article that Mr. Hebel just referenced that came from I believe 2005 or 2006; is that right?

A. I think that's correct.

Q. Has there been any developments in the field since then shedding light over whether Geddes' hypothesis is or more or less supported than it was in 2005 or 2006?

A. Yes. There has been more research and more published literature regarding the Geddes' hypothesis. In fact in support of the Geddes' hypothesis as a mimic of abuse.

Q. This critique of the Geddes' hypothesis was about the same time as the trial in this case, in the Lemons' case was taking place here in the United States?

A. That's correct.

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Q. Have you seen a letter that Jennian Geddes published in pediatric radiology in 2009 about the status of her hypothesis at that point?

A. Yes, I have.

Q. You're familiar with, it's call Non-Accidental Trauma; Clinical Aspects and Epidemiology of Child Abuse?

A. That is correct.

MR. MORAN: Your Honor, I would move to admit that letter to Pediatric Radiology from Doctor Geddes as Defense Exhibit Number 20.

THE COURT: Mr. Hebel has been provided with a copy.

Do I have a copy of that, Mr. Moran, or no?

MR. MORAN: I don't think so. We have not admitted it before. I'm offering it now.

THE COURT: I didn't know whether it was part of the collection of items you had introduced.

Mr. Hebel?

MR. HEBEL: No objection since this is an Evidentiary Hearing.

THE COURT: All right. That's fine. I will receive it.

MR. MORAN: Doctor Barnes, I have no further questions. Thank you.

THE COURT: Mr. Hebel, any recross?

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MR. HEBEL: No thank you, your Honor.

THE COURT: All right.

Doctor Barnes, thank you so much for being with us so early on your time. I really appreciate it. Okay.

All right.

WITNESS BARNES: Thank you, sir.

THE COURT: Do we have other testimony this morning?

MR. MORAN: Your Honor, we're intending to call Doctor Cassin. I'll go look for him and see if he's out there.

THE COURT: Let's take about ten minutes.

Let me sort of clean up some of my other regular docket stuff as well, okay.

MR. MORAN: I think we are done with remote for today.

THE COURT: Okay.

(Whereupon a recess was had by all).

THE CLERK: Back on the record, People versus Milton Lemons.

Appearances, please.

THE COURT: Good morning. Dan Hebel on behalf of the People.

MR. MORAN: David Moran from the Michigan

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Innocence Clinic on behalf of Ms. Lemons joined by Rebecca Hahn, Ron Syad and Student Attorney Baruse Abdul.

THE COURT: All right. We're ready for Doctor Cassin.

BADER CASSIN,

called as a witness by the Defense, having first been duly sworn by the Court Clerk, was examined and testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. MORAN:

Q. Good morning, Doctor Cassin.

A. Good morning.

Q. Why is your current position?

A. I work part time as a medical examiner in Lenawee County. I also do some private consultation and some autopsies for people who request it or for hospitals that request them.

Q. In this particular case are we paying you today?

A. No.

Q. Have we paid you anything for your reconsultation in this case?

A. No.

Q. Now in 2005 and 2006, what was your position?

A. At that time I was a medical examiner in Washtenaw

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County.

Q. And, Doctor Cassin, you testified previously in this case in 2006. Do you recall doing that?

A. Well, I don't recall it, but I have read that testimony.

Q. You were qualified at that time as an expert in forensic pathology?

A. Yes.

Q. You have been qualified as an expert in forensic pathology roughly how many times in court?

A. Over a thousand times I'm sure.

MR. MORAN: Your Honor, I would move to have Doctor Cassin qualified again in this case as an expert in forensic pathology.

MR. HEBEL: No objection.

THE COURT: All right. Certainly. I am well familiar with Doctor Cassin, and he's testified before me in any number of times, and I will allow him to testify and give his opinion as an expert in the field of forensic pathology.

MR. MORAN: Thank you, your Honor.

BY MR. MORAN:

Q. Now when you issued your Summary Investigation Report on October 11th, 2005, which counsel, is page three of the Defendant's Exhibit 12 in this case, you wrote, and

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I see you don't have it with you.

Could I show you a copy?

A. Please.

MR. MORAN: May I approach, your Honor?

THE COURT: Yes.

BY MR. MORAN:

Q. You wrote in that report "death was caused by brain swelling with bleeding behind the eyes and onto the brain surfaces. These features are the essential components of the shaken baby syndrome."

Doctor Cassin, have you heard those three symptoms called the triad?

A. Yes, triad of findings at autopsy.

Q. Was that an accurate statement of what you believed then that the triad equals shaken baby syndrome?

A. Yes.

Q. So that you saw those three symptoms, you would diagnose shaken baby syndrome?

A. Well, I should qualify that by saying that there would be no other obvious cause of death, and it would be in a subject or infant that came from circumstances that led to acute death or sudden death.

Q. All right. And I'm going to show you some of your trial testimony.

Counsel, this is August 7, 2006 at page eight

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of the transcript.

MR. MORAN: Approach again, your Honor?

THE COURT: Yes.

WITNESS CASSIN: Do you want me to read it to you?

BY MR. MORAN:

Q. Sure.

A. I found brain swelling with blood on the brain surfaces as well as in the nerve sheath of both eyes, and recognized this as an organization of findings in the absence of any other thing or phenomena called the shaken baby syndrome.

Q. Thank you.

Now in those days then were you taught to diagnose shaken baby syndrome if you saw those symptoms unless there was something else?

MR. HEBEL: Objection. Leading.

THE COURT: No. I'll take the answer.

WITNESS CASSIN: I wasn't taught much in those days, but I had been taught prior to those days that that triad of signs at autopsy would be qualifications that I just mentioned evoked the or should evoke the diagnosis of shaken baby syndrome.

BY MR. MORAN:

Q. Did you teach others that those three symptoms taken

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together evoked shaken baby syndrome?
A. I did.
Q. Did you work with a Doctor Jentzen?
A. I have.
Q. Who is he?
A. Doctor Jentzen had been a medical examiner for a lot of years in Milwaukee, Wisconsin and then left that position and was looking for another position at the same time that we were looking for a deputy medical examiner in Washtenaw County. So that's when he joined me there as deputy medical examiner.
Q. Were you aware that in 2001 he wrote a book chapter and a book entitled Shaken Baby Syndrome, a multi-disciplinary approach?
A. No.
Q. I'm going to -- Mr. Hebel sent us a copy of this Book Chapter. I'm going to read just a quote from that and ask if that is consistent with your understanding of what forensic pathologists believed in circuit 2001; is that all right?
A. Okay.
Q. The quote is, this is on page 206 counsel, "despite the current debate over the exact mechanism of injury of shaken impact syndrome, the classical finding of retinal hemorrhage, subdural hematoma and brain

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swelling cannot be fully explained by any other medical entity."

Does that fairly reflect the thinking of pathologists in 2005, 2006?

A. I think it reflects the findings of the majority of pathologists, yes.

Q. As you were taught shaken baby syndrome, or as you learned it, if the baby was abusively shaken, when would you expect the retinal hemorrhages would show up?

A. Well, at that time I expected that retinal hemorrhages would occur immediately. In fact, it was part of the shaking injury that occurred.

Q. So if hypothetically there were no retinal hemorrhages present when Nakita Lemons was admitted to U of M Hospital, that would be inconsistent with shaken baby syndrome; is that right?

A. Yes.

Q. Now there were retinal hemorrhages present at the autopsy; is that right?

A. Correct.

Q. Do you know if they were severe or multi-layered?

A. I think they were multi-layered as I recall reviewing them. By the way I don't recall that review. I recall the review I did a few days ago, but they were acute hemorrhages.

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Q. Let me ask you about that. You had a chance to look again at the slides just a few days ago?
A. I had the chance to look at not the exact same slides but recuts from the same blocks.
Q. Did you see retinal hemorrhage in any of those slides?
A. Yes.
Q. And would you characterize them as severe or multi-layered, or do those terms mean anything?
A. Severe doesn't mean anything to me. It's either hemorrhage there or not. Hemorrhage was indeed there, and it was layered but all acute.
Q. Now, sir, you were the Washtenaw County Medical Examiner in 2005 and 2006. When did you leave that office?
A. I don't remember exactly. It was some time around 2012 or so.
Q. And did you get any forwarded requests from the Washtenaw County Medical Examiner from me or my clinic that we were looking for you, that we wanted to speak with you?
A. No.
Q. Did you get any requests forwarded to you from the prosecutor's office that they were looking for you?
A. No.
Q. So when was the first time that you made contact with

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either me or the prosecution that this case was being litigated?

A. The end of June, in other words within the last month.

Q. And how did that contact come about?

A. It came by you calling my office phone and asking if I would be willing to review this case.

Q. And in preparing for your testimony today I think you already said you looked at some of the slides?

A. I look at the slides. I looked at 13 slides.

Q. Did you look at your original autopsy report?

A. I looked at the copy of the original autopsy report.

Q. Did you look at your testimony from the trial?

A. I did.

Q. Did you look at the medical records that we sent you?

A. Yes.

Q. Did you look at the reports from other experts?

A. I did. I looked at some. I don't know how many of them generated.

Q. Did you look at any literature that has been written about shaken baby syndrome or abusive head trauma?

A. I have read it over the years, but I looked at some reviews of literature, yes.

Q. So has your opinion changed about the validity of the shaking baby syndrome hypothesis since the time of the trial?

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A. Since the time of this trial in 2006, yes.
Q. Can you elaborate on that? How has your thinking changed?
A. My thinking has changed I think consistent with the community of forensic scientists around the world that first of all the triad of findings is not pathogenic or exclusively diagnostic of what is called or what was called at that time the shaken baby syndrome.

And, in fact, the term shaken baby syndrome has been essentially dropped from common use, both by the forensic community as well as by pediatric head trauma specialists.

Also the forces necessary to produce the injuries that are described in this case, as well as in other cases of similar type are challenged as being produced by shaking and only by shaking rather, many biomechanical scientists have demonstrated that the forces in shaking are insufficient to produce such injury.

So those are the two main things that have occurred in the scientific and professional literature, again that the findings in the triad are explainable by diseases and other abnormalities, as well as injuries and that the forces in shaking are insufficient to produce such injury.

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Q. Having had a chance now to look back at the records in this case, Nakita Lemons' medical records, the autopsy report, the slides and so forth, how would you now characterize Nakita Lemons' death?

A. I would characterize her death as having occurred with the findings that I mentioned at the time. I think that is incontrovertible.

I found subarachnoid and subdural hemorrhage. I also found nerve sheath hemorrhages. I also found brain swelling, and then in addition to that I found some early bronchial pneumonia.

I think she would have died from all of these things or with all of those things in any case, but the mechanism of how those changes occurred, that is to say essentially the cause of death is to me not explainable now.

And, therefore, as a manner of death I would have certified indeterminate, meaning it's unable to be determined. It could either be natural, or it could be accidental or perhaps even homicidal.

Q. And you saw in the reports from the other experts that other experts have opined in this case that choking to death on formula likely caused Nakita Lemons' death.

Do you believe that is a plausible manner, cause or manner of death in this case?

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A. I do believe it's a plausible manner of death. Excuse me. Cause of death in this case simply because she did lose consciousness prior to the arrival of Emergency Medical Service workers and maintained her comatose state throughout her short hospitalization, and therefore very likely could have been caused by that concept, loss of consciousness, could have been caused by an aspiration event.

Q. Did you see in the evidence in the records as to whether or not there was formula in her respiratory system?

A. There was. The phone call to the Emergency Medical Service phone operator mentioned it as well as the neighbor, who was talking to the Emergency Medical Service operator, and the Emergency Medical Service workers mentioned it as well.

Q. That they found formula in her respiratory system?

A. Yes.

Q. I'm going to shift gears a little bit, Doctor, and turn to the acromial fracture or the alleged acromial fracture that may have been present in this case.

At trial, this is page 37, counsel, of the same date, August 7th, 2006.

At trial you agreed that you didn't know how the acromial fracture occurred but agreed that it could

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have been caused by excessive CPR on a small infant.

Do you still agree that that's a possible cause of that acromial fracture if it was a fracture?

A. I can't rule it out quite frankly, but let me discuss that issue if you don't mind briefly.

THE COURT: Go ahead.

WITNESS CASSIN: First of all, I learned about the acromial fracture subsequent to the autopsy. It was discovered by a radiologist and reported by a radiologist who looked at post-autopsy films. And so the body had been dissected and opened when that skeletal survey was done.

I reviewed the reports. And as I recall and I think in my review I saw a film that shows a transverse fracture of the acromia, which is part of the right shoulder. It's part of the shoulder. This particular injury is depicted on the right shoulder.

However, I have to say and finally that this fracture may be artifact in the sense that it may have occurred during the autopsy procedure or the manipulation of the body by some personnel after the dissection of the body.

During the autopsy I described no injury in the shoulder, and the shoulder was exposed, at least the area of the acromion by the autopsy incision

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through the skin that opens that part of the chest.

I described no presence or blood or any sign of injury at that time. And then finally with regard to CPR, let me just say that's anterior.

So applying force to the front of a child's body or an adult's body would not in my experience produce that kind of a fracture.

However, other measures of CPR were applied, such as reversing the child's body and pushing upward and very hard on the back, and that would push force into the scapula, which is the shoulder bone at the end of which is the acromion. So it may be, it may be that that is another possible cause for the acromion fracture.

Q. Is it fair to say, Doctor, though at the time you didn't think that that possible fracture supported the diagnosis of child abuse that you made?

A. At that time I was told that there was a coracoid process factor, which is on the front of the chest, and it was described by the radiologist as highly specific or highly suggestive.

Anyway, I don't want to put words into his mouth. I believe the word is, you can find his report, highly suggestive perhaps of abuse.

Q. But that turned out to be incorrect. It was not a

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coracoid. It was an acromial fracture?
A. Yes.
Q. So even then you wouldn't have used the acromial fracture to support your diagnosis of abuse?
A. No.
Q. You wouldn't today?
A. No.
Q. Doctor, I believe we discussed that subsequent to your finding of shaken baby syndrome Mr. Lemons was interrogated by a police officer and made some admission of shaking.

Does that change your view today?
A. Frankly, I don't know if I knew that at the time or not, but apart from that now I do know it. I have read an account of it and perhaps several accounts, even quotes of it and so on.

And today it does not contribute to my investigation of the death in this regard, and that is it does not indicate anything with regard to the cause of death.
Q. Now, Doctor, I understand that when you left the Washtenaw County Medical Examiner's Office, you may not have been on the very best of terms with Doctor Jentzen; is that fair?
A. We had some disagreements, but I don't know what you

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mean.

Q. Well, I will cut straight to the question. Are you testifying the way you are because of some resentment against Doctor Jentzen or the Washtenaw County Medical Examiner's Office?

A. No. Absolutely not.

Q. What motivated you to come to my office last month and agree to testify today?

A. Well, quite frankly I reviewed my report. I put that into the context of my reading since that period of time in the last dozen years or more, and in my experience I think that I used the wrong language and made a mistake, and I believe that I owe Judge Kenny and you an explanation.

MR. MORAN: Thank you, Doctor Cassin.

I have nothing further.

THE COURT: Mr. Hebel?

CROSS-EXAMINATION

BY MR. HEBEL:

Q. Good morning.

A. Good morning.

Q. Quick preliminary matter. If you don't understand the question, please state so.

Can you promise to do that?

A. Yes.

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Q. And answer only the question that I ask you. Can you promise to do that?
A. Okay.
Q. Just to recap, you reviewed your original opinion in this case and still see all the same injuries; correct?
A. I do.
Q. And that includes subdural hemorrhage, retinal hemorrhage, nerve sheath hemorrhage and brain swelling?
A. It does include this.
Q. And you have changed your opinion from homicide as the cause to indeterminate as the cause?
A. Currently I have changed my opinion yes, but it's not the cause. It's the manner of death.
Q. The manner of death?
A. That wasn't answering your question. I'm sorry.
Q. Actually, it was.
A. I should have said no.
Q. Well, this happened in 2006. That was the time of the original report. And since then since the years after authoring this report, have you written any peer review publications on the issue of child abuse?
A. No.
Q. How about shaking baby syndrome or abusive head trauma?
A. No.
Q. Have you presented any papers or presentations to

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national or international committees or meetings on the subject of child abuse?

A. No.

Q. In that case what scholarly article changed your mind from the opinion that shaken baby was a real and active diagnosis to not? What publication changed your mind?

A. I don't know that there was any publication that changed my mind.

Q. So your change of opinion is not based on a scholarly article or study?

A. It's based on a number of them, but the answer is no, not on a scholarly article or publication.

Q. So it's based on a number of them. Can you tell me which ones?

A. No.

Q. Now you also mentioned that the forces necessary for shaking to generate the type of injury, that is a concept that has been challenged, and you mentioned that on direct; correct?

A. Yes.

Q. Can you give me any citations for those challenges?

A. None. I don't want to simply because I may be wrong. So I don't want to do that, but I'm sure you will hear many citations that would support that.

Q. You also said that diseases can mimic the findings of

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subdural hemorrhage and retinal hemorrhage and brain swelling; is that correct?

A. I did.

Q. Which diseases?

A. I don't want to tell you which ones, but they are in the category of hemologic and connective tissue diseases.

Q. Do you recall in your findings that the victim had any of those?

A. No.

Q. Now the manner of death being indeterminate, can you give me a full definition of what indeterminate means in all cases when it's used?

A. Well, literally the term means unable to be determined. So that's the best definition of what it really means.

Q. Makes sense.

Thank you.

Correct me if I'm wrong, but doesn't indeterminate, aren't indeterminate deaths highly indicative of homicide?

A. No, they are indeterminate.

Q. They are indeterminate obviously, but is it usual for people to drop dead for no reason?

A. Is it usual? I don't know how usual it is. A lot of people do.

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Q. Now in your new report, you claim that the injury.
A. Excuse me a minute.
Q. Yes.
A. I don't know that I answered your question. So if you don't mind a brief comment.
Q. Absolutely.
A. You said drop dead for no reason. Indeterminate does not say there is no reason. It says that you can't classify the type of death as to manner, perhaps that's a clearer answer.
Q. That's specifically by autopsy?
A. By investigation really. Medical examiners are bound to do an investigation. So it depends on the information that you have around autopsy as well as the autopsy itself, which an autopsy is only part of the evidence.
Q. In your report you claim that the injury to Nakita may be caused by something else, and you discuss that a little bit?
A. Yes.
Q. But you also specifically and very specifically on direct don't rule out trauma or even homicide. In fact, your original autopsy, original conclusion could be correct. You just can't testify that it absolutely is correct. She could have been?

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A. Is that a question?
Q. Yes. Is that accurate?
A. That's accurate.
Q. Now did you review the medical records of Nakita Lemons in preparation for this case?
A. I reviewed some of them, the most recent medical records.
Q. Did you note that the victim had her vaccines on time?
A. Yes.
Q. And does the fact that this infant was vaccinated, would that have anything to do with your opinion here?
A. That she may have had a reaction to vaccination? I have to ask for clarification.
Q. That's just, right. Yes. Could that have had something to do with the subdural hemorrhages and retinal hemorrhages, those findings?
A. I can't rule that out.
Q. So this might have been caused by vaccines?
A. By reaction to vaccine, possibly.
Q. And so in your professional opinion you believe that the victim's injuries could have been caused by a reaction to vaccinations?
A. I can't rule that out. It is not my opinion.
Q. But you can't rule it out?
A. I can't rule it out.

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Q. In your opinion have you discovered in the past that reactions to vaccinations have caused these types of injuries?
A. I've heard about it, yes.
Q. Have you given any opinions to that effect in other cases?
A. I don't know.
Q. Quick question. Do you remember the case of an infant with the last name of Elreba?
A. The name is familiar to me. I don't remember the case, although I was told that you would be asking me about that this morning when I came, and I was shown a report which I very briefly reviewed that I had written.
Q. You did write that report?
A. I wrote it, yes. Is that what you are asking?
Q. Yes.
A. Yes.
Q. And with that the People are going to offer Proposed Exhibit 13.

Actually before I do that, I'm going to show you a copy of that report.

MR. HEBEL: May I approach the witness?

THE COURT: Yes.

BY MR. HEBEL:
Q. And what I am showing you has been marked for

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identification as People's Exhibit 13.
A. Yes.
Q. And is that the report from this case that you authored?
A. Yes.
Q. And in this report do you suggest that the brain hemorrhages in the case were possibly caused by vaccine-medicated toxic reaction masquerading as head injury, and that is on the second page, Point B?
A. I see it now. Yes. Hemorrhages allow for the possibility of a vaccine-mediated toxic reaction masquerading as head injury.
Q. So that is correct?
A. That is what I wrote.
MR. HEBEL: Your Honor, the People would offer Proposed Exhibit 13 into evidence.
MR. MORAN: I have no objection, your Honor.
THE COURT: 13 will be received.
I got a copy of there.
May I approach?
THE COURT: Certainly.
BY MR. HEBEL:
Q. Is it your opinion that the majority of forensic pathologists would agree that vaccines can mimic head injury?

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A. No, it's not my opinion.
Q. Okay. So you disagree with that?
A. That it is the -- I have to repeat the question.
Q. Fair enough.
A. Do I disagree with your proposed statement?
Q. Do you believe that the majority of practicing forensic pathologists agree that subdural hemorrhages can be caused by reaction to vaccines?
A. I don't know.
Q. Do you believe that the majority of forensic pathologists agree that non-traumatic events can cause subdural hemorrhages, retinal hemorrhages?
A. I'm sorry. I don't quite understand the question. It's my fault.
Q. Not a problem whatsoever. I might be asking the question confusingly.

In your opinion do you believe that the majority of forensic pathologists agree that non-traumatic events can cause subdural hemorrhage and retinal hemorrhage?

A. Today I do, yes.

MR. HEBEL: Thank you.

No further questions at this time.

MR. MORAN: Just a few redirect, your Honor.

THE COURT: Go ahead.

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REDIRECT EXAMINATION

BY MR. MORAN:

Q. Do forensic pathologists rely on by biomechanical literature?

A. I believe they do.

Q. And you rely on biomechanical literature in forming your opinions?

A. I do.

Q. Now Mr. Hebel asked you about you mentioned hematological diseases as something else as mimics of the symptoms of shaken baby syndrome. He asked you whether you saw any of these in Nakita Lemons' autopsy.

Were you looking for mimics of shaking baby syndrome such as hematological diseases in 2005?

A. No.

Q. Once you saw the triad, you thought this was probably shaking baby syndrome?

A. Yes. I must have I guess is my best answer.

Q. Now Mr. Hebel asked you some questions about what it means to say that the manner of death was indeterminate, and he asked you whether it might still today be trauma or homicide. Would you still say today that this is shaken baby syndrome?

A. No. I wouldn't even use the term in any case.

Q. And just one question about the vaccine. Is it known

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in the forensic pathology community that vaccines occasionally do cause injuries in children?

A. It is reported, and I must have known that at the time that I wrote that statement that I wrote in 2011.

Q. Doctor, are you aware of whether there is a federal program to compensate children who have been injured by a vaccine?

A. Yes, there is.

MR. MORAN: No further questions.

THE COURT: Mr. Hebel, anything else?

MR. HEBEL: Just briefly.

RECROSS-EXAMINATION

BY MR. HEBEL:

Q. As defense counsel and you just discussed, you would no longer use the terminology shaken baby syndrome for any case; correct?

A. No. I wouldn't, sir, because it's too controversial. I'm sorry.

Q. That's just fine. But the replacement constellation of injury is abusive head trauma; correct?

A. It is a more generic term that is used. Yes.

Q. And potentially even though the manner of death is indeterminate, if this was caused by homicide, the correct terminology would be abusive head trauma; correct?

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A. I think it would be more appropriate. Abuse would imply intent, and head trauma would be a generic term for the findings primarily about the head, yes.

MR. HEBEL: No further questions.

THE COURT: All right.

MR. MORAN: One last one, your Honor, if I might.

THE COURT: No. It's just direct, cross redirect, recross.

MR. MORAN: All right.

THE COURT: I have a question for you, Doctor Cassin, if you would. There has been reference made to the fact that the initial hospital examination of Nakita Lemons indicated no retinal hemorrhaging.

So presumably if the records are accurate, that when she was alive there was that initially seen medically, there was no retinal hemorrhage, but during the autopsy you did discover that.

Do you have any explanation in your expert opinion how that would happen, how that could come into play?

WITNESS CASSIN: I'll try to be brief, Judge.

In my review of the records I did not see that a physician did an opthalmologic examination of this child. However, it is reported and was at that

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time reported to me by the investigator who was getting preliminary information regarding this child prior to the autopsy that a physician had examined the eyes and had not found any retinal hemorrhages.

I don't know who the physician was. I don't know the experience of the physician. I don't know how often they had ever seen it, if they had ever even seen it before.

The other thing is that there are a number of things sometimes we find, as you have heard over the years at autopsy, that have not been discovered during clinical examinations because they are essentially dealing with the outside of the body and symptoms and signs that are presented.

Whereas we in the autopsy suite are looking at individual tissues inside the body. And in some cases, and I would propose to you the eyes are among those cases. We have a better look at all the parts of the eye than an opthalmoscope can see, but it does depend on the examiner.

THE COURT: Okay. All right.

Thank you.

Anything else as a result of that?

REDIRECT EXAMINATION

BY MR. MORAN:

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Q. Doctor Cassin, if the physician makes a note that he or she is going to do an opthalmologic consult specifically to look for retinal hemorrhages, do you think that that would increase the chance that they would see the retinal hemorrhages if they are there?

In other words, they're looking specifically for retinal hemorrhages not just looking in the eye generally?

Would you expect a more accurate assessment of whether there were retinal hemorrhages there or not?

A. I don't know if they saw retinal hemorrhages or not. A note saying they are going to look for them indicates to me that it's a very directed examination, which is good in this case, but the result of that was not in the record that I could find.

Q. Are there mechanisms that would explain in answer to Judge Kenny's question, if the retinal hemorrhages weren't there when Nakita Lemons was admitted, how they could have gotten there by the time she was autopsied?

A. In other words, could they have subsequently occurred and then been found at autopsy?

Q. Yes.

A. That is possible.

Q. Is increased intercranial pressure a way that a retinal hemorrhage can occur subsequent to a hospitalization?

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A. That is an example of a possibility.

MR. MORAN: Thank you, Doctor Cassin.

THE COURT: Mr. Hebel?

RECROSS-EXAMINATION

BY MR. HEBEL:

Q. And ultimately as you just explained to the Judge, you have a better look at all parts of the eye during the autopsy than a doctor would have examining with the opthalmoscope; correct?

A. We have a better look at a lot of aspects of that. For instance, an example of the contrary just so that you know you and everybody knows that I was simplifying my statement.

The evaluation of hypertension by an ophthmological exam is better during life than after death because there is blood pressure during that examination. That is an example of how it can work the other way as well. So I apologize for being simplistic.

Q. But in this particular case you would have more of a chance to examine the hemorrhaging of the eye during the autopsy itself than beforehand?

A. Well, I would say we had the best chance because I removed both eyes and looked at that very close for hemorrhages.

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MR. HEBEL: Thank you.

MR. MORAN: I have one more.

THE COURT: Go ahead on that same subject though.

REDIRECT EXAMINATION

BY MR. MORAN:

Q. Is there any way to date a retinal hemorrhage?

A. I don't know of a way do to it. Somebody may be able to, but I don't know.

MR. MORAN: Thank you.

THE COURT: Mr. Hebel, anything?

MR. HEBEL: No.

THE COURT: Doctor Cassin, thanks so much. You may be excused.

WITNESS CASSIN: Good to see you.

MR. MORAN: That is all of our witnesses.

I understand that the prosecution plans to call a witness this afternoon.

MR. HEBEL: That is correct, your Honor. I believe that Doctor Jentzen is set for 1:30 this afternoon, and I don't have anything else for right now.

MR. MORAN: I would just, maybe to save time, if we could just briefly discuss the scope of Doctor Jentzen's testimony. Doctor Jensen has not submitted a

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THE COURT: Okay.

JEFFREY JENTZEN,

called as a witness by the People, having first been duly sworn by the Court Clerk, was examined and testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. HEBEL:

Q. Good afternoon.

A. Good afternoon.

Q. I have been having a habit of doing that in this hearing. I'd like to start off by asking you to tell us about your job?

A. I'm the Director of Autopsy & Forensic Services at University of Michigan. I'm the medical examiner for Washtenaw County.

Q. And just once again to repeat for the record your name.

A. Jeffrey Jentzen.

MR. HEBEL: I believe there is a stipulation for the record, your Honor.

MS. HAHN: Yes, your Honor. We will stipulate to Doctor Jentzen's credentials and qualifications as an expert.

THE COURT: As an expert in the field of forensic pathology?

MS. HAHN: Yes, forensic pathology.

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THE COURT: That's fine. Thank you.

BY MR. HEBEL:

Q. I just want to ask a couple of quick questions about that. In addition to your current position with Washtenaw County and also with the University of Michigan, what current previous national positions have you held in forensic pathology?

A. I was the Chief Medical Examiner in Milwaukee, Wisconsin from 1987 to 2008, and part of that time I was an assistant medical examiner at Hennepin County Medical Center in Minneapolis.

Q. Have you held any nation wide offices in forensic pathology?

A. I'm active in the National Association of Medical Examiners and was the past President and Chairman of the Board 2008 through 2009.

Q. In a professional capacity have you had any dealings with suspected cases of child abuse?

A. Yes, on numerous occasions.

Q. And how did you come into contact with these cases? Was it through being a medical examiner? How do you come into contact with these cases?

A. In the course of my position as medical examiner, forensic pathologist, I frequently came across our referred cases to our office that related to abusive

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injuries in children, and those were fairly common. What I would say in Milwaukee I typically had between five and ten of those cases per year, and then recently it has been more like five cases per year.

Q. And additionally do you work with the Child Death Review as well?

A. Yes, as a part of my routine duties I have monthly meetings with what we call the Child Death Review Teams. These are multi-dispensary teams of professionals that come together to discuss deaths, sudden unexpected and unexplained infant deaths, and I have been doing that since 1990.

Q. Now do these aspects of your employment bring you into a decision-making capacity regarding the cause of death in potential child abuse cases?

A. The medical examiner is the statutory, has a statutory responsibility for certifying the cause and the manner of death in the cases they investigate. So they determine the cause and manner of death.

Q. Have you ever presented any papers or presentations on the topic of child abuse, national or international meetings?

A. Yes, over the course of my 30 year career I presented a number of papers, presentations and book chapters on child death investigation and specifically child

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injuries in children and evidence of shaken infant syndrome.

Q. And do you know approximately how many of these there are?

A. I believe I've had like three presentations in international programs, probably around 10 or 15 in national programs on various topics such as retinal hemorrhage, shaken baby syndrome, abusive head injury.

I also published a number of papers on childhood injuries, including abusive head injuries, retinal hemorrhages, and I made presentations on injuries to the neck and head areas in kids.

Q. As the Chief Medical Examiner of Washtenaw County do you have the statutory authority to change the cause of death when it becomes apparent that the original cause of death was wrong?

A. I do. Yes, I have that authority.

Q. And are you familiar with the child death case of Nakita Lemons?

A. I am.

Q. Was this a Washtenaw County case?

A. Yes. It was a case that was admitted to the University of Michigan Hospital and became under the jurisdiction of Washtenaw County.

Q. What materials did you review in preparation for this

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case?

A. I reviewed the medical records, the Wayne County paramedic records, the radiographic reports, the death investigative report, the autopsy report. I reviewed the microscopic slides and police reports.

Q. Did you also review the defendant's statement?

A. I did. That is part of the police report.

Q. In your position as a forensic pathologist, do you stay up to date with the literature regarding shaken baby syndrome and abusive head trauma?

A. I do.

MS. HAHN: Objection.

THE COURT: Please stand if you have an objection.

MS. HAHN: Your Honor, I'm objecting to the general nature of the questioning. I think that the prosecutor could be a little bit more specific as to literature in which he's asking the witness about.

MR. HEBEL: I can restate the question.

MS. HAHN: Should I repeat my --

THE COURT: No. Just keep your thought, and then we'll have Mr. Hebel respond.

MS. HAHN: I was just asking about what specific literature the prosecutor is asking the witness about.

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THE COURT: Mr. Hebel.

MR. HEBEL: I'm specifically referring to literature in scholarly journals and peer review publications regarding shaken baby syndrome and abusive head trauma changes to the science.

WITNESS JENTZEN: I tend to keep current in that literature, yes.

BY MR. HEBEL:

Q. The defense claims that there has been a see (ph) change or radicle alteration in the science of abusive head trauma and shaken baby syndrome since 2006 undercutting or even rebutting the previously-held understanding of shaken baby diagnosis.

Do you agree with that statement?

A. I guess it determines what you mean by see changing. In general, I don't agree with that statement. There certainly has been a lot of recent publications and surveys and research type papers that have been presented, but none of those papers in my opinion has changed the overall diagnosis of the mechanism of shaken baby syndrome.

Q. In the chapter you wrote in 2001 about pathological findings in fatal shaking impact syndrome, did you discuss the status of the scientific literature and general beliefs of medical practitioners regarding the

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injuries caused by shaking only?
A. I did.
Q. And did you reach a conclusion about whether the literature as a whole supported the definition of shaken baby syndrome regarding shaking only cases?
A. I did. And in addition to that paper presented 18 cases of my own in which I demonstrated that in roughly a third of those cases there was no evidence of external injury related to the death, and that the findings of retinal hemorrhage, subdural hemorrhages and brain swelling were consistent and diagnostic of the shaken baby syndrome.

That that finding has stood the test of time by being corroborated by additional studies since that time.

Q. And did you reach a conclusion about whether the majority of pathologists supported the definition of shaken baby syndrome regarding shaking only cases?
A. It would be my opinion and in being in contact with my peers on a regular basis and following the literature that the majority of forensic pathologists still consider shaken baby syndrome to be a plausible and accepted diagnosis for a subset of abusive head injury.
Q. Just to be clear, that is both in 2001 and today in 2017; correct?

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A. That would be my opinion. Yes.
Q. And with your knowledge of the ongoing literature has the science changed since 2001 when you wrote it to invalidate the science that was presented in that chapter?
A. No.
Q. Has the literature changed in such a way as to invalidate your conclusion about shaken baby syndrome?
A. No. Certainly there has been additions to the literature that would enhance the understanding of mechanisms and findings in cases of abusive head injury, but none of those articles or findings has in my opinion invalidated the diagnosis of shaken baby syndrome.

In fact, I have made a presentation at a national meeting in February of 2015 detailing the updated findings corroborating shaken baby syndrome.

MS. HAHN: Objection, Judge. We have not been --

THE COURT REPORTER: Ma'am, I can't hear you.

THE COURT: I think he's just responding to the question by saying that he still thinks it is valid and recognized as a valid subset of abusive head injuries by saying in 2015 he actually did a presentation about the validity of it.

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Did I hear you right?

WITNESS JENTZEN: Correct, your Honor.

THE COURT: I'll let the answer stand.

Go ahead.

BY MR. HEBEL:

Q. Can I ask a clarifying question? Does this presentation have citations?

A. It should be in my CV.

Q. Okay. I'm going to change modes a little bit and go to other causes of death.

Are you familiar with a wide variety of causes of death due to your work with the Washtenaw County Medical Examiner's Office?

A. Yes, in my 30 year career as a forensic pathologist, certainly.

Q. Now the defense, including the original medical examiner that worked for Washtenaw County in 2006, claims that there are non-traumatic methods that cause infants to suffer subdural hemorrhages, retinal hemorrhages and brain swelling.

Can you think of any non-traumatic methods of an infant requiring three injuries to the extent that the child dies?

A. I'm not aware of any specific entity that specifically causes those three findings on a regular basis without

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being an exception. Certainly there are diseases that cause bleeding, and there is diseases that cause bleeding to the eyes, and I have seen that personally.

There is a number of entities that cause brain swelling, but taken into total without a plausible, acceptable cause of death other than trauma, I'm not aware of any specific cause.

Q. Now let's get a little more specific. You reviewed the report and assessed the findings in the original autopsy report; correct?

A. Yes.

Q. And it has been repeatedly suggested that Nakita Lemons died from choking or aspiration. Is that a possibility in this case?

A. I don't believe there is anything in the medical, in the report, the emergency room report that would indicate that. There was nothing that was seen at the time of the autopsy, and there was at the time the child was being resuscitated, there was a description of milky fluid exuding from the mouth, which is a common finding in infants that are unresponsive.

The child was not -- I did not see any report that the child was actually choking or was alive at the time showing choking motions.

Q. Now what would be present in an autopsy finding if the

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child choked to death in your experience?

A. You can see large amounts of aspirated fluid, gastric contents and other materials that would keep reaction, keep inflammatory reaction related to aspiration.

It is very difficult to determine that because of the resuscitation efforts that are being provided both by trained expert paramedics and individuals that respond initially as first responders.

Q. If the child has aspirated, would there be any findings present in the lungs?

A. There could be. There could be evidence of wide spread foreign body material in the lungs, milk products or other types of material that would be microscopically visible.

But again it would be almost impossible to determine whether that was an episode unrelated to the resuscitative efforts.

Q. Now was there any of that in this case?

A. Yes. It was extensive resuscitation with paramedics at the scene.

Q. Was there any finding of particulates or white formula, foreign body in the lung?

A. Not to my recollection. Doctor Cassin did mention there was acute pneumonia that was present within the lungs, which is a very common finding in infants that

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are resuscitated and live in the hospital for some period.

Q. Did you also refer to that as hospital-acquired pneumonia?

A. I believe so, yes.

Q. Is hospital-acquired pneumonia something different from aspirated or body pneumonia?

A. We would typically refer to it as something different, yes.

Q. Do things like vaccines cause subdural hemorrhages and retinal hemorrhages?

A. Not in my recollection, no.

Q. Do you see any signs of this child had congenital defects that could mimic shaken baby syndrome?

A. No. Doctor Cassin commented on none of that. No.

Q. In your professional opinion do you see anything in Doctor Cassin's report or the associated records that causes you to doubt the cause of death listed in the autopsy report?

A. No.

Q. In the medical examiner's investigator's report, there is a statement that no retinal hemorrhages were identified on opthalomogic examination by admitting physician, and the physician reporting death was one Jeffrey Flemming, MD.

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Is there any indication that this submitting physician was in fact an opthalmologist?

A. No. It was my understanding that he was the resident admitting the child to the hospital and that he was not an opthalmologist.

There was in fact a reference to a referral to consult an opthalmologist, but in my review of the medical records I never found a document that either indicated the presence or absence of retinal hemorrhages.

Q. And if the child had seen an opthomologist, would there be a record?

A. There would have been a formal consult report that would have been in the medical record, yes.

Q. I would also like to discuss the definition of indeterminate. What does indeterminate mean when used in autopsy reports?

A. Indeterminate is one of the five manners of death, which is available in Michigan to certify the death, the manner of death. We use the certifications of natural, accident, suicide, homicide and indeterminate.

Indeterminate is used when the medical examiner or certified physician is unable to make a distinction between two manners, two or three manners of death, and so under those circumstances they leave

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the manner of death as indeterminate.

Q. And is indeterminate indicative of homicide?

A. It very well could be, yes, depending on the circumstances and the autopsy findings in each individual case.

Q. Another question. It has been today was actually suggested that, well, let me back up.

In your review of the materials, has it come to your attention that the child suffered a fracture in the acromion process?

A. Yes. There was a fracture identified in the right shoulder area, the right scapula portion of the scapula or the shoulder blade.

Q. Could an autopsy cut have caused the break in the acromion?

A. Not in my opinion, no. There could have been a cut, but not of the type that was described in the report as a fracture.

Q. How are confessions relevant to autopsies?

A. Medical examiners are and forensic pathologists perform autopsies and review medical records and take histories and witnesses and individuals' past medical history, et cetera to make a determination of the cause and manner of death. Witness statements or statements that are included in the investigation or presented by law

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enforcement to forensic pathologists are used to basically weigh the validity of those statements.

Witness statements do not change objective observations at the time of the autopsy, but autopsy findings, objective autopsy findings do corroborate and invalidate witness statements that are made.

For example, if there is a story or some type of statement that is made, and when that information is presented to the forensic pathologist, it does not corroborate that statement, then the forensic pathologist will indicate that that statement in his or her opinion is invalid.

Q. So with the defendant's statement that the victim was shaken three or four times at a strength of seven on a one to 10 scale, would that be corroborated by this report or rebutted by this report?

A. The autopsy findings would corroborate that statement, and that the findings at the time of the autopsy would have been consistent, very consistent with that statement.

Q. In your professional opinion was the cause of death listed in the autopsy report for Nakita Lemons correct?

A. That would have been my opinion at the time. Correct.

Q. And is there a different term that you would use now as opposed to shaken baby?

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A. Well, over time there has been with advancing research and attempts to understand the mechanisms, there has been changes in the terminology of the shaken baby syndrome.

In my chapter I use the term shaken impact syndrome because in 2010 we were aware of the fact that babies would be shaken, and then they could have been discarded and received head injuries, or they could have received head injuries and then been shaken, or they could have been impacted against soft objects, which would not have left an impact.

So in order to be more inclusive of the mechanisms, that definition or that terminology has changed. Basically it went from shaken baby syndrome to shaken impact syndrome. And now according to pediatric associations, and I think widely used across the country by medical examiners is a term abusive head injury or blunt trauma to the head or just head injury.

Q. So with the statement of abusive head injury, is there a difference in the mechanism that would have been from way back here, or is it a change in the terminology?

A. I would say that shaken baby syndrome is a subset of a wider group of abusive head injury in children.

Q. In this particular case would shaken baby syndrome still be descriptive of what happened?

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A. Correct.

MR. HEBEL: No further questions.

THE COURT: Ms. Hahn, whenever you're ready.

CROSS-EXAMINATION

BY MS. HAHN:

Q. Doctor, this is just on a point that you just mentioned. You said that the injuries would be described as shaken baby syndrome.

If you were to diagnose the injuries today, how would you diagnose them?

A. Are you saying how would I sign the death certificate out?

Q. I believe the question that the prosecutor asked you was the injuries that were presented in Nakita's case, you would describe them as shaken baby syndrome?

A. I would.

Q. Would you still use that terminology as a diagnosis today?

A. I would.

Q. Now it is evident, but I just want to clarify that you didn't conduct the autopsy in this case?

A. No. I was asked to review the reports, records and medical records and to make an opinion and to basically give my opinion as to the cause and manner of death.

Q. And in your review of the case records, did you also

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review the expert reports that were prepared in connection with our case?

A. I did.

Q. And which expert reports did you review?

A. I'm trying to remember. I remember the ex-medical examiner from Tennessee, a radiologist, Doctor Barnes, I'm forgetting the other.

Q. Doctor Galaznik and Doctor Nichols?

A. Galaznik and Nichols was the forensic pathologists, correct.

Q. You reviewed all those reports?

A. I did.

Q. Thank you.

And it's pretty clear at this point that you didn't testify at the trial?

A. Correct.

Q. That Doctor Cassin was the medical examiner that performed the autopsy, testified at the Preliminary Hearing and testified at the trial?

A. Correct.

Q. You're now aware that Doctor Cassin would no longer diagnose Nakita as suffering from shaken baby syndrome?

A. I also reviewed his report. I understand that to be the case, yes.

Q. And did you discuss with Doctor Cassin about why he's

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changed the manner of death?
A. No. I read his report.
Q. But you're aware that he changed the manner of death to now indeterminate?
A. In his report he indicated that in his opinion he would have determined the death to be indeterminate, but he no longer has the statutory authority to change the death certificate.
Q. In your testimony with the prosecutor you indicated that indeterminate is indicative of homicide?
A. It could be. Yes.
Q. But indeterminate does not mean that a homicide took place?
A. Correct.
Q. And so when indeterminate is listed as the manner of death, it is not indicative of any way that a homicide occurred because it's indeterminate?
A. It's indeterminate. It indicates that the certifier does not have in their opinion sufficient evidence to certify the death.
Q. And in your earlier testimony you indicated in your review of all the case records so far that you did not review any record that demonstrated Nakita choked on formula?
A. Correct. I was aware that there was a previous acute

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life-threatening event that occurred when the child was under the age of one month. But in my answer I was referring to fact that there was no choking at the time of the arrest.

Q. So you are referencing the two earlier episodes, one at one week of life and one at four weeks of life?

A. Correct.

Q. And you indicated earlier that you also had an opportunity to review the case documents involving the incident report prepared by the City of Wayne Fire Department?

A. Correct.

Q. And isn't it true in this document on page six that the author indicates upon assessment the patient had large amounts of white fluid in her mouth and had to be suctioned numerous times?

A. Yes, that's what I read.

Q. And then later in the narrative.

A. Excuse me. I testified that that was a common finding in infants that were unconscious.

Q. And then it follows that the drug box number 438 was opened to give the first round of previa ET. However, it was not given due to the large amount of fluid in the mouth and lungs?

A. Yes.

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Q. Are you also aware that it is indicated in the report?
A. Yes.
Q. And then additionally as part of the case record in the 911 call that was placed by the neighbor, you are aware that she indicated to the operator that she, meaning Nakita, was choking on some formula, and she is not breathing?
A. I understand that. Yes.
Q. And just as an administrative matter the 2015 presentation that you refer to you indicate the title would be in your CV, do you recall the title of the presentation?
A. The title was New Findings in Shaken Baby Syndrome at the American Association of Forensic Science. I believe it was in New Orleans.
Q. And the article that you mentioned previous to that where you explained about the findings of 13 studies you conducted, what was that?
A. That would have been in the 2001 chapter I wrote on Shaken Impact Syndrome.
Q. Okay. So since the trial in 2006 you would agree that there has been a lot of scientific research questioning the validity of the diagnosis of shaken baby syndrome and abusive head trauma?
A. Yes.

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Q. And you would agree that there is actually a controversy between the medical community regarding the reliability of the diagnosis of shaken baby syndrome and abusive head trauma?
A. There is a, I guess you could call it a controversy. There is a minority of forensic pathologists that do indicate that they no longer support. I would assume Doctor Cassin is one of those in the diagnosis of shaken baby syndrome.
Q. So you're familiar with study conducted by Doctor Norain in which he finds that only 40 percent of forensic pathologists surveyed believe that shaken baby syndrome is a valid diagnosis?
A. I'm not aware of that. No.
Q. And when you indicated that there is a minority of doctors that believe that a controversy exists, would you say it's fair to characterize it as a disagreement within the medical community about the validity of shaken baby syndrome and abusive head trauma diagnosis?
A. I would say it's a disagreement.
Q. Part of the disagreement stems from research provided from biomedical studies?
A. But biomedical studies have not been able to adequately or accurately determine the mechanism. There has been a number or studies that have been mainly by inanimate

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or none human models that have attempted to mimic the shaken, the mechanism shaking baby syndrome.

We have not yet developed the ideal model in order to do that, and there has been a number of challenges as to the models that have been used to make those determinations.

Q. And then the controversy that also exists about infant traumatic brain injury also stems in part from research about the causes, about the mechanisms that occur to subsequently result in the symptoms that are discussed as triad, the retinal hemorrhages, the subdural hematoma, the brain swelling?

A. I wouldn't say the mechanisms. I would say that there has been a hypothesis on, a recent hypothesis on hypoxic brain injury, which is lack of oxygen to the brain, and we have known and documented hypoxic episodes to the brain ever since the shaken baby was first determined by the evidence of brain swelling, which is indicative of lack of oxygen to the brain, which is the final mechanism of all injuries to the brain.

So it's nothing new in indicating that there may have been lack of oxygen to the brain.

Q. But you agree that these researchers believe that hypoxia, especially when accompanied by intercranial

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pressure and CPR in an instance like this where it's for an extended period of time could lead to the constellation of injuries, the triad of injuries?

MR. HEBEL: I'm going to object. The question was specifically about what particular researchers believe, and I would just ask number one, I think it's speculation as to what certain researchers believe, and number two, I would just request specificity on which researchers.

THE COURT: I agree.

Let's rephrase the question please.

MR. HAHN: Thank you. I will.

Actually, Judge, I'm going to come back to that issue if that's okay.

THE COURT: That's fine.

MS. HAHN: I'm going to touch on something else.

BY MS. HAHN:

Q. And so do you agree that there is a prominent controversy within the medical community regarding the reliability of shaken baby syndrome and abusive head trauma diagnoses?

A. I would agree that there is disagreement.

MR. HEBEL: I'm going to object to the term medical community and ask for specificity because we're

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talking with a forensic pathologist not a pediatric surgeon, not an emergency room doctor, just specificity in what area of the medical community.

THE COURT: Ms. Hahn, do you want to comment on that?

MS. HAHN: Yes, your Honor. I'm directly quoting the language from the Michigan Supreme Court Justices in case of People versus Ashley.

THE COURT: Well, I appreciate that. I guess my concern is that we've heard from a number of different doctors in terms of specialties, radiologists and medical examiners and what not. I think in terms of asking about the, I think certainly Doctor Jentzen may be capable of answering whether or not in the forensic pathology community there is disagreement, and I think he can answer that.

I think with all due respect to the doctor, I think let's keep him in his lane.

How's that?

MR. HAHN: Okay. Do you want me to repeat the question?

WITNESS JENTZEN: No. I would indicate there are disagreements with the minority of forensic pathologists like Doctor Cassin, who have indicated in their opinion there may be changes due to the research.

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But when you look at the research, there is still nothing that has been developed, no research or hypothesis has been proven to disprove the fact that severe shaking of an infant can and does cause death, and this has been an accepted diagnoses.

It has been in current textbooks and in the current literature. It has been documented by statements made in numerous investigations, and it has been documented by findings.

One of the major issues is that if there is enough force that's going to cause a death from shaking, there should be some injury in the neck.

Well, there is now evidence that there is injury in the neck in cases of infants that are violently shaken. So there is nothing. Certainly there has been a number of papers and research that has been done to attempt to determine that, and there are new hypothesis on the horizon, but none of these has disproven that shaking baby syndrome is a subset of abusive head injury.

Q. So you're familiar with the SBU Report, that Swedish Report?

A. I am. And that again is controversial and not accepted by general acceptance in the medical community.

Q. You will agree that that study questions the validity

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of shaking baby syndrome and abusive head trauma diagnoses?

A. Yes. It's one of them. But again the methodology from that study is questioned and not accepted in the general medical literature.

MS. HAHN: Just one second, your Honor.

THE COURT: Of course.

MS. HAHN: Nothing further, your Honor.

THE COURT: Mr. Hebel?

MR. HEBEL: Thank you, your Honor.

REDIRECT EXAMINATION

BY MR. HEBEL:

Q. Couple of quick follow-up questions. It was discussed that one of the 911 calls, a lay witness said that she thought the baby was choking. Does that equal a diagnosis of choking in your perspective?

A. I interpret it as a statement from a lay witness and seeing formula coming out of the child's mouth and the terminology would be choking.

But the paramedics indicated that there was no gag reflex at the time the child was first viewed, and that was confirmed when the child was admitted to the hospital. The child was basically unconscious and in an early coma by the time paramedics arrived, and there was a delay in getting the child to medical

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treatment, and the neighbors saw that, and that delayed death.

Q. Also it was discussed whether or not a majority of forensic pathologists agree with shaken baby syndrome, and the defense produced an article that said perhaps only 40 percent in that particular study.

But one of the things you also indicated on direct was that the new terminology is abusive head injury. And in your experience would the majority of forensic pathologists agree that abusive head injury is a correct and accurate description of the diagnosis?

A. Certainly. And that's the current terminology that is being used or recommended.

MR. HEBEL: No further questions.

THE COURT: Ms. Hahn?

MR. MORAN: Nothing based on that, your Honor.

THE COURT: All right.

Doctor Jentzen, if I may, I believe when you were asked on cross-examination about the Swedish Study, and you indicated that you are familiar with it, but it's your belief that the methodology and their findings were not generally accepted in medical examiner --

WITNESS JENTZEN: That's my understanding.

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hand, please. Do you solemnly swear or affirm to tell the truth, the whole truth and nothing but the truth so help you God.

DR. STROUSE: I do.

THE CLERK: Thank you. You maybe seated.

DR. PETER STROUSE,

called as a witness at about 10:51 a.m., having first been duly sworn by the Clerk of the Court, was examined and testified on his oath as follows:

DIRECT EXAMINATION

BY MR. HEBEL:

Q. Good morning.

A. Good morning.

Q. Please give your name for the record.

A. Peter J. Strouse.

Q. And what's your job, Mr. Strouse?

A. I'm a Pediatric Radiologist at the University of Michigan and tractor of the section of Pediatric Radiology within the Department of Radiology at the University of Michigan Health System.

Q. And what is your specific position within the Radiology Department at Children's Hospital?

A. I am a John F. Holt Collegiate Professor of Radiology. I'm the Director of the section of Pediatric Radiology within the Department of Radiology, and I'm also the

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Service Chief for Pediatric Radiology.

Q. Now, what's the difference between a regular Radiologist and a Pediatrics Radiologist?

A. A Pediatric Radiologist has additional training and experience in specifically in Radiology of Children as opposed to a General Radiologist that has some training in Pediatric Radiology but also has training in Adult Radiology but just practices throughout the realm of Radiology, not just focused on peds.

Q. And what type of education did you receive to become a Pediatric Radiologist?

A. I have an undergraduate degree and then I went to medical school four years at the University of Michigan, then I had a residency in general diagnostic Radiology which was at Henry Ford Hospital here in Detroit. After that I had two years of fellowship, one specially in Pediatric Radiology, the other in what's called cross-sectional imaging which is MR, magnetic resonance imaging CT and computed tomography and ultrasound.

Q. What current national positions do you hold in Pediatric Radiology?

A. So, I'm currently the President of the Society for Pediatric Radiology which is the national professional organization for Pediatric Radiologist. It has 2000

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members. I serve as the President, will preside over the meeting next year. I'm a past President of the Society of Chairs of Radiology in Childrens Hospitals. Served as President from 2011 to 2013.

MR. MORAN: Counsel, I will stipulate to Dr. Strouse's expertise in Pediatric Radiology

THE COURT: That's fine. Go ahead.

MR. HEBEL: In that case I can skip through most of the rest of my questions. I do have one more question.

BY MR. HEBEL:

Q. What certificate of added qualifications do you hold?

A. So, I have a certificate of added qualification in Pediatric Radiology from the America Board of Radiology.

Q. And does that qualify you as a neuroradiology specialist, too?

A. No, it does not.

Q. Would you suggest that as for specialties it's one certificate per specialty?

A. The certificate of added qualification is obtained after doing a fellowship within that subspecialty. The fellowships are usually one year sometimes two years. You also are tested for expertise in that area and you have to practice within that area for a

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certain length of time. They're renewed every seven years now.

Q. In a clinical capacity have you had any dealings with suspected cases of child abuse?

A. Yes.

Q. And can you tell us what in your clinical capacity what portions of your job bring you into contact with suspected cases of child abuse?

A. So, as a clinical Pediatric Radiologist I provide interpretation on imaging studies; those being x-rays, magnetic resonance imaging, computed tomography or CT ultrasound. In that capacity we do see cases of suspected child abuse unfortunately fairly commonly. So very frequently I am reading them because I'm assigned to the reading and they come through. I have also served as the main liaison for our child protection team from Radiology for the last 22 years, so even cases that I don't officially interpret I often review for them in that capacity.

Q. Does this bring you into a decision making capacity regarding the cause of injuries in potential child abuse cases?

A. I wouldn't necessarily call it a decision making capacity but it's my job to interpret the images, make the findings and to provide the referring physicians

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with an interpretation of those findings.

Q. And to follow-up on that, how many official reports on skull surveys have you done in the past year?

A. I would say probably one or two a week, so 50 weeks times one or two per week is 50 to 100.

Q. And in the past five years?

A. Multiple that by five.

Q. Are you familiar with the child death case of Nikita Lemons?

A. I am.

Q. And what was your involvement with this case?

A. I rendered an official interpretation of the postmortem skeletal survey that was performed.

Q. And what materials did you review for preparation in this case leading up to today?

A. So you provided me with a number of -- a packet of documents. I briefly went through those shortly after they were provided to me. I've reviewed the imaging studies. I've reviewed the Radiology reports. You provided Dr. Cassin's statement to me, so I read through that.

Q. Would some of those materials in the packet have included the autopsy report?

A. Yes, the autopsy report was, I forget if it was in the packet or if I was provided by Dr. Johnson, but I did

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see that and I specifically actually did look at that this past week.

Q. And also the hospital records of Annapolis and U of M Children's?

A. I did not go through those carefully. I believe they were provided to me.

Q. And the defense expert reports?

A. Yes, I have those.

Q. All right. Time to shift questions. What's a fracture?

A. A fracture is a break or a disruption of a bone. It can either be a complete fracture completely through the bone or sometimes in young children it's a partial fracture where there's a partial break that doesn't go quite all the way across the bone. That's called either a green stick fracture or a buckle fracture, but it's basically a break or disruption of the bone.

Q. And what does the term normal variants of ossification mean?

A. When a baby is born the bones are partially formative of cartilage and that has to do with how the bones grow over time or time cartilage turns to bone and there's growth at the ends of the long bones within the arms and the legs. Within that cartilaginous model of bone in an infant there are ossification

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centers where the bone forms. Sometimes those ossification centers are just one, sometimes there's extra ossification centers that subsequently congeal as the child matures into a single bone. It's very common at multiple cites within the human body within an infant or with a young child to have have variations in how these ossification centers occur. They're very very common, particularly ossifications within the body.

Q. Now, turning specifically to this case. In the Radiology of Nikita Lemons there was diagnosis of a fracture. I'm going to ask you to explain where the acromion is, and it is my understanding that you have prepared a slide presentation based on the radiography -- the Radiology, my bad, that was in this case; is that correct?

A. Yes. I made a PowerPoint for you.

MR. HEBEL: And at this point I am going to ask to introduce that PowerPoint into evidence.

MR. MORAN: No objection, your Honor.

THE COURT: All right. It will be received. I think just for purposes of the record should we have that marked as an exhibit? You want to get a -- eventually we can get a printout of that.

MR. HEBEL: Your Honor, I have it marked as

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People's Exhibit Number -- or People's Proposed Exhibit No. 15, and I do have printed out copies as well.

THE COURT: Any objection to it then being introduced on hard copy?

MR. MORAN: No objection.

THE COURT: Copy for the defense and for me as well, Mr. Hebel.

(At about 11:02 a.m. Whereupon People's Exhibit 15 admitted into evidence.)

MR. HEBEL: May I approach?

THE COURT: Sure. Mr. Moran and Ms. Hahn, do you -- we need extra -- you want an extra one?

MR. MORAN: We got it.

THE COURT: You got -- okay. Go ahead, Mr. Hebel. Thank you.

MR. HEBEL: Due to the size of the images I was requested to provide those in a PowerPoint format on the big screen, so if you will give me one moment to set that up.

THE COURT: Absolutely.

BY MR. HEBEL:

Q. Now, as you will observe behind you, Dr. Strouse, the presentation People's Exhibit No. 15 is the first slide is on the screen and would that be of assistance

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in explaining the position of the acromion fracture?

A. Sure. The acromion or also known as the acromion process is part of the scapula which is basically the shoulder blade. The acromion sticks out anteriorly or towards the front where it joins with or articulates with the clavicle or the collarbone. So the acromion is basically a part of the shoulder blade that extends towards the front.

Q. And in this radiological imaging can you point out to where the diagnosis of the fracture was?

A. So, this is the chest tape radiograph that was initially obtained on the child and the red arrow indicates the fracture within the acromion process.

THE WITNESS: If I can stand I --

THE COURT: Sure. That's fine. Whatever works for you. Maybe we can -- okay, that's fine. I think we can hear, Dr. Strouse. Okay.

THE WITNESS: This is the chest x-ray. This image on your right is magnification of the right shoulder, so it's the same image just made bigger. And come down. The acromion process is this part of the bone right here that is basically extending forward from the shoulder blade from the scapula. The red arrow is pointing at a transverse line or lucency we would call it in Radiology through the acromion

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process that should not be there, that is a fracture.

BY MR. HEBEL:

Q. Are there other slides showing this fracture that you'd like to go to?

A. Yes. You could advance it, please.

THE COURT: Dr. Strouse, if I could just interrupt for a moment. Could you clarify for me when these films were taken.

THE WITNESS: So I believe the first chest x-ray, chest radiograph was obtained when the child came to the emergency room and I have the date and time on the slides there. The second one was obtained a few hours later. I don't have the slip. Is that the first one or the second?

MR. HEBEL: The first one is labeled October 10th, 2005 at 10:17 p.m., the second one is labeled October 11, 2005 at 6:11 a.m.

THE COURT: Okay.

THE WITNESS: So this chest extra basically shows us the same thing, perhaps a little better. Again, the red arrow is indicating the fracture within the acromion process.

BY MR. HEBEL:

Q. Can you as a pediatric radiologist experienced with this type of imaging can you tell the difference

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between this being a normal variant or being a fracture?

A. That is a fracture. It's sharply defined line. The normal variant of scapula ossification usually are closer to the end of the scapula and not in the middle or towards the base as this one is. It's asymmetric. There's not a similar finding on the other side, although that doesn't completely exclude it being a normal variant. If it were a normal variant we would expect the margins of it to be less well defined and maybe a little white from some sclerosis because it's a normal structure and that's what it would look like. This is clearly not a normal variant.

Q. What is the significance of a fracture in the acromion process in this particular area?

A. Fractures of the acromion process in young children and infants are very rare. It's considered an injury that's of high specificity for child abuse because it's rarely seen outside of the setting of child abuse therefore it's concerning.

Q. Can this type of fracture be caused by resuscitative efforts?

A. In my years of experience I have never seen a case where an acromion fracture was attributed to recitation nor am I aware of any such case within the

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medical literature.

Q. And do you stay up-to-date in the medical literature in this field?

A. Yes, I do very much so.

Q. Are there any other slides that you would like to look through on this particular issue?

A. Yes. You can advance. The rest of the slides are from a skeletal survey that was performed after the child passed away and after an autopsy was performed or during the autopsy was being performed.

I'm not sure why the skeletal survey was done after the autopsy. Standard today would be to do it before an autopsy. So we see changes of the autopsy on these images.

The skeletal survey is basically a series of radiographs of all parts of the body of the infant or in this case the deceased infant looking for fractures, looking for other abnormalities, looking for evidence of other diseases that might be present. So these are x-rays of the child's head and upper torso basically showing post autopsy changes but nothing else abnormal other than the acromion fracture.

If you go to the next slide. This is a magnification of one of the pictures on the prior

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slide just again showing the acromion process fracture marked by the red arrow.

Q. Are there any other slides on the acromion process that you'd like to review?

A. No. I think that's the last one showing the acromion process fracture. I've put the rest of the slides in to demonstrate the rest of the bones and their appearance.

Q. I'll turn to that topic right now. Pediatric Neuroradiologist Patrick Barnes identified several areas in the skeleton that he felt may indicate that the victim had rickets; can you tell me what rickets is?

A. Rickets is a disorder in calcium and vitamin D metabolism that basically leads to under mineralization or under calcification of bones. It has a number of potential causes, one of which is vitamin D deficiency. The infant doesn't have enough vitamin D. There are metabolic bone diseases that can cause it. Certain types of chronic kidney or liver disease can cause it.

Q. Now, is rickets common in the United States or is it rare?

A. I wouldn't call it either common or rare. We see a fair bit at my institution of kids with congenitale

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metabolic disorders that have rickets. We see some that's acquired in premature infants that have Met Bone Disease. It's a little more complexed than just rickets itself and we see occasional cases each year of vitamin D deficiency rickets in older infants.

Q. So, you've seen skeletons that have exhibited rickets before?

A. Oh, yes.

Q. How would a pediatric radiologist find and diagnose rickets in an infant?

A. So, there are characteristic findings that are used to make or suggest the diagnosis. Since it's a disorder where the bones don't -- aren't normally mineralized normally calcified they don't look -- they don't have normal density so they appear osteopenic. There's not enough calcium within the bone, so on an x-ray they won't appear as white as they should.

The other characteristic that happens at the ends of the bone where the bone is growing the fastest is where the manifestations of rickets are best seen. So adjacent to the growth plates at the end of the bones there's a portion of the bone called the metaphysis. Characteristically in rickets the metaphysis is not normally mineralized, it's ill defined, it's cupped. It has a very characteristic

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radiographic appearance.

Q. Are there any other findings that you would note in findings of rickets?

A. In severe rickets you can also get what's called a rachitic rosary which is where the ends of the ribs have a similar appearance to what I already described within the metaphyses which is that they're ill defined, broaden, poorly mineralized, osteopenic. Those are all medical terms but basically they're not normally mineralized or ossified.

Q. Now, you reviewed this skeletal survey of Nikita Lemons, correct?

A. Correct.

Q. And can you tell whether or not the victim had rickets from the skeletal survey?

A. There's no evidence of rickets on the skeletal survey whatsoever.

Q. And can you explain to us how you came to this conclusion? And you can use the slides if need be.

A. Okay, the bones are normally mineralized. They are not osteopenic at all. These are images of the child's chest. The lungs and the heart have been taken out so it doesn't look like a normal chest x-ray like we saw a few minutes ago. The ribs here have a normal density. At their anterior margin which is in

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the front the ribs expand slightly which is perfectly normal and seen in every single infant. That is not a rachitic rosary. That is normal.

The ends of the ribs are well defined. There's no evidence of expansion, there's no evidence of poor mineralization. They have a normal appearance. The rest of the slides are images of the child's long bones within the legs and within the arms. And again, these bones are normally mineralized. They are not osteopenic. The metaphyses, the ends of the bones are well defined. There's no fraying, there's no cupping, there's none of the described findings that would be seen with rickets. These bones have a normal radiographic appearance.

Q. And that would be consistent with all the bones on the rest of the slide or the --

A. Right. Rickets is a systemic process, so if you have rickets you would see it throughout, and we don't see it anywhere.

Q. Can you tell me what the definition of a craniotabe is?

A. You mean craniotabes.

Q. Craniotabes. My bad.

A. Craniotabes is a term that's basically a clinical or

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physical exam finding where a physician presses on the infant's skull and it deforms and then returns basically to it's normal state and it's supposedly a marker of the skull not being normally mineralized, normally ossified. Craniotabes is not a radiographic term. It's a term used for a clinical exam, physical exam finding.

Q. Did you see any evidence that this victim exhibited those symptoms?

A. The skull of this baby is normally mineralized. I also did look at the CT images of the head to look at the skull since the x-ray images are limited by the post-autopsy findings. The skull here is normally mineralized, does not show any evidence of rickets.

Q. I'm going to -- First, before we leave this topic are there any or slides that you would like to review in this area?

A. So, I would specifically point out that the changes of rickets are most prominent at the growth plates or the bones that grow the fastest and those are the -- next to the knee and at the wrist. So that would be the distal femur within the upper leg, or the end of the femur in the upper leg, the top end of the tibia, the lower leg and the end of the radius at the wrist. All of those bones are perfectly normal and symmetric here

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without evidence of rickets. If we were to see rickets we would see it at those sights and we did not.

Q. Is the slide behind you indicative of the portion of the leg by the knee that you are discussing?

A. Right. Towards the bottom of both of the images is the knee and both of the knees have a normal radiographic appearance without evidence for rickets.

Q. All right. I'm going to change gears now and ask you about a paper. Are you familiar with the SBU paper out of Sweden?

A. Yes, I am.

Q. And how are you familiar with that paper?

A. Familiar via multiple routes.

Q. Let's start with the earliest chronologically?

A. The earliest I heard about it actually was at Peter Aspelin's presentation at November 6, two years ago in Michigan where he mentioned it was coming. I was not at that presentation but was told by somebody there that it was mentioned and subsequently saw it on the slides. So that's the earliest I got wind that it was coming. After that I think the next time I heard about it when it was actually published in Swedish and it immediately made the rounds within the Child Abuse Pediatrics Committee as a concerning document.

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Q. At some point did you cowrite commentary objecting to the publication and requesting peer review?

A. I'm a coauthor on a commentary within the Journal Pediatric Radiology. The main point of the commentary was to express concern with the document that it hadn't been properly peer reviewed, but more so that it had not at that point been released in English, it was only available in Spanish -- or not Spanish, Swedish at that time. We had a Google translate version of it which had typos and stuff like that so did not want to officially respond to it without the proper English translation version, so a lot of the gist of that commentary was asking them to produce the English version that they had promised but was delayed.

Q. Were there other societies that joined in that letter to express concerns?

A. That particular commentary was mostly -- the offers on that commentary were leadership from the Society for Pediatric Radiology, the European Society for European Society of Pediatric Radiology, the Society for Pediatric Radiology Child Abuse Committee and the European Society of Pediatric Radiology Child Abuse Task Force.

Prior to that commentary I'm aware of seven

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organizations that contacted the SBU and expressed concern about the forthcoming manuscript and offered peer review. And the SBU specifically refused peer review of all seven of those organizations. And those organizations were the American Academy of Pediatrics, the Royal Society of Pediatrics, the English Pediatric Group, the Norwegian Pediatric Society, the Swedish Pediatric Society, the Society for Pediatric Radiology, the European Society of Pediatric Radiology and the American Society of Pediatric Neurosurgeons.

Q. The last one could you --

A. The last one was the American Society of Pediatric neurosurgeons.

Q. Do you see any flaws in the SBU study?

A. Can I refer to my notes on that because there are --

Q. If that will refresh your recollection.

A. So there's numerous flaws with it. The first thing is the SBU report basically is attacking the so-called triad of subdural hematoma, hypoxic-ischemic encephalopathy and retinal hemorrhages. That's really a straw man. The diagnosis of child abuse is not based solely on that triad of findings. It's based on a comprehensive multidisciplinary evaluation of a child. So that's one problem.

Their inclusion criteria for articles in

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their analysis is incredibly and impossibly narrow and constrained and basically designed to exclude virtually every article in the Journal.

Essentially their inclusion criteria was only papers that had confessed or witnessed traumatic shaking. They excluded papers that have injuries outside of the brain. So papers where there were fractures or other things were excluded which is somewhat nonsensical as is very well-known that injuries outside of the brain occur with abusive head trauma.

They also discounted multidisciplinary child abuse teams in terms of making the diagnosis, calling it circular when, in fact, those teams do a very thorough and comprehensive workup and are extremely careful to make the right diagnosis and consider differential diagnoses. The SBU's handbook specifically states that these reviews are done by panels of experts in the field, yet this review specifically did not include Pediatric Radiologist or Pediatric Neuroradiologist, Ophthalmologist, or child abuse pediatricians, all of whom, you know, are very integral to the diagnosis of child abuse.

In the review they used the generic term retinal hemorrhages which is very deceiving. Retinal

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hemorrhages have a spectrum of appearances, and severe patterns and associated other retinal findings can be very specific for child abuse whereas other minor forms of retinal hemorrhage have nothing to do with child abuse, but they use the term generically.

There's a bias in terms of their inclusion criteria excluded any study or any paper that had less than ten cases, whereas when they were discussing differential diagnoses they allowed single case reports and did no analysis of the quality of those papers, hence, their list of differential diagnoses has some that are nonsensical or, quite frankly, discredited. And we already mentioned that they declined an external peer review by professional organizations with the a vested interest in well-being of children.

Q. Do you believe that the conclusions of the SBU study are relevant?

A. The only thing they prove were that there were two papers that met their criteria. That's the only thing they proved. The study really has no utility.

Q. It has been alleged that you have written letters to the editor and publications specifically regarding Dr. Patrick Barnes; is that correct?

A. I haven't written letters to the editors. I have

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written editorials that have to do with papers that he has published. I'm editor of the Journal Pediatric Radiology, so occasionally I write editorials and a couple of them have referenced his papers.

Q. And with those do you have -- are your concerned -- do you have -- First off, do you have concerns about Dr. Barnes?

A. Of course, I do.

Q. And those concerns are those personal or are those professional in nature?

A. Those are professional. I do not know the man personally.

Q. And what concerns do you have?

A. I have concerns with his professional integrity. I have concerns that articles he's published in the literature have been unethical, deceptive, contained inaccuracies and that similar behavior occurs in court. I've seen depositions from him on several cases now some of which I've been involved with and, quite frankly, it's very worrisome.

Q. To conclude I'd like to head back to the skeletal survey in this particular case. Is a finding of abuse from a multidisciplinary team consistent with your examination of the skeletal survey and the surrounding findings in the Nikita Lemons case?

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MR. MORAN: Your Honor, I object. There was no multidisciplinary team that made any finding of abuse in this case. It was just a pathologist.

MR. HEBEL: If I may respond?

THE COURT: Please.

MR. HEBEL: A pathologist that was educated by a pediatric radiologist, an investigator and the medical records that were provide beforehand.

MR. MORAN: Your Honor, we were provided a report that Dr. Strouse was going to testify about the SBU report and about the acromion finding. We were not given any notice that he was going to go beyond that.

THE COURT: Well, Mr. Hebel, I don't think I've heard anything yet about a team. If you want to start laying a foundation about how he might have been part of some sort of team I'll allow that.

MR. HEBEL: I can completely rephrase the question.

THE COURT: Go ahead, please.

BY MR. HEBEL:

Q. Is a finding of abuse from whatever source consistent with your examination of a skeletal survey and the surrounding findings in the Nikita Lemons case?

A. By the surroundings findings are you referring to the

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head findings?

Q. The head findings and the medical records findings?

MR. MORAN: Again, your Honor, this is far beyond anything that was in the report, the two and a half page report we were provided from Dr. Strouse.

THE COURT: I'm going to allow it. Go ahead.

THE WITNESS: I said the acromion fracture in itself is very concerning. That's considered a high specificity legion or fracture for child abuse. So that in itself is very concerning. You put that together with the intercranial findings, the eye findings, yes, it's very consistent with child abuse, abusive head trama and a fracture.

Q. And in your opinion would the fracture of the acromion support the medical examiner's findings that this was a homicide by Shaken Baby Syndrome and child abuse?

MR. MORAN: Again, your Honor, that's contrary to the record as to what Dr. Cassin testified to at trial and yesterday that he did not rely on the acromion findings in making these diagnosis.

THE COURT: Mr. Hebel?

MR. HEBEL: To respond I'm asking Dr. Barnes not whether or not the medical examiner relied on

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it --

THE COURT: Dr. Strouse you mean.

MR. HEBEL: Did I say Dr. Barnes? My apologizes, Dr. Strouse.

THE WITNESS: That's a bad one.

MR. HEBEL: My specific question was whether or not Dr. Barnes' description of the fracture in the acromion process would support that, not whether or not it was relied upon.

THE COURT: I guess I'm trying to understand when you mention the findings of homicide are you referring to what was the conclusion back in 2006 which I think is Defense Exhibit No. 12?

MR. HEBEL: Yes.

THE COURT: As oppose to what Dr. Cassin testified to yesterday?

MR. HEBEL: I'll completely rephrase the question.

THE COURT: Thank you.

BY MR. HEBEL:

Q. Does your interpretation of the Radiology support or oppose the original autopsy report prepared in this case?

A. It supports -- the acromion fracture is a fracture. It's indicative of force and trauma to the child.

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Q. Thank you.

MR. MORAN: Are you ready, your Honor?

THE COURT: Yes. Whenever you are.

CROSS-EXAMINATION

BY MR. MORAN:

Q. Good morning, Dr. Strouse. I am David Moran. We haven't met, have we?

A. No.

Q. In fact, we haven't spoken, have we?

A. No.

Q. Now, I did try to speak with you before your testimony today; isn't that right?

A. That's correct. You sent me an email saying you wanted to ask me a few questions. I was not comfortable with that. I thought it kind of odd.

Q. Okay. So this is the first time that we have spoken?

A. Right.

Q. Now you prepared a report in anticipation of your testimony here today; is that right?

A. Correct.

Q. And I have it marked as Defendant's Exhibit 21.

Mr. Hebel, I'm sure have a copy though.

MR. HEBEL: Thank you very much.

MR. MORAN: May I approach, your Honor?

THE COURT: Yes.

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BY MR. MORAN:

Q. Could you just page through that and confirm that that is a copy of your report that you submitted to Mr. Hebel in anticipation of your testimony?

A. Yes.

MR. MORAN: Your Honor, I'd move to admit Dr. Strouse's report as Defendant's Exhibit No. 21.

THE COURT: Any objection to that?

MR. HEBEL: No objection.

THE COURT: All right. It will be received.

(At about 11:35 a.m. Whereupon Defendant's Exhibit 21 admitted into evidence.)

BY MR. MORAN:

Q. Dr. Strouse, let's start with the suspected acromion fracture. Now in the report and in your testimony here today, I'll quote your report. You said you're very -- you're certain that this is a transverse acromion fracture and in your report you say it's unequivocal. Is that your position it's unequivocal --

A. Yes, it's a fracture.

Q. -- transverse acromion fracture? Now you recognize that there are mimics of acromion fractures that are not in fact acromion fractures?

A. Correct.

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Q. In fact, in your report you cited several articles recognizing that there are mimics of acromion fractures; is that right?
A. Yes, I did.
Q. Was one of those articles by a Currarino and Prescott?
A. Yes, by Guido Currarino (ph). I don't recall the second author off the top of my head but if you say it's Prescott I'll --
MR. MORAN: And that was previously admitted as Defendant's Exhibit No. 19, counsel.
BY MR. MORAN:
Q. Now that article begins by recognizing and I quote, "fractures of the acromion are uncommon at any age." Do you agree with that that they are uncommon at any age?
A. I don't know about beyond 18 years of age because I don't practice in that realm.
Q. Okay, are they uncommon among infants?
A. Yes.
Q. So you don't really have very many cases to work with, do you?
A. I've probably seen eight or 10 in my career.
Q. And your career is how long?
A. Twenty-two years.
Q. So they're fairly rare?

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A. Un-huh. Right.
Q. And Currarino and Prescott go onto say in that same opening paragraph, they are seen most often in Battered Children's Syndrome -- Excuse me. Battered Child Syndrome, end quote. Do you agree with that?
A. They're most often seen in the setting of child abuse. Battered Child Syndrome is a term that was used previously to describe a name for child abuse. I would say yes.
Q. Battery means hitting, right?
A. I wouldn't necessarily say so. It just means the child is abused.
Q. Really? Battered doesn't mean hitting?
A. I don't know. You could ask Dr. Kemp who originated the term how he meant it to be defined but I don't know. I have avoided that term myself.
Q. But back to that paper which you cited in your report. Currarino and Prescott found several cases in which the suspected acromial fracture wasn't really an acromial fracture, right?
A. In that paper they have examples of a normal variant, they have examples of I think three or four examples of fractures. The appearance of the fractures in that paper is much more consistent with what we see in this child than the acromion -- the normal variant is --

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most of the cases in that case are healing fractures so they do appear different than the fracture that we see in our case that does not have signs of healing.

Q. That really wasn't my question. My question was is that Doctors Currarino and Prescott found examples of variants that look like on Radiology acromial fractures?

A. They did.

Q. But there is no chance that you made that mistake because as you put it --

A. This is a fracture. It doesn't look like a normal variant.

Q. Doctor, I'm grateful if you let me finish my question. Because you stated this is unequivocal?

A. Right.

Q. Okay. Now the other article you cited in your report is by Kleinman and Spevak. Variations in acromial ossification simulating infant abuse in victim of sudden infant death syndrome, and that's a 191 article from Radiology; do you remember citing that one as well?

A. Yes.

MR. MORAN: Your Honor, at this point I move to admit Kleinman and Spevak as Defendant's Exhibit 22. I have previously sent it to Mr. Hebel.

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THE COURT: Any objection?

MR. HEBEL: No objection.

THE COURT: Twenty-two will be received.

(At about 11:39 a.m. Whereupon Defendant's Exhibit 22 admitted into evidence.)

BY MR. MORAN:

Q. And that article again notes that there are anatomical variations that could easily be confused on Radiology for an acromial fracture, correct?

A. By the inexperienced, yes.

Q. And the article ends with and I'll quote, "in suspected fatal abuse the acromion should be resected as should all other sites of osseous injury for further radiographic and histological analysis." Can you tell us what a histological analysis?

A. It's the pathologist looking microscopically at specimens.

Q. And so to translate that sentence into plain English, if the infant is deceased the medical examiner should confirm the suspected acromial fracture by resecting the area; is that right? Is that what they're saying?

A. I don't think informations needed here but it would have been nice if it had been resected.

Q. Doctor, my question was is that what Kleinman and Spevak were saying?

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A. Yeah. It sounds like they're suggesting that, yeah.
Q. But that wasn't done here, was it?
A. Not to my knowledge.
Q. But despite what that article says in a fatal case you should resect the area and confirm through histology that it is a acromial fracture. You're very confident that this is an acromial fracture?
A. I have no doubt.
Q. Unequivocally?
A. Right.
Q. Now, your -- you mentioned Jeffrey Jensen, and you mentioned that you consulted with him; can you tell me what that was about?
A. I already forgot what I said about Dr. Jentezen.

THE COURT: It was with regard to certain -- talking with him about the file on the Nikita Lemons matter.

MR. HEBEL: I'm going to object and this -- my memory of what the witness said was that he may have acquired the autopsy report from Dr. Jensen rather than through my office.

THE WITNESS: Correct. That's what I said, but I did not consult with him further than that.

MR. MORAN: I don't remember frankly myself, your Honor.

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THE COURT: Okay.

BY MR. MORAN:

Q. But you know Dr. Jensen?

A. Yes.

Q. And he wrote a book chapter in a book called the Shaken Baby Syndrome in 2001 that was discussed yesterday, and at page 217 of that book chapter which Mr. Hebel has, the last sentence of the carryover paragraph at the top of the page let me read that to you. In cites where radiograph suggests the present (sic) should by presence, of recent or remote skeletal injury, the area should be incised, examined and fractured bones removed for examination with more detailed radiological and histological methods, end quote. So if you translate that into English again Dr. Jentezen was suggesting that in a case of a fatal injury or a fatality that the area should be incised and histological methods and more detailed radiological methods should be used; is that fair?

MR. HEBEL: I'm going to object at this point because this is beyond the scope of this witness's expertise. That is chapter specifically referring to pathological findings and this witness discussed the radiological findings of the acromion, not the pathological.

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MR. MORAN: Your Honor, the question is what should you do when the Radiology suggest an acromial fracture in a case where the infant is dead and I am questioning whether or not this is an unequivocally acromial fracture.

THE COURT: I understand. I'll allow it.

MR. MORAN: Thank you, your Honor.

BY MR. MORAN:

Q. Again that wasn't done here; is that right? None of that what Dr. Jensen suggested was done in this case?

A. To my knowledge they didn't resect the acromion.

Q. Robert Reese and Cindy Christian wrote a book called Child Abuse Medical Diagnosis and Management, are you familiar with that book?

A. I'm familiar with Dr. Reese having written books but not specifically with that one, although I may very well have it on my shelf in my office.

Q. It was 3rd edition 2009, so about eight years ago, published by the AAP, can you tell us what the AAP is?

A. The American Academy of Pediatrics.

Q. And at page 236 of that book they write: Variations in the ossification pattern of the acromion process have been recorded as mimics of inflicted trauma. And later on the same page they write: In deceased patients histological evaluation of skeletal lesions

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identified during the skeletal x-ray survey should clarify the traumatic versus nontraumatic origin of the finding. I take it you disagree with that, that you don't need to do that? You can make the call as to an acromial fracture?

A. In this case there is an unequivocal acromial fracture. I don't need pathology to confirm it. It would be nice if we had pathology to confirm it and unfortunately we don't, but it's a fracture.

Q. All right, now, Doctor, where exactly is the acromial process? Could you point on your body where it is?

A. It's right here.

Q. So you're pointing towards the front of your shoulder?

A. Correct.

Q. Let me show you a diagram. I'm gonna have this marked as Defendant's Exhibit 23 from a medical text book. Propose Defendant's Exhibit 23.

MR. MORAN: May I approach, your Honor?

THE COURT: Yes.

BY MR. MORAN:

Q. Can you look at that diagram?

A. Um-hum.

Q. That seems to show that the acromion is towards the back of the shoulder and the coracoid process is more towards the front of the shoulder; is that wrong?

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A. That's wrong.
Q. So it's not?
A. Both the acromion and the coracoid process are extensions of the scapula, the shoulder blade which extend towards the front. Both of them extend towards the front a few centimeters. On that drawing you're basically looking essentially down the barrel of the acromion, so you don't appreciate its length or the fact that it extends towards the front nor do you appreciate that for the coracoid on that drawing.
Q. Now, how far apart are the acromion and the coracoid?
A. It depends on the age of the patient. A centimeter maybe or so in a little -- in an infant. Three or four centimeters in an adult maybe.
Q. But they are separated by a little bit?
A. Um-hum.
Q. And they are separated by the main body of the scapula; is that right?
A. Well, they both connect to the main body of the scapula. I mean, in-between there's soft tissues and ligaments.

MR. MORAN: Well, your Honor, I move to admit Defendant's Exhibit 23 and we have Dr. Strouse's commentary on it.

MR. HEBEL: At this point the People would

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object because --

THE COURT: I agree. I don't think it's helpful at least not at this particular point.

MR. MORAN: I'd like to make an offer of proof then of Defendant's Exhibit 23.

THE COURT: Go ahead.

MR. MORAN: I'll submit that as a rejected exhibit.

BY MR. MORAN:

Q. We've heard testimony already in this case that the acromion process is more towards the back of the shoulder. That testimony is just wrong then?

A. It's part of the scapula which is towards the back, but the acromion process itself extends towards the front from the scapula. So to be kind of completely correct it's somewhat in the middle.

Q. Now the acromion and the coracoid are different pieces?

A. Correct.

Q. And they have different shapes; is that right?

A. Correct.

Q. So they look different on Radiology?

A. Correct.

Q. And a radiologist can tell the difference between the coracoid and the acromial process?

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A. Yes. In my original report I made an error and mislabeled it as the coracoid rather than the acromion. It's clearly the acromion and there's an addendum making that correction. So I don't know why I made the error. It's 12 years ago. If a fracture -- it's a fracture regardless.

Q. So you made an error. In fact, I am going to show you what's previously been admitted as Defendant's Exhibit 10 which is the U of M medical records. And this is page 15 and 16 of that original medical record.

MR. MORAN: May I approach again, your Honor?

THE COURT: Yes.

BY MR. MORAN:

Q. Dr. Strouse, could you start reading right in the second paragraph under findings with there is a transverse?

A. There is a transverse fracture of the right coracoid process. This fracture is best seen in the supplemental view of the right humerus and the Townes view of the skull.

Q. Can you read the rest?

A. This fracture is also seen on the chest radiographs of 10-10-2000 -- 10-10-05 and 10-11-05. The left

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coracoid process appears intact.
Q. Thank you. And then at the very bottom of that page there's impressions. Could you read the first impression?
A. Fracture of the right coracoid process.
Q. And read the rest of that impression?
A. A fracture at this location is considered highly specific for child abuse. That would be true whether it was the acromion or the coracoid.
Q. Okay. So you were the original radiologist on this case back in 2005?
A. Correct.
Q. You didn't reveal that in your report, did you?
A. What report?
Q. The report that you sent to Mr. Hebel?
A. I didn't see any reason to. He was aware of that.
Q. I see. And so the only reason that I found out about it is because I dug back into the Radiology. You didn't think it was important to tell the Court or Mr. Hebel that you were the original radiologist?
A. Mr. Hebel was aware.
Q. And in your report you're diagnosing an unequivocal transverse acromial fracture but you don't mention that 12 years ago you got it wrong and called it something else?

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A. It's very clear there is an addendum there.
Q. There is an addendum and can you read that addendum for me, please?
A. The fracture of the right scapula is within the acromion process, not the coracoid process. This was discussed at the Child Abuse Review Committee on 11-2-05 and communicated to Dr. Pomeranz of the Child Protection Team by Dr. Strouse 11-2-05.
Q. 11-2-05. So how long did it take for you to get around to correcting the error that you made as to what kind of fracture this allegedly was?
A. Well, clearly I did it on 11-2-05.
Q. And when was the original report written?
A. 10-11-05.
Q. All right. And would it surprise you to learn then that the pathology report listed this as a coracoid fracture, that they were relying on your error and wrote that this was a coracoid fracture?
A. I'm sorry. Please repeat your question.
Q. Would it surprise you to learn that the original autopsy report list this as coracoid fracture because they were apparently relying on your radiological error?
A. Yes, they copied that into their report.
Q. Apparently the error got caught three weeks later at a

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meeting in the child abuse team; is that a fair reading of that addendum?

A. Um-hum, again, it's 12 years ago so I don't remember exactly when it got caught. That's when it was presented and documented. So I assume it was when I went to review the images for that conference.

Q. This episode teaches us that Radiology is not an exact science is it?

MR. HEBEL: Objection. That is testifying rather than asking a question.

MR. MORAN: I'm asking him a question about whether Radiology is an exact science.

THE COURT: Well, sounds argumentative. Rephrase it, Mr. Moran.

BY MR. MORAN:

Q. Radiology like other areas of medicine has errors? Errors are committed in Radiology as in other areas; is that right?

A. I'm sorry?

Q. Radiological errors happen; is that correct?

A. They do.

Q. Medicine is not an exact science; is that a fair statement?

A. That would be a fair statement.

Q. Statements like unequivocal are not usual made in

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exact sciences; is that a fair statement?
A. There are circumstances where it's appropriate to say equivocal like this fracture of the acromion is unequivocal. That's appropriate. But there's other places where it's not. Yes, I made an error. Quite frankly, there's a typo further down the page too. We want to go over that?
Q. Dr. Strouse, are you equating a typo to identifying the wrong bone in which a --
A. No. I am just saying it's a mistake.
Q. All right. Let's shift gears a little bit and talk about the mechanisms of acromial fractures. Now, you're 2017 report that you sent to Mr. Hebel says that an acromial fracture is highly specific for reviews, that's what you wrote?
A. Correct.
Q. Which is the same thing you wrote about the coracoid fracture that you thought existed 12 years earlier?
A. Correct.
Q. Now, your report doesn't explain the mechanism by which acromion or fracture, does it?
A. No.
Q. In fact, blunt force trauma can cause an acromial fracture, can it not?
A. Yes.

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Q. And in your report you write and I quote now, "to the best of my knowledge they", and you're referring to acromial fractures there, "are not reported with cardiopulmonary resuscitation and specifically not with back blows"?
A. Correct.
Q. Are there any publications indicating that back blows unlike other blunt force trauma cannot cause acromial fractures? Is there any literature to support that assertion? Or is it just that it hasn't been reported?
A. No. And I am not sure how you would do such a study, so I am not surprised there's no literature. I mean, there is no cases I know of where acromial fractures are described in infants that have had cardiopulmonary resuscitation.
Q. That's fair. But as we said earlier acromial fracture in infants are fairly rare?
A. Correct.
Q. So it's not surprising that you haven't heard of any cases in which it is attributed to CPR, is it?
A. It's not surprising that I haven't heard of any cases?
Q. Too many negatives, but do you understand the gist of my question?
A. It's not reported to occur, so I'm not surprised I

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haven't seen anything.
Q. And the infant that has acromial fracture can't tell you how he or she got it, can he or she?
A. Of course, not.
Q. But an adult who has an acromial fracture can tell you what happened; is that fair?
A. Well, they can probably say I was in a motor vehicle accident and I fell two stories or something like that, but I don't think they know exactly what, you know, what the mechanism was.
Q. Those examples -- those are realistic examples of how an adult might explain having an acromial fracture, I was in a motor vehicle accident? Blunt force trauma?
A. Un-huh.
Q. Can you give a verbal answer to that?
A. Yes.
Q. Thank you. Let me now turn to the -- your views about the SBU report. In your report you wrote -- the report to Mr. Hebel. You wrote, and I am quoting now. "Within the mainstream medical community, the SBU report has zero validity"?
A. Correct.
Q. And you underlined zero validity?
A. Correct.
Q. So not even a little bit of validity, zero validity,

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is that your view?
A. Yes.
Q. And you determined that the SBU report was, to use your words from direct examination, concerning before you even knew what it said in English; isn't that right?
A. No. I did know what -- somewhat what it said because I had seen it in Swedish. And it wasn't just me that determined it, it was a large number of people who saw the document and the Google translate version of it and were concerned.
Q. So back to zero validity. You don't admit any uncertainty about anything relating to Shaken Baby Syndrome, do you?
A. That's incorrect.
Q. You admit uncertainty about Shaken Baby Syndrome? You fear that child abusers are gonna get away with it; isn't that right?
A. That's incorrect. I'm not sure I understood your question there but --
Q. Well, doctor, you're certain that the SBU report has zero validity?
A. Correct.
Q. You have an unequivocal fracture here that you called it something else 12 years ago. So I am wondering

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where you're admitting --

A. I called it a fracture 12 years ago. It's still a fracture now.

Q. All right. Doctor, in 2016 you wrote an editorial for Pediatric Radiology entitled "Child Abuse We Have Problems"?

A. Correct.

MR. MORAN: I would move to admit that as Defendant's Exhibit and I've lost track now.

THE COURT: Twenty-four. Twenty-three was not --

MR. MORAN: Twenty-four was not accepted. And Mr. Hebel, you have a copy of that? Here's another one. I move to admit Dr. Strouse's editorial "Child Abuse We Have Problems" as Defendant's Exhibit 24.

THE COURT: Any objection?

MR. HEBEL: No objection.

THE COURT: Twenty-four will be received.

(At about 11:57 a.m. Whereupon Defendant's Exhibit 24 admitted into evidence.)

BY MR. MORAN:

Q. Doctor, that editorial begins with the opening sentence, child abuse exists, and if you like a copy to follow along would that be --

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A. That would be helpful.
Q. At the end of second paragraph still on that first page you write, there is no justification for denying the very existence of child abuse, and you use the phrase child abuse denialists repeatedly throughout your article, correct?
A. I do use that term.
Q. And when you talk about denialists in this article you seem to be referring in large part to physicians who question Shaken Baby Syndrome Abuse of Head Trauma diagnoses like Dr. Barnes; isn't that fair?
A. I'm more referring to physicians who are inappropriate and irresponsible in their portrayal of the science both in the literature and within the courtroom.
Q. Well, Doctor, in looking at the references you cite multiple articles by Dr. Barnes, references 27, 29 cowritten, 30, 31, and if you go back to the text where these citations are none of them seem to be favorable; is that fair? There's more, 45 -- You're not a fan of Dr. Barnes?
A. No.
Q. In fact, you think people who question Shaken Baby Syndrome Abusive Head Trauma are frauds and charlatans, don't you?
A. They're denialists.

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Q. They're denialists, fine.
A. And I wouldn't necessarily say everyone.
Q. Could you cite me an example where Dr. Barnes denied the very existence of child abuse as you put it in your article?
A. I did not specifically say that Dr. Barnes denies the very existence of child abuse. I have -- you know, his articles have examples of cases of child abuse that he clearly labels as not child abuse, and his obfuscation within the articles and within reports is very troubling.
Q. Questioning whether child abuse occurred in a particular case is not denying the very existence of child abuse is it, Dr. Strouse?
A. Not necessarily, no.
Q. The very existence of child abuse is not the debate that is going on now about Shaken Baby Syndrome Abuse Head Trauma, is it?
A. It actually is because it seems like there are those who no matter what the case is it can't be child abuse. And they make reference to the fact that child abuse occurs but yet in a case that you give them they will probably deny being child abuse.
Q. I see. So when the issue is framed is whether you can reliably diagnose child abuse from certain findings,

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you don't see that as the issue that's actually being raised, you see it as some -- you see it as people trying to deny the very existence of child abuse?

A. They're both issues.

Q. I see. But you prefer to characterize the debate as being about whether child abuse exist at all because that makes your opponent look ridiculous, doesn't it?

A. Doesn't make them like ridiculous.

Q. It's ridiculous to deny the existence of child abuse, isn't it?

A. I don't know if I'd use the term ridiculous. I think it's very wrong and it's very deceptive and it's irresponsible.

Q. So let's go back to Dr. Barnes who I think it's fair from your article to say is an example of somebody you call a child abuse denialists?

A. Yes.

Q. You know in fact that he cofounded and directed Interdisciplinary Child Abuse Team at Stanford, don't you?

A. I don't know for sure. It's on his CV, but I don't know it for sure.

Q. Do you know whether he regularly diagnosis child abuse as part of his responsibility at Lucille Packard Children's Hospital?

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A. I don't know what he does there to be honest with you because it's nonsensical.

Q. I see. On page 588 of your article at the second page you complain in the second paragraph, the second full paragraph -- the second paragraph, excuse me. That participation by the denialists in the legal adjudication of child abuse is a growing threat to the healthcare of children and the well-being of children and families?

A. Un-huh.

Q. So it's important to you to not concede that these denialists might be right about something; isn't that right? Isn't that fair? Because if you concede that they might be right then in your view you would be endangering children?

A. I mean, that's a very broad question you asked. I mean, in medicine we're opened to new ideas, we're opened to different hypotheses. We consider them, you know, for what they're worth, you know, but I don't know if I answered your question.

Q. Well, if you admit uncertainty and you admit that they might be right even a little, aren't you concerned that children are going to be harmed?

A. I am concerned about the misinformation. I mean, if you call something rickets and it's clearly not

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rickets, you know, that's not what suppose to happen. That's not responsible behavior by a physician by a medical expert.

Q. Did you see in his report that Dr. Barnes diagnosed rickets?

A. I've seen it in several of his reports.

Q. But he didn't diagnose rickets in this case, did he?

A. I'd have to read his report word for word to see exactly what words he used.

Q. He listed rickets as a possibility in a lengthy differential diagnosis?

A. Yeah, that's his usual stake is to list about 15 things most of which can be, you know, excluded very easily.

Q. That's what a differential diagnosis is; isn't it?

A. No. You take into account the findings and those that make sense and you come up with a differential diagnosis that's helpful to the clinical physicians or in a case like this to Dr. Jensen. You don't list 15 or 20 things just to obfuscate and confuse people.

Q. But you don't list a differential and diagnosis at all. It's an unequivocal acromial fracture?

THE COURT: It's been asked and answered.

THE WITNESS: This isn't an acromion --

THE COURT: Doctor, Doctor, I ruled. It's

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been asked and answered.

MR. MORAN: All right. I'll move on.

BY MR. MORAN:

Q. And on that same second paragraph you write about two sentences later, institutions at Harvard denialists whether they be private practices or esteemed academic institutions should carefully consider their employment. So you think that institutions that hire people such as Dr. Barnes should consider terminating him?

A. Dr. Barnes behavior is irresponsible and I do not understand why he's still an employee of Stanford University.

Q. All right. On the right column of that page 588 in the first full paragraph about two thirds of the way down, maybe 60 percent of the way down you write, the legal system is extremely poor at triaging literature and the growing cash of denialists lecture is becoming increasingly difficult to counter, disappointingly tis even extends to the Supreme Court of the United States?

A. Un-huh.

Q. Now there you have a citation to Justice Ginsburg's Dissent for three justices in Cavazos versus Smith in 2011; is that right?

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A. I do.
Q. And Smith was a shaken baby case, wasn't it?
A. I believe so.
Q. And in addition to the three justices there who expressed doubts about the reliability of shaken baby diagnoses, were you aware that the majority acknowledged that and quote, "doubts about whether Smith is in fact guilty are understandable"?

MR. HEBEL: Objection. This is irrelevant. We're talking about a legal case in the Supreme Court of the United States that this witness does not have expertise on. He was giving a single example in this article and the discussion of what happened in the case is irrelevant to this one.

MR. MORAN: Your Honor, he cited the case and I am simply asking if he's aware of what the majority said. He cited the Dissent. I'm asking if he's aware of what the majority said.

THE COURT: I'll allow just a little bit further on this, Mr. Moran.

MR. MORAN: This is my only question --

THE COURT: It's really for this witness's state-of-mind as to whether or not this witness --

THE WITNESS: I cited the Supreme --

MR. HEBEL: The Judge is talking.

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THE WITNESS: I'm sorry.

THE COURT: Go ahead.

BY MR. MORAN:

Q. Were you aware of the majority also expressed concern about whether --

A. I'm not aware of the particulars of the case. I gave those citations as examples of the Supreme Court citing articles that have been discredited in the literature. I think namely the Donahue evidence baby -- shaken baby article which has been thoroughly discredited in the literature which they used in that case. It was the purpose of making that citation.

Q. I see. All right. Now, and you talk about not just Radiology in this editorial, you're talking about what you consider to be bad science, bad medical science throughout the medical science; is that fair?

A. Yes. It's more than Radiology.

Q. You're actually not just talking about other radiologist?

A. Correct.

Q. So, based on that statement and that editorial would you agree or disagree they there is a prominent controversy within the medical community regarding the reliability of SBS AHT diagnoses?

A. Within the greater medical community I don't think

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there's much of a controversy. Within the small group of people who discount the diagnosis of Shaken Baby Syndrome and Abusive Head Trauma, yeah, there is disagreement there.

Q. So if a court wrote that that's another example of the court getting it wrong about the state of the controversy in a medical community?

A. I believe so, yes.

Q. Doctor, I'm going to turn to another editorial you wrote in Pediatric Radiology in 2012. This one coauthored with Slovis, Coley and Rigsby.

A. Correct.

Q. Am I pronouncing those names correctly?

A. Correct.

MR. MORAN: And am going move to admit this as Exhibit 24 -- 25. I previously provided a copy of this to Mr. Hebel. I'm moving to admit this -- it's an editorial entitled The creation of non-disease: an assault on the diagnosis of child abuse.

THE COURT: Any objection?

MR. MILLER: No objection.

THE COURT: Twenty-five will be received.

(At about 12:09 p.m. Whereupon Defendant's Exhibit 25 is admitted into evidence.)

MR. MORAN: I'm going to give Dr. Strouse a

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copy so he can follow along. May I have a moment, your Honor?

THE COURT: Sure.

BY MR. MORAN:

Q. On page 903 of that article you and your coauthors wrote -- right column. A small group of individuals, has during depositions and courtroom testimony perverted cases by using incomplete statements of the facts and unproven hypotheses to obscure the straightforward historical and physical findings utilized to make the diagnosis of child abuse; you acknowledge writing that or cowriting that?

A. Yes.

Q. And in that you speak of unproved hypothesis. SBS, Shaken Baby Syndrome is a hypothesis, isn't it?

A. I think it's very well-accepted within the medical community that Shaken Baby Syndrome occurs. So, yeah, you could call it a hypothesis. It's also something that's well-known to occur.

Q. Let me make this statement and let me know is this a hypothesis, that if an infant comes in with retinal hemorrhages, subdural hematoma and cerebral edema or encephalopathy, then that baby has very likely been abusively shaken; is that a hypothesis?

A. No. That's actually a very hard statement to say very

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likely and basically those are red flags. The child needs a comprehensive evaluation to, you know -- with further testing with further lab work with expert, you know, physicians from different disciplines. So it's very concerning.

Q. Would you agree that Dr. Norman Guthkelch is one of the founding fathers of Shaken Baby Syndrome hypotheses?

A. He wrote some papers decades ago that were some of the initial papers on subdural hematoma and abusive head trauma, that's correct.

Q. You're referring to infantile subdural hematoma and its relationship to whiplash injuries which appeared in the British Medical Journal in 1971?

A. I think he wrote another one earlier than that one too.

Q. Were you aware that in 2012 Dr. Guthkelch wrote an article entitled problems of infant retino-dural hemorrhage with minimal external injury. Have you seen that article?

A. Yes.

Q. And in that article he wrote on pages 203 and 204, while society is rightly shocked by any assault on it's weakest members and demands retribution there seemed to have been instances in which both medical

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science and the law have gone to far in hypothesizing and criminalizing alleged acts of violence in which the only evidence has been the presence of the classic triad or even just one or two of it's elements. Often there seemed to have be inadequate inquiry of the possibility that the picture resulted from natural causes. Do you agree with that?

A. No. I think when there are these cases that as physicians they're handled very carefully. The diagnosis isn't made just based on the three findings, it's based on a comprehensive evaluation of the child which includes history, physical exam, laboratory, other imaging studies, social evaluation, et cetera.

Q. Now on page 207 of that article Dr. Guthkelch writes SBS and AHT are hypotheses that have been advanced to explain findings that are not yet fully understood. There is nothing wrong in advancing such hypotheses. This is how medicine and science progress. It is wrong however to fail to advise parents and courts when these are simply hypotheses, not proven medical or scientific facts or to attack those who point out problems with these hypotheses or who advance alternatives. Do you think Dr. Guthkelch is wrong about that, that his theory is passed from a hypothesis to a proven fact?

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MR. HEBEL: Objection. It's not Guthkelch's theory. It would be Caffey's theory and that is a mischaracterization of saying that represented one person's theory.

MR. MORAN: I'm happy to rephrase it.

THE COURT: Go ahead, please.

BY MR. MORAN:

Q. Is Dr. Guthkelch wrong to say that hypothesis that he was one of the leading people to help shape is still not proven?

A. I think there is plenty of evidence in the literature that Shaken Baby Syndrome exist and that abusive head trauma exist so --

Q. Back to the cowritten editorial. The 2012 editorial. You wrote that the small group of individuals has during depositions and courtroom testimony perverted cases and I already read that quote, and there is a citation footnote nine and ten there. And footnote nine is to the case of state of Arizona versus Samantha Mcclay Couffer and Jonathan L -- Excuse me. Joshua L. Couffer. That's a husband and wife who were tried and acquitted of child abuse based on a shaken baby theory in Tucson, Arizona in 2012; is that correct?

A. I don't know the particulars of that case. Dr. Slovis

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was the main author but was involved in that case and put the reference in --

Q. I see.

A. -- and much more familiar with it than I am.

Q. You don't have any special knowledge that the Couffers were really guilty and got away with it?

A. I don't have specific knowledge of that case. I believe Dr. Slovis was involved and Dr. Barnes was involved.

Q. Okay. But you acknowledge that scores -- maybe hundreds of people may have been acquitted in recent years when defense experts have come in and testified that -- about problems with the Shaken Baby Syndrome?

MR. HEBEL: Objection. I think this is probably beyond the witness's knowledge.

MR. MORAN: I am just asking if he is aware of that fact.

THE COURT: I'll take the answer.

THE WITNESS: I'm aware of cases, quite frankly, that have had erroneous verdicts and actually the last one I testified in in this building was that way.

BY MR. MORAN:

Q. You're talking about the case of Mr. Houtz, right?

A. Yes.

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Q. And you testified in that case and Mr. Houtz was acquitted?
A. Right.
Q. And that was an erroneous verdict in your view?
A. Correct.
Q. Now later on in that same article you and your coauthors write, and this is now at the top of page 905, the last page. It is time for the academic institutions of those who are creating and propagating half truths and myths, the scientific and professional societies of those who are child advocates and the legal community involved with protecting children and preventing further abuse to collectively do something. You can say what you and your coauthors meant by that. What was the do something that you want these institutions to do?
A. You know, I don't have a good answer for that because it's a very perplexing problem what to do. Clearly, we need to do more research. Clearly, we need to collaborate with each other in different disciplines, and that's just not within medicine but also within law and medicine and the other services that support children. We need to teach. We need to educate. We need to research. We need to do our jobs well.
Q. But you would also like to see these institutions rid

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themselves of these people, wouldn't you?

THE COURT: Who are these people?

BY MR. MORAN:

Q. The denialists that you're referring to?

A. I think if their behavior is irresponsible and inappropriate, yes, they should.

Q. Now, let's return to the SBU report. In your report that you wrote for Mr. Hebel paragraph four on page three you write -- you criticize the SBU report -- this is paragraph four on page three. Excuse me. Page two of your report. You criticize the SBU report for quote, "creating a straw man of the triad of subdural hematoma, hypoxic-ischemic encephalopathy and retinal hemorrhage. You did the same thing in your direct testimony, you criticized the SBU for creating a straw man. You go on to explain that these findings are quote, "highly suggestive" but the diagnosis of SBHT, and I'm quoting now, "always rely on a thorough, multidisciplinary medical evaluation supplemented by medical" -- "supplemented by imaging studies laboratory studies and social evaluation". That's the position you took on direct exam as well. The always is an exaggeration, isn't it, Doctor? Sometimes the triad is diagnosed just -- Excuse me. SBS is diagnosed just from the triad?

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A. I don't think that's true. I think in every case that the other findings need to be evaluated and assessed.
Q. University of Michigan treated Nikita Lemons until she died; isn't that right?
A. I believe so.
Q. University of Michigan -- no one at the University of Michigan diagnosed Shaken Baby Syndrome; isn't that right?
A. I don't think that's true.
Q. The diagnosis was made by Dr. Cassin the pathologist, Washtenaw County Medical Examiner; isn't that right?
A. He did make the diagnosis. I would have to go back through the medical records and see what their suspicions were in the emergency room. It would be valuable to talk to Dr. Pomeranz who I think was the emergency physician involved in the case.
Q. If Dr. Cassin came into this trial hypothetically and testified that he made the diagnosis because he saw these three symptoms and didn't mention a thorough multidisciplinary evaluation, that would be a contradiction to your claim that it's always diagnosed after a thorough multidisciplinary evaluation, wouldn't it?
A. Obviously, with a deceased child you're limited as to what you could do. I mean, he did do the skeletal

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survey, which I give him credit for because back in those days he didn't get them on every single case because I'm not sure what he got in here as opposed to other cases. And the child was evaluated by pediatric ER docs, pediatric surgeons, pediatric neurosurgeons while in the hospital. I do recall from the medical notes that there is a note that they were gonna get an ophthalmological examination and skeletal survey the morning of October 11th but the child passed away before those were done. So that tells me that they were considering the diagnosis before the child died.

Q. Did you see the note in the autopsy report that the ophthalmological examination did not show retinal hemorrhages?

MR. HEBEL: Objection.

MR. MORAN: I'm asking what it showed.

THE COURT: Hold on. Hold on. There's an objection.

MR. HEBEL: That's a mischaracterization of what the note says in the autopsy -- or, excuse me, the medical examiner investigator's report.

THE COURT: I don't recall that, Mr. Moran.

MR. MORAN: I'll be happy to read it.

BY MR. MORAN:

Q. Page two of the -- I'll read it. This is the medical

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examiner's investigator's report. This is page two of what's previously been admitted as exhibit, Defense Exhibit 12. "No retinal hemorrhages were identified on ophthalmological examine by the admitting physician". That's the exact quote. Were you aware of that note in the autopsy report?

A. That physician is not an ophthalmologist. There is a reason why ophthalmologist do these exams in suspected child abuse because they're experts and they have the equipment to see the retina better, so I don't think that has any --

Q. But my question was were you aware of that note --

A. Yeah.

Q. -- in the autopsy report?

A. I saw it, yes.

Q. Doctor, have you heard of a David Chadwick, Robert Reese and Carol Jenny?

A. Yes.

Q. These are three of the most prominent proponents of the SBS hypothesis theory; isn't that right?

A. They're child abuse pediatricians. I don't know as I call them proponents of SBS. I mean, they're child abuse pediatricians. I am more familiar with Dr. Reese and Dr. Jenny than I am with Dr. Chadwick.

Q. Were you aware that in 1998 they and 68 others wrote

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and signed a letter to Pediatrics that appeared in February 1998?

A. That was in the packet of documents that Mr. Hebel gave me that were from you I guess.

MR. MORAN: I would move to admit this letter which is called Shaken Baby Syndrome of Forensic Pediatrics Response as Defendant's Exhibit 26. Mr. Hebel's previously -- I am moving to admit the letter.

MR. HEBEL: The People don't object.

THE COURT: Mr. Moran, we are going to take ten minutes. I want to give my court reporter a break. Okay. Ten minutes.

(At about 12:24 p.m. off the record.)

(At about 12:39 back on record.)

THE CLERK: Back on the record in People versus Milton Lemons. Appearances, please.

MR. HEBEL: Good afternoon, Daniel Hebel on behalf of the People.

MS. MORAN: David Moran, Michigan Innocence Clinic on behalf of Ms. Lemons along with Rebecca Hahn and Ron Syed and student Attorney Feruse.

THE COURT: All right. Mr. Moran, whenever you're ready.

Mr. MORAN: Thank you. Before the break I

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handed you or referred at least to a letter that appeared in Pediatrics in 1998 and I believe we got that one admitted.

THE COURT: Yes, 26 is admitted.

MR. MORAN: We did. Twenty-six is admitted.

(At about 12:39 p.m. Whereupon Defendant's Exhibit 26 admitted into evidence.)

BY MR. MORAN:

Q. And in the third paragraph of that, Dr. Strouse, the 71 or 72 signatories wrote, the Shaken Baby Syndrome with or without evidence of impact is now a well-charactered clinical and pathological entity with diagnostic features in severe case virtually unique to this type of injury. Swelling of the brain, cerebral edema, secondary to severe brain injury, and bleeding within the head, subdural hemorrhage, and bleeding in the interior lining of the eyes, retinal hemorrhages.

Doctor, that's a statement signed by the leading Shaken Baby Syndrome proponents in 1998 saying that the triad is essentially diagnostic of child abuse, isn't it.

A. It's signed by a bunch of child abuse pediatricians. There's at least one pediatric radiologist on there. I don't know all of the names.

Q. But that's a fair reading of that statement that it's

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verbally unique to child abuse? It's reliance on the triad; isn't it?

A. It's -- I think it's a good statement. I mean, in severe cases it is very suggestive of abusive head trama and it is virtually unique. It doesn't obviate that you need to do a good workup and a evaluation.

Q. But at least in those days attacking the triad wasn't a straw man argument for people who were skeptical, was it?

A. Attacking the straw man --

Q. You called it -- you called the SBS's report making a straw man argument by attacking the triad, but if the proponents of the Shaken Baby Syndrome hypothesis are claiming that the triad is virtually unique for child abuse then attacking the reliability of those three symptoms is proof of child abuse is not a straw man argument, is it?

A. I'm not sure that I understand your question.

Q. All right. Well, that's fine. I'll go on then. Back to your report. I already mentioned that you concluded that the SBU report has zero validity within the mainstream medical community. Do you know how many professors of medicine participated or reviewed the SBS report before it was published?

A. I know there is a number of names listed on the report

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in different capacities. I don't know if they're all professors or what their positions are, what they're roles were in preparing or reviewing the report.

MR. MORAN: Your Honor, this has previously been admitted as Defendant's Exhibit 4. I'm starting with page 37. May I approach the witness?

THE COURT: Sure. Page 37 of?

MR. MORAN: Yes. Page 37 of the SBU report Chapter 7.

BY MR. MORAN:

Q. So, just in the project group can you read aloud those who are professors of medicine, or some form of medicine. And you don't have to read the names but just say what sort of expertise or what sort of field they were in.

A. Professor of Pediatrics, Professor of Forensic Medicine, Senior Consultant of Pediatrics in Neonatology, Senior Professor of Medical Ethics, Senior Consultant of Neuroradiology, Professor of Health Technology Assessment, Professor of Medical Technology.

Q. And then the next page there's a list of scientific reviewers that says that the SBU engages external reviewers in its reports and there's a list of them there. Can you mention any of them who were

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professors in medical fields? Just the fields. You don't have to read the names.

A. Consultant in neurosurgery, professor of public law, I guess it's not medicine, professor of medical ethics.

Q. Professor of clinical medicine.

A. Clinical medicine.

Q. Professor of forensic medicine.

A. Senior consultant in forensic pathology and clinical forensic medicine, consultant in forensic medicine. And as I pointed out before, there's no pediatric radiologist, there's no pediatric neuroradiologist, there's no child abuse pediatrician, there's no pediatric neurosurgeon.

Q. That wasn't what I asked you. I just asked you to go with me --

A. Right. But they're conspicuously absent from -- and contrary to the organization's own handbook and how they do these reviews.

Q. And can we continue on page 39?

A. Yes.

Q. The Scientific Advisory Committee. There's two Scientific Advisory Committees, one called Broga and one called IRA?

A. Um-hum.

Q. Any medical professionals -- medical professors in

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that one?
A. Professor of care Science, I guess that's medical.
Q. Psychiatry that's a medicine, isn't it?
A. Yes. Rehabilitation medicine, dental care.
Q. And then under Scientific Advisory IRA --
MS. BROWN: Objection, your Honor. I believe that this article has already been admitted into evidence. It speaks for itself.
BY MR. MORAN:
Q. Well, let me cut to the chase then, Dr. Strouse. By my count, and you can correct me if I'm wrong, at least a dozen professors of various medical science including Radiology, Forensic Pathology, Pediatrics all participated either in the production or review of this report; is that fair, before it was published?
A. Again, I don't know exactly what everyone of these people did. So their names are here.
Q. Well, according to the report they either wrote the report or they reviewed it for publication?
A. If that's what it says, yes.
Q. You don't have any information that these people secretly didn't read the report and just signed their names to it?
A. Correct. But I don't know -- like the board of directors I don't know what they could have done with

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it necessarily.
Q. Assuming they did, assuming they did review the report before they signed their names to it, would you -- would it follow from your report to Mr. Hebel that all of these professors of various forms of medicine must be outside of the mainstream medical community.
A. No.
Q. Your report says in the mainstream medical community the SBU report had zero validity?
A. Correct.
Q. So, all of the people who reviewed the report who are in the medical community must be outside the mainstream medical community?
A. No. I think the report is poorly done and I outlined the reasons for that before and I think, quite frankly, a lot of these people are probably ill informed about child abuse and its -- if you're gonna do a review on child abuse and shaken baby and abusive head trama it seems like you would want experts from those fields to participate on your committees and they're conspicuously absent.
Q. But the people who signed the report they're just wrong?
A. I think they were careless.
Q. I see. Doctor, you complain in your report about the

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SBU's quote, "incredibly strict criteria and you've echoed that complaint in your direct examination; is that fair?

A. Correct.

Q. The main incredibly strict criteria that the SBU applied was again studies that engage in circularity; would you agree with that that they excluded most of the studies because the of circularity problems?

A. They excluded studies that weren't confessions or witness trauma. They excluded studies where they're diagnoses of findings outside of the brain such as fractures. They excluded studies less than ten patients. They excluded studies that they defined as circular.

Q. They excluded hundreds or I think maybe thousands of studies that they found were circular; isn't that right?

A. I know they excluded thousands of studies, yes, that's correct, and I'm not sure if they're all because they defined those as circular or as low evidence or for those other reasons.

Q. Circularity is a real problem for the Shaken Baby Syndrome hypothesis, the study that support it; isn't that fair?

A. It makes it challenging I think to do research in the

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area because, obviously, you know, in most cases there aren't confessions, there aren't witnessed events, so it's difficult, but the way you get around that is you have multiple disciplinary teams. You look at different features of it, you do comprehensive evaluations. And I think a lot of the papers that they reject as circular aren't, quite frankly, not circular at all. There's manifestations of careful evaluations and all their disciplinary needs.

Q. But you agree that it is circular when you design a study in which you assign some of the patients to be abused based on whether they have a subdural hematoma or a retinal hemorrhage and then you find from the fact that most or all the folks in the abused group have a subdural hematoma or retinal hemorrhage is proof of the hypothesis, that's circular reasoning; isn't it?

A. I'm aware of very few papers that do what you're describing.

Q. But that's an example of what you are talking about where there is incredibly strict criteria. They have a very strong anti-circularity device?

A. No. It was broader than that. I mean, the main thing is they restricted their analysis to papers that were only of confessions and of witness cases.

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MR. MORAN: I have no further questions at this time, your Honor.

THE COURT: Mr. Hebel?

REDIRECT EXAMINATION

BY MR. HEBEL:

Q. Would it be fair to say that in your original unmodified diagnosis you made a mistake, you called the acromion something else?

A. Yes.

Q. Have you made mistakes before in medicine?

A. I have made mistakes like that where I've substituted a wrong word like I called a humerus a femur or a right or left, and, obviously, you'd like not to ever make those mistakes but they happen once in awhile.

Q. Have you ever known a doctor that doesn't make any mistakes?

A. No.

Q. Now, how do you catch mistakes? When there's a mistake made how do you catch the mistake?

THE COURT: Why don't we narrow it down to this case, Mr. Hebel.

MR. HEBEL: Okay.

BY MR. HEBEL:

Q. You described that you caught this mistake on cross-examination. You believe it would have been

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while you were reviewing to prepare your findings for the committee meeting; is that correct?

A. That's what it appears from the way I documented.

Q. So, you can eliminate mistakes by thorough research, would that be a correct statement?

A. No. A statement like that -- or a mistake like that I am not -- the research is not gonna to fix. I think it's a matter of catching it when you're done. I mean, usually on these reports, and increasingly so I'm very careful to read them over, to print them before I sign them and probably -- and now that I am finding myself in court more I am even more careful than I was 12 years ago. You know, I'll dictate the report, I'll print it, I'll read it, I'll come back to it half an hour, hour later trying to find those things. You know, and unfortunately, some of them are me misspeaking and some of them -- more often it's a question of the voice dictation then getting something wrong and not catching it on first read.

Q. So, by thoroughly reviewing the issue you can avoid those type of mistakes; is that correct?

A. Hopefully, but I mean some of them still show up in the reports as careful as you think you're being.

Q. Understandable. But I'm gonna direct you to this case and specifically your findings of the unequivocal

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acromial fracture as you described it. Have you -- obviously, you made the diagnosis back then, have you reviewed them again?

A. Yes. I mean, I looked at the images again. I looked at my report.

Q. And you are -- you have said many times to defense counsel and also to myself that you are certain that this is a fracture?

A. Yes.

Q. Now, does having made a mistake once in your wording discredit all of your radiological findings in this case forever in your opinion?

A. No.

Q. Also we had the discussion on direct and then on cross, defense counsel went further into the question of mimics versus fractures, and you've seen mimics in the Radiology in other cases, correct?

A. I have seen mimics. I've also, quite frankly, read the papers and the books and --

Q. In your reading of those papers and those books do they support or oppose the findings that you've made in this case?

A. They show the variants of ossification can occur and that this is different in appearance from a variant, and in my experience it's different in appearance from

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a variant. If some of -- if something similar was in a different bone I would say the same thing it's a fracture, it's not a variant.

Q. Now, defense counsel asked you extensively about quote unquote, "reluctance to concede that the denialists are right. Has the science changed to the point where the denialists are right?

A. No. There's no new science. The science hasn't changed and as a matter of fact, in response to the denialists we're seeing more literature just proving what we already know. This is particularly true with some papers on rickets recently.

Q. Defense counsel characterized Shaken Baby Syndrome and Abusive Head Trauma as a hypothesis with the connotations that anything can be a hypothesis, but in your view is abusive head trauma used in the medical industry as a nebulous concept or as a concrete diagnosis?

A. It's a concrete diagnosis, but it's also an inclusive term meaning abusive head trauma can occur from different mechanisms and one being shaken, one being impact, shaken with impact, being hit with something, et cetera.

Q. But this isn't just somebody's idea that they put out there. There's actually proof of Shaken Baby Syndrome

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in the literature and the findings; is that correct?
A. Yes. I mean, there's plenty in the literature supporting the diagnoses and the existence of that.
Q. I want to turn to something that was emphasized on cross-examination. The consent of a multidisciplinary approach and how you said that it's not, you know, just one finding of three things but there should be more that is available to a decisionmaker from multiple disciplines; is that correct?
A. Correct.
Q. Now, in this case, correct me if I'm wrong, was there an examination by a forensic pathologist?
A. Yes, there was.
Q. And was there imaging done?
A. Yes, there was.
Q. And was there a history of the child's medical history made available?
A. Yes. Medical history was obtained.
Q. And the examination of the treating doctors and the hospitals was available, correct?
A. Correct.
Q. Ultimately, there was even the conclusions and findings of the medical examiner investigator that was available, correct?
A. Correct.

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Q. Based on that and when compared with your article would you consider this to have been diagnosis by a multidisciplinary team?

A. Yes, I would.

Q. And ultimately it was the pathologist with the Washtenaw County Medical Examiner's Office that made that final determination, but he had all this reference material to work with; is that correct?

A. To my knowledge, yes.

MR. HEBEL: No further questions.

THE COURT: Go ahead, Mr. Moran.

RECROSS EXAMINATION

BY MORAN:

Q. Do you see any evidence that this alleged multidisciplinary team got together in 2005 and made this diagnosis?

A. I mean, the child died I think before we had our next meeting of -- I mean, it's a multidisciplinary team, but you don't necessarily get together in a room and discuss the thing, but clearly you have Radiology, you have ER docs, you have Neurosurgery, you have Pediatric Surgery, you have Forensic Pathologist. So, yes, there was a multidisciplinary thing and it's documented in the medical literature.

Q. But if the forensic pathologist says he made the

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diagnosis on his own based on the triad then he's lying or mistaken?

A. No.

Q. Okay.

A. He had the rest of the information available to him.

Q. He just didn't mention that he met with this multidisciplinary team and they chewed it over and decided that it was Shaken Baby Syndrome?

A. That sounds like a question for Dr. Cassin, not for me.

Q. But you don't see any evidence in the records that there were meetings of a larger team --

A. It's, quite frankly, not how we usually do it at U of M, but it's a multidisciplinary team in the sense that people of different disciplines are involved in taking care of and evaluating the child and when necessary there's meetings and consultations, but we don't necessarily convene a team in a room to talk about each and every case.

Q. Sounds like there was a meeting of the team in this case and to discuss the error that was made about --

A. It wasn't to discuss the error but it was to discuss the whole case as well as the other cases for that month.

Q. There was a meeting of a team apparently in this case

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that resulted in the error being correct?

MR. HEBEL: Objection. That's not the testimony of the witness.

MR. MORAN: I'm asking if there was a meeting of the team.

THE COURT: You are talking about Dr. Cassin.

MR. MORAN: I'm asking if there was a meeting of the team on November 2nd that resulted --

THE COURT: I ask to clarify. But it seems to me, Dr. Strouse, you are referring to -- are you referring to the fact that there were multidisciplinary sources of information --

THE WITNESS: Correct.

THE COURT: -- that were made available, but in terms of whether or not all of the sources of this writers, compilers of this information met in a room to discuss Nikita Lemons' injury and circumstance and how she died, that you don't have any personal knowledge as to whether or not that actually took place?

THE WITNESS: At the time she was in the hospital as a patient, no it didn't happen. The November 2nd meeting is basically a review conference where we go over several cases from the proceeding

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month in all aspects of the case are discussed.

THE COURT: Okay. So you're saying that on November 2nd that that occurred?

THE WITNESS: Correct.

BY MR. MORAN:

Q. And there's no report from that meetings that we're aware of?

A. There's a list of cases that were discussed somewhere.

Q. But there is no report saying Nikita Lemons was child abused? There's no reports from that meeting indicating that there was some sort of multidisciplinary evaluation and a finding that Nikita Lemons died of child abuse?

A. There is no written transcription of that conference.

Q. Now there is currently a multi -- some sort of child abuse team at U of M, isn't there?

A. We have a child abuse review committee it's called, and basically we meet once a month, we have a conference and we review cases that have occurred within the prior month.

Q. You do actually get together in a room and talk it through and decide whether you think it was child abuse?

A. It's more to review the cases than it is to make any sort of decision and determination at that time. I

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mean, most of the time by the time we get to conference the cases have happened.

Q. Back to the acromion versus coracoid. You said that on redirect that you somehow documented that you made a mistake. I am wondering where that documentation is?

A. Well, there is an addendum there on the report.

Q. Was that addendum added by you?

A. Yes.

Q. And that was after the meeting of the child abuse team on November 2nd?

A. Right.

Q. And you said several times that you substituted a wrong word?

A. Un-huh.

Q. That really wasn't the error here, was it? You used the word coracoid multiple times, you compared the left coracoid; you didn't substitute a wrong word, did you?

A. I substituted three times. So, obviously, for whatever reason I was thinking coracoid when it was acromion. It's an error. It's still a fracture whether it's a fracture in the coracoid or in the acromion it's a fracture and it's high specificity for child abuse.

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Q. You confused two bones?

A. I used the wrong word, yes.

MR. MORAN: Thank you, Dr. Strouse.

THE COURT: All right. Thank you, doctor, you may be excused. Thank you, sir. 1:30 on the 25th.

(At about 1:03 p.m. proceedings concluded.)

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Detroit, Michigan

Tuesday, July 25, 2017

Approximately 10:00 a.m.

PROCEEDINGS

THE CLERK: This is Case Number 06-4818, People of the State of Michigan versus Milton Lemons.

This matter is here for an Evidentiary Hearing.

Appearances, please.

MR. HEBEL: Good morning, your Honor.

Dan Hebel on behalf of the People.

MR. MORAN: David Moran, Michigan Innocence Clinic on behalf of Ms. Lemons. I'm joined today by Rebecca Hahn and Byron Lichstein, who was admitted last week. He's a California attorney who will be participating tomorrow, but he is here today.

THE COURT: All right. That's fine.

We ready to proceed?

MR. HEBEL: Yes, your Honor.

MR. MORAN: Yes.

MR. HEBEL: Your Honor, at this point the People are going to call Doctor Dan Davis to testify by video conference.

THE COURT: All right.

DANIEL W. DAVIS,

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called as a witness by the People, having first been duly sworn by the Court Clerk, was examined and testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. HEBEL:

Q. Could you please give your name and spelling for the court reporter?

A. Daniel Wade Davis. Common spelling, D-A-V-I-S.

Q. Could you please tell us about your job?

A. Well, I'm currently a Deputy State Medical Examiner for Oregon. I'm specifically assigned as the County Medical Examiner for the County of Lane, L-A-N-E in central Oregon. That encompasses Eugene and other small cities, my actual profession is, but I'm a forensic pathologist.

Q. What type of education do you receive to become a forensic pathologist?

A. I graduated from medical school at the University of Minnesota in 1984. I performed a general pathology residency at the William Beaumont, B-E-A-U-M-O-N-T Army Regional Center in El Paso, Texas. I practiced pathology for three years in Germany at the Lamdstuhl School, L-A-M-D-S-T-U-H-L Army Regional Medical Center in the same name in Germany.

After that three year stint, I was released

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from the military. My obligation was over.

I performed in a subspeciality training year of Fellowship and forensic pathology back in my home town Minneapolis at the Hennepin, H-E-N-N-E-P-I-N County Medical Examiner's Office and have been a forensic pathologist for I guess 27 years now.

Q. And what prior clinical employment have you held in forensic pathology?

A. I was a regular staff forensic pathologist. They called them assistant medical examiners in Minneapolis for 15 years. I moved to Phoenix, and was Deputy Chief Medical Examiner for about a year and a half. Decided we didn't like Phoenix. Moved to Eugene about ten years ago, and I have been here the whole time.

Q. In a clinical capacity have you had any dealings with suspected cases of child abuse?

A. In a clinical capacity?

Q. Yes.

A. I never performed in an intern year, although I had three months of emergency room duty in El Paso at the William Beaumont Army Medical Center and have seen injured children occasionally as a forensic pathologist at the invitation of pediatricians, but that has been rarely.

Q. As a pathologist have you?

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A. I have been a forensic pathologist. I'm sorry.
Q. As a pathologist have you seen cases of child abuse and neglect?
A. As a pathologist?
Q. Yes.
A. Many.
Q. And in your capacity as a medical examiner, a forensic pathologist does this bring you into a decision-making capacity regarding the cause and manner of death in potential child abuse cases?
A. Every time.
Q. And do you know approximately how many times that has been?
A. Where I have been faced with the decision?
Q. Where as a forensic pathologist you had to review a child death case that may or may not have been abuse?
A. Probably about 200 times, probably more.
Q. Have you made any presentations on shaken baby syndrome or abusive head trauma?
A. Yes.
Q. And approximately how many times have you given presentations on that topic?
A. It's an estimate, maybe 30 times or more.

MR. HEBEL: Your Honor, at this point the People are going to move to admit Doctor Davis as an

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expert in forensic pathology.

MS. HAHN: Your Honor, may I voir dire the witness?

VOIR DIRE

BY MS. HAHN:

Q. Doctor, can you hear me okay?

A. I can.

Q. In what year did you become board certified as a forensic pathologist?

A. I believe it was 1995.

Q. And what areas do you have your board certification?

A. Forensic and anatomic pathology.

Q. And before you became certified in anatomic and forensic pathology, you took and failed the bored exam three times; is that correct?

A. For anatomic and clinical pathology, but the first time I passed on anatomic and forensic pathology.

Q. So it's fair to say that you failed the board exam three times in an attempt to become board certified in clinical pathology?

A. Clinical and anatomic pathology. There's a combination exam.

Q. So you are not board certified in clinical pathology?

A. That's correct.

Q. And that's because you took the board exam three times

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and did not pass?

THE COURT: I think it has been asked and answered. I heard it the first time.

BY MS. HAHN:

Q. And then, Doctor, you're familiar with the College of American Pathologists, the medical society?

A. Yes.

Q. And that's composed exclusively of pathologists by the American Board of Pathology. Are you familiar with that?

A. I am.

Q. You're not a member of that organization?

A. No.

Q. You're also not a member of the American Medical Association?

A. No.

Q. You're also not a member of any State of Oregon Medical Association?

A. That's correct.

Q. Or any local, medical association for forensic pathology?

A. No.

Q. You also indicate on page two of your Curriculum Vitae that you possess a special expertise in child abuse and computer graphics and animation.

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I would like to ask you about your special expertise in child abuse. You do not possess any certification from a national, state or local board in that area, do you?

A. There aren't any.

Q. So what agency has identified you as possessing a special expertise in child abuse?

MR. HEBEL: I'm going to object at this point. This is well beyond the expertise that the witness has been offered for. I mean he's offered as a forensic pathologist.

THE COURT: Ms. Hahn?

MS. HAHN: Your Honor, I believe the state's voir dire included the doctor's experience in opining cause of death and matter of death in child abuse cases.

THE COURT: All right. I will give you a little latitude.

MS. HAHN: Thank you.

BY MS. HAHN:

Q. Doctor, I'll repeat my question.

What agency has identified you as possessing a special expertise in child abuse?

A. Well, every organization I've worked for has recognized that I'm a child abuse person in those organizations

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and have done a disproportionate number of the child abuse cases that, you know, suspected cases that come to those offices.

So I guess that's special recognition but not official recognition like a piece of paper if that's what you mean.

Q. When you refer to every organization that you have worked for, can you identify those organizations?

A. Yes. Hennepin County, Minneapolis, the Maricopa County Medical Examiner's Office.

Q. I'm sorry. What was that last one?

A. Maricopa County.

THE COURT: That's Phoenix.

WITNESS DAVIS: And where I am currently. I'm the person that everybody talks to about child abuse.

BY MS. HAHN:

Q. And so when I asked you previously about the local medical organizations for forensic pathology, you indicated that there were no associations?

A. Correct.

Q. So when you now reference the Hennepin County and Maricopa and your current county identify you as a specialist but not formally, there seems to be a disconnect.

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A. Well, that's easy to explain because you know within pathology, which is a specialty area, there are multiple subspecialty areas like cardiac pathology, pediatric pathology, neuropathology, forensic pathology, but there is no such thing as a child abuse expert tab. There is no certification for that.

Pediatrics has a special subspecialty area now that deals with child abuse issues, but we don't have that in pathology.

Q. And you never received any formal recognition in the form of certification or even a certificate from the agencies identifying what you call a special expertise of that knowledge?

THE COURT: Is there such one?

To me your question assumes a fact not in evidence.

MR. HEBEL: It is my understanding that the witness testified that his employment has recognized his specialty being employed at different Medical Examiners' Offices and also maintains that there is no organization or association that is in the local area that is acknowledging. I think we're talking about apples and oranges here.

THE COURT: Ms. Hahn?

MS. HAHN: Your Honor, I'll let the record

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speak for itself.

THE COURT: All right.

Go ahead.

Next question.

MS. HAHN: No more questions, your Honor.

THE COURT: All right.

There was a motion.

Any objection?

MS. HAHN: Not based on the questions.

THE COURT: All right. Okay. I'll permit Doctor Davis to give his opinion as an expert in the field of forensic pathology.

Go ahead please.

MR. HEBEL: Thank you, your Honor.

BY MR. HEBEL:

Q. I'd just like to ask a couple of clarifying questions before we go on. First clarifying question is, is there a professional association of medical examiners in the local area?

A. No. There's a national organization. There's actually two.

Q. And what are those?

A. One is the National Association of Medical Examiners of which I am a member, and the other one is the American Academy of Forensic Scientists also of which I am a

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member.

Q. Then the second question is when you were talking about being recognized as an internal expert in child abuse, were you discussing the counties for which you were employed?

A. Yes.

Q. All right. Thank you very much.

I would like to go on to the case specific research that you have done.

Are you familiar with the child death case of Nakita Lemons?

A. I am.

Q. And what materials did you review in preparation for this case?

A. The 911 call transcript, the City of Wayne Fire Department Report, the Oakwood Annapolis Hospital medical records, the University of Michigan Children's Hospital medical records and radiology, that's X-rays and CT Scan, the Washtenaw County Medical Examiner investigation and autopsy reports, microscopic slides from that autopsy, the Wayne County Police Department Report, that includes a summary of the written interview of Milton Lemons, Sr., on 10-12-05, a written statement by Milton Lemons, Sr., on 10-12-05.

Court testimony of Lloyd Lemons, court

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testimony of Pamela Van Meeter, court testimony of Jerry Teamer or Timer, court testimony of Renee Sydem, court testimony of Bader Cassin, court testimony of John Williams and then scene photographs.

Q. Did you also review the defense' experts reports in this case?

A. I don't specifically remember if I did or not. I certainly didn't pay any attention to them.

MS. HAHN: Objection. Strike the answer. None responsive.

THE COURT: It's the questioner's prerogative.

Overruled. Go ahead please.

BY MR. HEBEL:

Q. Let's talk about the science behind shaken baby for a minute. In your position as a forensic pathologist, do you stay up to date with the science and literature regarding shaking baby syndrome and abusive head trauma?

A. Well, I can't say that I read every single article that has been published up to this date, but I am very familiar with the literature. Yes.

Q. And can you describe for us what happens when a baby is forcibly shaken?

A. Well, basically what happens is the brain rotates in

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the head, and it damages the substance of the brain itself, causing the baby to become immediately abnormal alarmingly so such that someone usually makes an effort to provide intervention one way or another.

Q. And have you created a demonstrative presentation of what happens when a baby is shaken?

A. Yes.

MR. HEBEL: Your Honor, at this point the People would offer into evidence People's Exhibit 16. People's Exhibit 16 is a slide show, almost a video that was prepared by this expert for the purpose of demonstrating what happens during a shaking scenario.

THE COURT: Ms. Hahn, have you seen it?

MR. HAHN: I have seen it. It has been tendered. I would just reserve the right to question the witness about it.

THE COURT: Oh, certainly.

It will be received.

MR. HEBEL: Thank you, your Honor.

BY MR. HEBEL:

Q. Doctor, if I could ask you to bring up on the screen your presentation regarding shaking. What happens when a baby is shaken, and for the record that would be People's Exhibit 16.

A. Okay. I got to figure out how to do this.

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Q. We see your computer screen right now.
A. I'm not sure what's going to happen.
Do you see the word blank?
Q. Yes.
A. Okay. I think this is the shaken baby syndrome on your screen.
Q. We still have a blank screen.
A. Does it say blank, or does it say the mechanism of injury in the shaking baby syndrome?
Q. It doesn't say anything. It's a black screen right now.
A. So you don't see anything right now?
Q. That's correct. We do see a mouse.
There we go. We just saw the picture of the baby.
A. I need to figure out how to get this to work on your screen.
MR. HEBEL: For a moment there we did see a picture of a baby.
WITNESS DAVIS: But you don't currently; right?
MR. HEBEL: Now we do.
WITNESS DAVIS: You do?
MR. HEBEL: That's correct.
WITNESS DAVIS: So to understand what happens

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in shaken baby syndrome, we have to learn something about baby head anatomy.

MR. HEBEL: We just lost the picture of the baby.

WITNESS DAVIS: Now you got it?

THE COURT: No.

WITNESS DAVIS: Let me see what I can do.

Now do you see something?

MR. HEBEL: We see the picture of the baby again.

WITNESS DAVIS: Do you see the baby moving?

MR. HEBEL: The screen just went blank completely.

Would it be doable to use the video version and pause it intermittently?

WITNESS DAVIS: You're not going to be able to do it at the appropriate times.

Let's see. I don't know how to do it. I don't know how to do it. Apparently your program won't allow it. Let's do this. Try share application. Let's see what that does.

How about now? Do you see the baby?

MR. HEBEL: The baby is moving.

WITNESS DAVIS: Oh, perfect Okay.

So to understand what happens with shaken

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baby syndrome, we have to create what is a baby's anatomy.

One is the fact that the baby has a skull and you see the skull, the word skull and all that?

BY MR. HEBEL:

Q. Yes.

A. Okay. So the skull on a baby is much thinner than an adult, but it protects the baby from the usual impacts they're going to sustain as part of the normal wear and tear on a baby growing up.

The brain looks like an adult's brain, even though they are a baby. But the difference is that the brain is like just-set jello in a baby. It's much, much softener than an adult's brain.

There's a space between the skull and the brain called the subdural space, which is a potential space, and for us that's like the space in a folded paper bag. It's there, but you're not using it.

There is a series of bridging veins that connect between the brain and a large vein at the top of the brain that I just call the central vein because it's got a big medical name.

And blood flow generally goes from the bridging veins to the central vein and is returned to the heart.

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You also have to understand something about the nervous system in a baby. The first line I'm going to describe is the sensory nervous system, where impulses travel up nerve fibers or axons, from this case the hand up to the brain to tell the baby's general contour, weight, shape, et cetera.

There is a roughly parallel system of axons that impulses travel on typically out to muscles that also perform action.

The system we're interested in though is the autonomic or some people call automatic nervous system that begins in the brain stem and sends signals to the lungs to breathe, keeps the baby awake, alert and has an effect on heart rate. Any interruption of this system the baby is going to become immediately unresponsive, stop breathing and will affect heart rate.

So when a baby is shaken, it's typically grasped around the chest or the chest and the arms and is shaking violently back and forth, and given that the brain is a semi-solid object surrounded by a fluid layer, which is super spinal is inside of a rigid object, which is the head, the skull, the brain actually rotates back and forth inside the head.

It's the bridging veins that rupture on both

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sides of the central vein, and then bleeding of the subdural space as a film of blood called the subdural hematoma.

Additionally most of these cases have bleeding that occurs in the back of the eye, the retina that involves multiple layers and is diffuse over most of the retina, retinal hemorrhage.

The real problem though is not the bleeding over the brain. What is happening to the brain itself, when the brain is rotating, there is tremendous distortion of the substance of the brain, causing strains and stresses on these delicate nerve fibers throughout the brain, and the brain stem that we were never evolved to be able to handle. We are pretty good a taking a head bump, but we were never designed to have our brain stirred.

As a result of that thousand or millions of these minute microscopic nerve fibers throughout the brain and especially the brain stem are injured, blocking the transmission of signals or the origin of signals over these axons in a process we call axon injury.

The effects are immediate, and they are dramatic. Your eyes roll back in your head.

Q. One moment, Doctor. We lost what you said last because

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of a microphone.

A. So did you see this rotation?

Q. Yes, we did.

A. Okay. Thousands or millions of axons throughout the brain and brain stem are injured in this process called axon injury. The results of that are immediate. They are traumatic, and typically the babies are stunned. Their eyes go back in their head. They may stiffen up, breathing will stop or become extremely irregular and shallow, and it will be an effect on heart rate.

Eventually if there is no more breathing, the heart will stop altogether as well.

We know this happens because babies that have a significant survival interval, many hours to days, has characteristic bulbs that form at the zones of injury on the nerve fibers, the axons, that we can identify under microscope using special stains, specifically beta amyloid precursor protein.

That's the end of that part.

Q. If you could stop sharing your screen so that you'll once again go full screen for us.

A. So do you see me yet?

Q. We see you in the corner. I believe that if you put a menu, if you stop sharing your screen with us.

A. Where does it stay stop sharing.

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Q. It should be one of the options in the menu.
A. I don't see that option.
Q. I think possibly the easiest way would be to hang up and immediately redial.
Would that be doable, Doctor?
A. I know this is painful. I'll just see if I can figure out how this -- it's up. Okay.
Q. Thank you very much, Doctor.
In your review of the evidentiary material in this case, do the injuries to the victim match the injury mechanism shown in the video?
A. Yes.
Q. So you mention rotational force and brain rotation during the video; is that correct?
A. Yes.
Q. And have you personally made any effort to answer the question of whether or not the brain rotates during shaking?
A. I have.
Q. And what did you do?
A. Well, it was the result of confluence of technologies available approximately three years ago that I made as biofidelic as I could a baby's head containing a brain, silicon brain surrounded by a slippery layer of fluid, which is water for the purposes of proving or

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disproving that a semi-solid object like a baby's brain will in fact rotate in a rigid object, which would be the skull.

MR. HEBEL: At this point the People are going to move to admit demonstrative Exhibit People's 17, which is studied by Doctor Davis in an attempt to determine whether or not the brain could potentially rotate instead a child's head.

MS. HAHN: No objection.

THE COURT: 17 will be received.

BY MR. HEBEL:

Q. And, Doctor, I'm going to ask if you could once again pull up your slides for Exhibit 17 for the study.

Go ahead.

A. So now you should see the wording, the shaken baby machine.

Q. We do.

A. So now do you see the silhouette of a baby's head?

Q. That's correct.

A. Okay. So in my effort to pursue whether or not something like a baby's brain does in fact rotate inside of the head, it appeared to me that it was important to have a model that is the shape and size of a baby's head for the experiment, an object in the center, which is the shape, size and general weight of

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a baby's brain surrounded by a slippery fluid layer in pink, which would be cerebral spinal fluid as we have around our brains.

A bridging vein system, a ponning (ph) system in the model to show the connection between bridging veins and the brain. Then rotate the head mechanically to approximately 120 degrees, which was mentioned in one article as to the maximum speed that can be obtained by shaking range of motion.

Then somehow record the whole thing to see what happens when the head is shaken.

Those are the design parameters. So towards that end I had a case a few years ago of baby that died of an abdominal catastrophe not associated with trauma and used the software that I used to examine the radiology on all my cases.

It's called OsiriX MD. It's FDA approved for medical use. That has significant capability for first of all looking at images in a 2-D access, the cross sectional access to begin with that all software can do that.

But in addition it's able to do 3-D reconstruction, several forms, one of which is volume rendering, which is in fact that particular baby. That is in fact this baby's skeleton and to show the

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fidelity of the software in achieving a 3-D model of the skeleton.

Just rotating the skeleton around allows us to view all aspects of the skeleton and do certain cropping maneuvers in order to appreciate that a baby's skull is in fact made up of several plates with spaces between the plates that eventually will fuse together over many years as we become older and more adult.

So this software also allows the technique of surface rendering, which then will generate files that represent CAD information, computer-aided design information, from which an actual model can be made.

So in this case I exported the surface CAD file of the baby's skin and then the surface CAD file of this baby's skeleton, specifically interested in the head itself, from which I was able to, I employed an animator to use that data to create a digital model of that baby's head, which then was made in two parts.

The lower part of the head is in fact the baby's head, the outside skin surface and the inside of the skull directly opposing the brain.

My model or animator repaired the skull base because we got plates that are separate in the real baby's head. So he simply pulled in those gaps so we have a solid interior, and then he made an interlocking

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rim on the edge of the bottom half of the baby's head, which then is going to join the top half.

We're going to see in a second.

He also performed some repair work on the baby, illuminated the two beams and sealed up holes to make the baby a solid object and more aesthetic.

The top half from the very same baby's model fit perfectly on the bottom half, and you can see that it's not a perfect shape because no baby's head has a perfectly, round shape.

But there is as the bottom half a plumbing system that makes up the central vein or superior sagittal sinus, several tubes that will ultimately be bridging veins.

They will be squared with silicon and then the side tubes for the bridging veins will be broken off so that silicon tendrils will hang out to be imbedded into the baby's brain.

And then although I tried to actually create the model on a low-end 3-D printer, I ended up doing it commercially, but the technique from the low-end printer is identical to the commercial method, and this one is called photo acrylic resin modeling, and I use that technique because it creates a clear model.

So this is from the Internet. I had no idea

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when the model was being made, but a laser beam shines through the fluid over a thin layer of photo acrylic resin that solidifies in a solid form, and it literally pulled out a solution.

So I had the commercial version done, which was a little more expensive but very professional. They made the top and bottom halfs, which you can see here fit together, and that is in fact the baby's head that we started with on a CT Scan.

At that autopsy I used alginate, which is a quick setting vegetable product that dentists used to model your teeth. And if you've ever been in a dentist chair, you know that they can do that. It firms up in a couple of minutes.

I immersed that baby's brain in alginate and made a mold of the brain and then reversed it in the plaster, which you see here, and then ultimately reversed that into silicon.

I had a silicon expert then create a silicon mold for that and then inject that with silicon, and then once that was returned to me, I'm showing here how delicate this is. It's very gooey. It's almost like a liquid. It's sticky so that was immersed in silicon beads the consistency of powdered sugar to cover the sticky surfaces.

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And now it's easier to handle because it's not sticky, but I think you can appreciate that it's very jiggly, very delicate, and it's semi solid basically. I don't know if that comes through on the transmission or not.

That was placed inside the two parts of the skull after I imbedded the so-called bridging veins into the substance of the silicon brain, sealed up the locking rim, and then through the bottom of the model injected fluid so the brain is separated from the inside of the brain case by water. There's a thin layer of water.

Unfortunately my silicon guy made light blue veins that I had hoped for dark blue. But anyway the light blue area is the superior sagittal sinus or central vein. Then the bridging veins in light blue are embedded in the brain model, the silicon brain model.

I needed a machine to shake the brain or the head and diagrammatically that would, you know, fire an axle to a motor, a mounting platform and then a separate platform or bracket for holding the camera to follow the model during the shaking motion.

I employed a local machinist at a machine shop to make a machine that would do that, and he made

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a really heavy duty machine with a big motor and lots of custom work in order to rotate the head model up to a 120 degrees and up to five cycles a second, which another article, which I can't put my hands on identified as probably the maximum rate of which someone could shake a baby.

So he's just tightening up the baby's head on to the mounting platform. You can see a light blue above where his hands are is a bracket that's going to hold my I phone that ultimately will try to -- there is some background audio that is completely unimportant. But the fact is that he's turning on the machine to rotate at so many cycles per second and increase that to the arc which it rotates.

So then the results are, well, this is the actual motion of it.

So the question is when we review the video, then does in fact a semi-solid object the size, shape and relative consistency of a baby's brain inside of a rigid object, the size, shape and rigidity of the baby's skull separated by a fluid layer actually rotate in that.

That's the question.

So the first experiment was 80 degrees of sweep at two cycles per second, and the playback speed

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is half normal so we can see it easily.

So even at this low speed with this short sweep, I think it's possible to appreciate that the silicon brain does indeed rotate inside the other object, the skull object.

So then it was just a matter of increasing the sweep this time 100 degrees at the same rate. There is greater movement with greater sweep.

And then 120 degrees of sweep at two cycles per second, again significant motion in the silicon brain inside the skull.

Then we increased the rate to three cycles per second through 80, 100, and 120 degrees, and I think it's possible to appreciate that with increase in cyclic rate and degree of sweep, the balance of the motion is greater and greater.

Then finally it was pretty obvious that this was getting to be kind of hard on the model. So I only went to 3.5 cycles per second through 80 degrees and 100 degrees. Then didn't pursue it any further.

It was it was pretty clear to me I was going to tear up the model. So I just quit at that point. I think the point was made.

Q. Thank you, Doctor.

Can you return that to regular full screen.

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Thank you.

So just for clarification, you're not a biomechanics expert; right?

A. I'm not.

Q. And this was specifically to demonstrate whether or not there would be rotation of a semi-solid object like a brain inside of a rigid object like a skull; correct?

A. Given they're separated by a filmed layer of a slippery fluid like water, yes. I had very humble holes in this.

Q. Now you discussed the tearing of bridging veins on the demonstrative model and your demonstrative study. It has been asserted that if there were a tear in one of the victim's bridging veins, there would have been far more blood than just 15 cc's found at subdural hemorrhage in the victim's head.

Do you agree or disagree with that assertion?

A. That there should be more blood in quantity?

Q. Yes.

A. Well, there never is. I mean every infant to about age one year or slightly beyond that has the subdural hemorrhage --

Q. One second, Doctor.

We missed the last thing that you said. The camera went out for a second.

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A. So babies up to about a year of age or beyond never have a significant accumulation of blood such that the blood quantity is worrisome for mass effect or pressing on the brain. They just don't get large collections of blood. They only get filming, volumes of film, F-I-L-M, volumes of blood over the brain.

So one can opine that there should be more blood, but there just never is, and I don't know what the explanation is. I do find at autopsy that the bridging veins that are ruptured are usually clotted off. So that may be that there is a hemostatic mechanism that actually prevents further bleeding, or maybe it has something to do with their anatomy, but there is never more blood.

Q. Are there problems with relying on biomechanical models to make claims about whether or not shaken baby syndrome or abusive head trauma exists?

A. Well, there is physical biomechanical models. I guess I just made one, although I think it's more biofidelic than most anything I have seen. I think the legitimate criticism that that is not a baby's head. That is a plastic case the shape of a baby's head with a silicon brain. So, you know, I have to concede that no, it's not a baby's head.

There is also the theoretical biomechanical

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models which are just based on calculations as to what would happen, given that you got a certain kind of a structure like a skull inside of which is fluid inside of which is a brain.

And although calculations can be made to examine the probability of brain injury, one, they're based on other assumptions from the animal studies that go back into the eighties and nineties, and they're scaled up for humans, which you know, is not quite clear whether you can even do that.

And none of them seems to except for one article I'm aware of seems to ever examine the actual properties of the brain itself, given that it's rotating, what happens to the substance of the brain.

And that one article they use something called finite element analysis, which seems to be leaning better in the direction of making better estimates.

But in the very end the third problem is that the only way they can ever corroborate their calculations on the theoretical models is to prove it by shaking a baby. And, of course, we're never going to do that.

So there just really isn't anything beyond the animal experiments years ago, and those really

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aren't done any more. There isn't anything beyond animal experiments where anybody has injured anything to prove or disprove or establish thresholds for injury on a living person.

I mean it just hasn't been done and undoubtedly won't be done. You need that to legitimize the biomechanical theory, and you don't have none of that.

Q. Now in this particular case have you observed the radiology of the head?

A. I have.

MR. HEBEL: I'm going to ask for admission at this point of People's 18, which is two head scans.

THE COURT: This is of Nakita Lemons?

MR. HEBEL: That's correct.

MS. HAHN: No objection to the admission of the scan.

THE COURT: People's Exhibit 18, which are two?

MR. HEBEL: Two slides from the head scan, your Honor.

THE COURT: 18 will be admitted.

MR. HEBEL: Thank you.

BY MR. HEBEL:

Q. Doctor Davis, if I could ask you to pull up the two

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radiology images. That will be People's Exhibit 18.
A. So you're looking at my screen right now?
Q. That is correct.
A. Now are you seeing radiology?
Q. Yes. So this is all of the radiology that you have prepared as a PDF document to look at. This is post-mortem X-rays. And then at the bottom are slices from the CT Scan.
A. Which would you like to talk about?
Q. Of the two images that you sent to me, you mentioned that you found, well, let me rephrase that.

Did you find subdural or subarachnoid hemorrhages in these scans?

MS. HAHN: Judge, I'm objecting to this line of questioning.

THE COURT: Hold on, Doctor.

Yes, Ms. Hahn, please.

MS. HAHN: I believe the way the question is posed is to elicit information from an examination of the slides. Doctor Davis was qualified as a forensic pathologist not a radiologist, and so we're fine with the doctor reviewing, discussing the report that he read in connection with the case documents.

But as far as to give an opinion and specify things about the actual slides, I believe it's beyond

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his scope of which he was qualified to testify.

THE COURT: Response?

MR. HEBEL: If I could lay a foundation.

THE COURT: Go ahead.

BY MR. HEBEL:

Q. Doctor Davis, have you reviewed radiology in association with your work as a forensic pathologist in the past?

A. Many, many times. I actually order radiology on my cases.

Q. And is it part of your job as a forensic pathologist to look at that radiology and come up with your own interpretations in addition to any other advice you're given?

A. Yes.

Q. Do you have experience looking at head scans such as the one at issue here and determining what, if anything, you're seeing on those scans?

A. Yes.

Q. And is this all in part of your job as a forensic pathologist?

A. Yes. I have been doing it for about 12 years, especially on CT scans.

MR. HEBEL: Your Honor, at this point the People would renew our request to continue with that

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line of questioning.

MS. HAHN: Judge, I will renew my objection. A radiologist has already testified in this matter.

THE COURT: I agree that a radiologist has already testified, but I think that Doctor Davis has indicated that part of the ordinary course of his work as a forensic pathologist is to review X-rays and CT Scans.

I'm going to allow his testimony, and I'll take his answer. I think it goes to weight rather than admissibility.

MR. HEBEL: Thank you, your Honor.

BY MR. HEBEL:

Q. Doctor Davis, once again I'd like to ask if you found any subdural or subarachnoid hemorrhages in these scans?

A. Yes.

Q. And what did you find?

A. So we're looking at some of the slices from the CT Scan performed on Nakita shortly after admission. This was three and a half hours after the 911 call where at the top of the head just for orientation, this is the very top of the head, and there is a suture that runs from front to back underneath, which is the central vein.

A few more slices down we get this kind of

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appearance of the brain. We're still kind of at the top fourth of the brain, and it's obvious to me that there is the presence of filmy subdural hemorrhage over both sides of the top, the brain and along the separating membrane called the falx, that separates the right and left sides of the brain.

Q. And are you certain that's subdural hemorrhage rather than subarachnoid hemorrhage?

A. Well, I am in my own cases, and in this case because they're followed by an autopsy. So there is absolutely confirmation.

Q. And is that the best picture to show the subdural?

A. This is the best one to show the filmy nature, the presence of the filmy nature of it, but undoubtedly there is subdural hemorrhage that's, you know, very thin film like hemispheres that's further down in slices.

This may or may not be subarachnoid hemorrhage or subdural hemorrhage. It's hard to say when it inner digitates within portions of the brain, but clearly this is subdural hemorrhage. I've seen it many times and confirmed it at autopsy and other peoples' autopsies.

Q. Now, Doctor, if you could switch to the main screen again.

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A. Back to you?
Q. Yes, please.
The defense raised the claim that it's impossible for shaking to cause subdural hemorrhages or retinal hemorrhages without concomitant catastrophic neck injury.
Is that claim accurate.
A. Well, I never seen any fracture or obvious separations of the spine except for one case. There was a slight subluxation of C-2 and C-3 in a case I reviewed from out of town otherwise in my career.
But I have seen hemorrhage in the ligaments and muscles of the back of the head that surround the upper part of the spinal column that indicate to me that there is, you know, stretching forces or hyperextension forces that are applied to the head on the neck that are evidence that there is at least ligamentous or muscular skeletal injury associated with shaking.
Q. Now would that show up in a typical CT Scan or X-ray, those soft tissue injuries?
A. The real beauty of CT Scan is that it's the gold standard for clinical people as the first diagnostic test where you can see what is going on inside the head and the rest of the body, but its Forté is

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distinguishing skeletal injuries versus soft tissue because it contrasts skeleton or metallic objects very well against soft tissue.

There is some exceptions where infusions are made of a contrast substance where blood vessels and some organs would be quite distinctive, but it's very bad at distinguishing subtle differences between soft tissue densities like small amounts of blood in muscle, for instance.

The gold standard for that is in fact MRI, magnetic residence imaging. That is ideal for looking for soft tissue injury, which we might see in the soft tissues of babies that are shaken, but it's rarely applied to a baby during the short course that many of them have in the hospital prior to declaration of death.

I've only seen a couple of cases in my career as consult cases where somebody thought to do an MRI within the first couple of days, and sure enough there is soft tissue ligamentous injury identifiable on MRI, but not identifiable on CT.

Q. You reviewed the autopsy and assessed the findings. It has been repeatedly suggested that Nakita Lemons died from choking or aspirating without shaking.

Is that a possibility in this case?

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A. Well, I don't think so because there are situations where infants and children can aspirate, but they don't end up with a subdural hematoma as a result of it. I mean there are different phenomena.

Q. And what was the root cause of any aspiration that the victim may have experienced in your professional opinion?

A. In my opinion it's a consequence of unresponsiveness and regurgitation of formula and/or CPR applied by various people.

Q. All that was the result of what?

A. The initial inciting event, which was brain injury as a result of shaking that started the train of subsequent event, which would be CPR or the natural phenomena of vomiting and aspirating fluid from the stomach, brain swelling. Those are all consequences of some brain dysfunction and the events that follow.

Q. In shaking cases how common is this outcome where there might be some sort of regurgitation or aspiration or both?

A. Well, I think most of the cases that I reviewed or had myself over my career have evidence of irritation down in the lungs as a result of aspirating gastric contents and the intubation and what not. So I would say it's quite common if not almost uniform.

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Q. Do you see any signs that this child had congenital defects that could mimic shaking baby syndrome?
A. I did not.
Q. In your experience do things like vaccine reactions cause subdural hemorrhages and retinal hemorrhages?
A. Not to my knowledge. I mean there's always the individual case report where somebody is associating a vaccine with some untoward result.

I am, you know, familiar with and had have seen in my own practice increase in the size of lymph nodes shortly after vaccinations that have created things like inter abdominal twisting of the intestines and what not that caused death, but to my knowledge there is no legitimate association between vaccination and the presence of subdural hemorrhage.

Q. The original medical examiner noted multi-layered retinal hemorrhages in the slides.

What does that mean?

A. I'm sorry. Say that again.
Q. The original medical examiner noted multi-layered retinal hemorrhages in the slides.

What does that mean?

A. Well, that is as depicted in the demonstrative aid on shaking, that is a frequent if not almost uniform consequence of the event of shaking where there is the

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diffuse, i.e., most of the retina diffuse bleeding that involves most of the time all of the layers of the retina, which is three layers.

So that would be, yet again that would be consistent with the phenomena of shaking as the mechanism of injury.

Q. Now when you observed the slides in this particular case, the case of Nakita Lemons, did you observe multi-layered retinal hemorrhages?

A. Well, only one slide depicted one eye, and I can't remember which slide that was evaluable. The other slide was poorly cut and poorly mounted on the slide. So I don't have an opinion on the other eye, but the eye that was on the slide that I looked at did in fact show multi-layered retinal hemorrhage. I can't say it was diffuse only because it's only a fraction of the eyeball. It's not the whole eyeball.

So normally when someone is going to opine that it's diffuse, you want to save the eyeball and affix the solution, then cut it in half and then shine a light in there and take a photo of it to guarantee that it is diffuse.

But on the section I looked at, it covered edge to edge the retina that was available on the slide. So I would presume it to be diffused.

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Q. Now the original medical examiner noted bilateral optic nerve sheath hemorrhaging.

What does this mean?

A. Well, it's that space is continuous with the subdural space over the brain, which is the eyes or something out pouching of the brain. So it's the same membrane that covers the brain and extends down over the optic nerves, and there are in fact bridging veins between that membrane and optic nerve itself, which rupture and blood forms in the space around the open nerve.

It looks like a bright red brain, and that's seen on two occasions by the forensic pathologist.

And first at autopsy when they remove the brain, you can see the ends of the optic nerve, and typically they're going to show that, and on the microscope slide one confirms that because you can obviously see it on the microscope slide.

In this case both optic nerves were on glass. They showed fresh perioptic nerve hemorrhage or optic nerve sheath hemorrhage some people say.

Q. Now that first thing that we discussed, the multi-layers retinal hemorrhages, does the presence of that support or oppose a finding of shaken baby syndrome and/or abusive head trauma in this case?

A. Supports.

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Q. And then the bilateral optic nerve sheath hemorrhaging does that support or oppose a finding of shaken baby syndrome or abusive head drama in this case?
A. Supports.
Q. Does the presence of subdural hemorrhage support or oppose than finding of shaken baby syndrome or abusive head trauma in this case?
A. Supports.
Q. In your experience do most medical examiners agree with shaking as a cause of these symptoms?
A. I would say that most medical examiners will not rule out shaking as the cause of these. I would say the majority accept shaking as the exact mechanism of blunt head trauma. While some are reluctant to use that mechanism specifically, but they agree that abusive head trauma causes, to my knowledge, causes this particular spectrum that we are talking about.
Q. In your professional opinion do you see anything in the autopsy report or the associated records that causes you to doubt the cause of death listed in the autopsy report?
A. I do not.

MR. HEBEL: No further questions at this time.

THE COURT: All right. Let me give my court

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five minutes, and then we will resume.

Doctor, we'll resume in five minutes.

(Whereupon a recess was had by all).

THE COURT: Back on the record People versus Milton Lemons.

Mr. Hebel, you're done?

MR. HEBEL: With one additional thing, and that is People's Exhibits 16 and 17 are on a disk. I want to provide that for the record. And also we had prepared People's 18, which was the CT Scan, but defense counsel brought up a really good point which is in black and white you cannot tell where the arrows are. So we're going to reprint those in color and provide them at a later time.

THE COURT: All right. That sounds fine. If you will just before you submit to it me, just make sure you show it to Ms. Hahn and make sure we're good to go.

All right.

Ms. Hahn, whenever you're ready.

Your voice tends to be soft. So if I could ask you, particularly since we're dealing with someone remotely here, if you can keep your voice up for us.

All right.

MS. HAHN: Thank you, Judge.

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I'll do my best.

CROSS-EXAMINATION

BY MS. HAHN:

Q. Now, Doctor, the prosecution asked you at the end of your testimony whether the presence of subdural hematoma supports the diagnoses of shaken baby syndrome. You indicated that it does.

Is that fair to say?

A. Correct.

Q. And you also indicated that the injuries in the eye characterizes retinal hemorrhages also support the diagnosis of shaken baby syndrome?

A. Correct.

Q. So it is fair to say that your testimony is that Nakita Lemons was shaken based on the diagnoses of those injuries?

A. Well, certainly those injuries were part of it, but it's the entire investigation, the presence of the acromial fracture and what Mr. Lemons, Sr. Said himself. It's all part of the package. But yes, alone those would support shaken baby syndrome.

Q. And, Doctor, you also testified on direct that most medical examiners agree shaking as a mechanism as to causing shaken baby syndrome?

Is that a fair recollection of your

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testimony?

A. I don't know if I put it that way. I think you will find that the vast majority of medical examiners are a terrifically independent group of people, stubborn group of people that typically work alone, are not part of a committee to make diagnoses.

We all have to make our diagnoses on our own based on the investigation --

MS. HAHN: Judge, I would ask that the testimony be stricken as none responsive.

THE COURT: All right.

Rephrase. Repeat the question.

Go ahead.

BY MS. HAHN:

Q. Are you familiar with Doctor Narang's study in which 40 percent of pathologists said shaken baby syndrome was a valid diagnoses?

MR. HEBEL: Objection, your Honor. At this point the People would ask to use the rule of completeness, actually look at this entire study rather than just one line from the end of one table.

THE COURT: Response?

MS. HAHN: Judge, I'm asking him about that specific line at the end of the table. I'm asking that the doctor is aware of that fact that was proven by the

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study.

MR. HEBEL: Your Honor, the rule of completeness is that was duress and the context of this should come in.

THE COURT: You can bring it. You can raise it on redirect.

Go ahead.

BY MS. HAHN:

Q. Doctor, are you aware that only 40 percent of pathologists said that shaken baby syndrome is a valid diagnosis in a study conducted by Doctor Narang?

A. Yes.

Q. And the study in which I am referring to is entitled Acceptance of Shaken Baby Syndrome and Abusive Head Trauma as a Medical Diagnosis.

I'm seeking to have it admitted as Defense Exhibit 26, your Honor.

THE COURT: Is there any objection?

MR. HEBEL: No.

MR. MORAN: 27.

THE COURT: 27.

26 is a letter.

BY MS. HAHN:

Q. And you agree that it's clear from the record that you reviewed that this case that we are dealing with today

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is a shaken baby syndrome case not an abusive head trauma case?

MR. HEBEL: Objection. That was not the testimony.

THE COURT: Sustained.

Rephrase.

BY MS. HAHN:

Q. Judge, I may have been misheard. I said from your review of the documents specifically the medical examiner's report in which medical examiner opines the baby died from shaken baby syndrome, would you agree that that was the diagnosis in this case of your review of the case documents?

A. Okay. Yes, I do agree with that. I'm a little bit confused from your first question, your second question. Just so I make sure that I didn't misstate, can you just repeat that second question again?

Q. Doctor, from your review of the case record in which you reviewed to testify to today, specifically Doctor Cassin's medical report, would you agree that the cause of death in this case was that Ms. Nakita Lemons died from shaken baby syndrome?

A. Yes.

Q. Thank you.

MS. HAHN: Your Honor, may I approach to

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tender a Defense Exhibit?

THE COURT: Yes.

BY MS. HAHN:

Q. Now, Doctor, you previously testified that you would expect that the tearing bridging veins would accumulate more than 15 cc's of blood.

MR. HEBEL: Objection. That's not what the doctor said.

THE COURT: That's not what I heard. I heard him say it was just the opposite, that you wouldn't see it.

MS. HAHN: I'm sorry, I misspoke, your Honor.

BY MS. HAHN:

Q. That you would not see more than 15 cc's of blood?

A. So in my experience they're always filming subdurals until they reach a greater age like after one year of age. They never have space occupying subdurals as infants.

Q. Just so I can be clear. That in this case you identified that there is 15 cc's of blood in the subdural hematoma; correct?

A. I did not identify 15 cc's of blood. The pathologist did. But I have no reason to disbelieve that after reviewing the CT Scan.

Q. The record indicated there was 15 cc's of blood in the

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subdural hematoma; is that fair to say?
A. Yes. I think I just said that.
Q. And that you indicated that there shouldn't be more blood than that in your experience?
A. Typically, there isn't more blood than about 15, 20 cc's. That's virtually an insignificant amount of blood.
Q. When you were asked by the prosecutor the documents that you reviewed in connection with this case, when asked about the defense expert reports, you indicated that you didn't pay much attention to them; is that fair to say?
A. I'm aware that I got them, but I don't recall reading then honestly.
Q. So are you aware that Doctor Galaznik opined in his expert report as to how much blood he expects a bridging vein is expected to carry per minute?
A. No. I have no idea what he said.
Q. Are you aware that it can be quantized and that it can be 5 to 10 millimeters per minute and that's listed in his report?
THE COURT: Well, that's a couple of different questions. I there he's indicated he has not read it.
Is your question is that something that he

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would agree with or disagree with? I think that's permissible, but I think the doctor indicated that he doesn't think he read the report. So I don't think he's in any position to comment on whether or not he read anything.

BY MS. HAHN:

Q. Do you agree with Doctor Galaznik's report in which he says five to 10 milliliters per minute of blood of bridging vein would be expected to carry permanent in his report, that there would be loss of blood from the bridging vein tear.

Do you agree with that statement?

A. Wow, that's an awful lot.

First of all, I'd have to see where he's getting his numbers of that kind of flow rate and that undoubtedly is in a non-traumatized living infant if there is in fact a legitimate study that does that, but that doesn't take in account clotting and subsequent brain swelling.

So I don't know that I can agree with that at all. Maybe he's seen that several times at autopsy or something, but I've never seen that, never heard that before.

Q. In generating the video in which you played today specifically regarding Exhibit Number 17, you indicated

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that software generates the rendering in a 2-D Model. What data does the software rely upon to generate those renderings?

A. I guess we're talking about osirix, O-S-I-R-I-X. It relies on the CT Scan, biometric data that's generated by a CT Scan in making 2-D and 3-D reconstructions of the biometric data, which is FDA approved.

So, I am not sure what it relies on, but I assume the FDA has researched that and determined that it's legitimate.

Q. Do you have any degree in biomechanical engineering?

A. I do not.

Q. Have you ever been qualified as an expert in biomechanical engineering?

A. I have not.

Q. Did you have a biomechanical engineer or expert consult with you in preparation of your video Exhibit that has been admitted as Exhibits 16 and 17?

A. I did not.

Q. And have you published any written articles or studies about your experiment?

A. I only presented it to national conferences but no written articles.

Q. And so you did not elicit any peer review about your study?

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A. Only in person at the two national conferences.
Q. And can you tell me about the methodology that you used in your experiments?
A. I think I explained it all through the presentation.
Q. Your video seeks to answer the question whether the brain rotates?
A. Correct. That's all I am trying to answer.
Q. Whether the semi-soft object in water rotates?
A. Inside of the rigid outer covering that's rotated, rotates, yes. That's the only question I wanted to answer one way or the other.
Q. So it does not address the question that exists in the medical community of whether the forces can be generated through shaking alone to cause injury such as retinal hemorrhages, subdural hematoma or brain swelling?
A. I made no effort at all to instrument the model to try to address those concerns. Maybe someone else will make another model to try to start doing that. I made no effort to do that.
Q. So it appears that shaking alone does not cause those injuries?

MR. HEBEL: Objection.

WITNESS DAVIS: It doesn't prove anything. It's just says that a semi-solid object inside of

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another object the shape and size of a baby's head separated by a slippery fluid layer will in fact rotate.

Q. Doctor, you indicated that you created this video; correct?

A. I created the experiment. I worked with the consultants. I created the presentation that you saw, all of it.

Q. Was your video created by the company Expert Digital Solutions?

A. Which one? There were two actually. So what are we talking about?

Q. Do you own a company by the name of Expert Digital Solutions, Inc?

A. I do. That's my consulting firm.

Q. And did your consulting firm produce the video?

A. Which one? I presented two today.

Q. Exhibit Number 16.

A. So the first one.

Q. Yes, the animation.

A. My company produced it. That's correct. It was commissioned through OOPS, O-O-P-S Animation, Minneapolis, Minnesota and Professional Animators, and Modelers made it for me under my direction.

Q. Did Expert Digital Solutions, Inc. Also produce the

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second video that was admitted as Exhibit 17?
A. So now we're talking about the machine?
Q. Yes.
A. Okay. That was produced entirely by me with the efforts, the physical efforts of my consultants. That was entirely produced by me personally.
Q. Do you sell the video that has been admitted as Exhibit 16?
A. The first one, which is the shaking baby mechanism of injury, yes. I have sold that over the years.
Q. Since what year?
A. It's probably been out for 12 to 15 years.
Q. My records, my research indicates as early as 2002. Is that fair to say you have been producing and selling it since 2002?
A. No. Not this one. There was an earlier version that wasn't as sophisticated that I had made personally, and then approximately five years later I had the professional version made.
Q. Do you sell the second video that has been admitted as Exhibit Number 17?
A. So now we're talking about the machine-shaking video?
Q. Yes.
A. No. I don't sell that.
Q. What is your revenue for selling the video, the

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animation, the first video that you played for us today?

MR. HEBEL: Objection, your Honor.

A. It sold --

THE COURT: No. I'll take the answer.

Go ahead. You can ask it if you want.

WITNESS DAVIS: Is there a question, or am I supposed to be answering?

BY MS. HAHN:

Q. Yes. Go ahead. You can answer. The Court indicated you can answer the question.

A. Well, as a courtroom Exhibit it has been available since it's inception for $450.00 a copy for the use of that jurisdiction for any purpose for any court, for teaching, any number of copies typically within a county jurisdiction.

So one per is all that's inside of that County.

Q. When was the animated video last changed? You indicated that there was an earlier version. When was it changed?

A. Okay. So is it Exhibit 16 we're talking about that's the mechanism of injury?

Q. Yes.

A. I don't want to be confusing. Okay. So Exhibit 16 has

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itself never been changed, but it is an upgrade of the original video, and I'm just guessing I think, you know, it may be the first video that was made in maybe 2002, and then the second video was I believe made in something like 2005, 2006. It's never been changed.

Q. So it hasn't been changed since 2005 or 2006?

A. Whenever it was made. In fact, what it really does is exactly the same principles of the earlier one. It's just better looking and more informative.

Q. And you indicated that you sell that video for $450.00 per unit. How much money have you made off that video being sold?

A. Well, I've been reimbursed my cost for making the video probably, and I would guess that the total revenue from that is maybe $45,000 in all those years.

Q. Are you being compensated for work in this case, Doctor?

A. I am.

Q. What are the terms of your compensation for your work in this case?

A. $350.00 an hour for review, time, report writing, testimony time, travel time, everything. My time is worth $350.00 an hour.

Q. You're billing the Wayne County Prosecutor's Office; is that correct?

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A. I presume so. I don't even know if I issued an invoice yet.
Q. Is your contract with the Wayne County Prosecutor's Office?
A. I'll have to look in the folder, but I expect there is. I'm going to send a bill to Mr. Hebel when we're done.
MS. HAHN: Just one second, your Honor.
THE COURT: Sure.
BY MS. HAHN:
Q. Now, Doctor, regarding the mechanism of injury video which was the first video you played for us today, you testified that the rotation tears the axon, but isn't it fair to say that the primary injury is the neck injury?
A. Well, it's actually more subtle than that. It is in fact axon injury, but the axons that are probably important causing the instantaneously deleterious and obvious issues of sudden unresponsiveness, interruption of breathing, etc., are located in the brain stem, brain and upper spinal cord at the juncture between the skull and the spinal column.
So it is in fact the result of injury to those vital structures, the autonomic nervous system in that zone, which is the upper spinal column, and at the base of the skull.

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So it's not about spine injury. It's about those things that are inside the spine at that level.

Q. Doctor, you had a chance to review the autopsy report in which there was no indication of neck or spinal injury; correct, in this case?

A. Correct.

Q. And, Doctor, your video does not address neck injury; correct, either video that you demonstrated for the Court today?

A. Well, it doesn't address bony neck injury because it's not seen in this case that it addresses what it is, which exhibits the spinal cord and the brain stem within that part of the neck. That is in fact the injury. There are soft tissue injuries that occurred that have only been evidenced lately as people do MRI's on these children. But, no, I don't specifically see ossious or soft-tissue injury outside of the nervous system.

Q. Now, Doctor, you believe the cause of Nakita Lemons' subdural hematoma was the result of acceleration, deceleration head trauma or shaking?

A. I do.

Q. You are aware that there is a controversy within the medical community whether or not non-traumatic causes can in fact result in subdural hematomas, such as

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hypoxic-ischaemia encephalopathy and CPR are thought to be a part of mechanism as a non-traumatic cause of subdural hematoma?

A. Well, I wouldn't say a controversy. There is certainly articles that have been published where people suggest that hypoxia is related to the presence of blood in the subdural space and interdural space. I wouldn't characterize it as a controversy. People simply publish articles.

Q. So you agree with the conclusion put forth in the 2013 article entitled, and your Honor, I already provided the title to the court reporter. I will now be seeking to admit his as an Exhibit as well for your review.

The article is entitled Non-traumatic Intradural and Subdural Hemorrhage and Hypoxic Ischemic Encephalopathy in Fetuses, Infants and Children up to three years of age. Analysis of Two Audits of 636 Cases From Two Referral Centers in the United Kingdom.

It was published in the Pediatric and Developmental Pathology Journal.

Do you agree with the study's conclusion that there was a significant association between subdural hematoma and hypoxic-ischemic encephalopathy and subdural hematoma occurs in many non-traumatic

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scenarios? And the article suggested the need to be extremely cautious in attributing a subdural hematoma to abuse.

Do you agree with that conclusion put forth?

A. I only briefly reviewed the article, but what it is offering is there is an association not a causality. In other words, it doesn't prove anything related to the ischemia causing bleeding. It just says they are associated. So what are you driving at, plus it's --

Q. So what --

THE COURT: Hang on. Let him finish his answer.

Finish your answer, Doctor Davis.

WITNESS DAVIS: Plus it's in neonates. It's not in fetuses. It's not really intended to specifically address older infants.

MR. HAHN: Your Honor, I'd be seeking to --

THE COURT: Let him finish his answer. Then we can move on.

WITNESS DAVIS: Well, I guess I don't agree with the conclusion that you're implying that somehow hypoxia causes bleeding, subdural bleeding.

THE COURT: You're moving for the admission of Proposed Exhibit Number 28?

MS. HAHN: Yes, your Honor.

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THE COURT: Any objection?

MR. HEBEL: Yes, your Honor. It's irrelevant to this case. This is primarily a study of neonates and subdural hemorrhages in fetuses. That does not speak to the case of two-month old Nakita Lemons, and if it doesn't apply to this case, there is no reason to admit it into evidence.

THE COURT: It's kind of hard for me to make a ruling on that unless I've read it. I'll take the offer under advisement until I finish reading it.

Then I'll let you now.

MS. HAHN: May I approach?

THE COURT: Sure.

BY MS. HAHN:

Q. Doctor, I believe your answer was, as I understood, was that you did not believe that there was a link proving causation; is that correct?

A. Between what and what?

Q. You indicated that you disagree that the article doesn't prove causation; is that correct?

A. My review of the article does not prove causation, that being hypoxia causes intradural and subdural bleeding. I do not believe they have established that causation.

Q. My question was about the association.

A. I'm sorry. I just want to finish. They have

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established an association which is not at all the same as a causation.

Q. Thank you.

Additionally, Doctor, I'm referencing an article that was published in the Forensic Science International Journal entitled Subdural Hemorrhage, Intradural Hemorrhage and Hypoxia in the Pediatric and Perinatal Post-Mortem. The question posed in the title, are they related? An observational study combining the use of post-mortem pathology and magnetic resonance imaging.

Do you agree with the findings that the study sets forth demonstrating that intradural hematoma and subdural hematoma can be seen in association with non-traumatic brain hypoxia?

A. Well, I don't know that I can answer that yes or no. This is an article I had a little bit more time to read. I think if you go to Table One on page two, you will notice that beginning with in Table One beginning with subject 20, that at one month and beyond you should notice that most of them were called pseudo, which is sudden unexplained death in infancy which means I don't know what they died of.

Yet they are talking about the presence of intradural subdural hemorrhage, and this is what they

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don't know what they died of. So we can't say those are non-traumatic deaths, but the fact that they call them pseudo means they don't know what they died of. They couldn't commit to a cause of death.

So I can't say that that association was necessarily that strong because they haven't told us what they actually died of. If they can't figure it out, then they can't figure it out, I guess. But it's not necessarily associated with non-traumatic causes of death in kids these age.

Does that make sense?

Q. So you disagree with the study's finding?

A. Well, I can't disagree with the data they have collected, but the interpretations are still that it's an association, although I think it's a thinly made association because the cases they're looking at are cases they couldn't figure out a cause of death on.

Well, maybe that was the cause of death, this traumatic brain injury. They simply couldn't recognize it. So I'd say it's a flawed study.

Q. And finally the articles from the Pediatric & Developmental Pathology Journal entitled Evidence of occurrence of Intradural and Subdural Hemorrhage in the Perinatal and Neonatal Period in the context of Hypoxic-Ischemic Encephalopathy; an Observational Study

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From Two Referral Institutions in the United Kingdom.

Do you agree with the authors' suggestion? Their observations indicate that the subdural hematoma in the triad is the result of bleeding from the dural sections rather than from the torn bridging veins.

A pattern of bleeding that may be associated with trauma or be of natural edeology and that such bleeding alone is therefore unreliable evidence of an inflicted head trauma or shaken baby syndrome?

Do you agree with that?

A. I do not agree with that conclusion.

MS. HAHN: And, your Honor, I would seek to admit the journal I just referred in the earlier journal as Defense Exhibits 28, 29, I believe and 30.

The Forensic Science International Article would be 29, and Evidence of occurrence.

And, your Honor, I apologize. I will tender Exhibit 29 to you shortly. I have Exhibit 30 for you if I can approach.

MR. HEBEL: Your Honor, at this point the People would object at least to Exhibit 30 because Exhibit 30 has nothing to do with this case.

We're dealing with a study of neonates that are literally in the table on page 175. I don't know which paper it is in the handout, but we're talking

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about children that were either hours or days old, not months old.

There is only one single case or one single thing that was in the weeks. There's one child that was four weeks old, but this is not a study of children in the same situation as Nakita Lemons.

This is a study on immediately born children, and it's known that children are sometimes born with subdural or intradural hemorrhages. So this has no relevance to this case.

THE COURT: Response?

MS. HAHN: Judge, I will ask the Court to give the appropriate weight to the article. Does not go to its admissibility.

THE COURT: Well, I'll take it under advisement. I need to read the article in terms of, you know, it certainly raises an issue in my mind. I need to read the article.

If we're talking about neonatal studies, how appropriate that is for this particular circumstance here.

MS. HAHN: May I approach?

THE COURT: Sure.

MR. HEBEL: Your Honor, for the record on Exhibit 29 the People levy the same challenge based on

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the same circumstances. These are neonate studies.

THE COURT: 28, 29 and 30 are under advisement.

MS. HAHN: Thank you.

BY MS. HAHN:

Q. Doctor, moving on to the subject of retinal hemorrhages. You indicated in your testimony that you found the presence of multi-layered retinal hemorrhages; is that correct?

A. Yes.

Q. And it is your opinion these retinal hemorrhages were caused by shaking?

A. Well, they're certainly associated with it. It's difficult to know for most people whether they occurred at the time of injury or are subsequent phenomenon, but I would favor that they would, they actually did occur at the time of injury.

As I have seen cases that don't get CPR that don't make it to the hospital that have the abuse multi-layered hemorrhage. It's only the pathologist that occasionally runs into those.

Q. So it's fair to say that you agree that retinal hemorrhages can emerge from other causes than shaking?

A. Oh, absolutely.

Q. So you agree with the position set forth by Doctor

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Lantz in his article entitled Are Peripapillary Intrascleral Hemorrhages Pathognomonic For Abusive Head Trauma?

A. Well, I guess I don't know that they have to be only associated with that, but this you see diffuse multi-retinal hemorrhage, which is a slightly different phenomena that we have here from what he's talking about in the article anyway, and it is highly associated with any form of severe head trauma in children, be it from shaking, blunt force or car crashes or whatever.

It's quite common as a result of massive injury to the head in children, but I don't think that's really what he's talking about here.

He's talking about hemorrhage in the optic nerve sheath if I'm not mistaken, which may or may not be that highly associated specifically with shaking.

Q. But you found, Doctor, going back to your earlier testimony in which you indicated that CT Scans are the gold standard as to what is going on inside the head.

Do you recall testifying to that?

A. On admission where there is no other imaging information already obtained, it's my experience that it is treated as the gold standard as the first test to find out what is going on inside the head of anyway.

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It's used virtually every time when there is suspected head injury.

Q. Doctor, I'm referring to the CT Scan that was performed at the University of Michigan hospital dated October 10th, 2005, in which you indicated you reviewed in connection with this case?

A. Let me check that date. I've got the program right here. So the CT Scan was performed on 10-10-05 at 10:53 p.m. That's the CT Scan I reviewed.

Q. Doctor, I'm referring to the report that was prepared on the Exam entitled CD Head without IV Contrast. Exam date indicates October 10, 2005 at 2249. This was previously admitted as Defense Exhibit Number 10, page 18.

A. Okay. I don't have the report in front of me, but I have my summary of that.

Go ahead.

Q. You previously indicated that upon your review of the CT Scan that you indicated a presence of subdural hematoma?

A. Correct. That's my review independent of what the report says.

Q. And is it correct that the report makes no mention of a subdural hematoma?

A. That's absolutely correct.

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Q. And who was the doctor, who is the doctor that prepared this report? And the records that I just was discussing with you, that was prepared by the radiologist in this case; correct?

A. Well, there is two references to the CT. At the end of page two in my report, I paraphrased what the radiologist said was seen on the CT Scan. There's only four lines.

Then the next three lines are what I see on the CT. So if that's what you're referring to, that's what that was.

Q. I am referring to the CT report that was prepared by the radiologist at University of Michigan on October 5th, 2005.

MR. HEBEL: Objection. At this point we don't know that the doctor referred to as reading CT's was in fact a radiologist. The doctor's name on the report is one Goeffrey Flemming; is that accurate?

MS. HAHN: Yes.

MR. HEBEL: It does not say his specialty.

MS. HAHN: I'll come back to that, your Honor.

THE COURT: I think at this particular point Ms. Hahn, it strikes me that your Exhibit Number 10, speaks for itself and what those medical records

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indicate.

Certainly you're free to ask Doctor Davis whether he agrees with the finding or disagrees or why he does or why he doesn't.

But I have the report in front of me, and I think we can go from there.

MS. HAHN: I'll move on, your Honor.

BY MS. HAHN:

Q. Doctor, going back to the question earlier that I posed to you about your video, whether or not it answered the question regarding the amount of force necessary to generate the injuries that are sustained by Nakita, meaning the retinal hemorrhages, the subdural hematoma and the brain swelling.

Now you indicated that the only way to corroborate studies, biomechanical studies corroboration, is only by shaking a baby, which would never be done. Is that a fair characterization of your early testimony?

A. Right. There will never be proof to satisfy everybody until we shake babies.

Q. But you're aware of the biomechanical studies that have been performed to date?

A. Yes.

Q. And those biomechanical studies suggest the amount of

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force that is required in the circumstances to generate those injuries?

MR. HEBEL: Objection to the word those.

THE COURT: Do you want to identify which studies you're referring to, Ms. Hahn? That might be that more helpful.

BY MS. HAHN:

Q. For example, Doctor, the study by Doctor Ommaya and Doctor Duhaime, which examined the force necessary to cause injury of retinal hemorrhage, subdural hematoma and brain swelling. Are you familiar with those studies?

A. So, yes. So is this the one that you're referring to called Biomechanics and Neuropathology of Adult and Pediatric Head Injury?

Q. Yes. Contributed in part by Doctor Ommaya.

A. There is no experimentation here. This is discussion of engineering principles and none of which deal with the issue of rotational forces. It's referring to scaling tolerance for skull failure and brain injuries of infants from basically, you know, animal studies.

There is no experimentation related to this, and there is no real reference to angular acceleration or rotational acceleration or deformation of the brain substances at all. So I would say it's not a

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particularly good study.

Q. In regarding the study contributing part by Doctor Duhaime, do you agree with the conclusion set forth regarding the forces necessary to generate those injuries?

A. Are we talking about a different article now?

Q. Yes. The second article which I referenced by Doctor Duhaime, Doctor Jenarrali, Doctor Tubalt, Doctor Bruce, Doctor Markelly and Wiser entitled the Shaken Baby Syndrome of Clinical Pathological and Biomedical Studies published in the journal of --

A. This is an old article from 1987, and basically this has done more damage to the understanding of abusive head trauma than any other single article by publishing what they think are thresholds for injury in babies with a completely substandard model from data that was scaled from animal studies.

No one, you know, none of which anybody knows if that is legitimate or not, but unfortunately lots and lots of professionals have hung their hat on this as wow, did somebody determine that it can't be done, when it's an absolutely flawed study, and she even admitted that herself later.

Yet it still comes up in courtrooms all the time, and is it, you know, authoritative? Does it

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actually say anything important? It says nothing important.

Q. Doctor, are you familiar with the SBU Study, the Swedish Study?

A. I'm sorry. Which one?

Q. The Swedish Study in which it evaluates the validity of shaken baby syndrome as a diagnosis? It evaluates the research?

A. Is it the article you gave me here or what?

Q. Just one second. No, Doctor, I have not tendered that. Are you generally aware of that article?

A. I have no idea what article you're talking about.

Q. Okay. I may or may not have it. I just don't know what you're talking about.

MS. HAHN: No further questions.

THE COURT: Mr. Hebel.

MR. HEBEL: Thank you, your Honor.

REDIRECT EXAMINATION

BY MR. HEBEL:

Q. I want to press on. Go all the way back to when we were discussing the whole issue of 15 cc's of blood and how Doctor Galaznik testified that he thought that would be much more because of calculations that a certain amount of blood would be traveling through each and every bridging vein every minute and that five to

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10 number, he told us he came up with himself.
Do you agree with that number?
A. I don't agree or disagree with it, but the fact is that's completely unrelated to the reality which is babies don't have space occupying subdurals. That's an older person's adult form of head trauma that causes that. They never have significant amounts of blood. So it doesn't really matter whether he's right or wrong about the flow rate through a bridging vein. It's not the reality. He's not working in reality.
Q. I got another question about our meetings yours and mine in which I was looking to hire an expert. And when I asked if you would review the case, did you promise me an outcome that I would agree with?
A. Of course, not.
Q. And did you tell me that the County would be paying for your time regardless of the outcome?
A. Absolutely.
MR. HEBEL: One moment please.
No further questions.
THE COURT: Ms. Hahn.
MS. HAHN: No, your Honor, nothing based on that.
THE COURT: Doctor Davis, thank you so much.
WITNESS DAVIS: Thank you.

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MR. HEBEL: That's correct, your Honor.

At this time the People would ask to call Doctor Cindy Christian to the stand.

THE COURT: Okay. We'll have the doctor sworn at this time.

CINDY W. CHRISTIAN,

called as a witness by the People having first been duly sworn by the Court Clerk, was examined and testified upon her oath as follows:

DIRECT EXAMINATION

BY MR. HEBEL:

Q. Could you please give your name and spell it for the court reporter.

A. My name is Cindy Christian. Cindy, C-I-N-D-Y, Christian C-H-R-I-S-T-I-A-N.

Q. And could you please tell us about your job?

A. I am employed as a professor of pediatrics at the University of Pennsylvania. I am a board certified general and child abuse pediatrician at the Children's Hospital of Philadelphia. I am the Associate Dean of Admissions at the Perelman School of Medicine at the University of Pennsylvania and an Assistant Dean in the Program for Diversity and Inclusion at the Perelman School of Medicine at the University of Pennsylvania.

Q. What type of education do you receive to become a child

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abuse pediatrician?

A. I did my, earned I would say, earned a Bachelor's of Science Degree in Animal Behavior at Bucknell University, graduating in 1981, and my medical degree from the Albany Medical College of Union University in 1985.

I then came to Philadelphia for an internship in residency and pediatrics at the Children's Hospital of Philadelphia, and between 1988 and 1989 I did a Fellowship, a mini Fellowship in Child Abuse and Neglect, learning about the evaluation and care of children who were suspected victims of abuse and neglect.

And then starting in 1989 came on as Pediatrician Faculty at Children's Hospital of Philadelphia, which is affectionately I think called CHOP to most people. So I have been one, well, for many years I was the only child abuse doctor working at CHOP, and I was on call almost all year long seeing every in-patient consultation regarding suspected child abuse and neglect, seeing out-patients in our care clinic, our clinic for sexually abused children, and I continue to see patients on a regular basis every week or virtually every week, even though we now have four pediatricians on our Child Abuse Team and do research,

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et cetera.

But when I was starting out in medicine, there was no board certification in child abuse pediatrics. That was board certified in, I became a board certified subspecialty in 2009, and I took those boards and am now boarded in both general pediatrics and child abuse pediatrics.

Q. What professional societies that deal with child abuse and pediatrics are you a member of?

A. I am a member of the American Academy of Pediatrics and have been a member for many, many years.

I am a member of the Ray E. Helfer Society, which is an honorary society of international physicians who do child abuse work.

I am a member of a State Wide Oversight Committee that helps our State Department of Public Welfare improve their work in the area of protection, and I'm on a Philadelphia Community Oversight Board that assists County children and youth agencies in improving their work related to children who are in the child welfare system.

And I'm a member of our AP 33 Team, which is a legislatively mandated review for all children in each County in Pennsylvania who have fatal or near fatal injuries related to child abuse to review kind of

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how the system evaluated and cared for those children before and since their injury, and that is held at the Medical Examiner's Office in Philadelphia as well.

So I'm also a member of the Academy of Pediatrics Association and have been involved in child abuse subcommittees for that organization as well.

Those are some of them.

Q. So what national positions in child abuse pediatrics have you held?

MR. LICHSTEIN: Your Honor, I would stipulate that the witness is qualified as an expert in general pediatrics and child abuse pediatrics as per the qualifications stated on her CV.

THE COURT: Is that accepted?

MR. HEBEL: And the People do accept.

However, we will touch a few specific relevant qualifications nonetheless because I believe that a few of them are very pertinent to this hearing.

THE COURT: That's fine.

I appreciate the stipulation, and the Doctor Christian will be allowed to give her expert opinion in the field of general pediatrics, as well as child abuse pediatrics as well.

Go ahead please.

BY MR. HEBEL:

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Q. And the question that I just asked was what national positions in child abuse pediatrics have you held?

A. I was elected as the first president of the Ray E. Helfer Society a number of years ago. I served that position for a year.

For many years maybe four or six years, well for a total of ten years I was on the Committee on Child Abuse and Neglect for the National Academy of Pediatrics, and for, I would guess, maybe four of those years I was the Chair of the Committee on Child Abuse and Neglect for the American Academy of Pediatrics.

I was also elected to the Sub-board of Child Abuse and Neglect for the American Board of Pediatrics, and that's the board that certifies all subspecialists in pediatrics as being board certified in.

So the Sub-board for child abuse pediatrics writes, develops, administers the Exam and criteria by which pediatricians earn and maintain their board certification in child abuse and neglect, and I was a board member of that.

I still am a board member for the Sub-board and Chair, in addition to the Sub-board for Child Abuse and Neglect for the American Board of Pediatrics.

Q. Now just in relation to child abuse and child abuse pediatrics, have you had editorial and reviewing

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positions in scholarly journals?
A. I do. I regularly review articles that are submitted for publication and peer review journals, maybe about ten different peer review journals.
Q. And have you written any editorials, reviews and/or book chapters discussing shaken baby syndrome or abusive head trauma?
A. I'm sorry. You'll have to repeat that in a minute. I have no idea how to quiet it here. I'm sorry. My phone keeps ringing.

Could you please repeat the question. I was distracted by the ringing telephone.
Q. Have you written any editorials, reviews and/or book chapters discussing shaken baby syndrome or abusive head trauma?
A. Yes. Many. I don't know how many, but I've written more than a hundred editorials, reviews and chapters. They are not all on abusive head trauma, but a number of them are.
Q. Have you written any peer review publications on the topic of shaken baby syndrome and abuse head trauma? About how many?
A. Yes, I have, and more than 20, maybe 20 to 30 or so, in addition to others, of course.
Q. Thank you.

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Now when serving as the Chair for the American Academy of Pediatrics Child Abuse and Neglect Committee, were you the lead author of the papers that recommended the change of the diagnostic terminology from shaken baby syndrome to abusive head trauma?

A. I was a lead author, yes.

Q. Now let's get specific to this case.

Are you familiar with the child death case of Nakita Lemons?

A. I am.

Q. And what materials did you review in preparation for this case?

A. I reviewed the defense' claims in People versus Milton Lemons, including Affidavits from Doctor Galaznik, Doctor Barnes, Doctor Nichols and Affidavit of the defendant.

The defendant's motion and brief arguing for relief from judgment, the defendant's response to the People's reply brief. Some notes on the case, evidence in People versus Milton Lemons, a waiver trial transcript dated August 3rd, 2006, radiographs of Nakita Lemons, including chest X-rays, Cat Scans and a post-mortem skeletal survey.

911 tapes, scene photographs and some medical records, which I don't know if it was listed in my

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letter. It may be under evidence. That might have been the evidence.

Q. Did you also as part of that evidence review the autopsy report?

A. Yes.

Q. And the police report?

A. Yes.

Q. And the defendant's statement to the police?

A. Yes.

Q. Let's turn to the academic and scientific acceptance of shaken baby syndrome and AHT.

MR. LICHSTEIN: Objection to the form of the question, your Honor. This is an SBS, shaking baby case and not AHT. So I would ask that the witness be clear about which of those he's talking about.

THE COURT: Response.

MR. HEBEL: The response was that I was introducing a topic.

THE COURT: All right. I'm going to allow it.

Overruled.

Go ahead.

BY MR. HEBEL:

Q. In your position as a practicing child abuse pediatrician professor and active member of several

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relative committees, do you stay up-to-date with the science and literature regarding shaken baby syndrome and abusive head trauma?

A. I try to. Yes, I try to.

Q. And it has been asserted based specifically on your statement on abusive head trauma that the AAP no longer recognizes shaken baby syndrome as a legitimate diagnosis; is that accurate?

A. It's accurate that that has been stated, but it's not accurate that our position paper on abusive head trauma stated that shaken baby syndrome is no longer a legitimate diagnosis.

Q. Please explain the relationship between abusive head trauma and shaken baby syndrome.

A. Sure. It has been very clear to me for many, many years if not a number of decades. I've been doing this work for more than three decades, that there are infants and young children who come into the hospital are diagnosed with head injury as a result of child abuse, and that they can have a range of different injuries.

Sometimes abused children simply have skull fractures, but they have other evidence of abuse. They don't have any intercranial bleeding. There's no subdural hemorrhage or bleeding inside of their heads,

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but they sustained blunt impact injury to their heads.

Some babies have blunt impact injury, and they also have evidence of findings consistent with shaken baby syndrome.

They may have extensive thin layered subdural hemorrhages. They may have severe bilateral retinal hemorrhages throughout the eyes in multiple layers. They may have acute, new or acute and healing rib fractures, supporting a violent squeezing of the chest, and there are some babies who come in with subdural hemorrhages, retinal hemorrhages without evidence of blunt impact injury who are also victims of child abuse.

So you can be an abused child with head injury, and you may or you may not have evidence of blunt impact injury. And what I had been seeing over a number of years was that there were some physicians who every time they saw an infant or young child who was a victim of abuse with head trauma, they will simply call things shaken baby syndrome.

Even if there was evidence of blunt impact injury, there was a tendency to simply name everything they saw as SBS as really an indicator of inflicted trauma to the head.

And so the position paper, and it's not even

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a position paper, it's a policy paper. So the policy paper that I authored was simply to broaden the nomenclature that was used, the nomenclature broad and more generic because there are multiple ways that infants are abused and that infants and young children sustain injury to their skull, to the content inside of their skull and to their head.

In that policy paper it specifically states that shaking is an important mechanism by which infants are injured, and that shaking has the potential to cause subdural hemorrhages, retinal hemorrhages and significant brain injury. I may be paraphrasing. I haven't memorized the paper.

It does not say that the American Academy of Pediatrics does not believe in shaken baby syndrome. It does not state that we are abandoning the importance of shaking as a mechanism. In fact, it states that we recognize that people are familiar with the concept of shaken baby syndrome and that for certain purposes it's important to potentially use that language.

Just as I think in a paper I wrote that most people don't talk about myocardial infarctions, they talk about heart attack. So that there are words that we can use to express important concepts for prevention purposes, education purposes, but simply to be broad

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and somewhat generic in our terminology to encompass all the different mechanisms that can cause brain and other injuries to an infant's head episode of child abuse.

Q. So would you agree with the concept that shaken baby syndrome is a subset of abusive head trauma?

A. Sure. I'll say that shaken baby syndrome is a subset of abusive head trauma.

Q. You were also the lead author of a publication by the AAP entitled "Understanding AHT in Infants & Children. For the record this was admitted as People's Two, I believe. For the record it is People's Two.

THE COURT: Okay.

BY MR. HEBEL:

Q. It has been alleged that that paper was not an official publication of the AAP; is that correct?

A. I believe that is incorrect. That was published by the American Academy of Pediatrics. It was peer reviewed. It was reviewed and published by the American Academy of Pediatrics specifically. So I don't know by what basis someone would say that, what was the contention that it wasn't a publication of the AAP.

Q. An unofficial document or publication?

A. I don't know what an unofficial publication by the AAP is. It was published by the AAP, and it was a position

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by the AAP. The AAP stands behind the publications that they publish.

Q. Now approximately how many children suffer non-fatal abusive head trauma in the United States are diagnosed?

MR. LICHSTEIN: Your Honor, I object to that. This is a shaken baby syndrome case. Information about how often abusive head trauma is diagnosed is not relevant. If the state wants to change its theory to something broader than shaken baby syndrome, they have to do that at a new trial.

THE COURT: No. I disagree. I think your experts have introduced considerable testimony with regards to abusive head trauma. I'm going to take the answer.

Go ahead.

MR. HEBEL: Thank you.

WITNESS CHRISTIAN: It has been estimated that a few thousand infants and young children are admitted to hospitals throughout the country every year who are victims of abusive head trauma and shaken baby syndrome.

BY MR. HEBEL:

Q. And how many receive fatal inflicted head injuries approximately?

A. Probably hundreds, a few hundred, maybe 150, 200. It's

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hard to know specifically.

Q. So we're not talking about an enormous number? We're talking about approximately a few thousand cases and up to 200ish who actually die from it, abusive head trauma of some sort?

A. Yes. That's pretty significant though; right? I mean infants, you know, that's a lot of infant deaths from something that should be preventable and not cause any death. It's more than the number of infants who die from cancer, for example. I mean it's notable.

Q. Now it has been claimed that some biomechanical articles suggest that shaken baby syndrome and abusive head trauma are either impossible or would require a broken neck?

MR. LICHSTEIN: Objection, your Honor. I believe that misstates the testimony that an injury caused by an impact versus an injury caused by shaking. The biomechanical testimony has been about shaking.

THE COURT: Response?

MR. HEBEL: I can restate.

THE COURT: Please do.

BY MR. HEBEL:

Q. It has been claimed that some biomechanical articles claim that shaken baby syndrome or abusive head trauma by the mechanism of shaking are either impossible and

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would not be able to generate sufficient force to create the injuries described or would require a broken neck before the injuries that are symptomatic of shaken baby syndrome would appear.

Now before we go into that, are you a biomechanist?

A. I am not a biomechanical engineer. I would never put myself up to be a biomechanical engineer. I have worked for many years with some of the leading biomechanical engineers in the country who do a good majority of the work of biomechanical modeling around shaken baby syndrome and abusive head trauma, but my responsibility and my role on that team is as a clinician.

It's as the doctor sees the patients who can bring the clinical reality to the table, and I can give you examples of how important that is in the work of biomechanical engineering.

Q. Now do you see any problems with biomechanical engineers claiming that their findings disprove diagnoses like shaken baby syndrome?

MR. LICHSTEIN: Objection, your Honor. The witness just testified she's not a biomechanical engineer.

MR. HEBEL: Your Honor, this is not a

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biomechanical question. This is a question that goes to her expertise.

THE COURT: I agree. I'll take the answer.

WITNESS CHRISTIAN: Could you repeat the question please?

BY MR. HEBEL:

Q. Do you see any problems with biomechanical engineers claiming that their findings disprove diagnoses like shaken baby syndrome or disprove that shaking can cause the injuries connected?

A. I do understand that there are some problems with that claim. I think very broadly, although biomechanical engineers can measure and calculate forces, there really is not data that shows us the actual injury threshold of tissue to know what injury one might or might not expect from certain forces.

That's the first problem.

There is also no, although people, biomechanical engineers like to describe their biofidelic models, there is no perfect biofidelic model of an infant to date.

And then finally some of the articles that have been used in courtrooms, and I know they have been used in courtrooms because I have been in the courtrooms when they have been used to prove that you

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cannot shake a baby or harm a baby without catastrophic neck failure are so fundamentally flawed, erroneous as they should not even be considered.

Yet they're used in courtrooms and have been used in courtrooms to try to disprove that you can shake a baby and cause subdural hemorrhages without neck, you know, you couldn't do it the without neck injury, and I specifically refer to the Bandak article for that.

Q. And does anything about these biomechanical studies change the clinical realities that you deal with?

A. They don't. Some of the biomechanical studies that are done find that the calculated angular accelerations don't meet kind of what thresholds are thought to be for subdural. Some of them find that they do. Many of them show that with blunt impact there is higher forces that make sense.

But if your biomechanical model doesn't fit with what doctors see over and over and over again on a daily, weekly, monthly, annual basis, then you have to go back and ask what's wrong with your model, not what's wrong with the patient, but where is the model kind of missing things.

And again just as an example when I started working with the bioengineers, they were under the

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assumption that skull fractures would be very uncommon in infants who had impact jury because they have sutures that are still open, because they have very thin skulls that are more pliable, and that when they hit their head, there would be deformation and that the forces would be transmitted more interiorly into the head.

That really was one of their biomechanical assumptions, and I would tell them repeatedly that they were wrong. That we see skull fractures in babies who fall and hit their head all the time, as I like to say a dime a dozen.

Babies fall, and if they hit their head in a certain way, or if they hit their head on a hard enough surface, or they fall a certain distance, they get skull fractures. And in the vast majority of those cases, there is no underlying intracranial injury, and there certainly is extremely rare or unusual that there is significant intracranial injury.

So again I think a clinician or pediatrician or a doctor who sees patients regularly works with others who have different expertise so that together they can try to understand kind of mechanisms and what's going on.

But again I go as the clinician, and in fact

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when Bandak published his article, I brought that article to the biomechanical journal club that we had weekly so we could review it because I could not look at the mathematics and determine what was flawed.

But they could, and they did and wrote a very strong letter to the editor regarding his mathematical miscalculation.

Q. Thank you.

Now the defense has suggested that the victim's subdural hemorrhage could have been caused by potentially intradural leakage. Is this a claim that is supported by the weight of the science right now?

A. No. It's not a claim that is supported by the majority of evidence. I think that we have learned over many decades and years more and more about anatomy and about the infant head and brain.

And there is a complex of blood vessels that supply the dura and the arachnoid and the brain and all of the tissues, and there have been a few reports that show that in certain situations usually with either fetal demise or in neonates, that microscopically when investigators look at the dura, which is the tough membrane just underneath the surface of the skull, they find red blood cells, and they postulate that's the subdural hemorrhage that is seen in cases of shaken

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baby syndrome or abusive head trauma, but in some of those cases it comes from those dural vessels that are leaking.

What they have not shown is that regularly you see a clinically significant or even clinically apparent subdural hemorrhage in their cases, and when they find some amount of blood, it's usually in neonates and fetuses, and we know that neonates commonly have some subdural hemorrhage usually a-symptomatic usually right in the back of their head from the trauma of birth.

Alternately because we now have more sophisticated MRI's, neuroradiologists are finding evidence of torn dural bridging veins in some MRI's of infants who sustained abusive head trauma and/or shaken baby syndrome.

So they can see what they call a lollipop sign or a tadpole sign, kind of a blood vessel and then a little blob of blood indicating that there has been a torn bridging vein leading from the brain to the sagittal sinus and to empty the head.

And sometimes when subdurals are significant enough and neurosurgeons have to go in and evacuate blood, which is not very often but they sometimes do, they sometimes see torn bridging veins.

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So I believe that torn bridging veins are the more common cause of bleeding in the subdural space in infants who have abusive head trauma, and I would not ever discount that you can't have some microscopic bleeding in other places.

But I would also question why we would have microscopic bleeding in only the subdural space and not microscopic or other bleeding in the spaces that would be more common, especially in these very young infants like in the intraventricular space, for example.

Q. So just to make sure that I understand. The intradural leakage theory is based on neonates and fetuses; is that?

A. Mostly. They include on occasion a few older infants, but most of the subdurals that are visible in those few studies that are done are seen in newborns who are less than five days old or in fetuses. Or sometimes you can see in some of their subdurals in babies who have overwhelming septus, newborns, premature infants with overwhelming septus.

I don't know anybody who would confuse shaken baby syndrome or abusive head trauma with overwhelming septus in a 25-week old premature infant.

Q. Now you were talking about how these bleeds that are found in these children are usually microscopic. Now

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would 15 cc's of blood constitute microscopic?

A. No. 15 cc's of blood is about a tablespoon of blood in babies who are victims of abusive head trauma, infant babies. Depending on the mechanism we can see significant volumes of subdural blood, but most of the time it's just a thin layer of subdural blood. And in clinical medicine we don't quantify how many cc's of blood there are because we're looking at MRI's and Cat Scans, and we can't calculate cc's by doing that.

Sometimes we can look at how many millimeters there are, but in many of the cases, and surely in my experience we see just a thin layer of blood, and that thin layer or blood sometimes goes all along the cortex. Sometimes it's on both sides of the head. Oftentimes it will settle toward the back of the head, but it's not usually an amount of blood where a neurosurgeon would go in and operate and take out the blood.

Although those cases do exist, really that blood for us is generally thought of as a marker for significant rotational injury to the head. Just as subdural blood in older children and adults are also usually a marker of significant rotation injury of the head.

Q. Now this intradural leakage theory, when was it

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originally created or written about?

Do you know offhand?

A. Now I don't remember the year that I think Doctor Geddes was the first one to publish a series of three different papers, first looking at kind of macroscopic -- I'm sorry. Intradural hemorrhage. So, I am sorry. I was talking about Doctor Geddes and hypoxia.

But intradural hemorrhages I think and probably within the last ten years or so, but I don't remember. I don't know if you are talking about Doctor Mack's paper or others, but I don't know the exact year but fairly recently.

Q. All right. Now among the physicians who actually treat patients, how widespread is the acceptance of shaken baby syndrome and abusive head trauma?

MR. LICHSTEIN: Your Honor, objection. If I can just ask to clarify which of those two.

THE COURT: Sure. I agree.

Rephrase if you would, Mr. Hebel.

BY MR. HEBEL:

Q. I was actually asking about both separately, but I can break them down into separate questions.

THE COURT: That would be helpful.

BY MR. HEBEL:

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Q. Among the physicians who actually treat patients, how widespread is the acceptance of abusive head trauma first?

A. I think it's incredibly widely accepted, and there was a recent study that was done to look specifically at whether or not shaken baby syndrome and abusive head trauma are widely accepted phenomena and diagnoses, and the researchers sent out surveys to hundreds and hundreds of doctors at the ten, I guess top ranked or rated children's hospitals in the country.

They asked emergency medicine doctors, neurologists, neurosurgeons, opthalmologists, critical care doctors, child abuse doctors, and they also asked the pathologists associated with those children's hospitals whether they thought that subdural hemorrhages were likely, very likely, likely, unlikely, very unlikely to be the result of shaking or abusive head trauma.

They looked at retinal hemorrhages. Also looked at what they defined as potential fringe theories for causation of subdural hemorrhages, retinal hemorrhages, anoxic brain injury in addition.

And then they also asked do you think that shaken baby syndrome is a valid diagnosis? Do you think abusive head trauma is a valid diagnosis? Are

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you unsure, or do you disagree that they are valid?

And then they published their results I think it was last year in JAMMA, in the Journal of The American Medical Association Pediatrics. I think that's where it was published. And they found that of all those different physicians, and there were probably 600 or so, I don't remember the exact number that more than 90 percent, and if look at --

Q. I'm going to interrupt you for just a moment and say for the record we are referring to the Defense Exhibit Number 27, which is the article by Sandy Narang regarding the study.

A. Yes. I apologize. It was in the Journal of Pediatrics not in JAMMA Pediatrics. So in the Journal of Pediatrics, another excellent journal, they found that the validity or that specialists thought that abusive head trauma was valid somewhere between 88.5 percent and 100 percent of specialists.

And then when they asked about -- and a grand total of one, two, three, four, five, six doctors out of hundreds said that abusive head trauma was not a valid diagnosis. And when they looked at shaken baby syndrome whether that was valid, the percentage of doctors who said yes ranged from 97 percent down to 40.7 percent, and the outliers for that were

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pathologists. Only 40.7 percent of pathologists felt shaken baby syndrome was valid, and neurosurgeons who thought, 76 percent of neurosurgeons thought it was valid. But again of those pathologists 11 said it was valid. Eight were not sure, and then eight said no.

So more doctors said that shaken baby syndrome, more pathologists said shaken baby syndrome was valid, or they weren't sure and said no, it wasn't a valid diagnosis. And overall more than 95 percent of the doctors who were surveyed recognized either shaken baby or abusive head trauma as a valid diagnosis.

I would be happy also to talk about the fringe diagnosis that they asked about.

Q. We'll to get that. But I also want to ask what percentage of pathologists said that they thought abusive head trauma was valid?

A. 92.6 percent.

Q. What percentage of neurosurgeons said that they thought abusive head trauma was valid?

A. 100 percent.

Q. Now you mention fringe theories. And in this article what did it discuss as fringe theories, and what is a fringe theory?

Let's start off with that.

A. Well, you know, I think in research it's really always

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important and helpful to define kind of what you're going to look at before you actually ask the questions. Okay.

So these authors defined fringe theories as fringe opinions as ones in which less than five percent of the respondents thought that a given mechanism for a finding as likely or very unlikely.

So if less than five percent ascribed to yes, I believe that this happens, that's how they define a fringe theory. But they defined it as such before they send the surveys out and before they looked at the results of the survey because that's the way you should reliably do research.

So if, for example, they said if less than five percent of doctors said shaken baby syndrome was a real diagnosis than not, they would have called it a fringe theory because less than five percent of the doctors would have said that yes, I think that this is valid.

So they did ask about some alternative causation and whether doctors felt that certain things could cause subdural hemorrhages, retinal hemorrhages or comas or death.

So, for example, when they asked whether vaccines could cause subdural hemorrhages, zero percent

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said likely or very likely. So when they asked whether subdurals --

Q. So zero percent saying it was likely or that with the zero answer, that's less than five percent. So that would be categorized by this article as a fringe theory; is that correct?

A. Correct, because again they defined a fringe theory as something that less than five percent of doctors would agree that, you know, was causative.

So for subdural hemorrhages when asked whether or not Vitamin D deficiency would cause subdural hemorrhages, 2.3 percent of doctors agreed that it was likely or very likely, again their definition of a fringe theory.

When they asked whether choking could cause subdural hemorrhages, 2.7 percent said or maybe Vitamin D was 2.3 percent, but choking was 2.7 percent of doctors thought it was likely or highly likely that subdural hemorrhages were caused by choking.

And four percent thought that subdural hemorrhages was likely or very likely to be caused by hypoxia. When they looked at vaccines, zero percent thought that retinal hemorrhages were related to vaccines. 0.8 percent thought Vitamin D deficiency would be related to retinal hemorrhages. 3.2 percent

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said it was likely or highly likely that short falls would result in a retinal hemorrhage. And when they looked at coma or death, 0.6 percent of doctors felt that Vitamin D deficiency would be likely or highly likely to result in coma or death. That one percent felt that it was likely or highly likely that things would result in coma or death.

And then when they asked the alternative, when they looked at unlikely or highly unlikely, when they looked at subdurals, 3.2 percent of the doctors felt that shaking with impact would be unlikely or highly unlikely to cause subdural hemorrhages.

So that would be a fringe theory.

That shaking with impact or shaking with no impact only between one and two percent of doctors thought that that would be highly unlikely that shaking with or without impact would be unlikely to cause retinal hemorrhages, and less than five percent thought that shaking or shaking with impact unlikely or highly unlikely to cause coma or death.

Those were --

Q. I'm going to interrupt you because we missed the very last one. There was a glitch in the sound, and you were about to say shaking without impact. What percentage felt that shaking without impact was

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unlikely to cause subdurals?
A. Unlikely to cause subdurals?
Q. Was that the area we were reading?
A. No. I was looking at -- they don't have that. But they have shaking with no impact. 3.7 percent of doctors felt that coma or death would be unlikely or highly unlikely with shaking without impact. Again and they defined a fringe theory before they sent the surveys out and before they looked at this data.

So they defined it as I would say apriority. This is how we're going to define a fringe theory, something that less than five percent of doctors ascribed to.

And I'll say that in the records that I recorded for Nakita Lemons, that some of these fringe theories were postulated and hypothesized and authored by defense experts in this case. They were all considered fringe theories by asking hundreds and hundreds of doctors who work in multiple subspecialties across many of the leading children's hospitals in this country, including pathologists.
Q. Now aside from the study you try to stay up-to-date on medical and scholarly literature; correct? You're also a reviewer in several peer journals or peer review journals, my bag?

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A. Yes.
Q. And in your personal opinion from your experiences does the weight of the scholarly literature currently support or oppose the diagnosis of abusive head trauma?
MR. LICHSTEIN: Your Honor, I guess I would object?
THE COURT: Hold on, Doctor.
MR. LICHSTEIN: I would object to the form of the question. It doesn't specify what the medical literature is. What literature are we talking about, pediatric literature? Pathology literature?
THE COURT: I think that's a good point.
If you would, Mr. Hebel, rephrase your questions so we have specificity.
Go ahead please.
BY MR. HEBEL:
Q. Now when discussing specifically the peer review literature regarding topics in child abuse, now this can encompass your understanding of the biomechanical literature, your understanding of the pediatric literature and neurosurgery literature and all the literature that you have seen on this topic. Does the weight of that literature currently support or oppose the diagnosis of shaken baby syndrome?
A. I think it supports the diagnosis of shaken baby

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syndrome, and I think it supports a diagnosis of abusive head trauma. That these are real problems that exist and that cause injury to infants and children.

Q. Now the defense has claimed specifically that shaken baby syndrome is an unproven hypothesis; is that accurate?

A. No. I think that there are hundreds and hundreds of articles with enormous amounts of empirical evidence that supports that babies are shaken and that they sustain injuries from their shaking, and they sometimes sustain severe or sometimes fatal injuries from shaking.

Q. Now the defense also claims that the AAP replaced retinal hemorrhages with spinal injury in the paper where you introduced the term abusive head trauma; is that accurate?

A. That's not accurate. Would you like me to expand?

Q. Absolutely. Please explain.

A. Okay. So I think that there is much writing and talk about a diagnostic triad of subdural hemorrhages, retinal hemorrhages and encephalopathy as a diagnostic Trifecta for diagnosing abusive head trauma or shaken baby syndrome. Now I'll even stick with shaken baby syndrome.

And when I was a young doctor doing this

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work, I worked with a very well known pediatric neurosurgeon Tina Duhaime, who is a very good friend of mine. We collaborated for years, and she is just a very dear friend. She works up at Mass General now.

And we did a lot of work together. We were both training at the same time. We were both young doctors at the same time. We were doing some research together.

And I never felt or believed that -- well, first of all I never ascribed to a, like a triad that I looked at. It is true that the majority was, the large majority of, since you come in with abusive head trauma and terrible shaken baby, they do have subdural hemorrhages, and they do have retinal hemorrhages and they do have encephalopathy. But I never thought okay, they have these three things, therefore, they're victims on child abuse. Okay.

That's not the way medicine works. In fact in some of the earlier work that Tina Duhaime was doing in looking at kinds of, all the reasons for how likely is it that a child might be a victim of abusive head trauma, that research specifically didn't look at retinal hemorrhages to try to avoid any kind of circular reasoning.

And early on in my career I thought if you

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only look for retinal hemorrhages in infants who were possible victims of child abuse, then you would really set yourself up for a self-fulfilling prophecy.

So very early on I have always ascribed to looking at children broadly so any baby or any young child who comes in that I know of who has any intercranial bleeding, whether it is from a medical disease or accidental trauma or head trauma, I also ask the opthalmologist to do an eye exam.

So I have never considered retinal hemorrhages as part of any kind of triad. To me they're like a death supporting actor or actress. They are often there, okay. In the majority of cases they are there, but they are not always there, and I don't rely on any one finding or any three findings to make a diagnosis, even though there is such a strong association of those three things with abusive head trauma and shaken baby syndrome, especially in young infants.

But the way we make medical diagnoses is not by looking for a triad. It's by taking a history, doing a physical exam, looking for evidence on your physical examination of medical disease, looking for evidence of injury, doing laboratory tests looking for medical disease, doing laboratory tests looking for

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evidence of injury, doing radiographs and X-rays and Cat Scans and MRI's looking for evidence of injury, looking for evidence of medical disease.

And then when you do all of that, you put the data together, and you come up with a working diagnosis. That's how doctors make diagnoses every day in medicine, no matter area what field of medicine you're in. That's the way we make the diagnoses of child abuse.

So I believe that this triad that somehow substituted cervical or spine injury for retinal hemorrhages is not true because I never considered retinal hemorrhages as any part of any triad.

On the other hand, and I'm sorry I'm talking a long time. But on the other hand over the number of years that I have been working, and as MRI's have gotten a little bit more sophisticated, and as there were more pathology studies that I was aware of and participated in that showed that in a majority of severe cases and fatal cases there is evidence of some soft tissue injury or ligamented injury or blood in the upper or all through the spinal cord, I felt that that would be important to put as part of what we think about and look for in some victims of abusive head trauma.

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And there have been studies since I added that, that really support that in a majority, not universally by MRI because MRI's are getting more and more sophisticated, we can now see evidence of ligamented injury or soft tissue injury in the cervical and other parts of the spine.

So I didn't never substitute it one for the other. I simply kind of used my clinical approach and added what I thought would be important at the time to consider in making these diagnoses.

So I note that Doctor Galaznik has testified about what I was thinking and what I was doing, that's not true. Because as I say in my report he's never had a conversation with me about this very topic and why I would talk about or write about spinal findings and like not specifically write about retinal hemorrhages.

So that's kind of where that all comes from, and it's not a substitution.

Q. Thank you.

Now the defense claims a rather, let me specify. Three defense experts claim that Nakita died of either dysphagic choking or ALTE or a combination of both of these which caused asphyxia, and this was not induced by shaking. So to start off with, what is an ALTE, and is ALTE a current medical term?

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MR. LICHSTEIN: Your Honor, I object to the form of the question in that the theory testified to by the defense experts is not that the choking episode led directly to the subdural and the retinal hemorrhaging.

The theory that the defense experts testified to is that there was a choking episode and that led to hypoxic injury, and then there was a long period of CPR that contributed to raising the venus pressure.

So I ask that the question be targeted to what the defense' theory actually is rather than something else.

THE COURT: Response?

MR. HEBEL: My memory of Galaznik's testimony is that it was specifically dysphagic choking and ALTE which caused asphyxia which caused the other symptoms. But I believe that the record in this case speaks for itself. What I will do is I'll ask two questions.

THE COURT: Okay. Go ahead.

BY MR. HEBEL:

Q. The first question is it is the defense' claim as I seem to understand that Nakita of dysphagic choking and an ALTE which caused asphyxia and eventually hypoxia that was not induced by shaking.

So what is an ALTE, and is it a current medical term?

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A. I will try to break this down. So an ALTE or an ALTE was a term that was used in the past to describe episodes usually in young infants where a family member perceived that the child had a sudden change that was life threatening that maybe they turned pale.

They stopped breathing. They turned colors. They turned a little blue, and those children were admitted to the hospital or brought to a hospital for medical evaluation.

And in the vast majority of cases of what has long been called, although it is no longer called ALTE, the vast majority of children are perfectly healthy children. The majority of them have what we call gastroesophageal reflux.

If there is a diagnosis, that's probably the most common one where just some formula kind of comes up from the stomach. They don't have great ability to kind of increase the pressure in their lower esophagus. So formula comes up and kind of causes symptoms. They may choke. They may vomit. They may just kind of sputter a little bit.

There are some children who have an ALTE who actually do have underlying medical diseases, but ALTE's at the end of the day were a really very benign event, except for the children where you can identify

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some significant underlying medical disease.

The vast majority or almost all babies outgrow gastroesophageal reflux, and 99 percent more of babies who have episode of an ALTE grow up to be fine healthy children, and the ones who die after an ALTE are generally those babies who have underlying severe kind of neurologic or other medical conditions that kind of cause them to stop breathing.

Because the workup when babies would come to hospital with these events was so variable, the American Academy of Pediatrics in the last few years real tried to look at, you know, kind of what's the best evidence, when is it safe not to even work these babies up and changed the terminology because they really felt that life-threatening in the ALTE, in the acute life-threatening event, they weren't really life threatening.

So now they call them like brief, I even know what brue stands for, B-R-U-E, but it's like brief unexplained episodes where they just kind of, they are scary to parents, but they're not dangerous to the baby, and the babies are fine.

And then for children who don't meet certain criteria, then we do a little bit more of an evaluation.

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So the bottom line is ALTE's are incredibly common in babies. There are incredibly common. I see them all the time. We evaluate babies, and the vast majority of them are fine.

The leading diagnosis in those cases if there is a diagnosis is just some reflux, and reflux can improve just as babies get older.

Just like in Nakita's case. She had two episodes. Then she didn't have any further episodes. That would be very common for a baby who had some possible g-reflex or an ALTE.

So that's the ALTE question that you asked.

If you want it about dysphagic choking, you have to re-ask the question. I don't remember what it was.

Q. My next question is can dysphasic choking cause the symptoms that were discussed?

A. That were discussed in this case?

Q. In this case, yes, with this victim.

A. No, I do not believe so. And as I mentioned in my report I literally searched through Pub Med, which is the NIH, Medical Literature Data Base, and I put in my key words, dysphasic choking in infants.

I came up with two articles. One is a case report that was written by Doctor Barnes and his

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colleagues. I think there's some others in this case, and the other was a larger study testing the hypothesis that dysphasic choking would lead to subdural hemorrhages and retinal hemorrhages, et cetera.

I believe that the case report written by Doctor Barnes about dysphasic choking left out or omitted important data that would have anybody who read it come to a different conclusion than what the authors intended the reader to come to a conclusion about.

Specifically they omitted the fact that the baby had a healing rib fracture at the time of the baby's death, and that their case report that suggests that the baby just choked on formula, developed hypoxic injury, then subdural hemorrhages, maybe retinal hemorrhages and then had acute rib fractures from CPR, which kind of supported their theory that dysphasic choking was the cause of this baby's death is not supported by the vast, vast majority of other literature that looked at babies who do have asphyxiation.

We'll talk about that in a little bit. But that if they had included the fact that the baby also had a healing rib fracture, that very few people would read that article and say, you mean the baby had subdural hemorrhages, retinal hemorrhages, acute and

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healing rib fractures, and this is supposed to, how do you explain old injuries to the baby? Rib fractures are not common in infants. They are rather uncommon in infants.

And so I think that when somebody publishes a case report, a single case where they are suggesting that is an alternative theory, or they want to highlight that this is an important compo physiologic mechanism, is it critical to be honest and to be complete in the information that is provided.

And the authors knew that trauma was the diagnosis in this case, but they chose to leave out some evidence of trauma from this case report, and I think that that is dishonest, and so I would have difficulty with that case report.

Now there is another study by some pediatricians in Kansas City that actually took Doctor Barnes' case report and asked the question does dysphasic choking explain the subdural hemorrhages and retinal hemorrhages that we see in infants who come in with what he believe is traumatic injury.

So what they did -- may I refer to my report just for a minute, Mr. Hebel, so I make sure I'm --

Q. If that will refresh your recollection, yes.

A. Okay. So what they did is they looked at whether

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dysphasic choking or ALTE results in the development of subdural hemorrhages.

So they compared the prevalence of extracranial injuries in a group of children who had ALTE-associated subdurals, meaning that they had subdural hemorrhages identified in the hospital. And in the medical records there was a report that they had an ALTE or that they choked or that they did something like that.

Then they compared those to the other cases where there was subdurals without a history of ALTE or choking, and their hypothesis before they looked at their data, was that if ALTE dysphagic choking was the legitimate cause of subdural hemorrhages, then they would expect to see many fewer other injuries in those babies who presented with choking than in the babies who presented with non-choking subdurals.

Because most subdurals are traumatic in nature, and we see these a lot in abused babies. And in many of these babies there are additions to the brain injuries and retinal hemorrhages. There may be other injuries to the baby.

So they looked at the like ALTE babies versus none ALTE babies to see if there was a difference in how often they had other injuries. And what they

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found, and if ALTE was the cause of the subdural, don't expect to find other injuries on the baby, if the baby simply choked and then got hypoxic and then developed a subdural.

But what they found were that babies who had ALTE-associated subdurals were five times more likely to have other injuries than babies who had none ALTE associated subdurals.

And so in the ten babies who had a dysphasic choking type ALTE history, all of them had at least one suspicious extracranial injury. So their conclusion was that ALTE's were not supported as a causative mechanism of subdural hemorrhages, retinal hemorrhages or encephalopathy and that their findings were actually the opposite of what you would expect if the choking, dysphasic ALTE hypothesis were true, because those babies simply had more severe injury.

They had more injury than the babies who didn't have that hypothesis which is, I believe, what you see in this case as well.

Q. Now the defense just a few minutes ago brought up the idea that perhaps the baby stopped responding after choking and an ALTE.

MR. LICHSTEIN: Your Honor, I object to the characterization. If you look at the report of the

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defense experts in this case, they are very clear.

THE COURT: Let me hear the question first before I hear an objection.

BY MR. HEBEL:

Q. As the defense was just saying before we got into this topic, that perhaps the infant, the victim here, started choking or had an ALTE or some sort of asphyxia that resulted in hypoxia and resuscitative efforts, and those resuscitative efforts were responsible for the intercranial injuries that we see.

Is that a possibility in this case?

A. I do not believe that that is what happened in this case. We see lots of babies unfortunately who come in with hypoxic-Ischemic or asphyxial injury. Hypoxia means low oxygen. Ischemia means poor blood flow, which, of course, if you have no blood flow, you can't deliver oxygen. Asphyxia means lack of oxygen basically.

We see lots of babies who come in with arrest from those problems, and many of them get resuscitated and then survive for some time. Sometimes they survive, and sometimes they survive and then die. And in those cases, and this has been studied. We do not see clinically significant, we do not see on our scan subdural hemorrhages.

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In the babies who suffer from shaken baby syndrome and abusive head trauma, what we typically see is this. On their first image, when is often a Cat Scan because a Cat Scan is something that you can do very quickly when a baby is in dire condition.

An MRI can take an hour or more. You can't leave a critically ill baby in a MRI machine for an hour or more when they first come into the hospital.

So most of these babies have an initial Cat Scan. And what we see on the initial Cat Scan is some blood, and the brain may or may not start looking a little bit bad like there has been damage and hypoxia, although the baby is comatose. So we can see the baby is not doing well and has had a some global brain injury.

You don't see the hypoxia. Very often you don't see it on that initial scan. You see the bleeding, but you don't see evidence of the hypoxic injury. That begins to develop in many cases over the course of the next 24 or 48 hours, and by MRI we can really see this in more subtle ways.

There have been studies that have looked at babies who died of known asphyxial causes. We see babies who drown in bathtubs; right? They're asphyxiated. They are trying to breathe against water

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in a closed lotis. They may have kind of obstructive apnea and hypoxic-ischemic injury.

When babies drown, and they get resuscitated, and you do a Cat Scan or an MRI, or they die, they don't have subdural hemorrhages.

We see babies who are smothered by other people. So their parents overlay them. They sleep on top of them for an extended period of time. They wake up, the baby is blue and dying or dead, and they get resuscitated. They have subdural hemorrhages.

And there was an article that was published in 2010 that specifically asked whether there was a causal relationship between hypoxia-ischemia associated with cardiac arrest and resuscitation and some hematoma.

They looked at --

MR. LICHSTEIN: Your Honor, I guess I would object at this point. If the witness is reading something, I'd like to know what it is.

THE COURT: Okay. I think that's fair. I'll allow the doctor to continue.

But, Doctor, are you referring to a specific article that you're looking at?

WITNESS CHRISTIAN: I am, your Honor, and unfortunately this particular article wasn't included

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in my reference list of more than 50 articles simply because I forgot about it until recently, but it was an article whose lead author was Mr. Hurley, H-U-R-L-E-Y published in the British Journal of Radiology in 2010 and entitled, "Is there a causal relationship between the hypoxia-ischaemia associated with cardio respiratory arrest and subdural hematomas, an observational study." And I'm trying to look at the total number of children that were included.

MR. LICHSTEIN: Your Honor, excuse me, Doctor. I didn't mean to interrupt you.

At this point I'm going to object the testimony about an article that wasn't included in the report, was not provided by the prosecution for the hearing.

THE COURT: All right. I'm going to allow it. What we will do is we'll make that article available, and if as a result of that article there needs to be additional questioning of the witness, we'll see that that happens.

MR. LICHSTEIN: Thank you, Judge.

THE COURT: Okay. Sure. You bet.

WITNESS CHRISTIAN: I'm sorry.

Am I supposed to stop, or I am supposed to continue?

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MR. HEBEL: You can go ahead and relate to us about that article.

WITNESS CHRISTIAN: So there were 50 children who were included who had cardiac arrest and had resuscitation and then either survived or died.

So 43 died and then also had post-mortem examinations. And in those 50 children who had cardiac arrest, resuscitation, lived a little bit, got imaging or autopsy, none of them had a significant and clinically apparent subdural hemorrhage.

One child has a small clot adherent to the dura at post-mortem finding, and two had microscopic intradural hemorrhage, but it was unclear whether they were artifacts as each had otherwise small brains.

So these researchers in England specifically tested the hypothesis of whether hypoxia-ischaemia, cardiac arrest, resuscitation resulted in young infants.

They were infants zero to 39 months, and 40 of the 50 were less than six months of age, and none of them had clinically significant and subdural hemorrhage. And that agrees with what I have seen over 30 something years of clinical practice. That yes, babies suffer terrible hypoxic-ischemic encephalopathy from asphyxia, from many different causes, but they

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don't develop significant or even visible subdural hemorrhages from that.

So again that's a hypothesis maybe, but it is but it is not an in-clinical experience and in-clinical research.

BY MR. HEBEL:

Q. One of the defense' experts claimed that the acromion fracture could be related to CPR or rickets. Is that possible?

MR. LICHSTEIN: Objection, your Honor. There has been nothing in the testimony about the doctor's qualifications that she's a radiologist. She has the certification in radiology. I would object to any specific testimony about that fractures.

I understand she used that to support her opinion in this case. I don't have a problem with that, but the specific characteristics of her independent diagnosis I don't think would establish her qualifications to do that.

MR. HEBEL: If I may respond, your Honor.

THE COURT: Please.

BY MR. HEBEL:

Q. Doctor Christian, in your experience do radiologists diagnose and treat fractures?

A. The radiologists diagnose fractures. They don't treat

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fractures generally.
Q. Who would treat a fracture?
A. Usually, well in some cases a general physician might, a pediatrician might, depending on where they practice, but very commonly an orthopedist might or some fractures don't need specific treating. They actually, depending like, for example, rib fractures there is no specific treatment. They just heal by themselves. Same for most acromial fractures, they just heal.
Q. So have you been in a position where you have diagnosed or treated fractures in the course of your job as a child abuse pediatrician?
A. Many, many, many, times. Many. I can't even count how many times. There is probably thousands of time.
MR. HEBEL: The People will ask to renew that question.
MR. LICHSTEIN: Your Honor, I guess I renew the objection. The fact that she's diagnosed or treated a fracture does not make her qualified to read scans and interpret them. We have had radiologists testify. The state called one. The defense called one, and additional testimony by someone who is not qualified to do that specific interpretation isn't going to be helpful.
THE COURT: Well, whether it's helpful or not

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I think that the question boils down to the way the question was formed. I'm going to sustain the objection to the form of the question.

I think in terms of the doctor's qualifications as an expert in child abuse and her work in that area, I think that she can certainly testify as to whether or not she saw any evidence of rickets at all in her examination of the totality of this particular case.

I think it has to be in that form as opposed to her radiographic readings.

MR. HEBEL: All right. Thank you, your Honor. I did not realize I was asking about the radiology, but I will confine it to those terms.

BY MR. HEBEL:

Q. So, Doctor Christian, in your examination of the totality of this case and all the information that you were given that as child abuse pediatrician you would commonly review in the course of your work, do you see any evidence of rickets?

A. So rickets is a diagnosis that is made by radiographic appearance and laboratory data and clinical data. I have seen many children in the course of my career who actually have rickets. I have done research on rickets and fractures in abused and accidentally injured

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children because of the hypothesis that low Vitamin D and subclinical rickets is explaining all of the fractures we see in abused infants and young children.

I in reviewing this case did not see any evidence of rickets. There is no physical examination findings that were recorded or reported that suggested rickets. The baby's calcium level was 9.3 when she first came into the hospital, I believe. It went a little bit low to 8.1 at some point. Again I don't remember which was which, but her alkaline phosphate was normal for an infant her age.

And usually when it's the first sign of clinically significant rickets isn't significant elevation in the alkaline phosphate level. Her alkaline phosphate level was normal. And I reviewed all of her X-rays, and there was no evidence of rickestic changes in the metaphases of her lung bones in the areas where we would tend to see rickets, and I don't believe that many pediatric radiologists would have seen any evidence of rickets in this baby, and finally I get another --

MR. LICHSTEIN: Objection, your Honor.

THE COURT: I'll strike that portion of what the radiologist might or might not have found.

MR. LICHSTEIN: Thank you, your Honor.

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THE COURT: I'm just taking Doctor Christian's findings from a clinical perspective.

MR. LICHSTEIN: Fair enough. Thank you.

THE COURT: Go ahead, Mr. Hebel.

BY MR. HEBEL:

Q. You can continue just from you own findings not from what you would expect from another.

A. Thank you. I apologize.

I also did Pub Med search, the NIA medical data base looking for any articles that referred to rickets and acromion fractures in infants, and I found zero. There were no results that matched any such terms. And I looked for any articles on acromion fractures and CPR, and likewise I could not find in Pug Med any association or any article that addressed acromion fractures from CPR.

So an acromion fracture is an unusual fracture. It is associated, strongly associated with child abuse. I have seen acromion fractures in my career in abused children, and I personally don't recall seeing an acromion fracture in an infant with other accidental trauma, although they can be associated with severe metabolic bone disease or severe prematurity, which are not an issue in this case.

Q. Now as a child abuse pediatrician, you had the

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opportunity to work in numerous shaken baby cases and child abuse cases; correct?

A. Correct.

Q. And during the course of your work as a child abuse pediatrician, you have been provided with admissions or confessions and statements from different defendants in shaken baby syndrome type cases; correct?

A. Correct.

Q. In this case were you provided with the defendant's confession?

A. Yes.

Q. Now in your personal experience does the defendant's confession share any commonality with the other confessions or admissions that you have seen from other shaken baby syndrome defendants?

MR. LICHSTEIN: Objection, your Honor. Relevance of other confessions and other cases that she's diagnosed, I don't see it.

THE COURT: Mr. Hebel, let me say this. I do think that if you want to make inquiry as to what extent, if any, the defendant's statement to the police played a part in her formulating an opinion.

But I think in terms of, you know, weight of the statement or how it compares to other cases or hundreds of other cases, I really don't think that has

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a bearing on this particular matter.

I think if you want to, as I said, if you want to make inquiry about that, that's fine.

Let me see both sides at side bar for just a second.

(Sidebar conference off the record).

BY MR. HEBEL:

Q. Doctor Christian, what role, if any, did your review of the defendant's confession play in your opinion in this case?

A. I believe that it supports the diagnosis of shaken baby syndrome, and in this case, and even without the confession if I were looking at the medical information, I would have concluded that the baby was a victim of abuse and abusive head trauma, as she had unexplained subdural hemorrhages, retinal hemorrhages, with those injuries and had additional acromion fracture and a couple of minor scrapes which I just note. They are not expected in a two and a half month old infant.

But this baby had an unusual specific fracture and head trauma. But the confession, and in fact the statements that were made, were made before, they were made repeatedly and before anybody even interviewed the defendant.

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He made statements about --

MR. LICHSTEIN: Objection.

THE COURT: Hold on, Doctor.

MR. LICHSTEIN: I would object to any testimony.

MR. HEBEL: Sorry about that, Doctor.

MR. LICHSTEIN: I would object to any testimony about specific evaluation of the reliability of the statement by the doctor. She's getting into why she thought the confession was actually something she should use, and finally her stating as she did that the confession supported her diagnosis. But getting into the specifics of it I think is beyond her expertise.

THE COURT: Well, I really think it's more, it really goes more almost to sort of a state of mind kind of statement as what I'm talking it for in terms of why the doctor chose to give some weight, if any, to that particular statement.

So I'm taking it in that context.

Doctor, you can finish your answer.

Go ahead.

WITNESS CHRISTIAN: Thank you.

So before Mr. Lemons was even interviewed, he repeatedly mentioned having shaken the baby. Maybe he said initially that like to revive her.

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And there have been studies that looked at back in the 1990's, Pettler and Green looked at how often do parents come and say they shook a baby to resuscitate the baby in medical cases or accidental trauma and child abuse cases, and they only found that people claim they shook to resuscitate in child abuse cases.

So it's not something that most parents would say in a hospital setting that oh, I worry if I shook baby too much. But then when he was meeting with the investigators, and he did provide his confession, his confession is similar to many other confessions and, and the most common --

MR. LICHSTEIN: Objection.

THE COURT: I'll discount that.

Thank you, Doctor. I just want to confine it to what extent you just gave credit to the statement of the defendant, and we are not going to compare it to other statements in other cases.

Okay. All right. Thank you.

BY MR. HEBEL:

Q. Now, have you diagnosed children in other cases who have subdural hemorrhages, retinal hemorrhages and encephalopathy but then found that they were not cases of shaking or abuse?

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A. Absolutely. And the word encephalopathy is a long word, but yes, I have made alternative diagnoses in children who presented with those features, with those findings.

Q. Now you looked at the autopsy report, the medical records, the radiology and the testimony and other evidence in this case.

Is there another non-traumatic diagnosis that explains the death of Nakita Lemons?

A. I do not believe so.

Q. And in your professional opinion did Nakita Lemons die from shaken baby syndrome, subset of abusive head trauma?

A. In my opinion she did.

MR. LICHSTEIN: Your Honor, I guess I would ask that we have some clarity about what mechanism of injury we're talking here. Shaken baby syndrome, subset of AHT is very vague as to what the mechanism is.

The mechanism testified to at trial was shaking. If we're going to do a diagnosis, we need to know what mechanism of injury we're talking about.

THE COURT: Response?

MR. HEBEL: My response is I will ask follow-up questions to make that crystal clear.

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THE COURT: Okay. That's fine.

BY MR. HEBEL:

Q. When shaken baby syndrome is diagnosed in your opinion, that should constitute the damage caused by shaking; correct?

A. Correct.

Q. So in this case in your professional opinion Nakita Lemons died because she was shaken?

A. Correct.

MR. HEBEL: No further questions.

THE COURT: All right.

MR. HEBEL: Was your answer not complete, the delay.

WITNESS CHRISTIAN: Well, I just wanted to say that she was shaken, and then all of the consequence that happened from that trauma to her brain. Absolutely. So, hypoxic-ischemia is part of that. That's more the physiology, but the mechanism was that she was shaken. That's what Mr. Lemons said happened, and the findings were consistent with that, and I didn't see any evidence of other medical disease.

And the other alternative hypotheses are not ones that I believe are supported by clinical experience or research.

MR. HEBEL: Thank you, Doctor.

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THE COURT: Good morning, Doctor Christian.

Just for the record I would remind you, you're still under oath.

Okay?

WITNESS CHRISTIAN: Not a problem.

Thank you, your Honor.

CINDY W. CHRISTIAN,

CROSS-EXAMINATION

BY MR. LICHSTEIN:

Q. Hi, Doctor Christian.

A. Good morning.

Q. Can you hear me okay?

A. I can.

Q. Good. Just let me know if you can't.

A. Okay.

Q. One bit of housekeeping. First, I want to make sure we get your report into evidence. You did provide a report to Mr. Hebel; is that correct?

A. I did.

Q. The version that I received didn't have page numbers. So I've added page numbers.

Mr. Hebel, do you have a copy of it with page numbers, or do you want me to give you one?

MR. HEBEL: I do, yes.

BY MR. LICHSTEIN:

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Q. Doctor, does your version have page numbers on it?
A. No, but I put in little page numbers on the bottom as you speak.
MR. LICHSTEIN: So, your Honor, I would like to move this into evidence. We got a sticker on it. Do you want me to provide the stickered copy to you?
THE COURT: That would be great.
According to my record we're up to 31.
MR. LICHSTEIN: That's what I have.
MR. HEBEL: For the record the People don't have any objection.
THE COURT: All right. You're moving for its admission?
MR. LICHSTEIN: We are, your Honor.
THE COURT: All right. Defense Exhibit 31 will be received.
BY MR. LICHSTEIN:
Q. Just let me know when you're done, Doctor.
A. I'm done.
Q. Okay. I want to start with some general observations you make in your report about the scientific research on the shaken baby syndrome.
You write in your report that "medical skepticism and scientific debate are important in order to advance medical knowledge, patient treatment and

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public health prevention?"

That's at page 13.

Do you agree with that?

A. I wrote it. I agree with that.

Q. Would you also agree that few pediatric diagnoses in general have much debate as SBS, AHT?

A. I believe I wrote that previously. So yes, I think it does engender a lot of debate.

Q. And you will also agree that the scientific issues at stake here are very complex and not completely understood; right?

A. It depends on what specific issue you were talking about. So in general I think there are many things that are not completely understood, but there are things that are understood. So I think it would be dependent on what the specific issue was.

Q. Did you write in your report "our knowledge about the infant brain is incomplete?"

A. Yes, that's true. I mean scientifically there's a lot more that in the next 10, 20, 50 and 100 years we will learn about the infant brain, 200 years.

Q. Okay. Did you also write at page 13 "the response to injure in the developing infant brain is only partially understood?"

A. That's correct.

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Q. And did you also write "there is much to learn about mechanisms, pathophysiology and treatment of infant head trauma" at page 13?
A. That's correct. I did write that, and it's correct.
Q. Do you also agree that the identification of an abused infant presents challenges?
A. I think the identification of an abused infant can present many challenges, which I probably listed, and I've written about before.
Q. And at page 13 you said there is no single or simple test to determine the accuracy of a diagnosis of abuse; right?
A. Just show me exactly where I wrote that. Page 13?
Q. Yes.
A. Yes. There is no single or simple test to determine the accuracy of the diagnosis. That's true.
Q. Thank you.

And also at page 13 the injuries from abuse overlap with injuries from accidents and medical diseases; right?

A. Yes.
Q. Would you also agree, Doctor, that diagnoses of abuse are sometimes wrong?
A. Yes. I think on occasion diagnoses of abuse are sometimes wrong. I think there is literature that

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shows that there are medical diseases that have sometimes been confused or interpreted as being from abuse.

I think sometimes accidents and abusive injuries are difficult to sometimes differentiate. Absolutely.

Q. Okay. And you would agree that there are valid criticisms of the SBS, AHT theory?

THE COURT: Can I ask let's not use the abbreviations for my court reporter's benefit but more particularly for mine. Okay.

BY MR. LICHSTEIN:

Q. Sure. Let me restate that.

Doctor, do you agree that there are valid criticisms of the theory of shaken baby syndrome and abusive head trauma?

MR. HEBEL: I'm going to object to the scope of the question that valid criticisms is nebulous, and as the defense has often done, I would ask that they specifically either use abusive head trauma or shaken baby syndrome.

MR. LICHSTEIN: I can rephrase, your Honor.

THE COURT: Okay. Fine. Thank you.

Go ahead.

BY MR. LICHSTEIN:

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Q. Doctor, do you agree that there are valid criticisms of the shaken baby syndrome theory?
A. So I don't think of shaken baby syndrome as a theory. I think of it as a mechanism by which babies can sustain significant head injury. I think that there are some reasonable criticisms of the literature regarding shaken baby syndrome, but I do not kind of agree that shaken baby syndrome is a theory.

So part of your answer I don't agree with.
Q. Okay. I appreciate that clarification.

But you do agree if I heard your correctly, that there are some valid criticisms of the research support for shaken baby syndrome?
A. There are some, but I don't think it negates the research that has been done in countries around the world many times or that this is a real diagnosis and a real mechanism by which infants are injured.
Q. Am I correct that there have been hundreds of studies in various scientific journals about the shaking diagnosis since 2005?
A. I don't know the number. I mean there is always medical research that is published. I don't know the exact number.
Q. Have you previously written that there have been hundreds of peer-reviewed articles about child

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maltreatment, infant head injury and so forth?
A. Well, that's true there have been. Again, I don't know the context, and I don't know what article you're specifically referring to or in what context I may have written that, but there are hundreds of articles that, you know, every month there might be articles in different journals that are written about child maltreatment, child abuse, abusive head trauma in lots of publications.
Q. So there's a lot of peer-review literature on that?
A. There is.
Q. And is it fair to say that some of the research since 2005 has been significant enough to alter the scientific community's understanding about the medical aspect of child maltreatment?
A. I would ask you to be specific about what articles, but I think overall there are articles always published that help inform us and advance us in our understanding and knowledge. Some do and some don't. So again you would have to be specific about what articles you're specifically talking about.
Q. Okay. You co-edited a text book in 2009; is that correct, it's called "Child Abuse, Medical Diagnosis & Management?"
A. Correct.

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Q. It's the third edition; is that right?
A. Third edition of that text book.
Q. I'm just going to read you a short quote from the preface and just ask if you agree with it. Okay?
A. I will do that if it's in context.
Q. Hold on just one second, Doctor. I'm going to get a copy from Mr. Hebel.
A. Shall I pull my copy?
Q. Yes, that would probably be a good idea if you have it handy.
A. One minute.
Q. Are you ready, Doctor?
A. I am.
Q. Okay. Just going to quote and ask you if you agree with this. It says "since the publication of the first two editions of this book, there have been hundreds of peer-reviewed articles appearing in the world's English-language medical literature about child maltreatment or related conditions.

Some of these articles have been significant enough to alter our concepts about the medical aspects of child maltreatment?"

Do you agree with that?

MR. HEBEL: I'm going to object as to the nature of the question as being irrelevant. This is a

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book on all forms of child abuse, and the statement is that peer-reviewed articles about child maltreatment or related conditions have changed the outlook. That's going to be obvious. It has nothing to do with abusive head trauma or shaken baby syndrome.

THE COURT: Response?

MR. LICHSTEIN: Well, one of the questions at issue in this case is whether there has been significant, scientific research that's changed the understanding of the shaken baby syndrome. This is a textbook that covers the topic of shaken baby syndrome in great detail.

THE COURT: Okay. Well, is that comment. Is that prefaced remark directed toward shaken baby syndrome, or is it a more expansive one, or do we know?

MR. LICHSTEIN: I think that's something that Mr. Hebel can follow-up on redirect.

THE COURT: I don't think so. I think your question in order to be relevant has to be focused on the issue of shaken baby syndrome or abusive head trauma.

MR. LICHSTEIN: Okay. Your Honor, would it be acceptable if I just ask that the quote is there and then ask does it apply to shaken baby syndrome?

THE COURT: I think you can ask whether or

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not that particular comment applies to the issue of shaken baby syndrome or abusive head trauma, and we'll wait and see what the answer is.

We'll go from there.

MR. LICHSTEIN: Thank you, your Honor.

BY MR. LICHSTEIN:

Q. Doctor Christian, does that. You heard the Judge I'm sure. But does that particular comment apply to the topic of shaken baby syndrome?

A. I don't think that when it was written it was specifically written on referring to shaken baby syndrome. This textbook is a textbook about child abuse, medical management and diagnosis, and it covers a broad array abusive injuries, including physical abuse, sexual abuse and neglect.

It's a general statement about the fact that since the first two publications there has been additional research. Some of it has altered our understanding. Some of it has bolstered our understanding, and I think that's included in that paragraph as well and others.

Other studies have clarified our thinking. So that's always going to happen in medicine and science that there is always going to be additional information. So the statement is not specific to

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shaken baby syndrome. It's not specific to abusive head trauma, and it was a general statement about the entirety of the textbook.

Q. Okay. But is it true or is it not true that there has been significant research on shaken baby syndrome since 2005 that significantly altered the scientific community's view of that?

A. It depends on what specific view you're talking about. If the view you're talking about is does the scientific community believe that shaken baby syndrome exists. The view has stood since 2005, and I think I discussed on direct examination the recently published study that showed that more than 90 percent or so of physicians still, together more than 95 percent of physicians in many different fields of pediatric medicine still acknowledge that shaken baby syndrome and abusive head trauma exists.

If you are asking whether there has been additional research that both supports the diagnosis of shaken baby syndrome, there has been. Has there been research published that suggests shaken baby syndrome doesn't exist?

I don't think that literature is very strong. You'd have to show me what the good evidence is.

Q. Doctor, you were just referencing the article by Doctor

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Sandeep Narang, the survey article that dealt with acceptance of shaken baby syndrome; is that correct?

A. Yes.

Q. And are you aware of the fact that the medical examiner and forensic pathologist in this case diagnosed shaken baby syndrome at trial and said that his opinion on that has changed based on scientific research?

A. I don't remember if he specifically diagnosed shaken baby syndrome, but I think that is correct, and I do know that he, I believe said that he would not have diagnosed shaken baby syndrome. I don't have the specifics though of his testimony if front of me.

Q. Okay. I'll read you a quote from his testimony at page eight, just so we're on the same page.

He said, "I found brain swelling, blood on the brain surfaces as well as in the nerve sheath of both eyes and recognized this as an organization of findings in the absence of any other thing or phenomenon called shaken baby syndrome." Okay?

A. Okay.

Q. And would you agree that Doctor Cassin, he's the forensic pathologist in this case. His shift away from diagnosing shaken baby syndrome here is consistent with a broader shift in the forensic pathology community away from accepting shaken baby syndrome as a valid

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theory?

A. I can't answer what Doctor Cassin's thinking was. I do believe that the majority of forensic pathologists still believe in shaken baby syndrome. I think that was documented study.

I think that there's a small community of forensic pathologists that don't use the term shaken baby syndrome, but I still think that the majority of the pathologists and practicing physicians recognize that shaken baby syndrome is a subset of abusive head trauma.

Q. Doctor, did you know that Doctor Narang surveyed clinical pathologists in his study?

A. I think he did, yes.

Q. Did you know that only 40 percent said they believe the shaken baby syndrome theory is valid?

A. I would have to look that up, and I'd be happy to do that.

Q. It's at page five.

A. Sure. Yes. 41 percent. So I apologize, but abusive head trauma I believe 93 percent.

Q. But we just agreed this is a shaken baby syndrome case; right?

MR. HEBEL: Objection. That was not established whatsoever.

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THE COURT: Sustained.

BY MR. LICHSTEIN:

Q. Doctor, in fact you yourself had written previously that pediatricians and pathologists often don't agree in these cases; is that true?

A. I've written a commentary looking at some hypothetical, or it was hypothetical scenarios given to pediatricians and pathologists. It wasn't my research, but I wrote a commentary.

I do think that there is a difference in how pediatricians and pathologists can sometimes look at issues in part based on the population of the patients that they take care of.

Q. Did you write, "pediatricians may be more influenced by confessions of perpetrators than pathologists who may be more sceptical of perpetrator confessions?

MR. HEBEL: Objection. I'm going to ask where this is taken from.

MR. LICHSTEIN: It's an article by Doctor Christian, 2007, General Child Abuse & Neglect, page 2006.

A. It was again it was a commentary on --

MR. LICHSTEIN: Doctor, can you hold on a second. We're still dealing with the objection.

Do you want a copy then?

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MR. HEBEL: Yes, I have the article.

THE COURT: Go ahead please.

BY MR. LICHSTEIN:

Q. I think you said you did write that; right?

A. I did. It was an invited commentary. It was a commentary.

Q. Doctor, I want to talk about the triad now.

A. Okay.

Q. Just for clarity, what we're talking about when we say the triad it's three medical findings, retinal hemorrhaging, subdural hemorrhaging and cerebral edema; is that fair?

A. No.

Q. It's not?

A. No.

Q. What is the triad?

A. I would -- it is, well, first of all it's a construct that some individuals not me use --

MR. LICHSTEIN: Doctor, I'm sorry. I'm going to interrupt you. I'm going to get into that, but I'm just trying to get on the same page for definitional purposes just what we're talking about before we get into it. I'm certainly going to let you finish that answer eventually.

THE COURT: That's not what I think she's

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trying to do. Unless I heard her wrong, I think that you were asking her about the triad, and she wasn't agreeing with what you stated were those three component parts; correct?

WITNESS CHRISTIAN: Yes, that's correct.

MR. HEBEL: She disagreed, and she went on to give her definition, and you cut her off.

BY MR. LICHSTEIN:

Q. Okay. Doctor, what is your understanding of what the three medical findings in the so-called triad are?

MR. HEBEL: I'm going to object to the form of the question. The doctor doesn't believe in the triad. How can she agree to the three medical findings?

THE COURT: Well, I think before there was the objection, if I heard Doctor Christian correctly, I think she referred to the triad as a construct and then was trying to explain what the construct consisted of.

Did I hear you correctly, Doctor?

WITNESS CHRISTIAN: In part, yes, that's correct, your Honor.

THE COURT: Okay. Why don't you answer that if you could what do you mean.

WITNESS CHRISTIAN: So what I mean is that there has been literature suggesting that the diagnosis

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of abusive head trauma or shaken baby syndrome is made by the identification of three findings, subdural hemorrhage, retinal hemorrhages and what I recognize as the third component of the construct, encephalopathy, not necessarily cerebral edema or brain swelling, which is what you said.

So in multiple ways I think that your question was wrong, and my answer is correct.

But the reality, your Honor, is that doctors who take care of infants and children who present with subdural hemorrhages or retinal hemorrhages and/or encephalopathy do not immediately see those three findings and diagnose abusive head trauma.

Although it is true, your Honor, that when those three co-exist, the diagnosis often is abusive head trauma because the leading cause of subdural hemorrhages in any person at any age group, including infants is trauma.

Retinal hemorrhages have been studied extensively, and again encephalopathy, brain swelling. It is unfortunate but a relatively common phenomena.

Any time a doctor sees any one of those findings, there is an obligation to think about a differential diagnosis, think about the different diseases that might cause that finding.

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And when they're found together, there is still a differential diagnosis, and you don't just see these three things and diagnose abusive head trauma.

You take a history. You do a physical exam. You look for additional injuries. You do radiographs. You do laboratory studies. You look for evidence of disease. You may get metabolic tests. You may do tests for coagulopathy. You may do tests for liver disease. You may do tests for many different things.

And it's after you do a history, a physical exam and all of your medical workup that you make a diagnosis.

So I've never practiced medicine by simply seeing a triad and making a diagnose. It is something that has been developed so that people can argue against the use of it. But if doctors don't use it to make the diagnose in the first place, then it's just a false, it's a false construct in order to kind of knock down a diagnosis that I think is clear in clinical experience and research.

And, your Honor, that's what I think about a triad.

BY MR. LICHSTEIN:

Q. So just to be clear, Doctor, no pediatrician, forensic pathologist could say there are these three findings,

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the three that you mentioned and that means there was abuse. That is not legitimate testimony in your view; correct?

MR. HEBEL: I'm going to object to that. I don't think that's what she said.

THE COURT: I'm sorry. Mr. Hebel?

MR. HEBEL: I'm going to object to that. I think that's a mischaracterization of what the witness just said.

THE COURT: I don't think so.

I think it's a legitimate question. I'll take the answer.

WITNESS CHRISTIAN: My answer, your Honor, would be that in some cases there may be subdural hemorrhages, retinal hemorrhages and encephalopathy, and it may be the result of abusive head trauma.

In other cases there may be subdural hemorrhages, retinal hemorrhages and encephalopathy, and it may be a different disease.

In some cases you can have those three findings, and it can be the result of accidental trauma. So I think that in every case you have to look at all of the data and all of the medical, and in cases investigative data that you have in order to come up with the right answer. Every case is different. So

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that would be my answer.

BY MR. LICHSTEIN:

Q. I understand. So no one should diagnose abuse based just on these three findings; right?

A. Again I just answered. In some cases an infant may have been abused and may have just those three findings, and so that's true. Sometimes those three findings alone are seen in cases of shaken baby syndrome and/or abusive head trauma. So it would depend on the circumstances of a case.

Q. But my question was no one should diagnose based on just those three things; right?

MR. HEBEL: Objection. That's been asked and answered.

THE COURT: Response?

MR. LICHSTEIN: I don't believe she did answer. It's a yes or no question, and she said that the three findings might be present and there might be abuse. But my question was should someone diagnose based on just the three findings.

THE COURT: I thought I heard her answer to be that one needs to be more thorough and has to look at each case individually and that it requires a looking at medical history, maybe also some laboratory results also considering whether there may be existing

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diseases, whether or not it may be explainable by some sort of accidental format.

And that I thought Doctor Christian indicated that there was a need to evaluate the totality of the data in order to make a diagnosis.

That you may have just those three concepts of what has been referred to as the triad, and it may just turn out to be abusive head trauma or shaken baby syndrome but maybe not. It's a more thorough mandate to look at the totality of the data.

Is that right?

Did I hear you right, Doctor.

WITNESS CHRISTIAN: Yes, you did, your Honor.

THE COURT: All right. We can go from there.

BY MR. LICHSTEIN:

Q. Doctor Christian, if I heard your testimony today and also on direct examination correctly, not only do you not believe that if you diagnose just based on the triad today, but you believe clinicians, pediatricians never did that. That there was never any such thing as a diagnostic triad; is that true?

A. I don't believe that doctors again just find these three things and make a diagnosis of abusive head trauma. On the other hand when you have unexplained subdural hemorrhages, retinal hemorrhages and

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encephalopathy, it is often the result of abusive head trauma in infants.

So it's not always, but it often is, and part of our responsibility is to think about legitimate diseases that can mimic or cause those findings, to look for additional injuries in babies that can support the diagnosis of trauma and evaluate cases carefully.

So again child abuse should be on the list and near the top of the list of medical diagnoses when babies present with subdurals, retinal hemorrhaging and encephalopathy, but there are other diseases that we want to think about.

Q. I just want to read you a quote from your report just make sure it's in the record before I ask you some questions about this.

You said at page 18 "the pediatric and child abuse community have never subscribed to a diagnostic triad."

You agree with that; right?

A. Yes. Again I think I just explained how we make diagnoses in medicine, and it's not only true for the diagnoses of abusive head trauma and shaken baby syndrome, it's true for every diagnosis.

Q. You also criticized the defense's motion for relying on a law review article rather than "a medical paper" as

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to whether there was ever a diagnostic triad; is that correct?

A. I did. That was their reference.

Q. Are you familiar with a letter by David Chadwick in 1998 in the Journal of Pediatrics?

A. I don't know which letter you're referring to.

Q. It's a letter titled Shaken Baby Syndrome and the Death of Matthew Eappen. E-A-P-P-E-N. It's dated 11-11-97.

A. Yes.

Q. I'm going to read you a quote from that letter.

The letter reads, this is the third paragraph of it. It says "the shaken baby syndrome with or without evidence of impact is now a well-characterized clinical and pathological entity with diagnostic features in severe cases virtually unique to this type of injury - swelling of the brain, cerebral edema, secondary to severe brain injury, bleeding within the head, subdural hemorrhage and bleeding in the interior lining of the eyes, retinal hemorrhages."

Doctor, are you a signatory to that letter?

A. I am a signatory to the letter.

Q. Okay. I'm going to ask you about another one. Are you familiar with a doctor named Jeffrey Jentzen?

A. No.

Q. He's a witness who testified previously in this case

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for the prosecution. He wrote a 2001 textbook called the Shaken Baby Syndrome, a multidisciplinary approach.

Actually, let me correct that, Doctor.

He did not write the text book. He wrote a chapter in the textbook. The editors of that textbook are Stevens Lazoritz, L-A-Z-O-R-I-T-Z and Vincent Palusci, P-A-L-U-S-C-I.

Are you familiar with either of them?

A. I know Doctor Palusci, but I don't know the book.

Q. So would you say Doctor Palusci is a respected member of the child abuse community?

A. He's a physician, a child abuse physician. Absolutely.

Q. And so you wouldn't have a basis for disagreeing with me if I said to you that that textbook at page 201 says "despite the current debate over the exact mechanism of injury of shaking impact syndrome, the classic findings of retinal hemorrhages, subdural hematoma and brain swelling cannot be fully explained by any other medical entity."

A. I would disagree with that statement as you read it to me.

I mean again, your Honor, there is a differential diagnosis for everything. So again I don't know the context, and that particular sentence I would not necessarily agree with.

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Q. But my question is you wouldn't disagree with me that that is in a textbook called the Shaken Baby Syndrome Multi-Disciplinary Approach?

MR. HEBEL: I'm going to object right now because this question is purely speculation at this point. The witness has already said that she doesn't know the book. That she doesn't have reference to the book, and therefore she's being asked to guess. Would you guess that this might be in the book. That's not proper questioning.

THE COURT: Well, before I take the answer first of all we're talking about a chapter in the book; right?

MR. LICHSTEIN: That's right, your Honor.

THE COURT: And I thought your question was whether or not you thought Doctor Christian agreed with that comment.

MR. LICHSTEIN: No. My point here -- I'm sorry to interrupt you, your Honor. Are you done?

THE COURT: No. Go ahead.

MR. LICHSTEIN: My point here is merely that the triad has been described as a diagnostic entity in several examples of child abuse and medical literature that I have here and many others. I'm only going through a few of them.

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This is a witness who testified for the prosecution in this case. So it certainly seems it's relevant that he wrote a chapter in which he described the triad and diagnostic.

MR. HEBEL: Rule of Completeness, your Honor. If they are going to quote one sentence out of a chapter in a book that regards it, I think we should admit the entire chapter.

MR. LICHSTEIN: He can get into that on redirect if he thinks I'm taking it out of context. He can get into that.

THE COURT: I don't think necessarily the whole chapter is necessary for the Rule of Completeness. I'm going to take the answer, we'll go into it on redirect.

MR. LICHSTEIN: Your Honor, I think I already heard the answer, which is that the witness isn't familiar with the textbook.

BY MR. LICHSTEIN:

Q. Is that right, Doctor Christian?

A. Correct.

Q. One more. Who is Doctor Robert Reece?

A. Doctor Robert Reece is a retired pediatrician and child abuse pediatrician.

Q. He actually co-edited a textbook with you, didn't he?

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A. With me?
Q. Yes.
A. You broke up for second. So I didn't hear all the words.
Q. Did he co-edit the textbook Child Abuse, Medical Diagnosis & Management, third edition with you?
A. He did, or I did with him.
Q. Either way I'm going to read you. And before the third edition there was a second edition, which you were not a co-editor of but Doctor Reece was; is that correct?
A. Correct.
Q. I'm going to read you two quotes from the second edition. First from page 503, the second from page 504.

Hold on one second, Doctor.

Doctor, page 503 says "shaken baby syndrome usually produces a triad of injuries that include cerebral edema, subdural hemorrhages and retinal hemorrhages. No other medical condition fully mimics all of it's features."

Then on page 504 it says "after a discussion about whether shaking alone is sufficient to cause the injuries, "this academic dispute should not be construed, however, to indicate that there is any disagreement that the diagnostic triad of shaken baby

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syndrome represents serious inflicted injury."

You disagree that that's in Doctor Reece's second edition textbook?

A. I don't have it in front of me. So I can't agree or disagree. I mean if you're just reading it, then I am happy to assume that you read accurately. And, you know, and I haven't memorized a previous or any textbook.

Q. But if Doctor Reece's 2001 edition said that, doesn't it establish that a medical textbook says the triad is a diagnostic entity?

A. Again I don't know any doctor who practices medicine by finding three things out of context of doing what doctors do every day, which is doing a thorough evaluation and making a diagnosis.

And as I said, if you look at previously healthy infants who come in with subdurals, retinal hemorrhages and encephalopathy, many of them have been victims of abusive head trauma, some of them shaken baby syndrome.

Q. I understand that you wouldn't do that today, but that's not what I'm talking about, what I'm asking you is --

A. I'm sorry. Complete your question.

Q. I'm not talking about whether you believe the triad is

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a diagnostic entity today. You established that you don't. What I'm talking about is whether the medical literature said that the triad is a diagnostic of abuse, and I just read to you a portion of a textbook that to me establishes that that's what the medical literature said.

So I am asking you am I incorrect somehow that the medical literature said that?

A. I wouldn't deny what you read to me, but I don't have it in context. I would imagine that there is a chapter in that textbook that talks about differential diagnosis that looks at other diseases that you have to consider, and again it all depends on what context you are writing about.

Q. Doctor, the 2009 edition that you co-edited took out that language about the triad being diagnostic; isn't that correct?

A. You know what? No, I didn't, or we didn't take out things. We wrote a new edition. So there also I think my line of questioning happened with the policy statement that I answered about with whether I changed the triad.

If I never subscribed to a triad, then I didn't take out the triad. I edit and write about my understanding of what the science tells us as I am

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writing. And if there is new data that informs my understanding, I will incorporate new information into my future writing. That is how medicine and science works. That there is always additional and new information.

But if you ask me did I take out the triad, I have absolutely no recollection, nor did I in any way intentionally remove a triad from an edition of a textbook because it's not how I think clinically, and it's not how doctors practice medicine.

So sure, you can have a triad that is characteristic, but it doesn't mean that I specifically took something out of the book.

Q. That's okay. I didn't mean to interrupt you, but the delay sometimes gets in the way.

Sorry about that.

Okay. Doctor, I want to move to a different topic.

You agree with me there is legitimate controversy about whether shaking alone can cause the triad injuries?

A. I think that there has been some controversy, but I think that the evidence is clear that shaking can cause these injuries.

Q. But do you believe there is legitimate controversy

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about whether shaking can cause the triad injuries? Yes or no.

MR. HEBEL: Objection. Asked and answered.

THE COURT: I'll take the answer.

Overruled.

WITNESS CHRISTIAN: Again I think that there is controversy. You would have to be specific with what legitimate controversy is.

And again, your Honor, my answer is that I believe that there is very good medical evidence that the shaken baby syndrome exists.

BY MR. LICHSTEIN:

Q. So you're willing to grant there is controversy, but as to whether it's legitimate you won't say, or you're not sure?

A. I think it would depend on what article you are referring to or what concept you're referring to.

Q. I am referring to -- it's a very simple question. The question is is there that legitimate controversy about whether or not shaking alone can cause the triad injury?

A. As I answered, I think there is controversy. I don't know that all of it is legitimate, and I think that the evidence shows that it exists.

Q. Is some of the controversy legitimate?

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MR. HEBEL: Objection. This is very nebulous. The witness has no idea what some controversy is.

THE COURT: I agree.

Rephrase the question.

BY MR. LICHSTEIN:

Q. I'll move on.

We'll talk more specifically, Doctor.

You testified on direct examination if I remember correctly that you have great respect for Doctor Duhaime, D-U-H-A-I-M-E; is that right?

A. I don't recall saying that I have great respect for Doctor Duhaime, but she is a friend and colleague. I do respect her, but I just don't remember specifically saying that.

Q. Did you dedicate your textbook to her praising her "objectivity and critical thinking?"

A. I probably did as one of my mentors.

Q. Would you agree that Doctor Duhaime has worked on a series of studies that question whether shaking alone can cause the triad injury?

A. I think she published a study in 1987 that looked at those clinical case series and some early dummy studies and concluded that in the most severe cases there was usually an impact associated with the shaking that

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caused, that was responsible for much of the injury.

Q. Did she say in the abstract at page 409 "it was concluded that severe head injuries commonly diagnosed as shaking injuries require impact to occur and that shaking alone in an otherwise normal baby is unlikely to cause the shaken baby syndrome."

Does that sound about right?

A. Well, if that's in the abstract, I think in the actual paper it says at least I think it refers to in the most severe cases, but that was a paper that she published in 1987.

Q. But it does say what I quoted in the abstract; is that right?

A. Again I don't have it in front of me. So I don't know if you quoted it correctly, but something to that effect.

Q. Okay. Did you co-author an article with Doctor Duhaime in 1998 in the New England Journal of Medicine?

A. I did.

Q. Did that article say "whether shaking alone can cause the constellation of findings associated with the syndrome, it's still debated?"

A. I don't remember. I haven't memorized it. I don't have it in front of me. I won't disagree if it said that, but I don't remember specifically.

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Q. Okay. Did Doctor Duhaime publish another study in 2003 in the Journal of Neurosurgery that said, no doubt has showed that the accelerations that occur in shaking are "sufficient to cause subdural hemorrhages or primary traumatic external injury in infants?"

A. I don't know what article that is. So I can't tell you if that's what it says. If you're just reading an article, I wouldn't deny that it said that, but again I don't know the article that you are referring to.

Q. And then your textbook at page 64 said in infant models have shown that "shaking does not generate force sufficient to reach the threshold of brain injury."

Your textbook say that?

A. In part it says that.

MR. HEBEL: I'm going to object. I'm going to for ask for the Rule of Completeness here because it's described in the very next couple of sentences what she means by that.

THE COURT: Response?

MR. LICHSTEIN: I mean it's a direct quote. If he wants to put it in context on redirect, I think that's fine.

THE COURT: No. I want you to do it.

Go ahead.

Go ahead, Doctor. You can give the complete

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answer.

WITNESS CHRISTIAN: Thank you.

So basically it is in a chapter that's about head trauma, and it says initially in infant models, and that's biomechanical models, I think I testified that biomechanical models are not biofidelic. There is no model that really has been able to kind of characterize the true infant brain and head and neck, et cetera.

But it says in this page in infant models have shown that the initial forces generated when the head is popped suddenly against a surface are many times greater than those that seem to be generated by shaking alone, and that shaking does not generate force sufficient to reach the threshold of brain injury.

However, due to limitations in physical models and the unknown effect of repeated injuries, many authors believe that shaking alone without impact also can lead to brain injury.

The role of injury to the brain stem and cervical spine also remains as possible contributors to the pathophysiology of injury in shaking or thought forceful impact, although this does not explain the presence of cortical subdural hemorrhage.

So, your Honor, I hope that that is

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consistent, and I think that that's reasonable, although there are biomechanical models now that do show that shaking can surpass the threshold needed to cause subdural hemorrhage, but I believe that our biomechanical models are incomplete. They do not represent what happens to an actual infant. They help us understand.

There have been great advances in biomechanical modeling, but they have not replicated what happens to an infant.

I think that since this was written there really is a lot of clinical literature that shows that when babies are shaken, they are often repeatedly shaken, and that that shaking leads to subdural hemorrhages and brain damage, and I think that MRI's have gotten more sophisticated surely since this textbook was published.

We do see evidence of neck injury, ligamentous injury, cervical cord injury in more than 50 percent, maybe up to two thirds of infants.

So I don't have any problem with what is written here, but again I don't believe that it was really asked of me in context.

BY MR. LICHSTEIN:

Q. Thank you, Doctor.

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In 2016 did you co-author another article that touched on the subject again and said "there is still controversy regarding the precise contribution of shaking alone to traumatic brain injury, your 2016 article?

A. I don't know what article you're referring to.

Q. Your article called Cyclic Head Rotations Produce Modest Brain Injury In Infant Piglets, Journal of Neurotrauma?

A. That is a biomechanical study, and I did contribute to that biomechanical study which showed that with cyclical or repeated low level shaking of a piglet model that there was more injury that was identified.

So again going back to the fact that sometimes these injuries are repeated in infants.

Q. But it did say "there is still controversy regarding the precise contribution of shaking alone to TBI."

That was in 2016; right? You said there was still controversy?

A. I don't know what page. So I'd like to look at in context please.

Q. It's page 16.

A. I don't have page 16 on mine.

Q. I think the record is clear. In the interest of time, I'm just going to move on.

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A. Okay.
Q. Now we've been talking about biomechanical research. There's also another branch of research in this area that many people in the child abuse community rely on when they're discussing the research support for abusive head trauma, and that has to do what I'll call, maybe this is the wrong term. You tell me if it is, but the associational literature.

Do you know what I'm talking about there?

A. No.
Q. I'm talking about literature that says okay, we have a population of children who are abused. Those children have subdural hemorrhages or retinal hemorrhages. There is significant research about that supporting the diagnosis that abusive head trauma, shaken baby syndrome?

Am I right about that?

A. I think what you are referring to is clinical research, and clinical research is incredibly common and standard and important in all fields of medicine. So I don't know doctors who refer to that as whatever you said, associated or associative research.

It's clinical research, and clinical research has filled the New England Journal and JAMMA and the Land Fit and medical journals throughout the world. So

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that's clinical research.

Q. Am I correct that a lot of that research is about finding an association between a population of children who were abused and certain medical findings; is that true?

A. You would have to be specific. Again that's too general a term. There's lots of clinical research that has explored issues around abusive head trauma. So if you would be specific, I'd be happy to answer questions if I can.

Q. Did your textbook acknowledge problems about the research supporting shaken baby syndrome and abusive head trauma?

A. I don't recall. Again I would have to look at that, and again it was probably written ten years ago, but I'd be happy to look at a specific page if you'd like me to.

Q. Yes. Page 3. Does your textbook say "child abuse research is particularly vulnerable to both selection and misclassification bias." And then later "these systematic errors may lead to erroneous conclusions from the data."

A. What paragraph that I can just find it. I'm sorry. I can see page three. It's an introduction about child abuse research and the evolution of research. Just

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tell me what paragraph.

Q. The bottom paragraph on the inner column. So under Study Design, the third paragraph.

A. So could you repeat your question so I can answer it appropriately?

Q. Sure. I'm asking you whether your textbook said this -- I'm not asking anything broader than that. But in the second paragraph it says second sentence, "child abuse research is particularly vulnerable to both selection and misclassification bias."

Then it says in the next paragraph down, it says, "these systematic errors may lead to erroneous conclusions from the data."

Does it say that? That's my only question.

MR. HEBEL: I'm going to object because that's bringing two separate sentences together that were not put together in the text of that book and are devoid of their relevant context.

THE COURT: Response?

MR. LICHSTEIN: I can read the whole portion if you want me to.

THE COURT: I have kind of a, we can back up just a second. This is Doctor Christian's textbook; is that correct?

She edited it?

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MR. LICHSTEIN: She edited it, co-edited it I should say.

THE COURT: I guess my question is, is this a comment that is out of the chapter or the section referring to shaken baby syndrome and abusive head trauma, or is this just sort of the umbrella issue of child abuse?

Because if it's just the umbrella issue of child abuse, I don't think that the question that is being asked is particularly relevant. I mean there may be very different issues that may come up as to whether or not a child who has a broken arm had a broken arm because they fell off of a bicycle or whether they were beaten by a parent. I think we need to be confining ourselves to the issue of shaken baby syndrome or abusive head trauma.

MR. LICHSTEIN: I can be more specific. I can rephrase, your Honor.

THE COURT: Sure, go ahead.

BY MR. LICHSTEIN:

Q. Does the quote that I just read, "child abuse research is particularly vulnerable to both selection and misclassification bias," does that apply to the research on shaken baby syndrome?

A. It would be depend on the study design and what

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questions you were asking.

And for the record this chapter is a general chapter on the evolution of child abuse research and not specific to abusive head trauma or shaken baby syndrome. So there are ways that researchers try to avoid bias.

And I guess the first thing to do is to recognize that in clinical studies there is always potential for different biases, and that's why we have sometimes control groups, and we have other methodologies to try to reduce bias. I mean that's just true in clinical medicine in general and clinical research.

Q. I want to ask you about the AAP guidelines.

Before I do that, Judge, could I just ask quickly how I'm doing on time?

THE COURT: I want to finish with the doctor. So I don't want you to think it's like a football game that we are in the fourth quarter, and the clock is running out.

MR. LICHSTEIN: I appreciate that. I just want to make sure I wasn't.

THE COURT: No. Go ahead please.

BY MR. LICHSTEIN:

Q. Doctor Christian, the AAP 2009 guidelines, AAP,

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American Academy of Pediatrics; right?
A. The policy statements that I wrote?
Q. Yes. And I just have some very specific questions. I'm not going to get broadly into the whole thing, but in your report and in your direct testimony you took issue with Doctor Galaznik's, I guess we can call it an interpretation of that policy statement; is that right?
A. I specifically was -- took -- I disagree with his interpretation of what I did.
Q. Let me be more specific.
A. Re-ask the question, yes. Thank you.
Q. In your report at page 14 I'm just going to quote it. It says "Doctor Galaznik opines as he has on multiple past occasions that the American Academy of Pediatrics abandoned the term SBS in 2009."

Then you say that is incorrect if you simply read the policy statement which I co-authored."

That's what you wrote; right?
A. Correct.
Q. So according to your report Galaznik said the AAP abandoned the term SBS, but he's incorrect about that; right?
A. He is incorrect about that.

And again what he has stated in the past and what he writes is that the American Academy of

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Pediatrics no longer stands by or recognizes shaken baby syndrome. And again if you read that report, and it's only a few pages long, you can see the discussion of shaking and shaken baby syndrome in that policy statement.

Q. I understand that, Doctor, but your report specifically says Galaznik is incorrect that the AAP abandoned the term SBS in 2009. But doesn't the AAP 2009 recommendation number four says "pediatricians should use the term abusive head trauma rather than a term that implies a single injury mechanism such as shaken baby syndrome in their diagnosis and medical communications.

So in fact Galaznik said the AAP abandoned the term shaken baby syndrome, and that's exactly what the policy statement says, isn't it?

MR. HEBEL: Objection. Compound question.

THE COURT: Rephrase.

MR. LICHSTEIN: Your Honor, I'm sorry.

BY MR. LICHSTEIN:

Q. Doctor Christian, the AAP 2009 did tell pediatricians to stop using the term SBS; right?

A. It said that they should use the term in medical communications and medical diagnoses. It didn't abandon the term shaken baby syndrome.

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And again if you read the policy statement, and I think it explains exactly that shaken baby syndrome is a component of abusive head trauma. It's one mechanism. It doesn't abandon shaken baby syndrome.

Q. So your quibble with Doctor Galaznik is that he used the word abandoned instead of the fact that they said pediatricians should use AHT rather than shaken baby syndrome.

That's your quibble with Doctor Galaznik is he said they abandoned it?

A. That's not my quibble with Doctor -- that's not the only problem I have with Doctor Galaznik. Again Doctor Galaznik has on multiple occasions stated that the American Academy of Pediatrics no longer believes in shaken baby syndrome, abandoned shaken baby syndrome.

Q. I'm sorry. What he said in multiple other occasions is not what my question was about.

You made a specific accusation in your report that he said something incorrect, and I'm asking you isn't what he said actually correct? They did stop using the term shaken baby syndrome?

THE COURT: That has been asked and answered.

Next question.

MR. LICHSTEIN: I'll move on.

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BY MR. LICHSTEIN:
Q. You also make a number of other attacks in your report on --
MR. HEBEL: Objection. Argumentative.
MR. LICHSTEIN: I'll rephrase.
THE COURT: Let me hear the whole question before I hear the objection to the question.
By MR. LICHSTEIN:
Q. I'm just going to go into the specific example.
Doctor Christian, let me start with one first though. One thing you say in your report is that Doctors Barnes, Galaznik and Nichols say that shaking is not harmful; right?
A. Just please point me to where I state that.
Q. Page 14 of your report. You call their work a "rejection that shaking is harmful;" right?
A. It I don't know which paragraph it is.
THE COURT: Are you referring to the last sentence of page 14?
MR. LICHSTEIN: Yes, sorry, your Honor. Thank you.
BY MR. LICHSTEIN:
Q. The last sentence on page 14, the rejection that shaking is not harmful to infants, et cetera, et cetera?

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A. I didn't specify any doctors in that statement. I just wrote that the rejection of the statement is promoted by a relatively small group of physicians and engineers. I didn't mean been anybody.
Q. So you weren't talking about the experts in this case?
A. I think that my report very specifically addresses kind of their interpretations and what I believe about the evidence that they used could to base their conclusions on.
Q. You say it again at page 19 the last paragraph, the second last line. You say why would anyone deny that shaking a baby is dangerous?
A. I stand by that statement. Why would anybody deny that shaking a baby is dangerous.
Q. What does that have to do with this case? If you are not saying it's the experts, and what does it have anything to do with this case?
A. Well, because I think that the defense experts in their reports argued that Nakita could not have died of shaken baby syndrome because there was no injury to the neck or spinal cord. They concluded that she died of dysphasic choking, leading to asphyxia which then resulted in intercranial hemorrhage.

They argued that a flawed triad has been used to diagnose shaken baby syndrome. They stated that the

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acromion fracture might be related to CPR or rickets, and that is the basis by which I responded to their different reports.

And my conclusion is that shaken baby syndrome is a valid medical diagnoses. It's diagnosed around this country unfortunately many, many times every year, and that the peer-review literature regarding abusive head trauma is extensive, and clinical experience by doctors all over this country recognize that this is a real phenomena and not the result of dysphasic choking or other non-supported theories of causation.

Q. I'm just going to return to my original question here, Doctor. Can you cite a single example anywhere, a report, testimony, any statement that any of Ms. Lemon's experts have made where they said shaking a baby is not harmful?

Can you cite any example of that?

A. I would have to go through and see if they said that, but my saying or stating why would anyone deny that shaken baby syndrome is dangerous is my conclusion.

Q. Doctor, what you said is that why would anyone deny that shaking a baby is harmful, and that defense experts that you just said in your testimony just a few minutes ago, the work of defense experts in these cases

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is a denial that shaking is harmful, but that's not actually what they're saying, is it?

MR. HEBEL: I'm going to object to that because she never said that these experts said that they specifically denied that any shaking was harmful.

Also she was very specific that she didn't list any doctors in her list, and she explained her statement multiple times.

At this point any further questioning is irrelevant.

THE COURT: Response?

MR. LICHSTEIN: I'll move to another area, your Honor.

THE COURT: Okay. Thank you.

BY MR. LICHSTEIN:

Q. Why don't we talk about some of the specific things you did say about Ms. Lemons' experts.

You said at page 16 of your report Doctor Barnes "misrepresented fact."

You said that "rhetoric is used "to manufacture controversy."

You said that the shaken baby syndrome is "fabricated for the courts and represents "denialism."

You said Barnes "misrepresented the clinical history at page 16." Then you said at page 16 again

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they committed, meaning Lemons' experts "falsification of research and research misconduct."

You said at page 19, Doctor Barnes' theories "have no place in the courts of law."

Then you finish your report at page 20 saying that their reports contain fabricated alternative facts, and you put the word "alternative facts" in quotes, didn't you?

MR. HEBEL: Your Honor, at this point I'm going to object because that wasn't one question. That was about 20 maybe.

THE COURT: I would agree. It was a number of questions. And when you finish that by saying didn't you, which question do you want answered?

So why don't we back up and take it one step at a time. Okay.

BY MR. LICHSTEIN:

Q. Are those statements that you said in your report? That's the only question. Are they in the report?

MR. HEBEL: Objection.

MR. LICHSTEIN: It's just a foundational question to establish that these are things in the report. They're direct quotes. I can go through each one and point her to each one, but I think --

THE COURT: The Exhibit speaks for itself,

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doesn't it? I mean I think if you want to just ask what did you mean by this on this page, that's fine. But my understanding is you moved toward the admission of the Exhibit 31, and it's been received. So I think we can go from there.

All right.

MR. LICHSTEIN: Thank you, your Honor.

THE COURT: Sure.

BY MR. LICHSTEIN:

Q. I just want to ask do these kind of criticisms that you made of Ms. Lemons' experts, do they also apply to Doctor Cassin, the forensic pathologist who no longer said it was shaken baby syndrome in this case?

A. I think that my report summarizes the information that I had at the time, and I don't know if I had. Hold on let me just take a look if you would give me a minute.

I summarized Doctor Cassin's testimony and the information that I had at the time, and I was asked to respond to defense expert reports in my report, which is what I did.

In addition, most of the statements that you read to me the last question were completely out of context. So I just would like to state that for the Court, and, your Honor, my report is my position.

THE COURT: All right. If I could just back

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up just as a point of clarification for me. When you referred to having information from Doctor Cassin, Doctor Cassin testified at the original trial, and he also testified here in this particular hearing.

I think that the defense's question, if I understood it correctly, was the notion of did you have the benefit of the transcripts of Doctor Cassin's testimony here in this appellate matter on the Motion for New Trial?

WITNESS CHRISTIAN: It's not listed. I'm sorry.

THE COURT: Go ahead.

WITNESS CHRISTIAN: I don't -- it's not listed here, and I didn't refer to it I don't believe. So I don't think I did have it at the time. Again I'll leave that to the lawyers, but normally I would list it, and then I would refer to it.

THE COURT: I just wanted clarification for myself from the point of when you were referring to what Doctor Cassin may have said, your reference is to his original testimony at the trial as opposed to his more recent testimony.

WITNESS CHRISTIAN: Correct.

MR. LICHSTEIN: Thank you, your Honor. I think I can short circuit this line by just asking just

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a simple yes or no question.

BY MR. LICHSTEIN:

Q. Do you stand by all of the criticisms you made in your report, or is there anything you want to back off or change?

A. I stand by my report.

Q. Okay. Thank you.

Now some of the criticisms you make may involve the dysphasic choking article by Doctor Barnes, Galaznik, Gardner and Shuman. Make a series of very serious criticisms, and if I recall correctly during your direct examination, you called these authors dishonest; is that right?

A. I think that this report was dishonest. I think the case report was dishonest.

Q. Did you know, Doctor, that the Journal that published the report investigated these accusations and found no problems with them?

A. I believe I heard that, but I haven't read anything about what the journal opined after reviewing this case.

Q. Doctor, did you know that Ms. Lemons' experts are working pro bono in this case?

A. No. I have no idea.

Q. What are you charging for your consultation here?

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A. My charge, your Honor, is $500.00 an hour for my time.
Q. I want to ask you a couple of other brief areas, Doctor Christian.
You referenced the topic of neck injury previously?
A. Yes.
Q. In your report at page 15 you criticize the Bandak Study. I believe you did that in your direct examination as well.
A. Correct.
Q. You criticized the mathematics; is that correct?
A. I'm sorry. I lost you for that. I criticized what?
Q. I believe you criticized the mathematics in the article?
A. Correct.
Q. But apart from your criticisms of the methods in the article you don't really disagree, do you, with the overall conclusion that you would expect to see neck injury in a shaken baby syndrome case; right?
A. Not necessarily. I think that when bioengineers at the University of Pennsylvania, who I work with, we calculated using the correct radius of an infant's neck. They calculated angular decelerations that fell below the threshold for causing subdural and above. So that their conclusion when they recalculated was that

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you may see neck injury in some cases, and you may not see neck injury in other cases.

And indeed we sometimes see neck injury, and we sometimes don't see neck injury.

So if it's there, it is there. But if it's not, it may not be. So again, and neck injury, as I very strongly indicated, is not a requisite for a diagnosis of shaken baby syndrome, which is what the defense experts did argue.

Q. Okay. Apart from the Bandak article, would you at least agree that there are other papers that say the neck would fail before the threshold to a brain injury?

A. I don't know of others. If you have others to show me, please share them with me.

Q. Are you familiar with a paper by Ommaya that deals with that issue?

A. No. You will have to send it to me because I don't know that specific paper.

Q. Okay. If you don't know it, there's no point in asking you questions about it.

But I thought you did testify earlier to some likelihood that you thought you would see neck injury? And I misremembering that? You thought it would more likely than not be present or something to that effect?

A. So I think that. Okay. So in a series of infant

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homicides, most of which were due to abusive head trauma, about two thirds or maybe 70 percent on autopsy done in a way where you can dissect the whole neck, including the posterior neck and ligaments, about two thirds. And early MRI studies didn't find any neck injuries by MRI because they were not sophisticated enough.

But more recent technology and the more sophistication with more sophisticated MRI's we now find that maybe two thirds of infants who have had abusive head trauma have some evidence of neck findings on MRI, but that leaves another entire third where it's not seen. So it's not universal.

Q. Just a couple of more quick areas, Doctor. I want to talk a little bit about retinal hemorrhaging in this case.

Are you aware that the first time retinal hemorrhages were detected in this case was at autopsy?

A. Yes, because the baby in my reading I didn't see that the baby had an opthalmologic examination in the hospital before the baby died. That was planned, but the baby died before the opthalmologist could examine the baby's eyes, and that really is the standard. That is the standard for diagnosing retinal hemorrhages.

Q. I'm going to read you a portion of Doctor Cassin's

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trial testimony where he said "no retinal hemorrhages were identified on opthalmologic examination by admitting physician." He said the attending physician "examined retinal area for hemorrhages and found none."

So there was an opthalmologic examination at the hospital; right?

MR. HEBEL: Your Honor, I'm going to object at this point because I believe that at some point the defense and the People figured out that the doctor that conducted the eye exam was in fact not an opthalmologist but was rather just the admitting physician.

Wasn't that Jeffrey Fleming?

MR. LICHSTEIN: I don't have a memory on that, but I don't doubt that. This was the attending physician at the hospital.

THE COURT: That's my recollection.

MR. LICHSTEIN: I don't have a problem with that.

THE COURT: With that clarification, with that understanding of the underlying facts.

BY MR. LICHSTEIN:

Q. There was an examination of the retina for hemorrhages, and they found none; right, Doctor?

A. Well, if you would hold on just for a second because I

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tried to be very specific in looking for evidence in the medical record that there was a retinal examination done.

MR. LICHSTEIN: I think the trial transcript is what it is, your Honor. I don't think the doctor needs to dig through the records. I can ask my question based on what's in the record.

THE COURT: That's fine.

WITNESS CHRISTIAN: And again they planned to have an opthalmology consult done in the morning, which would be how one would diagnose retinal hemorrhages in the ICU. I don't recall if it was the resident doctor or the attending doctor who looked in the eyes, but again in any of these cases the examination should be done by an opthalmologist because they have the ability if the pupils aren't fixed and dilated already, they can dilate the eyes.

And even if they are, they have an indirect opthalmoscope that allows them to look at the entirety of the retina rather than just a very tiny, little area of the retina, which is all that we can see with our direct opthalmoscope.

So the examination is night and day between an opthalmologist and a clinician who doesn't have the same tools that the opthalmologist has, which is why

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they ordered an opthalmology consult for morning.

BY MR. LICHSTEIN:

Q. So you're saying that the doctor at the hospital looked in the eye looking for retinal hemorrhages but missed them. That's your point?

A. That absolutely could be true, that a doctor looking who may not look him in the eye, I don't know, who's only using a small direct opthalmoscope, can't possibility examine the retina like an opthalmologist can examine the retina. Doesn't have the training, doesn't have the experience and doesn't have the equipment and doesn't have the ability to look at the entirety of the retina.

So it doesn't surprise me. And again I think the medical record is clear. They ordered an opthalmologic evaluation to be done the following morning, and it couldn't be done because the baby died.

So they knew that their evaluation in the hospital was incomplete. That's why they ordered an opthalmologist to examine the baby, which would be standard in any hospital where you were looking to see if there were retinal hemorrhages.

You would not rely on a doctor in ICU looking with a little direct opthalmoscope.

That's true. That's my position.

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Q. But just to be clear, you don't have any evidence that the doctor who did look for retinal hemorrhages missed them. You're just speculating that might be what happened; right?

THE COURT: I think she's answered the question. I think it has been asked and answered.

MR. LICHSTEIN: I'll withdraw it.

BY MR. LICHSTEIN:

Q. One more thing, Doctor. You have done some experimental research of your own concerning retinal hemorrhages; is that right, the article we referenced earlier, cyclic head rotations, et cetera?

A. Well, I have done a lot of clinical research and published lots of clinical research with the opthalmologists at Children's Hospital of Philadelphia, which published probably as much clinical research on retinal hemorrhages as any other group in the country.

I participated in this one biomechanical study as the clinician on the team, as I said in my direct examination, but really the majority of my retinal hemorrhage research is clinical research.

Q. Okay. But you're a co-author on a study in which pigs were mechanically shaken and then killed; right?

A. I am co-author, yes.

Q. And the effects of that shaking were examined both pre

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and post-mortem to try to replicate the velocity and angular acceleration created by an adult shaking an infant. That's the point of the study; right, to replicate the velocity of the shaking?

A. But not completely. There was no hyperflexion or hyperextension of the neck. So that it was really, there were limitations of the modelling as well.

Again it was to look at one specific question, whether cyclic head rotation results in different patterns or different amounts of injury than a single rotation.

Q. Okay. And when the eyes of these animals who have been shaken, the forces attempting to replicate human shaking of a child, those eyes were examined, none of them had retinal hemorrhages; right?

This is a study last year?

A. In this particular study which again included findings that were at the mild end of injury. And again I think if you read the conclusions of the study, it is one biomechanical study that does not, and it says to date, however, laboratory studies have not fully recreated the clinical scenarios that characterize infant abuse, including the psychologic changes from crying.

Our present study suggests that under controlled circumstances cyclic low velocity head

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rotations can produce more injury after 24 hours than is seen in a single head rotation at the same low magnitude. It was simply trying to compare cyclical or multiple rotations with a single rotation. So that is the study.

MR. LICHSTEIN: Nothing further, your Honor. Thank you, Doctor. I enjoyed talking to you.

THE COURT: Mr. Hebel.

MR. MORAN: Your Honor, at this point I have to excuse myself. We were told we were going to go to 11:00. I have another commitment that I have to attend.

THE COURT: Okay. I know that we had interrupted the doctor's testimony before, and I do want to get closure on this because my understanding we're back Wednesday at 2 o'clock.

MR. MORAN: That's correct, your Honor.

THE COURT: So we're going to finish this up. Okay.

Go ahead, Mr. Hebel.

Any additional questions?

REDIRECT EXAMINATION

BY MR. HEBEL:

Q. What does the word abandoned mean to you?

A. To me abandoned is to throw aside, completely dismiss,

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to leave totally and completely.

Q. Now when the AAP recommends that doctors use the diagnosis of abusive head trauma, and you wrote that position statement, what was your purpose in writing that position statement?

A. My purpose in writing that position statement, as I may have testified, I don't recall specifically that I thought that it was important to use generic terminology in the medical records and medical data that allowed for the recognition that there are many mechanisms by which infants are injured at the hands of their caregivers.

And what I had personally seen was that because shaking baby syndrome was a term that was recognizable and was commonly used to describe injuries, that sometimes it was used imprecisely. So that there were cases of abusive head trauma where a baby had clear evidence of impact injury, yet the diagnoses of shaken baby syndrome was made, even through the mechanism may have been in that particular case blunt impact trauma to the head.

So I didn't think that that was precise. I didn't think that that was accurate. And so I thought and the American Academy of Pediatrics agreed because this goes to an enormous and vetting proces that a more

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generic term would be an umbrella term that would be useful. That was the purpose in writing that policy statement but not abandoning shaken baby syndrome.

Q. Now while not abandoning shaken baby syndrome, what has the AAP subsequently mentioned what it thinks shaken baby syndrome should be, how it should be used, how it should be considered?

A. I think shaken baby syndrome is a subset of abusive head trauma. That's how I think of it. I think that that's how probably many of my colleagues would think about it. It's one mechanism by which a baby can be injured.

Q. I'm going to refer to what has been introduced into evidence as People's Exhibit Two, which is Understanding Abusive Head Trauma In Infants & Children, and that's a publication by the American Academy of Pediatrics.

And, Doctor Christian, I believe you are the principle author of that; is that correct?

A. I wrote that. Yes.

Q. And was this a publication by the American Academy of Pediatrics?

A. This a publication that is published and endorsed by the American Academy of Pediatrics, which I wrote for the American Academy of Pediatrics.

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Q. And doesn't it even specifically state inside this document that shaken baby syndrome should be considered a subset of abusive head trauma?
A. I'm sure it does. You would have to show me what page, but I believe it does.
Q. I'm looking at page two, and it is toward the --
A. Okay. Sure.
Q. Go ahead.
A. And I will be happy to read this if it would be helpful.
Q. I don't think it would be helpful to read the whole thing but rather just does this correctly summarize what we were just talking about?
A. It does, and it references situations where in legal and medical literature and in court testimony some have suggested that the American Academy of Pediatrics no longer recognizes shaken baby syndrome as a legitimate diagnosis.

And I went on to say on the contrary, the American Academy of Pediatrics reinforces the fact that shaking is an important contributor, and it is a subset of abusive head trauma.

Q. Thank you.

Now your report is dated May 22, 2017; correct?

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A. Correct.
Q. I'm just going to ask the Court to take notice that's before Doctor Cassin testified in this matter. And as such she did not have the benefit of any of his testimony in court at this hearing when she wrote that.
THE COURT: Well, okay. So just so that the record is clear, that the report dated May 22 of 2017, this report was generated before Doctor Cassin had testified. And so it obviously does not reference Doctor Cassin's more recent testimony.
MR. HEBEL: It was just a clarification point.
THE COURT: I think that was pretty clear.
MR. HEBEL: Thank you.
BY MR. HEBEL:
Q. Next question.
Are there different types of neck injuries that can be seen in shaken baby cases?
A. Sure. You can. I'm sorry. In some cases you can see injury to the spinal cord itself. You can see hemorrhage in the spinal cord. I have seen in some cases transections of the spinal cord, really horrible.
You can see subdural hemorrhage around the cord. You can see injuries to nerve roots coming out of the cord. You can see injuries to the soft tissues

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and muscles and ligaments around the spine, the bony spine itself, and it is really quite rare to see fractures of the cervical or cervical spine because of the anatomy and characteristics of an infant spine, but I have seen spinal injuries in child abuse cases, actual bony spine injuries, usually lower in the spine.

So there are many different kinds of findings that you can see.

Q. Which of those types -- so we have catastrophic failure such as fractures. We have soft tissue injury. We have nerve injury around the spinal cord. We have hemorrhage in the spinal cord, and then we have other bony injuries to the spine. Those would be the, I guess five categories; correct?

A. Soft tissue, muscle, ligaments, sure. I think that's fair.

Q. So which of these would be detectible on an X-ray?

A. Well, it depends on what kind of X-ray you're doing. So a plain X-ray only looks really at the bones and maybe can see some soft tissue swelling. A Cat Scan can look at bones and can tell you a little bit maybe about the cord, and MRI doesn't give you great information, although it can give you some information about bones, but it gives you very good information these days about muscle and ligaments and soft tissue

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and cord and the spaces between those things.

So there are, and again back in 2000 and hold on.

I'm sorry, 2005. Our MRI's were probably not, definitely not as sophisticated as they are now. And if an MRI had been done, which it wasn't, but if an MRI had been done, probably wouldn't be as sophisticated and able to recognize some of the findings that we kind can with modern MRI's.

Q. So basically we know that there wasn't the rare catastrophic failure with Nakita since there was no sign of fracture in the spine itself?

A. Okay.

Q. And we probably don't know -- and we probably know that there were no bony spine injuries that were detected?

MR. LICHSTEIN: Objection, your Honor.

The question itself is vague, as phrased that it is vague. It probably -- I don't know what exactly.

TH COURT: Response?

MR. HEBEL: I'll rephrase.

THE COURT okay. Rephrase please.

BY MR. HEBEL:

Q. So we know from the X-rays that there were no showings of bony spine injuries physical on the X-rays?

A. You know what, again a Cat Scan doesn't necessarily go

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all the way down the spine, the cervical spine. A Cat Scan that she had --

MR. LICHSTEIN: I'm going to object, your Honor. We had a discussion at a previous hearing about the radiology and the fact that the witness is not a radiologist. We had two radiologists testify. I think we're getting into details of radiology.

THE COURT: Mr. Hebel?

MR. HEBEL: Fair enough. I'll keep it very general, since her expertise with radiology is very general. I'll withdraw that question.

BY MR. HEBEL:

Q. Instead I'll ask of the types of different neck injuries that you listed, okay, it's your understanding that with the procedures that were done in Nakita Lemons' case not all of those would be visible on an X-ray that was done?

MR. LICHSTEIN: Objection, your Honor. The same objection. It still references radiology issues that are beyond the scope of this witness' qualifications.

MR. HEBEL: And this witness is qualified to look at radiology, and she does have experience dealing with these particular types of injuries.

THE COURT: I'll take the answer in the form

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of in terms of would she, based on her expertise, would she expect to see these on an X-ray. I'll take that answer.

MR. HEBEL: Thank you, your Honor.

BY MR. HEBEL:

Q. So based on your expertise would you expect to see things like soft injuries, nerve injuries and hemorrhages on a regular x-ray?

A. Your Honor, lots of different kinds of X-rays. None of the ones that she had would -- I expect that she would be able to see ligamentous injury or some soft tissue swelling or the kind of thing that MRI's are capable now of identifying. I hope that is clear.

Q. Thank you.

Now you mentioned that on cross-examination there was a discussion about retinal hemorrhages and specifically in relation to one biomechanical article that you provided the clinical expertise on and the other biomechanists provided biomechanical expertise; correct?

A. Yes.

Q. And you mentioned that that was one area that you have looked into retinal hemorrhages; correct?

A. Correct.

Q. And you also said that you had other experience with

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retinal hemorrhages in the context of shaken baby syndrome; is that correct?

A. Correct.

Q. What experience do you have regarding retinal hemorrhages? Let he withdraw that and be more precise.

Has your experience researching in retinal hemorrhages led you to any conclusion about their likelihood in shaking baby cases?

MR. LICHSTEIN: Objection, your Honor. I think the question is overly broad. It's doesn't direct the witness to reference anything in particular. It's just a broad-based opinion. We don't know what the basis of it is.

MR. HEBEL: I can narrow it.

THE COURT: Please do.

BY MR. HEBEL:

Q. Doctor Christian, can you think of any specific experience or studies that you have where you have looked into retinal hemorrhages in regards to shaken baby syndrome?

A. Yes, I have a number of publications of clinical research that looks at different aspects of retinal hemorrhages in head trauma, in infant head trauma, in accidental head trauma, in abusive head trauma and even in looking at some theories of causation that are not

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true.

So, for example, we were among the first group to report few retinal hemorrhages in infants and children who had accidental household trauma.

We reported on retinal hemorrhages, few and in a posterior pole usually on the side of injury in children who had accidental epidural hemorrhages.

We also have reported on the finding that as retinal hemorrhages become more and more severe the likelihood that a child has been a victim of child abuse increases.

We have looked at the correlation of retinal hemorrhages and Hypoxic-Ischemic Encephalopathy in cases of abusive head trauma, and we have shown by looking at the electronic health records of thousands of children that there is absolutely no correlation or association of retinal hemorrhages and children receiving vaccines, which in fact was postulated by one of the defense experts in this particular case in his report.

So I have a lot of experience and research publications, and I may have missed a few dealing with retinal hemorrhages in both accidental injury and abusive injury.

Q. Thank you.

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I'll go through those each one at a time.

People's Exhibit 23 is the Curriculum Vitae of Doctor Jeffrey Jentzen.

THE COURT: Any objection, Mr. Moran?

MR. MORAN: No objection, your Honor.

THE COURT: Any objection to any of the Curriculum Viteas?

MR. MORAN: No object to any of them.

THE COURT: Okay. That's fine.

MR. HEBEL: In that case for the record I will just read them off just one after the other.

24 is Peter Strauss.

25 is Daniel Davis.

26 is Cindy Christian.

I will approach and give those to your Honor.

THE COURT: Okay. Fine.

Mr. Moran.

MR. MORAN: Mr. Hebel done?

MR. HEBEL: At this point the People are going to rest.

MR. MORAN: In that case, your Honor, we will call a rebuttal witness, Chris Van Ee.

CHRIS A. VAN Ee,

called as a witness by the Defense, having first been duly sworn by the Court Clerk, was examined and testified upon

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his oath as follows:

DIRECT EXAMINATION

BY MR. MORAN:

Q. Doctor Van Ee, what do you do for a living?

A. I'm a biomedical engineer at Design Research Engineering, and I have an adjunct professorship at Wayne State University right here in Detroit.

Q. Do you have an undergraduate engineering degree?

A. I do. That is in mechanical engineering, and that was from Dordt College. It's a small school in Northwest Iowa.

Q. Then did you go on to graduate school?

A. I did.

Q. Where?

A. I went to Duke University to the Department of Biomedical Engineering, and I received a PhD from Duke University in 2000.

Q. What was that PhD in?

A. That was in the Department of Bioengineering or Biomedical Engineering, but my area of study is impact in orthopedic biomechanics.

Q. Can you explain to the Court what is the impact in orthopedic biomechanics?

A. Sure. First, orthopedic biomechanics that's like artificial knees or artificial hips or braces, what

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types of screws. It's the engineering behind the things that orthopedic surgeons use. So what kinds of threads do you want on a screw that's going to go into the sternum. And fundamentally those are engineering questions. Obviously there's a clinical component to it, but that's orthopedic biomechanics.

The other area where I have spent most of my research time as well as my training is impact biomechanics, and that's a study of the response of the human body to impacts or accelerations.

That includes external forces upon the body and how those types of forces or accelerations result in distortions of tissues in the body or injuries in the body, whether that's breaking of bones or stretching of say a bridging vein or something like that where you have actually have injuries created by mechanical forces. That's impact biomechanics.

Q. On the way to getting your PhD at Duke, what kind of projects did you work on there?

A. So I started there in '92. That was right about the time air bags were coming into the field. And one of the issues was people who were too close to the air bags when the air bags would go off, and they could suffer injuries, and that ended up being my dissertation topic.

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I worked for the Highway Traffic Safety Administration along with General Motors, and what I did along with my colleagues, what my specific project was to look at how strong the neck is when an air bag is up underneath the chin and stretching the neck.

So figure out what force equals injury, what types of injuries are produced under that scenario and then ultimately to give data to safety designers, people who design air bags to say if you take a crash dummy, and you put it in front of an air bag, and you blow that air bag up, how do you interpret the numbers from that dummy in terms of whether it would cause injury in a person or not.

And so my work along with work from the University of Wisconsin and Washington, University of Washington was used when the Department of Transportation came out with the new regulations which allowed for second generation air bags. So we had a better idea what causes neck injuries so they could adjust how the air bags performed, or at least set regulations which would then affect how air bags were designed and how they were evaluated.

So that was work that I did.

While I was there, we also looked at injuries to children related to air bags. I looked at

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properties of muscle and how they change post-mortem so when we do test cadavers, what does that mean to a living person that obviously doesn't have catabatic or dead muscle.

Q. So in your research at Duke then did you focus at all on neck or head injuries in children?

A. I did, and it was mostly related to, at least the application was related to air bags. We had training specifically in how tissues changed. That was class room training, as well as laboratory training that happens through maturation.

So when you have a young child, how are brain properties different than say an elderly individual or a teen-ager. How did that change occur.

That's tendon, that's bone, ligament, things like that. So it's a change of both geometry as well as structure of the tissue itself.

And so training that as far as application, it would be related to automotive injury while I was at Duke.

Q. Did that include infants?

A. It did.

Q. Children under one year of age?

A. Right. We were looking at injuries that occurred to children. I mean yes from age zero, anybody who was in

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the car.

Later when I got to University of Michigan, we even looked at injuries to fetuses in the Mom and how those injuries could occur.

Q. After you got your PhD at Duke, where did you go?

A. I moved to Ann Arbor and took a job at the University of Michigan Transportation Research Institute.

Q. What were you doing for them?

A. Similar impact biomechanics. A lot of the applications had to do with automotive safety or at least transportation safety, looked at injuries, as I said before. Looked at injuries that occurred to pregnant Moms and the babies they were carrying as well as knee, thigh, hip injuries.

So then somebody is in a frontal crash, they slide forward in their seat, and their knees usually hit the dashboard.

And so the question is how should you design the dashboard to help stop the body, but limit the kind of injury you get. Or if there is an injury, make the injury the least severe possible.

So you can shatter a kneecap. You can break a femur in the middle, or you can dislocate or break a hip ball at the socket.

So what determines what injury you get when

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you're in your frontal crash. Does it depend on angle of the leg? Does it depend on how firm the surface you're hitting.

So we did lots of experiments using human cadavers and computer modeling to once again evaluate how these injuries occur, and then that data was again used in evaluating regulations for frontal crash design put out by the Department of Transportation.

Q. Where are you currently employed?

A. My primary job is at Design Research Engineering, which is a consulting company in Novi, Michigan.

Q. And what do you do for them?

A. I'm an injury consultant. Primarily, you know, as a consultant what I do is people call with technical questions, and if the questions are related to impact biomechanics or mechanical engineering, my two areas of expertise, then I try to give them help.

I try help answer the questions or design experiments to help answer their questions or point then to relevant literature or regulations that are relevant to the issues that they're dealing with.

Q. You also mentioned that you teach at Wayne State?

A. I'm an adjunct faculty member at Wayne State. I'm not teaching any courses right now. I have been advising graduate students the last number of years. These are

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graduate students in impact biomechanics. One of them was looking at underbody blasts and IED types of explosions that occur in head and neck injuries that war fighters suffer in the field and how can we design restraints, as well as the inside of the occupant cabin to minimize or particularly prevent these kinds of injuries that are happening to people under that sort of situation.

The other graduate student was looking at impacts to the forehead and as they relate to non-lethal or less lethal munitions. These are the rubber bullets or plastic bullets that law enforcement can sometime use, and we're trying to figure out what types of speeds and weight and stiffness those types of objects, if they're going a certain speed, how can you predict whether a skull fracture will occur or not.

Q. I gather from your research that you've worked with crash test dummies?

A. I have.

Q. Have you worked with crash test dummies simulating very young children, infants?

A. I have. As far as advance crash test dummies, there is one that represents a six month old child, and I work with that one a lot. There is also one that represents a one year old and a one and a half year old child.

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Q. Have you worked then with not only car manufacturers but also restraint systems?

A. Yes. So and when I hear restraint systems, because of the ages of the children, we look at two parts. We're looking at the restraint system in the car, which is the belts and the air bags. And so that maybe working with TRW or another tier one supplier, but we're also looking at the child seat, the child restraint system.

And then we're looking at Graeco, Even-flo, Costco's. These are different companies I've worked with in different cases evaluating the performance of these seats in the field.

Sometimes those cases relate to ongoing litigation, where we look at a crash and look at the performance of the child seat in that crash.

Q. Has some of your research touched on or been motivated by an interest in shaken baby syndrome?

A. So I have been asked that question. What really was motivating me when I have done my research in pediatric head injury is to really understand what are the types of forces, what are types of environments or conditions that result in head injury to children.

So I don't think I have a single publication that has the words shaken baby syndrome in it, but I certainly have publications that talk about the type of

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accelerations or forces that give rise to injuries to the brain, as well as the skull in children and infants.

And so yes, the motivation for the work is to try to understand what causes injury. And then it doesn't matter if you're evaluating a case of abuse versus accident, or if we're evaluating a case of, is this car seat better than that car seat.

If we know how injuries occur, and we know quantitatively what are the factors that go into that. What are the important factors that determine whether a baby gets a subdural hematoma or skull fracture or both, then we can change designs for, if it's a design thing, we can change the design to minimize those injuries.

If it's an abuse versus accident scenario which I have been involved with a number of those types of cases or questions related to that, then maybe we can at least bring the best data to the table that may or may not shed light on that particular case.

Q. So particularly have you studied forces and angular acceleration associated with subdural hematomas?

A. I have, yes.

Q. And forces and acceleration associated with other brain injuries?

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A. Yes.
Q. And neck injuries?
A. Yes.
Q. And that's been part of your research?
A. It has.
Q. Have you compared accelerations produced by shaking versus other causes?
A. I have.
Q. Can you describe that a little bit?
A. Sure. I would say as far as specifically as it relates to when I've compared shaking to other scenarios, it was work that I did was published in I think it's neuropathology. It's a book by Jan Leestma, L-E-E-S-T-M-A. I think.

And he published a book on neuropathology, and within that book I contributed materials and test data specifically that relates shaking to things like falls or car accidents or things like that in terms of head accelerations.

So as far as published, that's where that's been. The publications I have had on infant head injury, I don't think specifically address shaking, but they certainly have addressed accelerations related to head injury.

Q. Can you talk about those publications related to

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accelerations in infant head injury?

A. Sure. So you said infant, which is typically to me it's 12 months or younger. I do have a publication that's about, it relate to infants. It was a case study of a child who was 22 to 23 months old who fell approximately 48 inches and hit on to a carpeted floor. This was on video tape.

MR. HEBEL: At this point I'm going to object, your Honor. This is kind of far afield from a two month old where there is no suggestion of falling injury.

MR. MORAN: I'm having him explain his expertise in pediatric head injuries, and he's talking about all the publications he's written on pediatric head injury.

THE COURT: I will give him a little latitude.

Go ahead.

WITNESS VAN Ee: So in that case this child fell. It was on videotape. The grandmother was videotaping the incident. Certainly didn't know it was going to happen. The child fell and suffered what ultimately was a fatal subdural hematoma, brain injury with bleeding in the eyes.

And so what I did, that was published by

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Plunkett. As an engineer I looked at that. I said we know that that kind of fall can cause these injuries. That's plain enough. We see it on video. It's documented.

The question is how does that relate to, if I take a crash dummy and an air bag blows up, it's in a car accident, and I get these numbers out of the dummy, how do I know those numbers relate to injury.

So what I did is use the videotape to reconstruct what happened to the child in the laboratory using a crash dummy. So the dummy fell, impacted into the carpeted floor. We measured the head accelerations, both angular accelerations and linear accelerations, and now we have data of what this engineering tool measures under conditions where we have a known injury outcome.

So then we can start to put these things together. Some of that had been done before me. I certainly was not the first person to do that. The question was for me was how good are the numbers that we have?

And so this was published in 2009, and specifically it was, we know what happened to this child. Let's put the dummy through it and see if the dummy predicts injury like what we see in this case,

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and it did. So that was worthy of a publication because a lot of the data that we have there are questions about, was that from scaling?

In other words using things that we know that happens to adults and applying that to children, and you can adjust for size. You can adjust for tissue properties. But ultimately there is still a question of were those methods effective. So that was one check on that.

Another publication I worked on was looking at skull fracture patterns in infants and how they relate once again to the child crash test dummy or the infant crash dummy. That was also published in 2009 and it specifically related, actually gave a risk assessment where you can interpret the head G's or head accelerations for an impact and say what percent chance of skull fracture you'd have in a child based on experiments that were done in the eighties in Germany.

Q. Have you ever testified before as an expert in biomechanics?

A. I have.

Q. About how many times?

A. In court it's probably on the order of 70 or 80 times.

Q. Have you testified as an expert in biomechanics in cases involving alleged shaken baby syndrome?

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A. Yes, where there is allegations of abuse or shaken baby syndrome, yes.
Q. Any estimate as to how many times?
A. I don't know. I mean it's hard for me to know how many times the word shaken baby syndrome came up in the case. But if it relates to cases people have baby alleged shaking or impact into a soft surface and --
THE COURT: Let's just talk about shaking as opposed to impact on a surface.
WITNESS VAN Ee. That's fair. I would say it's come up at least 15 to 25 times, but I'm not sure because I'm not always there for the whole trial. But certainly a number of cases I've worked in shaking has come up in the medical records, and we do that I would say that's probably on the order or 40 or 50 times I had cases where shaking is mentioned in the medical records.
BY MR. MORAN:
Q. Any of these case has the Judge held you not to be qualified to testify as an expert in biomechanics?
A. No.
MR. MORAN: At this time I would move to have Doctor Van Ee qualified as an expert in biomechanics.
THE COURT: Mr. Hebel?
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BY MR. HEBEL:

Q. You said approximately 15 to 25 somewhere in there times you testified in shaken baby cases; right?

A. Cases where I think shaking was mentioned in court, but you know, that's a really hard number for me to evaluate because I am usually just here for my own testimony.

So unless I read a transcript or heard from it somebody else, I don't know if shaking was mentioned or not.

Q. And of those 15 to 25 times, how many of these times were you testifying for the People?

A. I have never testified. The People or the State has never called me as a witness in that kind of case. They consulted me prior to a trial, but they've never called me as a witness at trial.

MR. HEBEL: No further questions.

THE COURT: Any argument?

MR. HEBEL: About the motion for the witness to be qualified as an expert in biomechanics?

THE COURT: In biomechanical engineering; right?

MR. MORAN: Correct.

MR. HEBEL: The People have no objection.

THE COURT: I'll permit it.

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Go ahead.

BY MR. MORAN:

Q. Doctor Van Ee, you're being called as a rebuttal witness in this case. So we're going to be limited to talking about what the prosecution witnesses have already said.

And so we've heard a lot of testimony in this case about whether humans can shake infants with enough force to cause the injuries associated with shaken baby syndrome.

So let me begin with a tangential question to that.

From your experience and from your knowledge of the infant brain, could shaking a baby injure or kill it?

A. Sure, not just, you say based on knowledge of the infant brain, knowledge of the infant injury tolerance head to toe, absolutely shaking could kill an infant.

Q. Have you ever heard an expert say that shaking is not harmful?

A. I have not heard that.

Q. So from a biomechanical perspective where is the controversy about shaken baby syndrome if you understand it?

A. Yes. So it's the mechanism. How does this happen. So

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shaking is the action. The injuries typically associated with it are bleeding in the eyes, et cetera, hemorrhages and whether a brain swelling or some sort of problem with the brain, that's typically the injuries that are associated with it.

And there is some argument about whether that's called a triad or how that is. Those are semantics to me. But ultimately the question is how does shaking result in this presentation or those injuries when the kid gets to the ER or to the morgue, unfortunately in some cases.

And if indeed if you see these injuries, even more important if you see these injuries, can you determinately say with confidence and accuracy that this child was shaken to get that.

So there is two steps. One is, and I think the second one is even harder than the first. The first step is can shaking produce these injuries, and there is controversy there.

And then the second step is let's say we knew that which, in my opinion we do not, but let's say we knew that. Can you then just look at the injuries and go backwards and say this child must have been shaken, which obviously means those sorts of injuries or that sort of presentation can only occur if shaking happened

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or something that can be eliminated through a history given.

So for the first step there has been a lot of research. I looked at can shaking give you this presentation. And so when you're talking about that, you say what's the mechanism? In other words, what's the pathway that makes shaking overall result in no injury to the chest, no injury to the neck, but these injuries in the head and the eyes.

Q. How can biomechanics be helpful in leading us toward a resolution of this controversy?

A. I would say I don't know if it helps in the resolution, but it certainly helps in evaluating the hypothesis.

So if a child is shaken, that's an impact biomechanical sort of question. That doesn't mean that only an engineer can talk about it. I don't mean to give that impression. I have a unique perspective on it. Physicians also have a unique perspective.

But when you're looking at how these forces are transmitted from the hands of the purported assailant up through the torso through the neck and to the head and doesn't cause injury along this path, those are biomechanical type questions.

So you need to know the strength of the chest. You need to know the strength of the neck. You

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need to have an idea what types of rotation or accelerations result in injury to the head and the brain.

And specifically when shaking baby was hypothesized, they said look, you look at these studies by Doctor Ommaya, who was at the NIH, and in these cases they took primates or monkeys, had them in a seat and accelerated the seat up to be 30 miles per hour.

There was no restraint for the head. So the head went back like this in a real stretching motion we call hyperextension.

And that data -- and so these primates then showed some injury in the neck and some injury in the head and brain.

The researchers at that time looked at these studies by Ommaya and said I think that shaking, this abusive action, which clearly is abuse, no question about it. But I think shaking gives this injury of the brain and the injury of the eyes, and it's through this angular acceleration of the head.

So that was the original hypothesis.

Now that is something that we can start to test, evaluate.

Q. Now outside of this shaken baby syndrome context do we rely on biomechanical research to help us predict and

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prevent infant injuries in other contexts?

A. Absolutely. Impact biomechanics is used by our federal government, particularly as it relates to children. It's also used by the Consumer Product Safety Commission, Department of Transportation. It's not just in our country. It's world wide, and particularly First World countries in evaluating what type of biometry come from it.

Now if you look at infants or typically on biometrics, but for infants you look at a car seat. You look at car seat design, playground equipment, things like that.

Q. There have been some suggestions from a previous witness that biomechanics may not be at level as clinical practice in understanding infant head injury because biomechanical researchers use models instead of looking at actual infants.

Do you agree with that?

A. Well, I think that is very dismissive and very narrow minded of saying what biomechanics does and does not do. I mean hopefully we all look at field data, which is injuries to children and how they happen. That's fundamentally where everybody has to start.

And if somebody's a pediatrician, and they're just in the hospital, and all they ever see is the

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presentation, but they never go visit the accident site, if's it a car accident, or they never go visit other places and investigate how these injuries are occurring, what types of forces cause these injuries, they're not going to have any insight in my opinion on how this actually happens other than what people tell them.

So if I'm designing, if I want to know how car crashes happen and how they result in injury, if I just work in an ER, I'll see a bunch of injuries, and they will say yes, they were in car crash.

But how do I know how fast they were moving, if they're wearing their seat belt, what they hit their head on inside the car? Is that a glass injury, or is that an injury of a piece of metal that bent.

If you don't go look at the car, you can't really help design cars and figure out how people get hurt in cars and how to prevent it.

Same happens in my opinion with infant injuries. If we looking at trauma, and primarily what I do is look at trauma. If we don't go really investigate this, we don't know the types of forces that result in these types of injuries because all you do is see the injury otherwise out of context.

THE COURT: Where do you suggest you look for

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that? When we're talking about a baby that was shaken as opposed to some sort of trauma?

WITNESS VAN Ee: That's is great question. I am only aware of three videos available that have been posted on the News where a child was shaken, and in those cases those three children thankfully didn't have any long-lasting injury.

So that's certainly not nearly enough data to say firmly one way or the other.

What we can do is take data from shaking and to understand what type of exposure that results in the head. In other words, what are the accelerations in shaking and compare it to situations where we do know injury occurs.

How do those accelerations relate to when an air bag hits a child in the head? We do have hundreds of data points on what happens to children in car crashes when air bags hit them in the head. That's in the Department of Transportation data base where they send crash investigators out to look at car crashes where children have been hurt.

We can also look at things like falls. Some falls are well documented by video, and we can understand what type of exposure happens there, and maybe even reproduce it in a lab like I did and then

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have an idea of the numbers that cause injury.

But you are right, your Honor, it's limited in what we can say. I think that goes both ways.

THE COURT: Okay. Sorry, Mr. Moran.

MR. MORAN: That was a great aside, your Honor.

BY MR. MORAN:

Q. So you have seen videos of shaking or have in fact been a few by video cases of babies being abusively shaken?

A. Yes.

Q. And they didn't have shaken baby syndrome?

MR. HEBEL: Your Honor, at this point I'm going to object. We are far afield from rebuttal testimony. This is original, and if we wanted to discuss these cases, it would have been, you know, much more useful in the case-in-chief.

MR. MORAN: I was just following up on the answer the Court got from Mr. Van Ee.

THE COURT: All right. Let's, I think we need to sort of circle back I think to the area that I thought you were going toward, Mr. Moran, and that was the notion of an earlier witness saying that biomechanical engineering knowledge is not as valuable as clinical knowledge.

I know I'm sort of oversimplifying it, but my

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expectation is that you have called Doctor Van Ee to talk about what biomechanical engineering brings to the table in that area. So I think we can get back to that.

BY MR. MORAN:

Q. How long has biomechanical research entered the shaken baby syndrome hypothesis been going on?

A. Well, as far as specifically the shaken baby syndrome, the first article that I'm aware of is published in 1987 out of the University of Pennsylvania that's specific to shaken baby syndrome in that presentation from a biomechanic standpoint.

The research that Ommaya did at the NIH that I talked about earlier with the monkeys, that wasn't about shaking baby. That was about understanding subdurals. But certainly Ommaya commented about the use of that data and whether it did or did not support the shaken baby syndrome theory.

Q. So if you could summarize that body of biomechanical research into shaken baby syndrome, what has it taught us about the controversy? Where do we stand with the biomechanical research today?

A. Sure. I mean the simple answer is we don't know, and there is good reasons to question that the angular accelerations produced in shaking will give rise to

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ripping of bridging veins. So let's piece that out a little bit.

So in '87 that's the first study that comes out at the University of Pennsylvania. It's done by their Bioengineering Department, and I think Duhaime, the first author, is actually a neurosurgeon if I'm not mistaken at that lab. Doctor Thibault was in charge of that lab.

They said let's look at this. Let's look at shaking. Look at the head accelerations that are produced in shaking. This is the same approach that they use when studying subdurals that occur in car accidents or subdurals that occur to boxers or things like that.

So it's the same methods that are being used to design boxing helmets or design air bags or seat belts.

And so what they said is we made a test device to represent an infant, and they had the University of Pennsylvania football players shake it as hard as they could. Then they also compared it to the shaking. They also said now shake it and slam it on a bench.

And what they found is that when you looked at the head accelerations that occur in shaking, they

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are relatively small. They are below the levels that are typically associated with injury like subdural hemorrhage diffuse axonal injury.

However, when they slammed the head on to a hard surface, and I think intuitively we certainly would agree that can result in massive head injury to children. And they said, and it's often been, I think that study has been misquoted or certainly has been referenced in a way that it gives it either more or less creative -- they never said look, you can't shake a baby heard enough to give shaken baby syndrome.

People often say well, Duhaime in '87 said that. I've heard both sides of this debate say that. What they said is look, when you shake, those head accelerations are well below the injury we associate with where injury occurs. They say specifically it's unlikely that shaking is going to give rise to these injuries without injury to the neck or the chest, without some sort of head impact, and that was as strong as they said it.

I think it was very important, but that was the first step. So that's '87. That lab continues to study this issue through today. One of the co-authors on that article, Doctor Margulies is still in that lab and still publishing on this topic of infant head

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injury as relates to shaking, and they have added a whole component, particularly starting with the work of Michael Prange, looking at how do the head accelerations in shaking compare to falls.

Q. And you have done some research to that as well?

A. I have.

Q. In short falls?

A. Yes.

Q. Like six-inch falls?

A. One foot typically is on the low end, but yes.

Q. And with a one-foot fall would you expect --

MR. HEBEL: I'm going to object to this line of questioning because not only doesn't it have anything to do with this case, it was not presented, no information was presented to my recollection during either side's case-in-chief on short falls.

THE COURT: Let me hear the full question first, Mr. Hebel, and then I'll hear your objection.

BY MR. MORAN:

Q. Did you compare angular acceleration or accelerations produced in such short falls with accelerations produced in shaking?

A. I did.

Q. And what did you find?

MR. HEBEL: Same objection.

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THE COURT: I'll take the answer.

WITNESS VAN Ee: We found that even a one-foot fall, which typically doesn't result in injury of any child, produces angular accelerations that far exceed those that are produced in shaking.

BY MR. MORAN:

Q. So a short fall, a one-foot fall, which you wouldn't expect to produce injury, would produce more angular acceleration than so far that has been demonstrated by biomechanics in shaking?

A. I want to add one clarification. There have been a couple of studies that have come out starting I think in 2002 was the first one where when they did the shaking, they had the head slammed into either the chest or the back. So it's a head impact situation, but it's a head impact into the body of the test device.

Under those conditions you can get head accelerations that are more than a one-foot fall. But where the head doesn't hit anything, which was the original shaken baby hypothesis, where you don't have impact on the head, those sort of situations, the head accelerations are well below that of a one-foot fall.

MR. MORAN: Your Honor, could I have the record reflect that Doctor Van Ee, when he was

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referring to the impact sites, he was pointing to his chin and I believe his upper chest.

THE COURT: Sure. That's fine.

BY MR. MORAN:

Q. Now I want to talk about one of those studies that's come up in this case. It's the 2017 biomechanics study which Carol Jenning was the lead author.

Are you familiar with that study?

A. I am. I have a copy of it if I'm allowed to pull it up.

THE COURT: Sure.

BY MR. MORAN:

Q. Did that study, is that one of the studies that in which the shaking was allowed to impact the baby's chin and the back of the head was allowed to impact the torso?

A. So this is the 2017 Jenny article. My understanding is that the chin did hit the chest in the testing, but I don't know that they were able to generate a back of the head to the back of the spine. That was generated in another study called Corian Jones.

Q. So if you're shaking a baby hard enough or at a high enough rate where the chin is hitting the chest, from a biomechanics point of view would that be injurious?

A. Well certainly. First of all even if the chin doesn't

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hit the chest, you can get injury by shaking. Don't get me wrong. There is big forces in the chest. There is tension and great bending of the neck.

It wouldn't surprise me at all if a child was shaken hard that you can get injury in those locations. Now specifically as it relates to this banging phenomenon of the child's chin into the sternum or the back of the head into the back of the spine, that's a scenario where at least based on the Corian Jones in the Jenny article, they're are producing accelerations that are very large, and those accelerations can only be generated by large forces. Force equals mass times acceleration.

So if you are to generate a large head acceleration when that chin hits the chest, that means there's a lot of force there, and you would expect to see visible injury in those locations if that's a true phenomenon in shaken baby syndrome.

I haven't seen that in cases that I've reviewed, but certainly you could.

And the other thing about this test device is they weren't looking at making the properties of the chin and the properties of the sternum necessarily reflective of a child. Doesn't mean that they weren't. They just weren't really looking at that particular

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issue. They are saying look, if the head when you're shaking it, goes bang, bang, bang, bang back and forth, under those conditions do you get bigger accelerations, and the answer is absolutely you do.

Q. Was there anything else about the size of the dummy in the Jenny article that stood out?

A. Yes. The test device that she used in this 2017 study was five and a half pounds. So it represents a fifth percentile of Japanese newborns, and I think it's important to note that she's using that test device, this very small test device, she was able to generate these head accelerations that are on the order of where we think injury could occur.

However, I have other test data where she used a test device of seven and a half pounds. So it's just a scaled-up version of this. I don't know which of the two dummies APRECA made first, but in that test device, when that was shaken, it only created 1600 radiants per second squared, and that was an 88 percent reduction.

In other words, it's about a tenth of the level as what she reported when she had the five and a half pound test device.

So when she moves from a five and a half pound test device, it represents a super very, very

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small child and then moves to a seven an a half pound and has a female shake it, she was able to produce values that are more in line with what had been produced in the past and reported by Duhaime and Prange. That are these very low levels of head acceleration. They are not typically associated with injury.

Q. Now looking at the Jenny study, did the Jenny study seek to answer the question of whether allowing the infant's head to slam into the torso would have produced injuries to the chin or the torso?

A. That was not addressed, no.

Q. Did the Jenny study attempt to answer the question of whether allowing the head to go back and forth that far would have produced neck injuries?

A. As far as I understand if they monitored neck forces, they certainly didn't report it. There was not a comment about what types of forces would be produced and whether those forces would be consistent with injury or not.

Q. In fact, are infant necks vulnerable to injury?

A. Very vulnerable to injury.

Q. You do a lot of work in the automotive field. Is that a concern in the automotive industry about infant necks?

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A. I would say if you turn the clock back in the seventies and eighties when the whole reason that we put infants in a rear-facing child seat as opposed to forward facing is because their necks are weak.

So frontal crashes are the most common type of crash. If I rear end somebody, I have a frontal crash. They have a rear crash. But if I run into a tree, that's a frontal crash just for me.

So if you look at the broad spectrum of crashes, for every rear crash there is always a front, and a lot of crashes are only a front. So frontal crashes or the most predominate crash mode, as you want to offer the best protection into that crash mode.

What they found is that under high velocity crashes, 25 to 35 mile per hour Delta V, so change in velocity. So hitting a brick wall 25 to 35 miles an hour the infant, who is held in a forward-facing car seat, the chest is held by the straps. The child moves forward. The straps get tight, and the head bends forward like this and starts to stretch that neck.

And what happens, and I have seen in cases that I have evaluated, there's a lot of articles about it in the literature. They talk about how the base of it, of the skull, the occiput, starts to separate from the first two cervical vertebrae, C-1 and C-2.

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So you may have an OC-1 one separation, and when you look at an X-ray where the head should be and the neck should be right beneath it, there's like an inch gap in there. Some of the infants die. Some are catastrophically injured with spinal cord injuries. So that we know that the infant neck is vulnerable. It's weak. And so as a result that's also what we try to protect under this.

If the head is moving unconstrained, we know that that can stretch that neck and injure the neck, and that has implications to the shaken baby syndrome theory.

Q. Because if a baby is violently shaken, that can impact the neck?

A. Those forces have to get through there. So that neck is going to be bent and stretched back and forth multiple times, and based on the limited data and what's available, it's certainly reasonable that shaking can give rise to a hundred pounds of tension in the neck, and that sort, 50 to 100 pounds is enough for infants to start causing these catastrophic injuries of the neck.

Q. So if there was high enough angular acceleration or high enough force to produce a subdural hematoma from shaking, would that have any implications for the neck?

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A. So if it's a non-contact head situation so the head isn't hitting something externally, and you are not getting impact sites between the chin and the chest or the back of the head and the spine, under that condition then that head motion is controlled by what is happening with that neck. It's like a rope. It's going back and forth and getting stretched and pulled each way.

So the point is when they've done the shaking, they can generate forces in the neck that are at about the level of injury, but they are way below the levels that are associated with bridging vein failures and getting subdural hematomas.

So if you start doing the tests, the tests say look, neck injury is probably going to be the most logical place to look for injury when this happens.

Just like if I had my foot out, and somebody stepped on my lower leg, I'm going to start looking where they stepped, and the knee and the ankle for injuries. I'm not going to immediately look somewhere farther away. I'm going to look at the contact site and the joints near it.

That's what we see in shaking baby is that if you are doing this big force injury or big force abuse to this child, where is the injury to the chest, and

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where is the injury to the neck.

It doesn't mean you can't have a head injury, but these look to be very vulnerable places for injury to show up.

Q. A final area of questioning that I'll ask you about. Did you have a chance to view the animated video Doctor Dan Davis has produced and sells about the mechanism of shaken baby syndrome?

A. I have. Yes.

Q. Do you have any comment on the value or accuracy of that video from a biomechanical point of view?

A. So being the accuracy, if this is his hypothesis, which is how I understand it, if he says this is how it happens, that's inappropriate.

But if he says my hypothesis is this, then that's I guess okay. But he shows brain motion in the animation, and that brain motion is not based on actual brain motion measuring experiments.

I mean it may be his idea, which I assume it is, but right here at Wayne State I mean there are studies looking at how the brain moves when there is an impact to the head or an angular rotation to the head, and these have been published, and what has been done, they put these high-speed X-rays --

MR. HEBEL: I'm going to object to the

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narrative, and I'm also going to object to specificity because he's --

THE COURT: I agree.

MR. HEBEL: He's obviously referring to something without naming what it is.

MR. MORAN: Your Honor, if I ask him what study he's referring to?

THE COURT: Go ahead.

BY MR. MORAN:

Q. What study are you referring to?

A. So it would be the work by Doctor Hardy, one of those would be the SOU article, S-O-U I think.

MR. MORAN: I did send Mr. Hebel a copy of the SOU article in advance of Doctor Van Ee's testimony.

MR. HEBEL: That is absolutely correct, and at this point I'm going to object both the SOU article and the prior Hardy articles before that refer to a 2001 study by Hardy, in which he used two cadaver brains neither of which does it say anywhere were infants. This is not an infant study. This is an adult study.

THE COURT: Response?

MR. MORAN: That is true. It is an adult study, but Doctor Van Ee has drawn some knowledge and

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information from the study, and it's an adult study. He's not going to pretend it's anything else.

THE COURT: I'm going to sustain the objection.

Go ahead.

BY MR. MORAN:

Q. Is there anything, any other comment you want to make about the Doctor Davis video?

Let me ask a more specific question.

The Doctor Davis video, I believe, purports to show bridging veins, severing or hemorrhaging as a result of the shaking. Is that based on any biomechanical knowledge?

A. The studies today do not support what he is showing in that video as far as that you can reach levels of angular acceleration in shaking that will do what he's showing in the video.

MR. MORAN: I have no further questions, your Honor.

I'm sorry, your Honor.

I would like to move to admit Doctor Van Ee's CV as Defense Exhibit Two.

Mr. Hebel has a copy.

THE COURT: No objection to that?

MR. HEBEL: No objection.

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THE COURT: It will be received.

CROSS-EXAMINATION

BY MR. HEBEL:

Q. Just a couple of quick preliminary matters. If you don't understand any of my questions, can you please say so?

A. I will answer them to the extent that I understand them. If I don't get it all, I will certainly ask you.

But if I answer a question that you meant something different, it's the best I can do.

Q. Fair enough. That actually ties into the next one, and that is when you do understand my question, answer only the question that I ask you.

Can you do that?

A. As long as I don't think it's misleading, sure.

Q. If you think it's misleading, can you point that out to me?

A. Sure. If it's misleading or incomplete, but sure.

Q. Are you doing this case pro bono?

A. I haven't been paid anything. I don't plan to charge anything.

Q. You mentioned that you thought it was very narrow minded I believe was the terminology for a pediatrician to be dismissive of biomechanics.

Was that a correct summary of what you said?

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A. I thought that statement that was made was very dismissive, and I thought it was narrow minded, yes.
Q. Would you believe that a more knowledgeable pediatrician would be somebody that worked with biomechanical engineers to, shall we say, get out of just the clinical setting and expand this person's horizon to more areas than just the clinical studies?
A. I don't think somebody working with bioengineers necessarily makes them more informed. I think it could if they are listening and they have the aptitude to understand what it is they're doing, then they could.

But just being in the room with them is not necessarily going to make them maybe understand the area of science better. It's certainly a first step.

Q. What is a subdural hematoma?
A. It's a collection of blood underneath the dura.
Q. And what are the different ways that you know -- now I know you're not a medical doctor, but what are different ways that you know of that subdural hematoma can occur?
A. Well, typically it's impact or angular acceleration. But if you're want to say specifically where blood is coming from that creates a pool of blood, I think that's up for discussion.

There is theories about it being bridging

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brain failure, but in a few cases that I've looked at at autopsy, they're able to identify a bridging vein that actually failed that caused the bleeding. In many cases they can't find the source of blood. So I think there are theories and different places that maybe the blood could come from.

Some people suggest that if the dura itself has vessels in it, and you can get some oozing or maybe bleeding from the dura. I don't have an opinion one way or the other about that.

The classic theory has always been bridging vein failure, but that has been called into question in some cases.

Q. Essentially what you're describing is bleeding inside the brain; correct?

A. At the surface of the brain and underneath the dura.

Q. All right. So just to back track a little. You have been talking a lot about medical questions, but you're not a medical doctor. You don't even plan to be; correct?

A. I haven't attempted to talk about any medical questions. I talked about biomechanical engineering issues.

Q. Now back to the question. You're not a medical doctor; correct?

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A. I'm not a medical doctor. Correct.
Q. And specifically that means you never performed forensic examinations on a deceased body?
A. Not as a forensic pathologist, no. I certainly have done many autopsies, but they are biomechanical autopsies. They would be different than what a forensic pathologist would do.
Q. You never medically diagnosed a case of child abuse?
A. Can't do that.
Q. And you have never performed a skeletal survey?
A. No.
Q. And that's because you are in fact a bioengineer as you already stated multiple times. And as a bioengineer how many experiments have you conducted on living babies?
A. 10 to 20, probably something in that order. Obviously it's a situation where you don't want the child to get hurt. You're looking at things like child seat fitness or movement or things like that.
Q. But when it moves from fitting to injury models, you can't use living, human subjects?
A. It would be unethical to hurt the child. That is part of it, but certainly there are video tapes of children being injured where you can start to evaluate those sort of things.

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Q. But from an experimental controlled perspective it's completely out of the question ethics wise?
A. In my opinion, yes.
Q. Now that relegates outside of, you know, limited occasional videos bioengineers tend to perform their studies using animal studies, physical modeling, computational modeling and cadaver studies.

Those are the big four; correct?

A. So when I talk about where we get our data, it's those plus what happens in the real world, and the real world is life experience, what's happening in car accidents or falls or things like that where we have data, but that's the main areas, yes.
Q. Excellent. And so really in the field of biomechanics you deal with replication hypothesis; correct?
A. I never heard that term. In science you make a hypothesis. Then you evaluate that hypothesis using the best tools available. That's just science.
Q. But you're not retrospectively dealing with fixing or amending the reality of living subjects that have gone through trauma of any kind?

THE COURT: Could you repeat that? I'm not sure I follow that question.

Maybe you did, Doctor. I didn't.

MR. HEBEL: Fair enough.

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BY MR. HEBEL:

Q. I'm saying that this, the main thing is that you have a theoretical, calculated exercise rather than an afterwards approach to repairing something that has already happened in the real world?

A. I will answer the question as best I can based on my understanding.

I don't treat children. I'm not looking at rehabilitation. I'm not looking at stabilizing them in the ER. I don't treat children. I'm not an ER. I'm not trying to get them back to health.

And if that's what you mean, I think that's what I understood you to start to say. I'm a Monday morning quarterback as it relates to how trauma happens and what are the important factors that govern, what injuries somebody gets under certain exposure of trauma.

Q. Actually that was a really good way. It wasn't exactly the way I was predicting it asking the question, but it's a really good answer. So thank you very much.

Now because of that, because of, you know, essentially your quarterbacking from behind, what you're actually trying to do is trying to make the most biofidelic model or replication possible in order to have it as closely related to the real world as

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possible; is that correct?

A. So I'll say as a quarterback Monday morning, we're looking at what happened in the situation. What can give rise to injury. And so you may use a model, and if you're going to use a model, then you want that model to accurately reflect what you think are the important parameters that your hypotheses are about.

So in other words if I'm looking at brain rotation, it's probably not that important exactly what the lips look like on the crash test dummy.

But you do look at the important mechanical components that give rise to that, whether that be the neck, the weight of the head, how that weight is distributed, how that motion occurs. Those are the types of things you would focus on if you're going to make a model to address issues whether the head acceleration and shaking, that's one way to do that.

Q. Now you mentioned a few studies such as Duhaime, Corian Jones, Prange. Did any of these use a biofidelic model of a two month old baby that was, you know, that's universally agreed upon to be actually biofidelic by, you know, any national society of biomechanical engineers?

A. I don't know any model -- I mean biofidelity is always something. You say there is no biofidelity index that

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I'm aware of.

And so you look at it. You say what is the pluses and minuses to the model used in this study or that study. And I think as far as I know in '87 when the Duhaime article came out, they said that was a reasonable model for starting to look at this hypothesis and evaluate what types of head acceleration can be produced.

It's not perfect. It's certainly not even close to being identical to an infant, but I think it does give us an idea of how to envelope the response in terms of they looked at neck, that's simply a hinge that had no resistance. They looked at a neck with more resistance.

So they can start to envelope the response and say look, a kid has to be between there because there is going to be some resistance. It's not a hinge, but it's also probably not as resistant as our structure. So they can start to envelope the response of where a person would be.

It's the same thing we do when we evaluate dummies for car crashes or things like that as well.

Q. So it's not divine revelation so-to-speak. There is no perfect model. Rather there's a path toward better and better; is that correct?

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A. I would agree with that. Hopefully the path is going towards better and better. If you're using scientific methods, that's the goal of science is that you work forward not go backward.

Q. So would you agree that Corian Jones tried to make some biofidelic improvements on the Duhaime model, and they had slightly different results, very different results in some areas, but they showed that a few changes could radically change the model; is that correct?

A. So I don't know if I would necessarily. I think there is debate whether the changes they made were more biofidelic or not, but they certainly showed that if you change things about the model and allow the head, the chin to bang against the chest and the head to bang against the spine, that you can produce larger head accelerations. That's true. That's exactly what they found, and they made those changes to help understand maybe -- I'm sorry. I'm going beyond your question. You asked me not to do that.

Q. Thank you very much.

And that has continued? That has not stopped. We're still trying to get better models to do more accurate tests, to have more accurate measurements; correct?

A. I think that's the goal of most scientists in this

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area, yes.

Q. Now you criticized Doctor Davis' visual model for not accurately reflecting the biomechanics of an infant's brain within the skull. I want to talk about that really quick.

Are you aware of a biomechanical study out of Australia by Cooper and Albernany, where assimilation showed that shaking a baby could be expected to result in the same brain movement that Davis' visual shows and rents in the same axonal injuries? I can't say offhand about the bridging veins, but the same axonal injuries that his video shows?

A. I don't think that's what the Cooper and Albernany article says, and I don't think that that, it certainly shows there's brain movement, but it doesn't show the kind of brain movement that Davis shows in his article or in his visualization.

There is no doubt there is brain movement in the skull during shaking, but I don't think that that article supports quantifiably what Davis is showing in his video, and that also is a computer model as well.

Q. And I believe that you said that you do know this article; correct?

A. I know that article. I have looked at it in the past, yes.

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MR. HEBEL: May I approach witness, your Honor.

THE COURT: Yes.

BY MR. HEBEL:

Q. I'm going to hand you what has been marked for identification purposes as People's Proposed Exhibit 22.

And in the conclusions which are on page 14 and approximately in the second paragraph approximately halfway down, "significant contact between the brain manner and the cranium/membranes is caused at each squashing extreme, particularly in the frontal portion of the cranial vault at the sinus confluence, and adjacent to the most superior portion of the inferior sagittal sinus.

At these locations, the model indicates that the max axonal injury in the peripheral white matter may be caused."

Continues into next paragraph and says "high strains are also developed in the corpus callosum and brainstem/cerebellum/connections, due the restraint of the brainstem developed by these main brain masses pulling in different directions.

Taking into account the repetition of these strain models, it appears likely that the focal axonal

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injury would be generated at these locations."

Is that a correct reading of that?

A. That is what it says, yes.

Q. So according to this model, which is a different computer model, he does say there can be brain injury caused by just shaking; correct?

A. That is what they say, yes. That's what they predict at least, yes.

MR. HEBEL: Your Honor, at this point I would look to offer into evidence People's Exhibit Number 22.

MR. MORAN: No objection.

THE COURT: 22 will be received.

BY MR. HEBEL:

Q. And then I'd also like to change our focus a little bit not a lot, but we've been looking at the models wherein there is a computer simulation that tries to be biofidelic or a physical model that tries to be biofidelic, and you compare the computational results of shaking to an established injury model to see whether or not there is injury; correct, and we've been talking about those models and their accuracy?

A. We have to some extent, yet.

Q. Now I'd like to focus on the injury model for a second because both Carol Jenny and other authors have criticized the fact that the injury model for Duhaime,

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Corian Jones, Prange and Marguilles, all these injury models are based on the single high energy insults from indirect impact, that is one motion and recording the amount of injury that occurred in a primate brain after that single, high energy insult; correct?

A. That's a very complicated a lot of level questioning, and if you give me a little freedom, I'd like to answer it, but I can't just answer that yes or no.

Q. What I'm going to do I'm going to break that down in multiple questions that we can kind of go through the answer together.

A. Sure.

Q. The Duhaime study, the Corian Study, the Prange study, these use the same basic injury model; correct?

A. You say Duhaime, Prange and which other one?

Q. Corian Jones.

A. I would say in general, I mean there are a couple of injury models that are part of that. It's not just a single injury model, but they're looking at, you know, linear accelerations as well as rotational accelerations. Prange in his dissertation which the article goes, I think he's looking at strain as well. So he looks at a lot of the same things that have been looked at, which includes tissue deformation, as well as overall kinetic responses of the head.

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Q. And those, specifically the ones used by Duhaime and Corian, and in the Marguilles study, those ones, and I know that there are multiples of them, but they are all based off of the single high energy insult.

Stated in inverse, there is no model in these that uses cyclic insult.

A. In the Margulies data they have been collecting in their lab. They have been looking at repetitive insults in animal models to look at how repetition results in injury.

So I do think that there is data today that helps inform the interpretation of the Prange data and the Duhaime data. And Margulies herself writes about this and says look, you know this repetition is important because it's not a just a single insult.

What we know, my understanding of that is that if one insult results in injury, multiple insults at that same level are going to give you worse injury.

But if you are a low level where injury is not occurring, multiple exposures of that same level typically aren't going to do it either.

Example is in if I'm jumping rope.

Q. I think you've gone a little bit beyond my question here. So what we're looking at is there is new data on cyclic models.

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A. I don't want to call it cyclic. Repetitive exposure which is, I wouldn't call it cyclic. I'm not saying it's wrong. I wouldn't call it that.
Q. Okay. In that case we're actually talking about possibly two completely separate things as opposed to repetitive versus a continual cyclic motion that would be a backwards, forwards continual motion on a model versus a repetitive motion?
A. I think you raised a good point. There are two different issues there. And what happens in the cyclic you can start to maybe get at a residence where like if I had a ball on a piece of elastic, as I start out, it's not going very far. But if I do it right at the right frequency, I can start to get big motion of the ball. But you have to be right at the resident frequency to do that.
Q. Now I would like to actually focus on another study, and I know that I provided this to the defense. And are you familiar with any of the work by D. R. Wolfson?
A. I am.
Q. And are you familiar with his thesis Biomechanics Of Shaken Baby Syndrome?
A. I actually read the entire thesis two days ago.
Q. Excellent.
Now are you aware that he finds that the

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current studies that are based off of the single high velocity impact are insufficient and that there are better models he believes that should be used?

A. That is one of his conclusions, yes. I don't know if it's male or female.

Q. David?

A. Okay. Thank you.

Q. So in this study he goes through and discusses a lot of the other studies and is very open and honest and says a lot of these biomechanical studies do not explain how we see pure shaking cases and the injuries that they have?

A. I don't -- when I read his dissertation, and I thought he was very honest in his dissertation, and he has a pretty reasonably good scope of the controversy that is out there and goes over that and talks about the problem is what is a pure shaking injury case.

We don't know unless somebody -- we don't -- that evidence data said, which is absolutely critical but incredibly problematic to get, we don't have a basis for it yet. So that's the problem.

And so while he may say something along the lines of what you said, he also says within that look, the studies to date haven't shown that we can get these injuries by shaking. And I agree with him completely.

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That door is not shut. What the studies to date show is that there are some problems with this theory, big problems with this theory and reasons to question it, but that doesn't mean we should stop looking.

Q. Exactly. One of the things that he does is he does his own study as part of this thesis where he continues looking. And in his model he finds that there would be brain tissue shearing under a low level cyclic, not with a single cycle, but with a low level cycling he finds that his data shows that there would be brain tissue shearing; correct?

A. There is going to be shear no matter what. If you have even the smallest angular acceleration, there is going to be shear forces set up. It's just a matter if those shear forces are sufficient to cause injury.

He says maybe using my very simplified model, maybe there is a way that that happens.

But the other quirk of this is if that's how the injury is occurring due to shear forces, shear forces are governed by angular acceleration, things that produce much greater angular acceleration should also give rise to those injuries. That's the other part of this. It's got to not just predict injury in a shaking case or not predict it, but it has to predict or not predict injury correctly in other cases as well.

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So you got to fit these together, and there hasn't been a study to date that can put it together and make sense of it.

Q. Now, but what his study says, I appreciate your editorial.

A. It's on his dissertation. It's not an editorial.

THE COURT: Let's just have a question please.

BY MR. HEBEL:

Q. But I'm most interested in didn't he say in his study that the shearing forces that he found exceeded the injury level that would cause brain damage?

A. If you can direct me to a page, I'd love to see. I've highlighted it. When I read his study, I did not I think taking that statement, if it is in there all by itself would not be a fair representation of his findings in this case.

It may be in there that that was one thing that he found, but I don't think that's fair to take it out of context.

Q. All right. On page 94, I can actually give you copy of what has been marked for identification purposes as People's 21A, and that is simply Chapter Seven of the Wolfson thesis.

MR. MORAN: Can I have a copy of that please?

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MR. HEBEL: Absolutely.

WITNESS VAN Ee: May I make a comment related to the question what I think is on the floor or not?

MR. HEBEL: There's no comments. Excuse me. There's no question right now.

THE COURT: Next question please.

MR. HEBEL: Your Honor, may I approach the witness?

THE COURT: Yes.

BY MR. HEBEL:

Q. I'm going to hand you a copy of what has been marked for identification purposes as People's Proposed 21-A, and that is Chapter Seven, the thesis discussion of the Wolfson thesis paper.

A. Yes.

Q. And I would direct your attention to page 94.

MR. MORAN: Your Honor, at this point this is a Proposed Exhibit. I don't think it has been moved.

THE COURT: It's just a Proposed exhibit at this point.

MR. HEBEL: You know what?

Your Honor, at this point before we have any further questions on the issue, the People would ask to admit People's Proposed Exhibit 21, which consists of 21 A, B and C.

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People's 21 is simply the Wolfson thesis paper, and that is from the University of Nottingham for the degree of Doctor of Philosophy of 2006.

The reason why it's separated and free is simply printing and stapling constraints.

The letter A, 21-A is the thesis discussion, which is the main portion that I would be interested in discussing about at this time. But the entirety of the thesis is in 21-B, and the appendices and bibliography are in 21-C.

MR. MORAN: Your Honor, I asked Doctor Van Ee, are you aware if this thesis was ever published in any peer-review journal?

WITNESS VAN Ee: Typically thesis are not published in peer-review journals, your Honor.

MR. MORAN: Are you aware if his research was replicated and produced in a peer-review journal?

WITNESS VAN Ee: I believe that there is a publication by what is now Doctor Wolfson related to some of the work in this dissertation that is published I think by the American Society of Mechanical Engineers.

I'm not sure to the extent it was peer reviewed or not. It may have been. I'm not sure, but it certainly would not be everything that is in the

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dissertation.

MR. MORAN: I would object. This is a PhD thesis, not a peer-review publication of the sort that both sides have entered into evidence at this point. If this thing were published in a peer-review journal, I would not object to it, but I do object to the admission of a lengthy PhD thesis.

MR. HEBEL: Your Honor, this PhD thesis was published and was offered on line by the university. As per peer review it was peer reviewed by his professors who looked it over, but we don't -- evidence is not limited under Daubert to exclusively things in peer-review journals, rather the question is the reliability of it, and what we see is his reliance on a wide number of peer-reviewed articles well established and published injury models and his own thesis model, which he lays out in exhaustive detail so that it can be replicated by others.

Further, the witness was correct that this entire thing was postulated by Wolfson, et al, in a peer-reviewed scholarly journal article that took place the year before.

THE COURT: I'll receive it over defense' objection.

Go ahead.

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MR. HEBEL: Thank you, your Honor.

BY MR. HEBEL:

Q. Now just to direct your attention to page the 94 of People's 21-A.

Would you agree in the second paragraph he says "two published medical articles were used, critical sheer strains, and I'm not going to get into the numbers. Tensile strains at strain rates for neural damage. And the next sentence says both of these strain values were exceeded in these tests with the average principle strain of 16.5 percent and the average sheer strains of 12 percent using the most biofidelic of the models.

Had it been possible to obtain maximum strain data, greater values could be demonstrated."

Does it say that?

A. That is what it says, yes.

Q. And in the very next paragraph it says "from these findings it can be concluded that shaking alone is capable of inducing strains that would damage brain tissue. This contradicts previous biomechanical studies of shaken baby syndrome that conclude that impact is required to cause the injuries associated with the syndrome."

Is that correct?

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A. You read that correct, but it think it's very important that you read what is on two pages later.
Q. Okay. I appreciate that, but I think that's a little bit beyond the scope of my question.
MR. MORAN: Your Honor, if Mr. Hebel would stop with the commentary, I'd appreciate it.
THE COURT: Okay. Let's just have the question, Mr. Hebel, if you would please.
Okay. There will be plenty of time for closing augment.
BY MR. HEBEL:
Q. Now I want to look at biomechanics one more time in general.
We discussed, or excuse me, you discussed on direct examination the nature of biomechanics, and you discussed that your company and you in particular have dealt with many different areas of biomechanics, including car crash studies.
A. Correct.
Q. And hypothetically your company could be hired. You could be hired to evaluate the safety of a passenger seat in a vehicle?
A. Could.
Q. And during a collision at a given speed?
A. Sure.

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Q. Now if your evaluations indicated that the passenger seat should be safe, but later real world data, which you said at the beginning is part of the analysis, later real world data says that that passenger seat under the conditions of the experiment in the real world causes a large number of fatalities, would you discredit the deaths, or would you try to find out why the study, what variable in the study did not accurately predict the deaths?

A. I would absolutely try to look at the study and try to figure out what variable didn't predict what's happening in the real world. You certainly want to look at if the real world data is indeed accurate, but you know, if it's reliable data, then yes, then obviously you're looking at the experiment absolutely.

Q. You're aware of this case, the defendant confessed to shaking?

MR. MORAN: Your Honor, that goes beyond what Doctor Van Ee was called for. We specifically did not ask him to look into this case. He's just testifying about biomechanics.

MR. HEBEL: I think this is very relevant. This is cross-examination.

THE COURT: I'm going to sustain the objection.

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MR. HEBEL: No further questions.

MR. MORAN: Just a few, your Honor.

May I have just a moment before?

THE COURT: Yes.

REDIRECT EXAMINATION

BY MR. MORAN:

Q. Doctor Van Ee, you're a scientist not a doctor; is that right?

A. I'm not a medical doctor. Yes, I have a PhD in Science of Bioengineering.

Q. Doctor, Mr. Hebel established that you're not a pathologist. You're not a radiologist. You're not a clinician of any kind?

A. He did ask a number of questions, and that's correct I'm not.

Q. As a scientist you rely on data to make your, reach your conclusions?

A. Almost solely, yes. I mean I don't know what else I would rely upon.

Q. And in reaching your conclusions, do you recognize principles of scientific uncertainty?

A. Yes.

Q. Now you don't just rely on biofidelic models in the testimony you gave today, do you?

A. No. It's all the knowledge related to this topic that

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I'm aware of.
Q. So do you use videos of real injuries being inflicted?
A. Inflicted implies that it's specifically abuse. I don't know that I have seen a video of an inflicted injury. I certainly have seen -- that's not true. I actually have seen videos of injury being inflicted. So I have used that.
Q. You have seen videos of accidents?
A. Yes. I've seen many videos of accidents, yes.
Q. And you use autopsies of real bodies?
A. So use the data that's from the autopsy report and the photos of that, or are you saying have I performed biomechanical autopsies on cadavers that we've done testing on?
Q. The latter.
A. The latter. Both. I use both. We do autopsies after we do our experiments to figure out what the injuries were and the nature of them.
Q. So what I'm trying get at you're not just tethered to one type of source of information about how these injuries might be inflicted or might be caused?
A. No.
Q. I want to briefly ask about the Cooper Alderman article.
From your reading of that did they try to

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discover whether shaking of the magnitude that was in their model would have any effect on the neck?

A. I don't recall that they looked at that issue in any depth at all, that they really commented on whether that shaking would result in neck injury or not.

Q. Let me turn to the Wolfson article that Mr. Hebel talked about. It wasn't an article. It was a thesis.

A. The one he brought up was his dissertation, yes.

Q. A PhD thesis. And he pointed you to some language on page 94?

A. Yes.

Q. You said there's something two pages later?

A. Yes.

Q. What would you like to talk about that is two pages later?

A. So on page 96 it's the very last paragraph of his entire dissertation of at least of that Chapter Seven. It says "Thesis Conclusions."

And what he writes his very first sentence is "at this time there is no clear explanation for how brain injuries are caused in cases of shaken baby syndrome without impact."

Q. Do you agree with that?

A. I agree with that.

Q. There's no clear explanation of how you get shaken baby

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syndrome injuries without impact?
A. Yes.
Q. That's the very last paragraph of the thesis before the appendices and the tables.
A. I think so. I mean he goes through and says what he did in this. He goes, I've done some work. I answered a few questions, but ultimately this is still with the article.
Q. Now a few pages earlier he writes that he thought through his model he was able to possibly induce brain injuries; is that right?
A. So when he's talking about one part of this whole dissertation project, he talked about a part that said, that suggested that maybe you could produce injury, yes.
Q. Was he able to specify the brain injury he's talking about is subdural hematoma?

Did he claim that he could show that subdural hematomas could be produced through these courses?
A. The paragraph that was read to me was specifically about diffuse axonal injury not subdural injury not subdural hematoma.

MR. MORAN: Your Honor, may I have just another minute?

THE COURT: Yes.

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MR. MORAN: I have no further questions, thank you, Doctor.

THE COURT: Mr. Hebel, anything?

MR. HEBEL: Yes.

RECROSS-EXAMINATION

BY MR. HEBEL:

Q. Just briefly we were discussing the thesis conclusions?

A. Yes.

Q. Page 96, and he did say that initial work to this end has demonstrated that shaking can cause deformation in physical models that would damage neural tissue. And then he described some of the work that needs to be done to more thoroughly explore that finding; correct?

A. That's correct.

MR. HEBEL: No further questions.

THE COURT: All right.

Thank you, Doctor. We'll excuse use at this time.

WITNESS VAN Ee: Thank you.

THE COURT: Mr. Moran, could I ask if you would touch basis with my clerk by sometime Friday before lunch time as to whether or not you're going to need Monday morning?

MR. MORAN: I anticipate we should have that to you by tomorrow.

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A-U-E-R, and Roland is R-O-L-A-N-D.

ROLAND NIKOLAUS AUER,

called as a witness by the Defense, having first been duly sworn by the Court Clerk, was examined and testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. LICHSTEIN:

Q. Good morning, Doctor Auer. Can you hear here me okay?

A. Yes, I can hear everybody okay.

THE COURT: Excuse me. Can you just hang on for a second.

MR. LICHSTEIN: The Judge had to step away for a moment. So just hang tight.

BY MR. LICHSTEIN:

Q. Doctor Auer, did you previously provide me with a copy of your Curriculum Vitae?

A. Yes, I believe I did.

Who are you?

Q. This is Attorney Byron Lichstein.

A. Oh, hello. I've never seen you in person.

Yes, I did provide you with a Curriculum Vitae.

MR. LICHSTEIN: We've had that document marked, and it is Defense Exhibit 33, a copy has been provided to Mr. Hebel.

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I would like to just offer that into evidence, your Honor.

THE COURT: Any objection, Mr. Hebel?

MR. HEBEL: No objection.

THE COURT: That's fine. It will be received.

BY MR. LICHSTEIN:

Q. Doctor, I'm going to go through a few selected areas of your CV relative to the testimony here. Okay?

A. Okay.

Q. My understanding is you're both a doctor and a researcher; is that correct?

A. Yes.

Q. And when did you get your medical degree?

A. I got my medical degree in 1977 at the University of Alberta.

Q. So you have been a doctor and a medical researcher for about 40 years then?

A. That is correct.

Q. Can you tell us what your current position is?

A. I'm the lead neuropathologist in the Province of Saskatchewan. That's just north of North Dakota and Montana. It's a province of about a million people, and I run the autopsy and the biopsy service in pediatrics and adult neuropathology for the Province,

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and I have a colleagues who covers one third of the time, and I cover two thirds of the time.

Q. Can you just briefly explain what neuropathology is?

A. Yes, it is the study of brain, spinal cord, nerve and muscle.

Q. And before the current position you hold, am I correct that you also held positions in several other universities in pathology and clinical neuroscience departments?

A. Yes, two other universities. The University of Montreal for five years in Pediatric Neuropathology and the University of Calgary for 25 years in Neuropathology, and I ran my own scientific research laboratory there.

Q. In addition to your medical degree from the University of Alberta, do you also hold a PhD?

A. I do, yes, from Sweden.

Q. What is the subject of that PhD?

A. I'm sorry. I lost the question.

Q. What is the subject of that PhD?

A. Brain damage. The brain damage due to low blood sugar. And then I later diversified into research on brain damage due to low blood flow and due to epilepsy and due to trauma.

Q. And you hold certifications am I correct in

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neuropathology both in the United States and in Canada?
A. That's correct.
Q. Okay. You're also a member of the Neuropathology Professional Society in both the United States and Canada; is that correct?
A. That is correct, yes. The Canadian Association of Neuropathologists and the American Association of Neuropathologists.
Q. Okay. I want to ask you about your experience conducting or participating in autopsies. Approximately how many autopsies during your career have you had some role in?
A. I'm often asked that. The largest number was actually in Montreal where there were 6,000 to 7,000 autopsies backlogged because there was only one neuropathologist there at the St. Justine Hospital, but I took a role in several thousands of those pediatric autopsies.

And in Alberta at the University of Calgary I played a role in over a thousand autopsies.

So the answer would be something like 4,000. I've never counted them actually.
Q. Apart from your role conducting autopsies, am I correct that you also --

THE COURT: May I ask you to back up and define what talking a role means, whether he did them

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or what exactly that role was.

BY MR. LICHSTEIN:

Q. Certainly. Did you hear the Judge's question, Doctor Auer?

A. I did, and it's a good one. The role in Montreal was signing out the autopsies, meaning affixing my legal signature to the final diagnosis. The backlog had caused considerable hospital liability, because if a mother had another child, and the autopsy was not signed out yet from a previous case and a similar abnormality showed up in her second pregnancy, she could sue the hospital for not having the autopsy signed out on the first pregnancy.

So my role there was not doing every one of these thousands but looking at the history, the gross findings, the microscopy and dictating the final report.

So that was my role there.

In addition during my five years there, in addition to cleaning up the backlog as it were, I performed my own autopsies fully, probably about a thousand new ones. We had 400 per year at that hospital.

In Calgary my role was performing the autopsies from stem to stern, including taking out the

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organs, the brain the spinal cord and nerve and muscle, and here for two years in Saskatchewan, my role is complete autopsy, brain, spinal cord, nerve, muscle and other organs if there is no pathologist doing the other organs. So that would be lung and heart.

But I do consultation internally, if there is a complex case on none neuro organs.

I hope that clarifies it.

BY MR. LICHSTEIN:

Q. Thank you, Doctor.

I want to ask you about your research now. Your CV says that you have published 126 peer-reviewed articles; is that correct?

A. Yes.

Q. And it is fair to say that all or at least all of your research has to do with the brain?

A. Yes. There is a little bit on caloric restriction, but it's mostly on the brain. We did some caloric restriction research as well in rats because of the epidemic of obesity and the importance of that topic, but most of it was brain research.

We did brain examination of calorically restricted animals as well. But most of it is epilepsy, trauma, ischemia and hypoglycemia.

Q. And you published repeatedly on issues involving

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hypoxia?

A. Yes. In my 126 is a chapter in the standard textbook of Greenfield's Neuropathology in the sixth edition, seventh edition and the eighth edition on hypoxia and related conditions.

Q. You also published your own book. I don't know if it's a textbook or not but called Forensic Neuropathology & Neurology; is that right?

A. It's close. It's Forensic Neuropathology & Associated Neurology, and it was by my German colleague, Manfred Oehmichen O-E-H-M-I-C-H-E-N and myself and another author, and that was 2005 when we published that book by Schrader Publisher.

Q. Thank you, Doctor.

Then finally teaching you also have teaching responsibilities; is that correct?

A. That is correct. Yes. I teach residents in pathology, neurosurgery and neurology.

MR. LICHSTEIN: Your Honor, I move Doctor Auer as an expert in neuropathology and pediatric neuropathology.

THE COURT: Any questions?

MR. HEBEL: Yes, briefly.

VOIR DIRE

BY MR. HEBEL:

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Q. Good morning, Doctor. I'm assistant prosecutor Dan Hebel.
A. Good morning.
Q. Just have a brief few questions.

Are you certified in anatomic pathology?

A. I'm not certified in anatomic pathology, but it is part of my examination, and I do consultations in anatomic pathology if the case is difficult. But the answer is no, I'm not board certified in anatomic pathology. I did one year of anatomic pathology, and it's part of my practice, bone lesions and other tissues than brain, but I'm not certified to answer your question accurately.
Q. Fair. Now one year, isn't that about 33 percent of the training that somebody normally gets in anatomic pathology when they are --
A. No. The one year is half of the training or one third, you're correct. But the experience of a lifetime trumps the training we often get because our practice profiles are different once we get out of the residency program.

So you're quite correct. It's one half to one third the training, but the lifetime of training is what really counts here, but you are correct.
Q. Okay. Now you were talking about the many autopsies

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that you performed throughout your career, and I was just wondering about how many autopsies do you personally perform in child abuse cases?

A. The autopsies that I have experienced in child abuse have all come to me through the courts of the world. I have had no case where I had personally done an autopsy on a case of alleged child abuse due to the rarity of these cases destined for the courtroom.

So in answer to your question it is zero personally, but it is over a dozen cases since 2013 examined in detail that have reached the courtrooms of several countries.

Q. And in those dozen cases that you worked with in the courts, approximately how many of those did you testify for the People?

A. I have had two cases of child abuse and about 12 cases of false diagnosis or misdiagnosis of child abuse.

Q. Now is that your own summary or is that --

A. I'm not sure if I answered your question because you said the People. I'm not sure what that means. I'm legally naive. The People?

Q. I was referring to the prosecution. I think that you may have answered that. My question is was that your conclusion, or was that the jury's conclusion in these cases?

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A. Well, the cases went to court, and they are jury cases or adjudged by a single Judge, and that is the result of those judgments, by jury or by a Judge.

Q. So my question is in how many of those 12 cases or those cases that you had been talking about that went to court, how many of those did you testify for the prosecution?

A. I did not testify for the prosection, but I opined that led to a decision of child abuse in two of them. I did not have to appear in court because the case was decided by my testimony without my actually traveling to. The cities were Montreal and Toronto. So I did not travel to Montreal or Toronto, but my opinion decided those cases.

Q. Now have you ever published any peer-review papers, and you did discuss 126 peer-reviewed articles, which is quite impressive, but are any of these on shaken baby syndrome or abusive head trauma?

A. No. I have not published on that topic yet, although I am preparing publications. I have not published on shaken baby syndrome yet.

MR. HEBEL: I have no further questions.

THE COURT: Any objection?

MR. LICHSTEIN: Expert in pediatrics.

MR. HEBEL: I haven't seen any certification

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in pediatric neuropathology. So I'll object to pediatric neuropathology. I would agree that the doctor is a well qualified neuropathologist.

THE COURT: Response?

MR. LICHSTEIN: There is no such thing is my understanding of a specific certification in pediatric neuropathology. The doctor testified that he had education, training in that area, that he conducted autopsies in that area. I think he's certainly qualified, and I don't believe there is any such thing as a stand-alone certification in that subject.

THE COURT: Is there, Doctor?

WITNESS AUER: No. There is no such thing as pediatric pathology. It's the practice profile that you find yourself in after you graduate from neuropathology. There is no distinct certification in that.

THE COURT: I'll take his -- I'll allow him to give his opinion in the area as an expert in the field of neuropathology. Since it's not recognized in any specific expertise in pediatric neuropathology, I'll take his opinion in the area of neuropathology.

Go ahead.

BY MR. LICHSTEIN:

Q. Doctor Auer, you're testifying today pro bono; is that

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right?
A. Yes, I am.
Q. Okay. And when we spoke on the phone I made it clear to you I hope that this is rebuttal testimony. It's responding to specific testimony from other witnesses.
And is it correct that as such we did not provide you with specific medical records about the child in this case or the treatment in this case?
A. That is correct. I have been provided with no medical records.
Q. And I did not ask you to give an opinion about the cause of death in this specific case; is that right?
A. That is right. I have not been privy to the specifics.
Q. Thank you, Doctor Auer.
So to the specific subject matter of your testimony today, I want to ask you about subdural hemorrhaging in infants without trauma; okay?
A. Okay.
Q. And I just have a basic question. Can subdural hemorrhaging in an infant be caused by hypoxia-ischemia?
A. Yes, it can.
Q. Can you explain how that occurs?
A. Yes, I can. The way that occurs requires consideration of physiology as well as anatomy. So I want to say

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that anatomy without physiology is a corpse, and physiology without anatomy is a ghost. So we have to consider the physiology or function to understand subdural hematoma.

In fact, we have to understand pathophysiology not just physiology.

What happens in hypoxia is an increase in blood flow. That blood flow is anatomically not a parrot, but is striking, and it occurs whether the hypoxia is due to low blood oxygen or due to anemia or due to carbon monoxide poisoning or due to mountain climbing. Anything that reduces the oxygen in the blood will lead to an increased blood flow.

So in a baby especially the brain is growing extremely quickly. It goes from about 350 grams at birth to one kilogram, 2.2 pounds. At 16 months it's almost at adult weight, and by six years many children have adult weight brains already.

To do that we need an enormous blood flow. This is the physiology I'm talking about. At age two years half of your heart blood goes to your brain. A newborn will have an enormous blood flow going to their brain, not half yet, but in the order of 30 to 40 percent as the baby is growing toward age two.

That blood flow is enormous in milliliters

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per hundreds gram of brain per minute, and that blood flow must be returned to the heart, of course. It doesn't pile up in the brain. And to do that it goes through the dura. The dura, D-U-R-A like Duracell battery because it's a tough membrane, returns the blood to the venus system.

When you have hypoxia, you increase yet more blood flow. In fact, if you have the hemoglobin and anemia, you toll your blood flow. If you cut your hemoglobin to one third, you triple your blood flow. So blood flow, not anatomy, blood flow is very important in understanding the propensity to hypoxic cerebral hemorrhage in the subdural space. That's where all the traffic is going through. That's where the blood is going.

MR. HEBEL: Your Honor, at this point I'm going to object to the narrative.

THE COURT: I would agree.

If we can move along, question and answer, that would be a little better.

MR. LICHSTEIN: Okay.

THE COURT: Sure.

BY MR. LICHSTEIN:

Q. So you were talking about the importance of blood flow in the incident of subdural hemorrhaging. Can you

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explain why that is the case, why the blood flow has an important role to play in subdural hemorrhaging?

A. Yes, and I apologize for the narrative, but would I finish, and I set the stage to say that enormous blood flow goes through damaged blood vessels in hypoxia-ischemia, and those damaged blood vessel leak.

Q. And when you say leak, you're talking about leaking in the dura?

A. Not only in the dura but muscles in the dura into the subdural space when it is open. It depends on the size of the leak. The endothelial cells separate, and that causes the leak, much like opening a ski jacket zipper in the middle.

Q. So you're saying that that's a process that can occur without trauma; correct?

A. Definitely with the trauma.

Q. I'm sorry. It can occur without trauma; is that right?

A. That's right. You see these hypoxic hemorrhages whenever the blood vessels are damaged by the hypoxia, and they are opening. They are tight junctions like the ski jackets that would be ripped open in the middle of the zipper, and it looks like that when you do electron microscopy, and the blood cells leak across these openings.

Q. So if I understand you correct, you're saying anything

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that causes that damage to the blood vessels can cause the leaking of blood into the dura?

A. That's correct. And that can include not only hypoxia, but, for example, infection.

Q. Okay. Can hypoxia be brought about by choking?

A. Yes. Choking is a complex item because choking involves impairment of venus return from the head in the neck, as well as lack of arterial supply going up to the brain from compression of the arteries in the neck. That gives you a more complex situation than pure hypoxia, but the answer is yes.

Q. How did CPR contribute to that phenomenon?

A. Well, CPR has been looked at intensively. The first guess that was it's simply the chest compressions that cause the increased pressure in the brain. That is not the case. It is the hypoxia itself that damages the brain vessels and importantly the reperfusion if CPR is successful.

If there is no success at reperfusion of blood, there is no bleeding. It's that simple. It's the reperfusion, the successive CPR that causes the reperfusion bleeding.

Q. So if I'm understanding you correctly, you're saying there is damage to the blood vessels, which renders them vulnerable to leaking, and then the CPR comes in

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and raises the pressure pumping the blood back through these damaged vessels; is that right?

A. That's correct. Often Epinephrine is given. That raises the pressure across these leaking vessels further.

Q. That's how you can get blood in the subdural space from for instance choking?

A. Yes. It's a high flow state through damaged vessels bleeding like a sieve.

Q. Doctor, I want to just very quickly touch on the research base that supports the opinion you just gave.

Am I correct that there has been research in the area of non-traumatic subdural hemorrhaging?

A. Yes. You're correct in that statement.

Q. And are you familiar with several articles by authors named Scheimberg and Cohen on this topic?

A. Yes, I am.

Q. I first want to ask you about an article from 2013 Scheimberg, Cohen, et al. In a journal called Pediatric & Developmental Pathology.

MR. LICHSTEIN: Your Honor, I believe it is Exhibit 28, Defense Exhibit 28.

BY MR. LICHSTEIN:

Q. Are you familiar with that article, Doctor Auer?

A. Yes, I am.

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Q. Just briefly what is the significance of that article to the subject of hypoxic injury?
A. Yes. The article looked at children, 382 infants, and they looked at how many had subdural hematoma, and these were not traumatic cases. These were natural deaths. Sadly offspring who are born do not live to adulthood. So these are natural deaths, and the subdural was present in 72 of them, which was noted as a striking finding by the authors.
Q. Am I correct that that research was not limited to neonates?
A. That is correct. The age was up to three years of age. I'm just checking the paper as I'm reading here, up to 36 months of age.
Q. And did the authors find an association between subdural hemorrhaging around hypoxic-ischemic encephalopathy?
A. Yes, they did. Of the 72 children, young children who had subdural hematoma, 65 of them had hypoxic-ischemic encephalopathy. So most of them.
Q. Was there also an association between successful CPL and hypoxic-ischemic encephalopathy?
A. Yes, there was and also between age and hemorrhage.
Q. Okay. Doctor, I don't want to spend too much time going through additional studies, but is it fair to say

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that your opinion is based on several other studies in this area?

I'm going to list a few and ask you if they are part of the research base you're relying on. Okay?

A. Okay.

Q. A 2010 study by an author named Cohen in Forensic Science International. Is that one of the articles you relied on?

A. Yes.

Q. A 2009 study by Cohen and Scheimberg in Pediatric & Developmental Pathology. Have you relied on that?

A. I have, yes.

Q. 2014 commentary by Commentary by Cohen and Ramsay in Forensic Science, Medicine & Pathology?

A. Yes.

Q. A 2009 study by Squier and Mack in Forensic Science International?

A. Yes.

Q. A 2008 study by Max, Squier, et al, in Pediatric Radiology?

A. Yes.

Q. And finally a 2014 commentary by Squier in Forensic Science & Medical Pathology?

A. Yes.

Q. Okay. Finally, Doctor, I want to ask you about a

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couple of studies relied upon by prosecution witnesses in this case. I previously provided you with an article by an author named Byard, B-Y-A-R-D, that's 2007 in Pediatric & Developmental Pathology.

Are you familiar with that article?

A. Yes.

Q. And also an article by an author named Hurley, 2010 British Journal of Radiology.

Are you familiar with that?

A. Yes.

Q. Did either of those studies change the opinion you have given today?

A. No.

Q. Doctor, did you when you reviewed those studies, see flaws in them?

A. Yes.

Q. Let me ask you. Is case selection an important factor in designing a study?

A. Very much so. Yes.

Q. Did you see problems with case selection as to the Byard and Hurley studies?

A. Yes.

Q. Could you explain briefly what those problems are, why case selection in those studies is an important aspect of evaluating the results?

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A. Yes. These are case series that are unselected sequentially and are not likely to give subdural hematomas because of certain biases that come about when you don't look at cases with severe hypoxic ischemic encephalopathy, and you don't look for the subdural hematomas the way that Scheimberg and Cohen did.

Looking at unselected series retrospectively with no controlled group is analogous to looking for your car keys where the light is best because that is where you dropped them. You're not going to find them.

You have to look in the right places, and these series, and they may be selective.

For example, the Hurley, et al paper says infants with occult trauma were excluded at autopsy, and it begs the question, what occult trauma is the Hurley paper that causes these infants to be excluded.

If one believes that subdural hematoma is only due to trauma, then one will eliminate the very thing what it's examining for, and this circularity is a major problem in that study.

Q. Now, Doctor, in the circularity problem you just mentioned also the subject of a recent report by a Swedish governmental agency criticizing the research based on shaken baby syndrome?

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A. Yes. Circular reasoning where the answer is included in the topic to be researched, is pervasive, and the Swedish Government commissioned a SIC panel, scientific body to go over the entire medical literature of which they selected over a thousand papers, and they came up with a no high qualify scientific evidence for the existence of shaken baby syndrome.

MR. LICHSTEIN: Thank you, Doctor.

I have no further questions. I appreciate you making yourself available so early this morning.

WITNESS AUER: It's my pleasure.

Thank you.

THE COURT: Mr. Hebel.

CROSS-EXAMINATION

BY MR. HEBEL:

Q. Now you were just discussing the intradural leakage theory that was the subject of unified hypothesis by Geddes. The same theory that was proposed by Wayne Squier and Julie Mack and also discussed slightly differently by Cohen and Scheimberg.

Now are you aware of the article by Sandeep Narang in the Houston Journal of Health, Law & Policy that specifically addressed these studies and concluded that the data that was provided in those studies did not support the intradural leakage theory?

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A. Yes, I am aware of that article.

MR. HEBEL: Your Honor, at this point the People would ask to admit that article as well as Proposed Exhibit 27 into evidence. It has been provided to the defense.

THE COURT: Any objection?

MR. LICHSTEIN: No objection, your Honor.

THE COURT: 27 will be received.

BY MR. HEBEL:

Q. And I'm going to skip over the problems that Narang found with Geddes because I don't think at this point that is that necessary due to your testimony on direct.

But I would be interested to know on pages 562 and 565.

MR. HEBEL: And, your Honor, may I publish that article to you?

THE COURT: That would be great.

BY MR. HEBEL:

Q. I am going to go back once again to page 562 to 565, the section entitled Alternative Hypothesis.

One of the issues that is brought up by Sandeep Narang is that subdural hemorrhage is often caused by trauma at birth; is that correct?

A. That is correct.

Q. And the Cohen study did nothing to exclude cases where

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the subdural hemorrhage could have been caused by birth. They did not differentiate those cases in any way; is that correct?

MR. LICHSTEIN: Objection, your Honor. That misstates the study.

THE COURT: Well, I don't know. I'll take the question.

WITNESS AUER: Am I allowed to answer?

THE COURT: Yes.

WITNESS AUER: All humans are subject to birth, and subdural hematoma has been reported even after Caesarian section. So there is no way of excluding births, since we all must be born.

BY MR. HEBEL:

Q. Actually that's a really good point. So it occurs then that one would separate then the subjects of a test because isn't it also true, Doctor, that the subdural that is caused by birth is usually absorbed relatively quickly after?

A. Not always. There are subdurals, depending on the birth process, which is always traumatic, and there are some subdural hematomas that persist because of the nature of subdural hematoma, and the nature I'm referring to is the tendency to rebleed because of the new vessels that are formed in subdural hematoma.

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Sorry.

Q. Well, that wasn't exactly my question. My question was isn't it the case that usually, okay, this goes away, the subdural goes away?

A. Yes. Usually, yes.

Q. And so would it not make more sense to study infants that are old enough that their subdural hematoma has probably left, rather than a large percentage of neonates and fetuses in a study?

A. Well, then you have a problem of circularity that you are looking for the things that you want to find, and you draw an arbitrary line in the sand, and then you exclude cases, and then you don't find it. It's truly like --

Q. Well --

A. Go ahead, sorry.

THE COURT: Finish your answer, Doctor.

MR. HEBEL: I didn't mean to interrupt. I thought you were done.

WITNESS AUER: I'm speaking slowly because I am not sure of the quality of this connection. I'm sorry.

If you filter the way you have suggested, then you are at risk for not finding something, and it becomes a circular self-fulfilling study. That is the

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concern with such a select in criteria. It's like I mentioned on the Hurley paper, which says occult trauma is excluded.

Well then you have excluded the thing you're looking for, subdural hematoma. If you believe subdural is always due to trauma, then you always get the predicted negative results, and therein lies the problem.

BY MR. HEBEL:

Q. So let me actually jump to the Hurley article and then go back to the my question that I asked because it wasn't -- I did not -- I think you can explore that topic a little bit more.

But let's look at the Hurley. Now you have interpreted occult trauma to mean subdural hemorrhage. Did the authors ever indicate that they were interpreting subdural hemorrhage as occult trauma?

Did they ever indicate that?

A. No. And that's one of the problems with the article is they don't say what that means. That's why the article is un-interpretable because you don't know what they eliminated with occult trauma at autopsy.

Q. And so guess guy from that standpoint you will have no problem with this article if they weren't looking, if they simply excluded say infants with broken bones or

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obvious bruising, signs of child abuse, or would you still have a problem with that?

A. Broken bones is another entirely different issue and relates to our living indoors and Ricketts, and your question is conflating several aspects of child abuse, and I would ask for a clear and simple question please.

Q. Fair enough.

Do you believe that children are abused? Let's start this. That is as simple as it gets.

A. I just told you that I opined on two cases of true abuse in Montreal and Toronto. Clearly there is abuse out there.

Q. Okay. If that's the case, do you believe that abuse can cause subdural hemorrhage?

A. Yes.

Q. Then do you believe that there are any cases of abuse that also involve hypoxia?

A. Yes.

Q. So if you have a study that does not exclude abused children but rather includes abused children with subdural hematomas and other children who died of hypoxia who may or may not have subdural hematomas, you won't learn anything about whether or not abuse causes subdural hematomas because you're lumping them all together?

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You wouldn't have any idea?

THE COURT: Is that a statement or a question?

BY MR. HEBEL:

Q. Correct.

A. No. Incorrect because contained in the diagnosis of abuse is the answer due to subdural hematoma. For example, abusive head trauma, which is what shaken baby syndrome is now called to include impact, contains within it the definition of subdural hematoma. So it becomes a self-fulfilling circular reasoning, circular prophecy that will always fulfill it's own definition because it's contained in the definition.

Abusive head trauma contains the answer within it. That's the circularity, whereas really abuse is speculation, is surmised, is inferred. There is no signature of abuse in the subdural hematoma. There cannot be.

Q. So any study that removes clearly abused children in your opinion would not meet the definition of an objective study?

A. No. I did not say that because you cannot remove clearly abused children because the diagnosis of abuse is surmised. It is inferred. It is indirect. So one cannot clearly remove such children from any study.

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It could be circular to do so, and you cannot do it for that reason.

Q. Isn't it just as circular to keep them in because what you are actually doing then is you put abused children in a study clearly with children with broken bones, children with bruises all over their body.

You put those children in with other children with no such sign, and then when you say oh, these children have both hypoxia and subdural hemorrhage, you say there's an association between hypoxia and subdural hemorrhage?

Isn't that circular reasoning?

A. No, because those children that have bruising often have before bruising due to disseminated intervascular coagulation, which comes about when the heart stops.

When you look at those children where the heart has stopped, and they have reperfusion, you medically handle them. You turn them. You change the sheets, you move them, and you get bruising. You intubate them. You get bruising, and that bruising is falsely attributed to abuse when the child has another condition which explains it and ditto for broken bones.

Vitamin D deficiency is ubiquitous because we live in buildings and rooms with no sunshine. So the same applies there, and multiple broken bones and what

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you're complating (ph) with subdural hematoma here. And you can't do that because there are other reasons for it.

Q. Do you believe in differential diagnoses?

A. Yes, of course, I do. We always have to have a differential diagnosis.

Q. Therefore, when the differential diagnoses removes those categories that you're talking about, for example, rickets, when the differential diagnoses removes rickets from the cause of the broken bones that are in the child, okay, you still say that this child can't be considered abused, and therefore can't be excluded from a study; is that correct?

MR. LICHSTEIN: Objection, your Honor. That's not what the witness testified to.

THE COURT: I think it's cross-examination. Go ahead. The witness can answer it.

WITNESS AUER: Thank you, your Honor. There are other causes of broken bones besides rickets, such as Ehlers-Danlos Syndrome and osteogenesis imperfecta.

Shall I spell those for the court reporter?

THE COURT: Yes.

WITNESS AUER: Ehlers-Donlas is the original elastic man from the circus. It's spelled

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EHLERS-DANLOS. This a connected tissue disorder that causes bones to be brittle because the crystallization of the calcium doesn't occur in strong, straight lamela (ph).

The other condition is Osteogenisis O-S-T-E-O-G-E-N-I-S-I-S Imperfecta, imperfect with an A at the end. This disease causes broken bones in multiple locations as well, and these diagnoses are often not properly excluded or Vitamin D is given, and then there is no more deficiency.

I have seen cases where the child is treated with Vitamin D, yet it's maintained that there was no deficiency before the treatment which one cannot know if one does not investigate that child at that time before Vitamin D is given.

So my answer is no, you can't be certain. You can't be certain that the elimination of rickets is the only factor because of the differential that you are saying is so important.

BY MR. HEBEL:

Q. Absolutely. So the differential diagnoses can be not only applied to rickets but also to other disorders; correct, to determine whether or not they caused something or whether or not they did not cause it, and that would require perhaps a radiologist, examining

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physicians.

You got multiple questions there, Mr. Hebel. Let's break them down.

MR. HEBEL: Thank you.

BY MR. HEBEL:

Q. That would require multiple disciplines to look into, but my question then would be can those things be diagnosed with a differential diagnosis?

A. Yes. Medicine is a very tricky minefield, and they can be diagnosed with as you say a multi-disciplinary approach and laboratory testing, yes.

Q. So basically what we have established is we really can't determine whether or not these things are the cause of an injury or whether or not there is suspected infliction of injury based on the differential diagnosis, just has to be a thorough diagnosis; is that about right?

A. Yes. You're quite right. It's necessary to go through a thorough differential diagnosis and a process of elimination of various considerations. And one of my problems with this whole area is the default diagnosis from the beginning has often been abuse, which really isn't a diagnosis. It's a legal accusation, and it's inferred from the beginning.

THE COURT: That will be stricken as

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non-responsive.

Go ahead. Next question.

BY MR. HEBEL:

Q. So with these articles you are making the assumption that they are not doing a full differential diagnosis with their exclusions; is that correct?

A. No. I'm not making that assumption. I cannot know what was done in each case in each article.

Q. Which means then that these articles could be perfectly valid and make the exact point that they're trying to make when they said they excluded occult injuries, at least in the Hurley article?

A. I don't believe so, no, for the reasons I've given.

MR. HEBEL: Of course.

One moment, your Honor.

THE COURT: Sure.

BY MR. HEBEL:

Q. Just briefly about the shaken baby syndrome articles that you were asked about on direct. The SBU has responded to the criticisms with some articles, and that was briefly discussed on direct; correct?

A. Yes, correct.

Q. Now it is also true, however, that that has not stopped the widespread criticism of the SBU statements; correct?

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A. That's correct.
Q. In fact, there was an article by the name of Lynoe et al., #the Rest of the Story, said by this generation as Hashtag, and that was written by Sandeep Narang and Christopher Greeley, and that's also in the ACIA Pediatriac Journal that Lynoe published it; correct?
A. That's correct.
MR. HEBEL: And at this point, your Honor, the People would ask to admit People's Exhibit 28 into evidence, and that is the Hashtag #The Rest of the Story article by Greenly and Narang.
The defense has a copy.
MR. LICHSTEIN: No objection.
THE COURT: 28 will be received.
MR. HEBEL: May I publish it to your Honor?
THE COURT: Sure.
BY MR. HEBEL:
Q. And on page three of this particular article Narang and Greeley conclude that "The SBU report possibly attempting to protect the people falsely accused of perpetrating abuse is likely to achieve an unacceptable end; providing lawyers with new ammunition to question valid, scientific data.
As shown, this ammunition relies on a methodologically flawed review of the evidence, and on

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the exclusion of all information inconsistent with the conclusion set forth by Lyneo, et al.; is that correct? Was my reading of that correct?

A. Your reading of that was correct, yes, but the statement isn't correct.

Q. But you would agree that that article disagrees with your opinion on the SBU article?

A. Yes.

Q. And there is also another much, much more recent article that was published in June of this year that is by eight authors writing on behalf of the European Society of Pediatric Radiology Child Abuse Task Force and the Society for Pediatric Radiology Child Abuse Committee here in the United States, and that article was published in Pediatric Radiology Journal and also is a scathing commentary on the SBU; correct?

A. Correct.

MR. HEBEL: And at this point, your Honor, the People are going to --

WITNESS AUER: Are you referring to Saunders, et al., Dawn Saunders.

MR. HEBEL: That is absolutely correct, Throwing The Baby Out With The Bath Water, Response To The Swedish Agency for Health Technology Assessment and

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the Assessment of Social Services, SBU, report on traumatic shaking is the full title.

WITNESS AUER: Thank you.

MR. HEBEL: Your Honor, at this point the People would move for People's Exhibit 29, which is this article from Pediatric Radiology Journal.

THE COURT: Any objection?

MR. LICHSTEIN: No objection.

THE COURT: 29 will be received as well.

MR. HEBEL: Your Honor, may I publish?

THE COURT: Yes.

BY MR. HEBEL:

Q. Now I would like to set the record straight on something because I made a mistake here, and the quote that I read from my paper was from this article not from the first article. So I would like to clear up record.

THE COURT: When you say this article, not that article, let's refer to Exhibit numbers.

MR. HEBEL: Fair enough.

Your Honor, the quote that was read that I briefly confirmed with the good doctor was not the quote from People's Exhibit 28. It was a quote from People's Exhibit 29. I got confused in my notes. So I just wanted to point that out for the record.

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THE COURT: Okay. That's fine.

BY MR. HEBEL:

Q. And at this point I would like to actually, since we already discussed the quote from throwing the baby out with the bath water, Exhibit 29, I would just briefly like to discuss Exhibit 28 and just ask a question of whether in that, The Rest of the Story, on the very first page Narang and Greeley note that the SBU makes the following mistakes.

Improper systematic review questions, improper criteria for a second bias and inequitable application of quality of assessment standards?

Would you agree that that's what they put in on that first page?

A. Yes. That's what they put in.

MR. HEBEL: Thank you.

No further questions.

THE COURT: Any redirect?

MR. LICHSTEIN: Just a little bit, your Honor.

THE COURT: Sure. Go ahead please.

MR. LICHSTEIN: Before I ask my questions, I'm going to move a few articles into evidence, your Honor.

THE COURT: Hang on.

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All right. Go ahead please.

MR. LICHSTEIN: What my notes indicate is that as to Defense Exhibits 28 and 29, 28 being the Scheimberg 2013, 29 being Cohen, 2010.

Those were offered during the cross-examination of Doctor Davis but objected to.

So I am now --

THE COURT: I took them under advisement.

Any objection?

MR. HEBEL: No objection.

THE COURT: All right. They will be received.

MR. LICHSTEIN: Then, your Honor, as to a couple of new articles that Doctor Auer referenced as part of his opinion. The first is an article by Cohen and Scheimberg, Pediatric & Developmental Pathology.

I have it marked as Defense Exhibit 34. And then the defense 35 is Cohen and Ramsay, 2014, Shaking Baby Syndrome and Forensic Pathology.

The prosecution has been provided with copies of these previously.

THE COURT: Any objection 34 and 35?

MR. HEBEL: No, your Honor.

THE COURT: 34 and 35 will be received.

REDIRECT EXAMINATION

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BY MR. LICHSTEIN:

Q. I will be very brief, Doctor.

Mr. Hebel was asking some questions about the SBU report. He read you a quote, and you confirmed that he had read the quote correctly, but said you did not agree with it. I just wanted to give you a chance to explain why you don't agree with the quote he read to you.

A. Yes. This is the country that is giving the Nobel Prizes. These are scientific minded physicians or scientists, and they have not made those errors. They have been very transparent in what they have done.

And there is another article coming out on exactly the composition of the people who did this study. It's called Shaken Baby Syndrome and the risk of losing scientific scrutiny by Rosin.

MR. HEBEL: Objection, your Honor.

At this point I do not have this article. If this article at this point exists, I think it's improper to introduce and rely on an article that the People have not been given a copy of.

THE COURT: Seems like we're kind of drifting into a narrative here. I think focusing on your questions would be more helpful.

BY MR. LICHSTEIN:

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Q. Doctor, without referencing specific research, I just want to let you finish your answer. I believe you were defending the work of the SBU just in general terms as concisely as you can please.

A. Yes. I was trying to say they have been very transparent about what they did and continue to be so in existing and future publications.

Q. Thank you.

Doctor, just so the record is clear, you do believe child abuse occurs; correct?

A. Absolutely. Yes, correct.

Q. If I understood you correctly, you're just saying that it's necessary to exclude other possible causes of a child's injuries; right?

A. Absolutely. Yes.

Q. And as to the Narang study that you were asked about, am I correct that was not a peer-reviewed article?

A. I believe it is, but I'm not sure how active Pediatrica works. I can't answer the question.

Q. I'm sorry. I was referencing the Narang article from the law journal, law review. Those are not peer reviewed; correct?

A. I believe not. The Houston Journal of Health and Law and Policy, I believe not.

Q. Thank you.

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Then finally you were asked some questions about what subjects were included in the research by Sheimberg in 2013, and I just want to make sure the record is clear that in fact that research did include babies that are older than just fetuses and neonates; correct?

A. Correct. Children up to three years of age.

Q. Okay. Thank you, Doctor.

One last thing. I'm sorry. The phrase occult trauma, does that phrase to you have the connotation of something that was hidden and assumed to be trauma?

A. Yes, it does. When I look at the right column of that Hurley article fourth line from the bottom, the only thing you can think was with occult trauma is that it is hidden. It's in the world, and they took out those children.

MR. LICHSTEIN: Thank you, Doctor.

No further questions.

THE COURT: Anything further?

RECROSS-EXAMINATION

BY MR. HEBEL:

Q. Briefly on the Cohen article, you just clarified it contained children all the way up to three years of age; correct?

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A. That's correct.
Q. Now what was the breakdown? How many fetuses? How many infants or how many fetuses, how many neonates? How many infants and how many toddlers were reviewed?
Or maybe we can put it a little bit more specific. How many fetuses were reviewed? Do you know offhand?
A. I would have to use some court time to get that.
Well Table One, which I have before me, goes from one day to three months in the first 28 cases, and then from 29 to 34, we're up to a year, and then 34 to 44 we're in the toddler range.
So I believe that answers your question.
Q. So between one day and three months were placed in the same category; is that correct?
A. No. I did that for expediency because you don't want me to go through every of the 44 case ages, do you.
There are 28 cases up to three months, 29 to 33 within the year, and then 34 to 44 are one year or older up to three years.
That's the breakdown you were asking about.
That's on Table One.
Q. Okay. Just for the record we're referring to Table One at this point, and thank you very much, Doctor.
That's all I have.

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INTRODUCTION

Defendant Milton Lemons, by his attorneys and student attorneys of the Michigan Innocence Clinic at the University of Michigan Law School, asks that this Court set aside his conviction and order a new trial, pursuant to MCR 6.500 *et. seq.*, and states the following:

1. After a bench trial in the Wayne County Circuit Court presided over by the Hon. Timothy M. Kenny, No. 06-04818, Mr. Lemons was convicted on August 11, 2006, of first-degree felony murder.
2. On September 5, 2006, Judge Kenny sentenced Mr. Lemons to life in prison without parole. He is currently serving that sentence at the G. Robert Cotton Correctional Facility in Jackson, Michigan.
3. Mr. Lemons appealed by right, and the Michigan Court of Appeals affirmed on February 26, 2008. *People v Lemons*, (No. 273058) (Mich App Feb 26, 2008). The Michigan Supreme Court denied his application for leave to appeal on July 29, 2008. *People v Lemons*, 482 Mich 895; 753 NW2d 169 (2008). Mr. Lemons filed a *pro se* petition for a writ of habeas corpus in the Eastern District of Michigan on May 11, 2009. Mr. Lemons's motion to stay was granted on October 26, 2009. *Lemons v Scutt*, (No. 09-11808) (E.D. Mich Oct 26, 2009). Mr. Lemons has filed one *pro se* motion for relief from judgment on January 21, 2010, which was denied by this Court on May 28, 2010.
4. Mr. Lemons was represented during preliminary matters and at trial by David T. Cripps, and he was represented on direct appeal by Arthur H. Landau.
5. All of the issues in Mr. Lemons's current Motion for Relief from Judgment are being presented for the first time. These claims have not been raised previously because they are based on new evidence that was not available to Mr. Lemons when he filed his prior motion.

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FACTUAL SUMMARY

6. Late in the afternoon on October 10, 2005, Mr. Lemons noticed his 11-week old daughter, Nakita, gasping for air in her crib shortly after being fed and put down to sleep. She passed away the following morning at the University of Michigan C.S. Mott Children's Hospital.
7. The treating physician characterized the cause of Nakita's death as "sudden unexpected and unexplainable." Later that day, however, the Medical Examiner concluded after autopsy that the cause of death was "shaken baby." Mr. Lemons, the only adult present during Nakita's fatal episode, quickly became the focus of a police investigation.
8. After the investigating officer presented him with the preliminary autopsy results, Mr. Lemons admitted to shaking Nakita. He was charged with first-degree murder.
9. At trial, the Medical Examiner testified that Nakita's primary injuries – subdural hemorrhage, retinal hemorrhages, and a swollen brain – and a perceived shoulder fracture were consistent with a diagnosis of Shaken Baby Syndrome ("SBS"), despite the absence of a neck injury and her history of similar choking events. The investigating officer testified that Mr. Lemons confessed to shaking Nakita after being confronted with the SBS diagnosis. Defense counsel called no witnesses to challenge the prosecution's theory of the case.
10. Mr. Lemons was convicted of first-degree felony murder and sentenced to life in prison without the possibility of parole.
11. However, expert reports and scientific evidence presented herein completely undermine the inculpatory evidence presented at trial. **There is now no credible evidence that shaking caused Nakita Lemons's death.**
12. By the time of Mr. Lemons's trial in 2006, it was generally understood in the scientific

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community that the "triad" of symptoms – subdural hemorrhage, retinal hemorrhage, and brain swelling – traditionally associated with SBS had a wide range of alternative causes. Biomechanical studies further indicated that the force required to elicit the "triad" from shaking would necessarily result in collateral injury to the neck or spinal cord.

13. A new analysis of the evidence in this case by Dr. George R. Nichols II, M.D., a forensic pathologist who served as Kentucky's Chief Medical Examiner for over 20 years, has yielded the conclusion that **there is no evidence to support a diagnosis that Nakita Lemons was shaken to death – or even abused.** According to Dr. Nichols, the Medical Examiner's findings have "no support in evidence or sound medical literature."

14. Dr. Nichols has concluded that Nakita's death was the direct result of choking on formula, triggering an apparent life threatening event ("ALTE") which fatally restricted the flow of blood and oxygen to the brain. Dr. Nichols would have expressed his same opinions in 2006.

15. A new analysis of the evidence in this case by Dr. Patrick D. Barnes, M.D., a pediatric neuroradiologist in the child abuse field at Stanford University Medical School, has revealed that **nothing in the imaging of Nakita Lemons's case is specific for, or even characteristic of, non-accidental injury.**

16. Dr. Barnes has concluded that a differential diagnosis is required, including ALTE and dysphagic choking. Dr. Barnes would have testified to the same opinions in 2006.

17. A new analysis of the evidence in this case by Dr. John Galaznik, M.D., a pediatrician with extensive experience with SBS, supports the conclusion that **shaking could not have caused Nakita Lemons's injuries**, particularly in the absence of a neck or spinal injury.

18. Dr. Galaznik has concluded that Nakita's death was likely caused by choking.

19. Each expert has independently criticized the Medical Examiner's finding of "acromial fracture"

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ORIGINAL ARTICLES

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Acceptance of Shaken Baby Syndrome and Abusive Head Trauma as Medical Diagnoses

Sandeep K. Narang, MD, JD[1], Cynthia Estrada[2], Sarah Greenberg[2], and Daniel Lindberg, MD[3]

Objective To assess the current general acceptance within the medical community of shaken baby syndrome (SBS), abusive head trauma (AHT), and several alternative explanations for findings commonly seen in abused children.

Study design This was a survey of physicians frequently involved in the evaluation of injured children at 10 leading children's hospitals. Physicians were asked to estimate the likelihood that subdural hematoma, severe retinal hemorrhages, and coma or death would result from several proposed mechanisms.

Results Of the 1378 physicians surveyed, 682 (49.5%) responded, and 628 were included in the final sample. A large majority of respondents felt that shaking with or without impact would be likely or highly likely to result in subdural hematoma, severe retinal hemorrhages, and coma or death, and that none of the alternative theories except motor vehicle collision would result in these 3 findings. SBS and AHT were comsidered valid diagnoses by 88% and 93% of the respondents, respectively.

Conclusions Our empirical data confirm that SBS and AHT are still generally accepted by physicians who frequently encounter suspected child abuse cases, and are considered likely sources of subdural hematoma, severe retinal hemorrhages, and coma or death in young children. Other than a high-velocity motor vehicle collision, no alternative theories of causation for these findings are generally accepted. *(J Pediatr 2016;177:273-8).*

Although shaking, with or without impact, has been recognized as a dangerous form of child physical abuse since the early 1970s,[1,2] the validity of shaken baby syndrome (SBS) and abusive head trauma (AHT) has recently been called into question in prominent national newspapers such as the *New York Times* and *Washington Post*,[3,4] judicial decisions,[5,6] and some medical literature.[7,8] In fact, a US Supreme Court Justice recently commented in a dissenting opinion that there is widespread "controversy" within the medical community regarding the concepts of AHT and SBS.[9,10] Not surprisingly, this has resulted in confusion in the courts and a chilling effect on child protection hearings and criminal prosecutions.[11]

Legal interventions are an important part of primary safety determinations and secondary prevention for victims of maltreatment. In that process, courts frequently rely on medical expert testimony to opine on the most likely source of a child's injuries. To determine the admissibility of scientific testimony, courts must assess whether concepts are "generally accepted" in the medical community. In approximately one-half of the US jurisdictions, known as Frye jurisdictions, "general acceptance" is the sole criterion for admitting expert testimony on a certain concept.[11] In the remainder of US jurisdictions, known as Daubert jurisdictions, "general acceptance" is one of several criteria used to assess reliability, but is still afforded significant weight.[12] In addition, several professional medical society ethical guidelines for expert testimony state that testimony should reflect generally accepted opinions, and/or that an expert who endorses a minority opinion should volunteer that information.[13-16]

In courts, evidence of what is generally accepted in the medical community has typically been adduced by the opinion of a solitary expert or a small cadre of experts. This approach is susceptible to the biases and knowledge base of the testifying physicians, and leaves open the possibility that a small group could create an incorrect impression about whether or not any particular concept is generally accepted. Courts are ill-equipped to measure the broad opinion of the wider medical field or to assess the validity of a single physician's assessment of that broad opinion. Although SBS has historically been considered a valid medical diagnosis,[17] to date no well-conducted study has measured the acceptance of SBS or AHT as diagnoses, or of the likelihood that shaking will result in subdural hematoma (SDH), retinal hemorrhages (RH), or coma or death, the findings commonly associated with SBS and AHT.[18,19]

Given the importance of this issue to child protection and legal outcomes, we aimed to attain empirical data on the acceptance of SBS and AHT as valid medical

AHT	Abusive head trauma
MVC	Motor vehicle collision
REDCap	Research Electronic Data Capture
RH	Retinal hemorrhages
SBS	Shaken baby syndrome
SDH	Subdural hematoma

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diagnoses by the physicians most commonly involved in those cases. We also sought to determine whether shaking, with or without impact, and other mechanisms of injury are generally accepted as reasonable explanations for SDH, RH, and coma or death.

Methods

This observational survey study was reviewed and approved by the University of Texas-Houston Institutional Review Board, and was conducted between March and October 2015. To identify a feasible sample size and limit enrollment or response bias, we surveyed hospitals identified from the 2014-15 *US News & World Report* Honor Roll of Children's Hospitals.[20] From the 10 leading children's hospitals, we identified faculty physicians (MD, DO) within the specialty departments most commonly involved in suspected AHT cases: Emergency Medicine, Critical Care, Child Abuse Pediatrics, Pediatric Ophthalmology, Pediatric Radiology, Pediatric Neurosurgery, and Child Neurology. Because forensic pathologists are not typically located within children's hospitals, we contacted the medical examiners' offices that jurisdictionally comported with the surveyed hospitals and offered participation in the survey. If no medical examiner's office comported with a particular jurisdiction, we contacted the responsible coroner's office and offered participation in the survey.

We obtained contact information (e-mail and mailing addresses) from hospital websites or physician collaborators. In March 2015, physicians were invited to participate by e-mail, and were informed that the survey was voluntary and anonymous. Using a modified Dillman method,[21] the lead investigator (S.N.) sent an e-mail to eligible physicians, providing a summary of the study's objective and methods, along with a unique, anonymous online link to the survey. After the initial e-mail, nonresponders were sent a reminder e-mail (with survey links) every 2 weeks on 2 separate occasions. If a physician had not completed the survey after 3 e-mail attempts, then a hard copy of the survey (with $1 attached) was mailed to the physician's office address on 2 separate occasions at 2-week intervals. After this, if the participant still had not responded, he or she was logged as a nonresponder, and his or her contact information was permanently deleted. Data collection efforts were completed in October 2015. As an incentive to improve response rates, participants were entered into up to 5 randomized, biweekly drawings for a $200 gift card (depending on the time of response, with earlier responders being eligible for and entered into more drawings).

To minimize the potential for bias, we did not approach nonresponders and used no additional methods to encourage recruitment by any respondent. To ensure an appropriate sampling frame, we asked each respondent to report his or her specialty on the survey, and those who reported specialties other than those being sought to be surveyed excluded.

Study data were collected and managed using REDCap (Research Electronic Data Capture) tools hosted at the University of Texas at Houston.[22] REDCap is a secure, web-based application designed to support data capture for research studies. No identifying information was recorded in REDCap, and once a physician completed the survey, his or her contact information was permanently deleted, thereby preserving anonymity.

Survey

Each participant reported his or her age (20-30, 31-40, 41-50, 51-60, 61+ years), board certification status, and years in practice (0-5, 6-10, 11-20, 20-30, 31-40, or 41+ years). Each participant was also asked to choose his or her field of specialty from the list of specialties sought (ie, Emergency Medicine, Critical Care, Child Abuse Pediatrics, Pediatric Ophthalmology, Pediatric Radiology, Pediatric Neurosurgery, and Child Neurology), or to report another specialty. Those reporting more than 1 surveyed specialty (n = 8) were included under each specialty for the report of respondent characteristics, but were only counted once in the remainder of the survey. Those reporting a specialty that was included in the sampling frame and a specialty that was not included (eg, Pediatric Emergency Medicine, General Pediatrics) were counted within the included specialty. Those identified within a division of pediatric emergency medicine who listed their specialty as "urgent care" were included with Emergency Medicine. Those listing only exclusion specialties (eg, General Pediatrics, Allergy and Immunology, Anesthesia, Pulmonology) were excluded.

Respondents rated the likelihood of each finding (SDH, RH, coma or death) to result from several proposed mechanisms in a child aged <3 years using a 5-point Likert scale (from "highly unlikely" to "highly likely"). "Severe RH" was defined as too numerous to count, multilayered hemorrhages extending to the periphery. Proposed mechanisms included shaking without impact, shaking with impact against a soft surface (eg, a bed), a very short fall (<3 feet) with impact against a hard surface, a high-velocity motor vehicle collision (MVC), hypoxia, dysphagic choking, vitamin D deficiency rickets, and adverse reaction to vaccines.

Finally, respondents were asked whether they believed SBS to be a valid medical diagnosis (yes, no, don't know/unsure), whether they believed AHT to be a valid medical diagnosis (yes, no, don't know/unsure), and the basis for those opinions (clinical experience, medical literature, both, or neither). Respondents were offered the chance to ask questions or to comment on the survey or the study as a whole by contacting the principal investigator.

For analysis, we defined a "fringe opinion" as one in which <5% of respondents deemed a given mechanism for a finding as likely/highly likely or unlikely/highly unlikely (**Table I**). For analysis of shaking with impact versus shaking without impact results, we defined "discordance" as a rating that changed from highly unlikely or unlikely to likely or highly likely (or vice versa), depending on whether or not impact was present. Descriptive statistics were used to determine the prevalence of each response along with associated 95% CIs. Comparisons were conducted using OR with 95% CI.

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Table I. Fringe opinions

	Likely/highly likely	%	Unlikely/highly unlikely	%
SDH	Vaccines	0.0	Shake WITH impact	3.2
	Vitamin D	2.3		
	Choking	2.7		
	Hypoxia	4.0		
RH	Vaccines	0.0	Shake WITH impact	1.0
	Vitamin D	0.8	Shake NO impact	1.8
	Short fall	3.2		
Coma/death	Vitamin D	0.6	Shake NO impact	3.7
	Vaccines	1.0	Shake WITH impact	4.8
	Short fall	3.1	MVC	3.5
	SBS invalid		4.8	
	AHT invalid		1.0	

A causative mechanism was considered a fringe opinion if the combined percentage of respondents rating it as likely or highly unlikely or as unlikely or highly unlikely was <5%.

Results

The survey was sent to 1378 clinicians, of whom 682 (49.5%) responded. A department of child neurology (n = 22) at 1 institution declined as a block to participate, and were counted as nonresponders. We excluded 54 (8%) survey respondents because they either did not list their specialty (n = 9) or listed only specialties that were not included in our sampling frame (23 general, primary, or hospitalist pediatricians and 22 other pediatric subspecialists). The remaining 628 respondents composed the main cohort for this analysis. Characteristics of the respondents are summarized in **Table II**. Among the respondents, the most common specialties listed were Emergency Medicine, Critical Care, Neurology, and Radiology. The large majority (88.2%) of respondents reported being board-certified in their specialty.

Table II. Respondent characteristics

Characteristics	n (%)
Specialty*	
Emergency Medicine	192 (30.9)
Critical Care	108 (17.4)
Neurology	101 (16.3)
Radiology	96 (15.5)
Ophthalmology	45 (7.2)
Neurosurgery	30 (4.8)
Child Abuse	30 (4.8)
Pathology	27 (4.3)
Board-certified†	548 (88.2)
Age, y‡	
20-30	4 (0.6)
31-40	240 (38.6)
41-50	180 (29.0)
51-60	128 (20.6)
61+	68 (11.0)
Years in practice§	
0-5	148 (23.8)
6-10	135 (21.7)
11-20	164 (26.4)
21-30	106 (17.1)
31-40	48 (7.7)
41+	16 (2.6)

*Sums to 629 because 8 respondents listed 2 specialties.
†Six respondents did not report board certification status.
‡One respondent did not report age.
§Four respondents did not report years in practice.

Ninety-nine respondents (15.8%) omitted answers for at least 1 question. The most common scenarios in which more than 3 responses were omitted were nonophthalmologists omitting questions about RH and, conversely, ophthalmologists exclusively answering questions related to RH. No question was omitted by more than 22 respondents.

Respondents' opinions about the most likely source of SDH, severe RH, and coma or death are shown in the **Figure**. More than 80% of respondents felt that shaking with or without impact was likely or highly likely to produce SDH, more than 90% reported that it was likely or highly likely to produce RH, and more than 78% reported that it was likely or highly likely to result in coma or death. The corresponding results for a short fall were 18%, 3%, and 3%, respectively.

Either SBS or AHT was characterized as a valid diagnosis by 607 respondents (96.7%; 95% CI, 94.9%-97.9%). SBS was endorsed as valid by 554 respondents (88.1%; 95% CI, 85.3%-90.5%); AHT, by 584 respondents (93.0%; 95% CI, 90.7%-94.9%). Pathologists were statistically significantly more likely to be divergent with respect to the validity of AHT and SBS, with 8 of 27 stating that SBS is not a valid diagnosis, but that AHT is valid (OR, 13.5; 95% CI, 4.7-38.1, relative to other specialties) (**Table III**). Two pathologists responded that SBS is valid, but AHT is not.

Among the respondents stating that SBS or AHT is a valid diagnosis, 545 (89.7%) reported that they were informed by both the scientific literature and their own clinical experience, 48 (8%) were informed only by their clinical experience, and 11 (1.8%) were informed only by the scientific literature. One respondent did not answer the question, and 2 respondents listed "other" as the reason for considering the diagnosis valid. With respect to specific findings (SDH, RH, coma or death), the respondents showed very little discordance in their responses according to the presence or absence of impact.

Using our definition of "fringe opinion," 165 respondents (26.6%) reported at least 1 fringe opinion. We also included respondents who stated that either SBS (n = 30; 4.8%) or AHT (n = 6, 1.0%) were not valid. Of the 6 respondents who stated that they thought AHT was not a valid diagnosis, 5 agreed that shaking with or without impact was likely or highly likely to result in SDH and RH. All 5 of these respondents agreed that shaking with impact was likely or highly likely to result in coma or death; 2 of the 5 were neutral about the likelihood of shaking without impact resulting in coma or death. One respondent reported that AHT was invalid, and that shaking with or without impact is unlikely or highly unlikely to result in SDH, RH, or coma or death. This respondent reported that only a MVC or a short fall were likely to result in SDH, no option was likely to result in RH, and only a MVC was likely to result in coma or death.

Discussion

Our survey results represent national, multidisciplinary physician opinions on the validity of SBS and AHT, and of the

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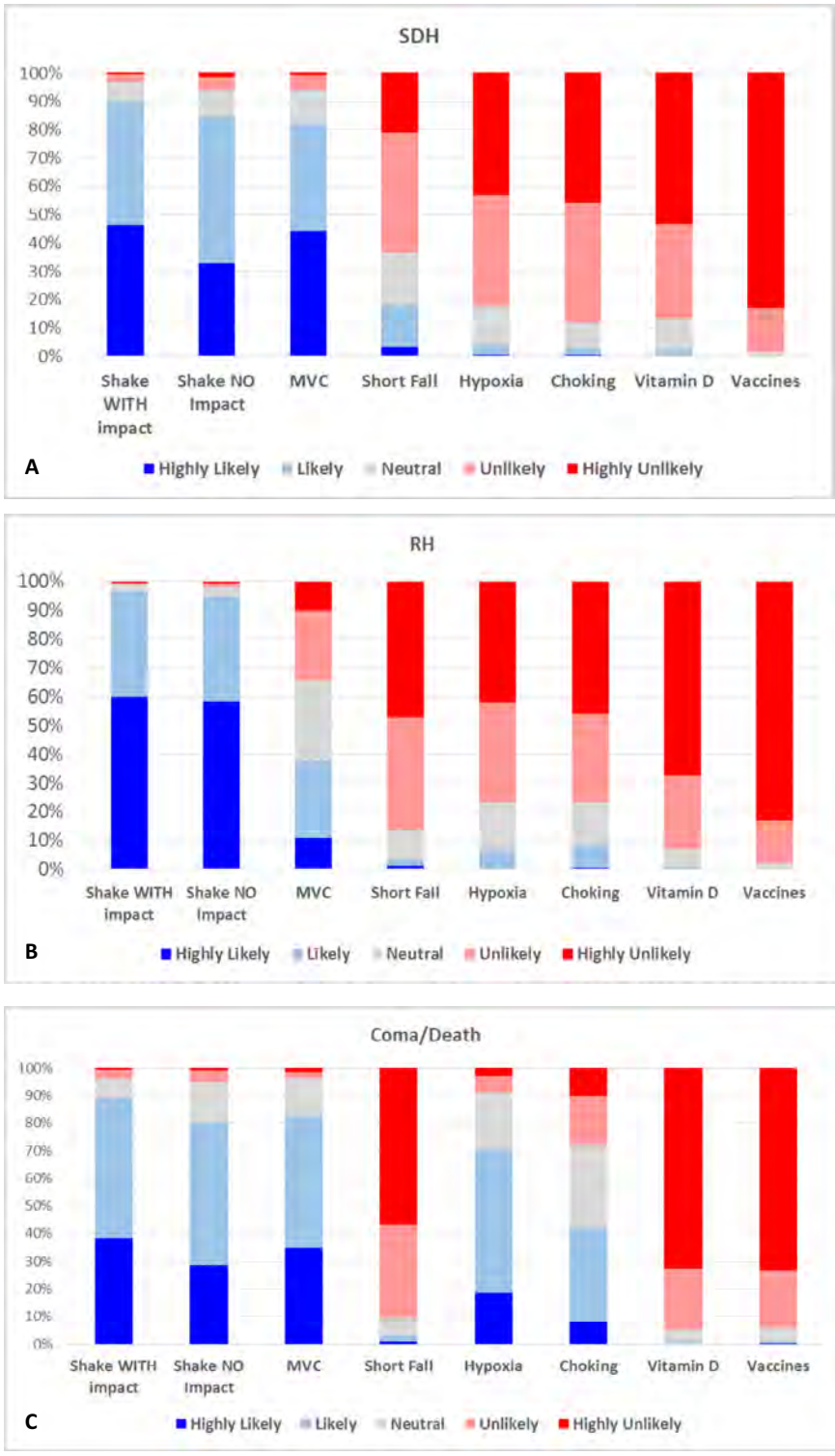

Figure. Percentage of respondents who believe that SDHs, severe RHs, and coma/death would result from the above events.

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Table III. Validity of AHT and SBS by specialty

Specialties	n	Yes, n (%)	No	Don't know/ unsure	Blank
AHT valid					
Emergency Medicine	196	184 (93.9)	0	10	2
Critical Care	108	102 (94.4)	2	3	1
Neurology	103	95 (92.2)	1	5	2
Radiology	96	82 (88.5)	2	8	4
Ophthalmology	46	44 (95.7)	0	2	0
Neurosurgery	30	30 (100.0)	0	0	0
Child Abuse Pediatrics	30	30 (100.0)	0	0	0
Pathology	27	25 (92.6)	1	1	0
SBS valid					
Emergency Medicine	196	175 (89.3)	7	11	3
Critical Care	108	99 (91.7)	2	7	0
Neurology	103	96 (93.2)	4	1	2
Radiology	96	84 (87.5)	2	6	4
Ophthalmology	46	45 (97.8)	0	1	0
Neurosurgery	30	23 (76.6)	5	2	0
Child Abuse Pediatrics	30	28 (93.3)	2	0	0
Pathology	27	11 (40.7)	8	8	0

Totals sum to 636 because 8 respondents listed 2 specialties: 4 for Child Abuse Pediatrics and Emergency Medicine, 2 for Critical Care and Emergency Medicine, and 2 for Critical Care and Neurology.

likelihood that findings commonly seen in those cases—SDH, severe RH, and coma or death—result from various causal mechanisms. Although "general acceptance" is not defined by a definitive numerical threshold in legal settings (although acceptance by <50% of field clearly would not meet the criterion for "general acceptance"), our results provide empirical data that clearly support the conclusion that SBS and AHT are still generally accepted as valid medical diagnoses across a broad range of specialties. Furthermore, our data show that shaking with or without impact (in contradistinction to several other alternative theories) is generally accepted to be a dangerous form of child physical abuse and capable of producing SDH, RH, and coma or death. Several alternative explanations that have been proposed to cause SDH, RH, and coma or death are not generally accepted. This high degree of consensus, irrespective of specialty, experience, or age, refutes recent reports in the lay press and legal commentary of a substantial controversy within the medical community regarding SBS and AHT. Other authors have discussed the various motivations for those media sources to proffer such assertions.[22,23]

As a specialty, forensic pathologists were discordant from other respondents, being more likely to question the validity of SBS as a diagnosis, although not more likely to question the validity of AHT (**Table III**). In this respect, our results are similar to the results of a survey of forensic pathologists that showed 35% questioning SBS.[23] That survey did not address the topic of AHT separately from SBS, however.

Our survey results demonstrate that physicians, irrespective of specialty, viewed the risks of shaking, with or without impact, to be similar to a high-velocity MVC and dissimilar to a very short fall. Although this finding may seem unremarkable to clinicians, it is important in light of some biomechanical literature arguing that shaking without impact cannot generate sufficient forces to cause SDH,[24,25] and biomechanical[24] and pathology[26] literature suggesting very short falls as a reasonable explanation for those findings. We believe the divergence of our results from this literature represents a recognition of the limitations of biomechanical data, a primacy of clinical literature and experience in relation to that literature, or both.

Our study has several limitations. First, we did not include general pediatricians in our sampling frame, even though some general pediatricians have substantial experience caring for children who have sustained physical abuse. Thus, our results are susceptible to selection bias. However, we chose to include only those specialties with the greatest likelihood of evaluating and treating pediatric traumatic brain injury. Our results could be different if general pediatricians with high rates of exposure to traumatic brain injury had systematically different opinions about the risks and injuries associated with shaking or other suggested mechanisms.

Second, as with all survey studies, ours might have been subject to response bias if respondents held systematically different opinions from nonrespondents. If present, this could have affected our results by increasing or decreasing the true proportion of clinicians who accept SBS or AHT. We do not feel that this limitation significantly affected our results, however, for several reasons. First, our sampling frame was chosen to reflect practicing clinicians from 10 leading hospitals, rather than groups that are most active in legal proceedings involving child abuse and neglect (and thus more motivated to respond). Second, our relatively high response rate (nearly 50% of those surveyed, with more than 600 clinicians) limits the potential that a small cadre of clinicians with divergent opinions would significantly affect results. Finally, our results show remarkable unanimity. Thus, nearly all nonresponders would have to harbor opinions that are diametrically opposed to responders for AHT or SBS to have an acceptance rate of <50% or for fringe opinions to be generally accepted.

The limitations of the *US News & World Report* hospital rankings have been discussed elsewhere.[27] Our intention in using these rankings was not to endorse a ranking of any particular children's hospital; rather, we sought to identify a relatively large and diverse cohort of clinicians likely to care for child victims of trauma, and to decrease the possibility that the survey would be preferentially distributed to clinicians whose opinion regarding AHT or SBS was known to the authors. It is possible that our results would differ if we were to use different hospitals or a different ranking system; however, given the degree of consensus, we believe it unlikely that such different choices would change the conclusion regarding whether SBS, AHT, or the other alternative hypotheses are generally accepted.

Finally, some respondents indicated confusion about the questions. For example, 1 respondent (who contacted the lead investigator) noted that there are important developmental and anatomic differences between infants aged <12 months and young children aged <3 years that could significantly impact the likelihood of the resulting findings. Another respondent noted that it would have been more appropriate to ask about the likely mechanism, given a particular finding, than to ask about the likely findings resulting from a given mechanism.

Although we recognize both points, we believe that any ambiguity in the survey design would bias against a high level of consensus. ■

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Biomechanical studies in an ovine model of non-accidental head injury

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Biomechanics

ABSTRACT

This paper presents the head kinematics of a novel ovine model of non-accidental head injury (NAHI) that consists only of a naturalistic oscillating insult. Nine, 7-to-10-day-old anesthetized and ventilated lambs were subjected to manual shaking. Two six-axis motion sensors tracked the position of the head and torso, and a triaxial accelerometer measured head acceleration. Animals experienced 10 episodes of shaking over 30 min, and then remained under anesthesia for 6 h until killed by perfusion fixation of the brain. Each shaking episode lasted for 20 s resulting in about 40 cycles per episode. Each cycle typically consisted of three impulsive events that corresponded to specific phases of the head's motion; the most substantial of these were interactions typically with the lamb's own torso, and these generated accelerations of 30–70 g. Impulsive loading was not considered severe. Other kinematic parameters recorded included estimates of head power transfer, head–torso flexion, and rate of flexion. Several styles of shaking were also identified across episodes and subjects. Axonal injury, neuronal reaction and albumin extravasation were widely distributed in the hemispheric white matter, brainstem and at the craniocervical junction and to a much greater magnitude in lower body weight lambs that died. This is the first biomechanical description of a large animal model of NAHI in which repetitive naturalistic insults were applied, and that reproduced a spectrum of injury associated with NAHI.

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1. Introduction

While non-accidental head injury (NAHI; or "shaken baby syndrome") is an important cause of death and severe neurological dysfunction in children under three years of age, the majority of cases occurring in the first 12 months of age, its pathogenesis and biomechanics are incompletely understood (Blumbergs et al., 2008). Early reports recognized subdural hemorrhage, retinal hemorrhages, and long bone fractures as being suggestive of inflicted head injury in infants and young children (Caffey, 1972, 1974). However, this concept has now evolved into a constellation of lesions (acute encephalopathy, and subdural and retinal hemorrhages) referred to as NAHI (Blumbergs et al., 2008; Krugman et al., 1993). In NAHI, death occurs in 10–40% of cases and many survivors are left with cognitive and behavioral disturbances, cerebral palsy, blindness and epilepsy (Blumbergs et al., 2008).

Many aspects of NAHI remain controversial and intermittently undergo revision (Donohoe, 2003) including whether shaking alone is sufficient to injure the brain or whether an additional head impact is required. This is due, in part, to varying mechanisms of brain injury between individual cases (Bandak, 2005) usually lack of a reliable history of the circumstances surrounding the suspected abuse (Leestma, 2005) and frequently denial of maltreatment by the perpetrator. Moreover, the absence of any external evidence of TBI does not necessarily preclude a diagnosis of NAHI and the lesions found in such cases are not pathognomonic (Blumbergs et al., 2008).

Very few animal models have been developed to study the biomechanics of NAHI and extrapolation of data from adult models to the pediatric population is frequently inaccurate (Gerber and Coffman, 2007; Margulies and Coats, 2010).

There have been several studies of NAHI in laboratory rodents (Bonnier et al., 2004; Smith et al., 1998), but the small, lissencephalic brain of these species does not satisfactorily replicate real-world human NAHI; the smooth lissencephalic brain surface may resist deformation after a traumatic insult more than brains possessing gyri, and since shearing forces and inertial loading are related to brain mass, small rodent brains can tolerate much greater angular acceleration forces than animals with larger gyrencephalic brains (Margulies and Coats, 2010).

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We recently developed an ovine model of NAHI (Finnie et al., 2010, 2012). This species was selected because lambs have a relatively large, gyrencephalic brain and weak neck muscles resembling that of human infants. This study proved that manual shaking of a younger, lighter body weight subset of lambs could result in death, without an additional head impact being required (Finnie et al., 2012). Neuropathological examination of these lambs revealed mild, focal macroscopic subdural hemorrhage in three of nine shaken animals (the dura was not examined histologically) and, sometimes, microscopic subarachnoid hemorrhage. Axonal injury, neuronal reaction, and albumin extravasation was widely distributed in the brain and cervical spinal cord and of much greater magnitude than higher body weight shaken lambs that did not die. The eyes of shaken lambs showed damage to retinal inner nuclear layer neurons, mild, patchy ganglion cell axonal injury, widespread Muller glial cell reaction, and uveal albumin extravasation. It was suggested that mechanical deformation of the brain, rostral spinal cord and eyes was probably largely responsible for the observed pathology (Finnie et al., 2012). Pathological data has been reported previously and is summarized in Table 1.

This paper describes the biomechanical events that produced the reported neuropathological findings in this ovine model (Finnie et al., 2010, 2012). The objective of this study is to characterize the kinematics of lamb heads during shaking episodes, together with some general characterization of the relative motion of the head to the body.

2. Materials and methods

2.1. Experimental protocol

Nine anesthetized and ventilated lambs were manually grasped under the axilla and vigorously shaken for 20 s with sufficient force to move the head rapidly back and forth, similar to head motions believed to occur in human NAHI. There was no intentional head impact and the head moved freely during each episode. Each lamb was shaken in this manner 10 times over a 30-min period and then placed quietly in the sphinx position for 6 h under anesthesia. Four control lambs were not shaken, but were otherwise subjected to the same experimental protocol. Lambs were maintained under anesthesia for the full duration of the experiment, without ever regaining consciousness, until killed by perfusion fixation of the brain (Finnie et al., 2010, 2012).

The experimental protocol complied with the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes (National Health and Medical Research Council, 2013) and was approved by Animal Ethics Committees of the University of Adelaide and SA Pathology.

2.2. Biomechanical analysis

The acceleration of the head was acquired at 20,000 Hz using an 8 g triaxial accelerometer (Endevco©). The position and orientation of the head and torso were registered using the FASTRAK© system (Polhemus©): two 9.1 g motion sensors were used. The triaxial accelerometer and one motion sensor were mounted on the skull using plastic supports mounted in epoxy putty. A second motion sensor was sutured under the axilla of the right forelimb in order to measure the motion of the torso. This sensor was held under the hand of the operator during each shaking episode.

The position of the accelerometer and the head motion sensor was registered in an anatomical coordinate frame using a three-dimensional coordinate measuring arm. Sensor data were transformed into this consistent anatomical coordinate frame.

2.3. Signal processing

Acceleration and FASTRAK were synchronized using cross-correlation between the sensor data. The acceleration data could therefore be located both in time and in space, in order to determine which phases of the shaking motion high accelerations were occurring. Acceleration data were filtered forward and in reverse using a 500 Hz 8th order Chebychev digital filter, post-acquisition.

Severity was characterized by peak levels of head acceleration and the power transfer to and from the head. The Head Injury Criterion used in impact testing is similar to a power calculation (Hutchinson et al., 1998), and more than one power criterion has been proposed in the past (Neal-Sturgess, 2002; Newman et al., 2000). Power was estimated by taking the scalar product of the head acceleration vector and the head velocity vector; the power was expressed in the units of W/kg.

2.4. Brain injury evaluation

Full details of neuropathological findings may be found in Finnie et al. (2010, 2012) and are briefly highlighted in Section 1 of this paper and Table 1. A particular focus was on the amount of axonal and neuronal damage revealed by immunohistochemistry.

3. Results

3.1. Head kinematics—displacement

Three individuals manually shook animals over the course of the experimental series. Each animal was shaken at a frequency of about 2 Hz resulting in approximately 40 cycles per episode and about 400 per animal. The shaking input occurred generally in the sagittal plane. The motion of the axilla position sensor (at the hand of the shaker) was generally anterior–posterior, although there was cranial–caudal (vertical) displacement in some episodes. In response, the center of gravity of the head typically moved within or about the anterior–posterior plane of the animal.

Trajectories are shown below and in supplementary animated figures that are available electronically. Fig. 1 shows the trajectory of the head motion sensor and the axilla sensor in the laboratory space in the fourth shaking episode of Subject 3. The motion of the axilla sensor was cranial–caudal and anterior–posterior. In response, the head was propelled away from the shaker until it reached the lowest point in the laboratory space, after which the head rose vertically, closer to the shaker. An animation of this trajectory is shown in three orthogonal views in Supplementary Fig. S1.

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The position of the axilla sensor represents the position of the torso of the subject and can be used to locate the head relative to the body (Fig. 2). In most episodes, this relative motion of the head was “C”-shaped trajectory.

3.2. Head kinematics—acceleration

Each shake was characterized by local acceleration peaks at various phases of the shaking cycle. An example of a single cycle (beginning at α and ending at ω) is shown in Fig. 3; the labeled points indicate the incidence of acceleration peaks. The acceleration history of this episode and the acceleration levels over the cycle α to ω are shown in Fig. 4. There were three acceleration peaks during the cycle (A, B and C). The first occurred as the head passed the summit of its arc and was being accelerated downwards (A; c.f. Fig. 3). A larger pulse was measured at the nadir of the arc as the head/neck reached the limit of motion (B) and short, sharp acceleration was recorded as the head suddenly reversed direction relative to the torso (C). This location corresponded to a point where the head interacted with the posterior aspect (dorsum) of the torso of the subject.

Local peak acceleration levels and their associated locations in the head trajectory, across the entirety of Episode 4 of Subject 3 are shown in the top left panel of Fig. 5, and in a real-time animation on three orthogonal views in Supplementary Fig. S2. The peak acceleration level recorded in this episode was 67 g.

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3.3. Head kinematics—power

An example of the power calculation is shown in the top right panel of Fig. 5. Negative power was associated with decelerations of the head at the nadir of the shake cycle and also as the head interacted with the dorsum of the animal. Although the first of these events appears more important, there may have been equally numerous high magnitude power pulses related to the second event, but because of the lower sampling frequency of the FASTRAK system, many of these may not have been captured. Periods of high power transfer reflected periods of high acceleration or deceleration of the head.

3.4. Head kinematics—head extension and flexion

An indication of head extension and flexion was derived using the head and torso position sensors. Localized peak values of extension and flexion are shown in the lower left panel of Fig. 5 for Episode 4 of Subject 3. Note that zero on the scale is arbitrary and may not be indicating a truly neutral position of the head/neck. However, the values indicate that the head/neck was furthest in extension either at the bottom of the shake cycle or shortly afterwards on the head's upward trajectory. The head was placed in flexion near the top of the downward phase of the shake cycle.

The gradient of the sagittal flexion–extension angle is shown in the lower right panel of Fig. 5. The gradient of the sagittal angle indicates periods of high angular speed of the head relative to the torso; the highest angular speeds occurred as the head was in the a caudal–posterior position (increasing extension) and when the head was at the extremity of the cranial–anterior position at the highest point of the shake cycle (increasing flexion).

3.5. Variations in shaking kinematics

Shaking styles varied between individual shakers and also depended upon the weight of the animal. Smaller animals showed different biomechanical characteristics by virtue of their smaller size, and the shaking occurred within a smaller physical range. The regions of highest acceleration were often found when the head was at the most anterior position. For example, lamb 7 weighed only 5 kg. A typical episode of the shaking of this animal is shown in Fig. 6 (see also Fig. S3 for an animation in three orthogonal views).

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3.6. Summary statistics

Summaries of parameters that define the shaking are shown in Table 1. Axonal damage in lambs that died (7, 8 and 9) was greater than in animals that survived to the planned experimental endpoint. However, in general there was no consistent correlation between mechanical input and the injury scores based on neuropathological examination. This is illustrated in Fig. 7, which shows, for each subject, the number of local peaks in acceleration that exceeded a given acceleration value. The accelerations of the heads of the animals that died before the endpoint of the experiment (lambs 7–9) showed no features that were not also present in lambs that survived shaking, despite their premature deaths and high axonal injury scores. Lamb 3 is a particular outlier in this figure, as it exhibited numerous high acceleration impulses, but produced the least axonal injury. Similarly, lambs 5 and 6 experienced higher acceleration inputs than lambs 2 and 4, but had similar levels of brain injury.

Instead the amount of axonal injury showed a strong negative correlation with subject weight ($R^2=0.84$), a multivariable regression suggested that weight, average pulse acceleration and peak acceleration could explain the majority of the variance in axonal injury across the series ($R^2=0.95$). Some caution is warranted over the interpretation of these correlations however, as they are greatly influenced by the results from subjects that died (7, 8 and 9) and there are well known pitfalls in interpretation of the results of stepwise multivariable regression in general.

Table 1
Injury levels and mechanical inputs in the lamb model of non-accidental head injury.

Subject	Weight (kg)	Time to death (h)	Axonal injury score	Neuronal injury score	Acceleration of impulses > 30 g		
					Peak (g)	Average peak (g)	*N*
1	12	6	10	49	39	38.5	1
2	11	6	13	56	53	37.9	14
3	10.5	6	6	37	67	39.9	120
4	10	6	12	74	40	34.1	15
5	10	6	15	61	73	44.9	225
6	8.5	6	15	71	80	40.4	98
7[a]	6	5	31	66	66	41.5	78
8[a]	5.5	2	30	75	58	35.9	20
9[a]	5	3	26	58	79	37.3	21
Average			18	61	62	41.6	66

[a] Intermittent signal failure on one acceleration channel may have caused an under estimation in average and peak values of acceleration and power.

4. Discussion

This study has presented the biomechanics of shaking in a naturalistic large animal model of NAHI. The main features of this model are that the insults closely resemble events thought to occur during episodes of abuse to human infants, and that it produced a spectrum of injuries that resembles those suffered by children who are victims of NAHI. Acceleration events were between 40 and 80 g and each subject generally experienced many such impulses.

The model was designed to closely resemble real-world human infant manual shaking episodes and, as such, is likely to be a more accurate replication of what occurs in pediatric NAHI than previous models. The disproportionately large lamb head containing a gyrencephalic brain is effectively a poorly controlled mass laxly supported by weak neck muscles and thus has the craniocerebral anatomical features of a human infant.

Raghupathi et al. (2004) concluded that the intensity and nature of the resulting axonal injury in their model were dependent upon both the number of insults and severity of the loading. It might have been expected that, in this study, the number and intensity of events occurring during shaking episodes would be related to the production of brain injury. While the present study was not designed to elicit any such correlations, their absence deserves comment. First, it appears that subject weight had a significant bearing on the amount of axonal injury observed. The effect of weight did not appear to be a consequence of some resulting variation in the intensity of the head accelerations experienced, although it should be noted that the characterization of the biomechanics in such a complex biomechanical model is not straightforward; impulsive and kinematic severity were characterized using several parameters, but there were some omissions; the kinematics of the craniocervical junction could not be measured and was only characterized indirectly, while angular acceleration was not measured. Nevertheless, we noted a substantial degree of

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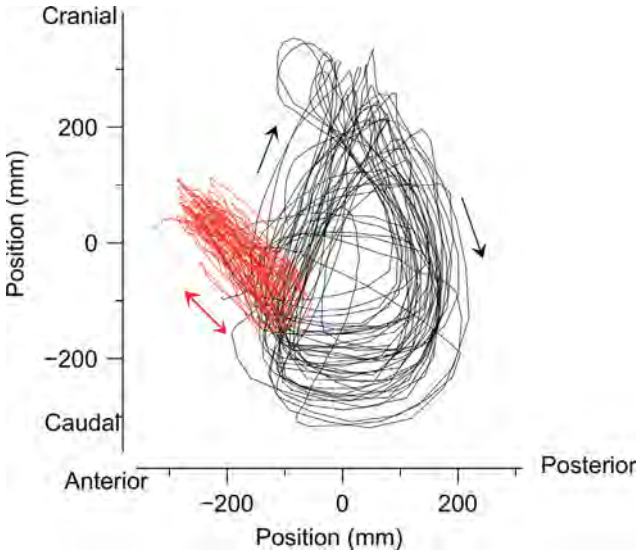

Fig. 1. Trajectory of the axilla (hand) sensor (red) and the head position sensor (black) in one episode (Subject 3; Episode 4). See also Supplementary Fig. S1.

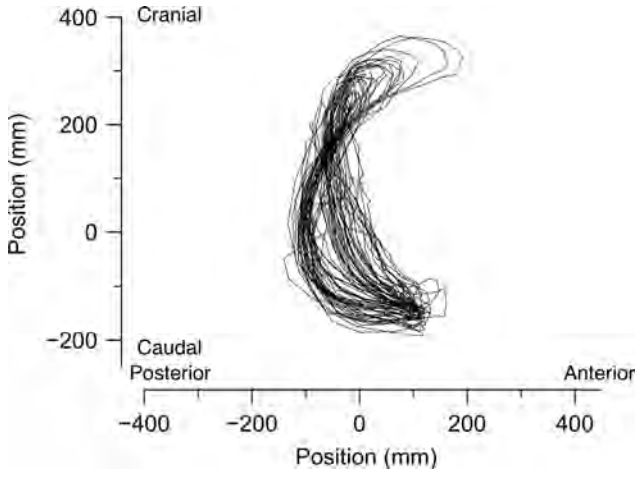

Fig. 2. Relative trajectory of the head position sensor to the axilla sensor in one episode (Subject 3; Episode 4).

concordance between the different measures of severity that we were able to characterize, and other measures that might have been recorded, we would expect, would reflect a similar order of severity between the nine animals. Nevertheless, it might be that there was some unmeasured biomechanical response to shaking, critical to the development of brain injury, that is greatly affected by developmental changes occurring over the first days and weeks of life.

4.1. *The immature ovine brain as a model for the infant human brain*

Ethical considerations meant that there was no option but to ensure each animal was under deep-plane anesthesia for the duration of the experiment. Unanesthetised lambs would be expected to have greater neck muscle tone and correspondingly less head acceleration after shaking. This is a relevant consideration insofar as it might affect the model as an analog of the human infant. It is arguable that the lower neck muscle tone of anesthetized lambs in the present study is more likely to resemble the very weak neck muscles of a human infant.

The development of a satisfactory animal model of non-accidental head injury (NAHI) in children is required, but selection of an appropriate species has proved to be difficult (Gerber and Coffman, 2007). Rodents have been used as experimental models, but they have smooth, lissencephalic brains with scant white matter, unlike the gyrencephalic brains of large mammalian species. Moreover, the presence of gyri affects the movement of the brain within the skull and, after a shaking episode or head impact, significantly more brain deformation occurs than in brains

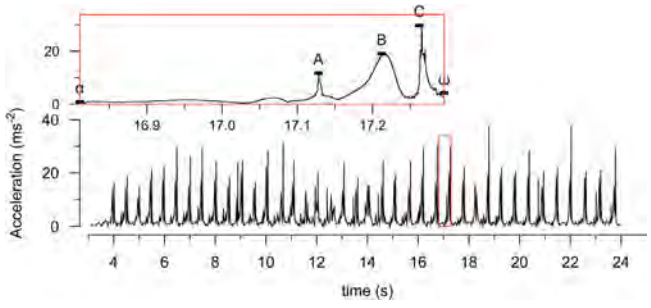

Fig. 4. Acceleration history in Subject 3, Episode 4. Detail shows acceleration events in one cycle (α–ω): Accelerations at positions A, B and C are indicated.

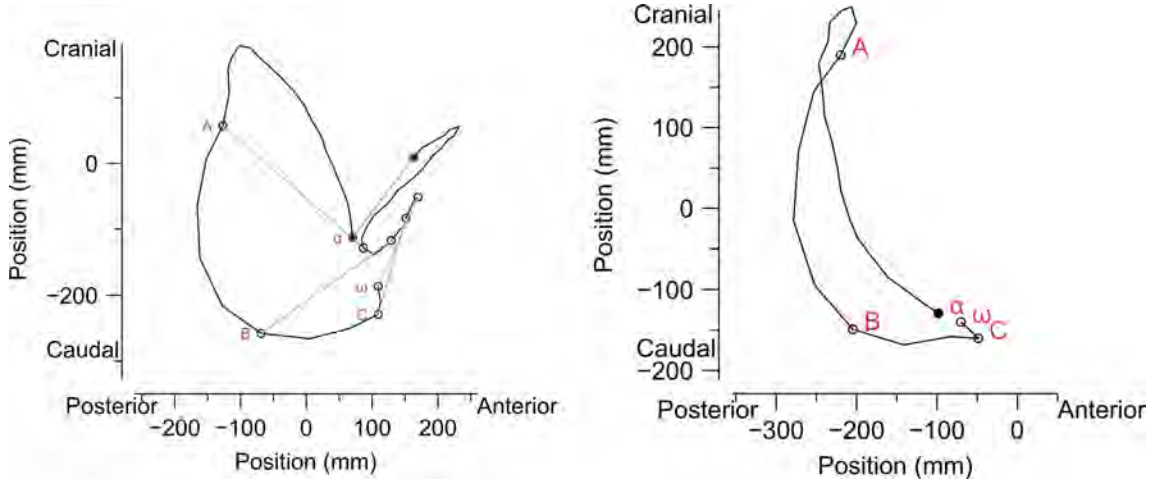

Fig. 3. Detail of a single cycle of motion (α–ω) in Subject 3, Episode 4. Labeled points refer to regions of interest and may be cross-referenced with Fig. 5. Trajectory of head and hand in laboratory space (left), and head relative to hand (right).

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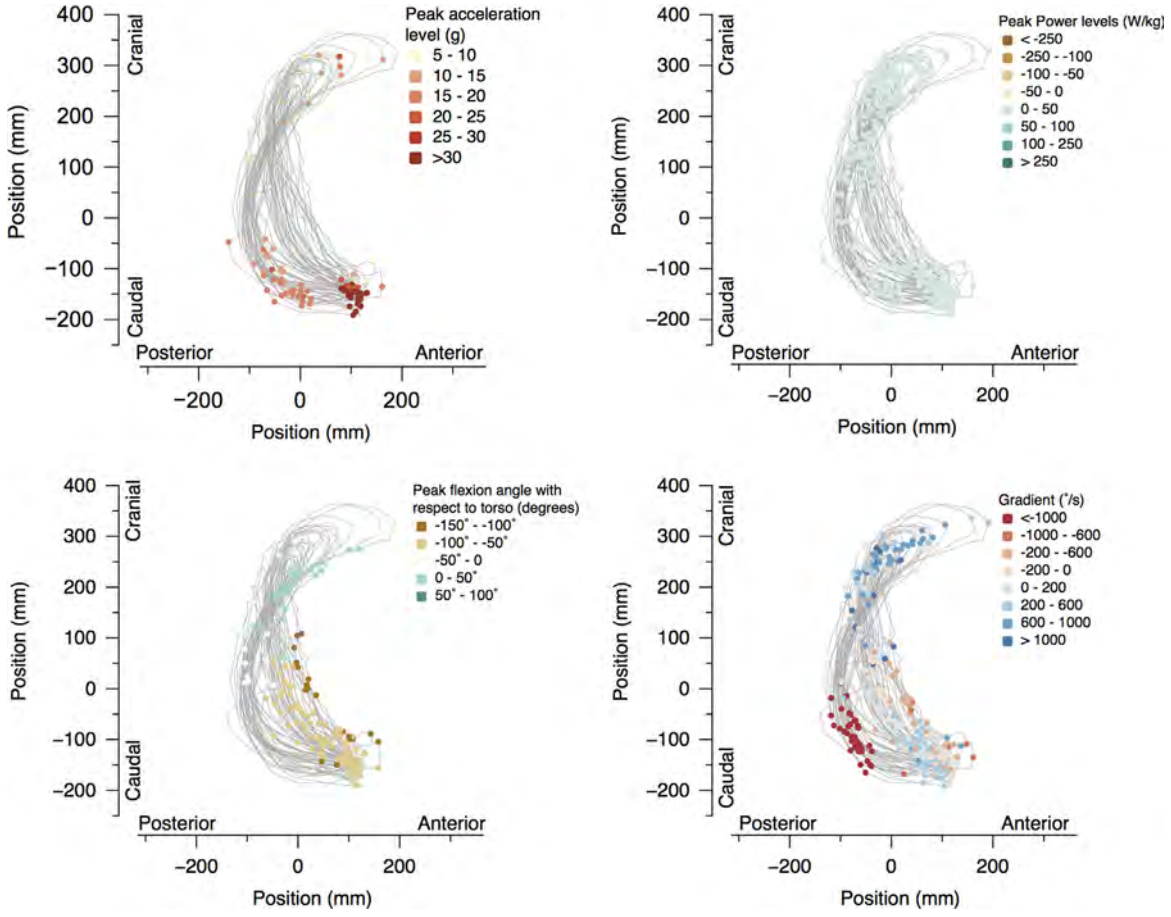

Fig. 5. Trajectory of the head position sensor relative to the axilla sensor in Episode 4 of Subject 3. The location and levels of local peaks in the acceleration (top left), power (top right), peak flexion (lower left) and flexion/extension gradient (lower right) are overlaid on the trajectory.

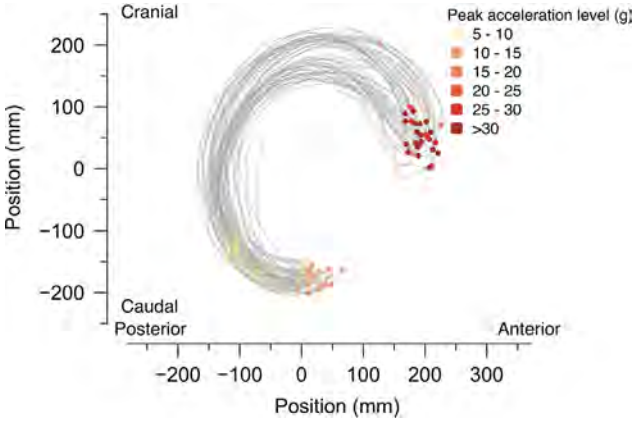

Fig. 6. Trajectory of the head position sensor relative to the axilla sensor in the sagittal plane of Episode 3 of Subject 7. The location and levels of local peaks in the acceleration are overlaid on the trajectory.

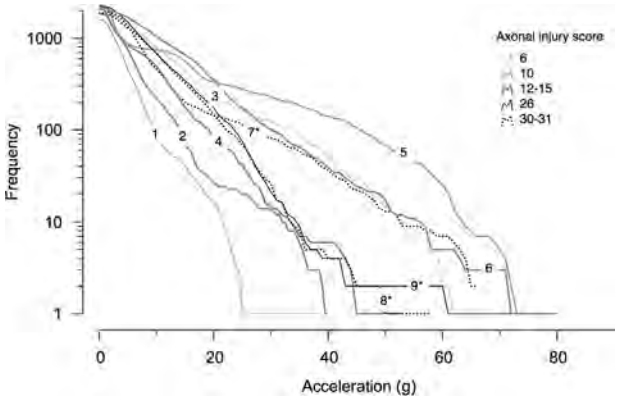

Fig. 7. Frequency of transient peaks in acceleration exceeding a certain value. Distributions are labeled with Subject numbers; asterisked numbers indicate subjects that died. The line legend indicates injury severity.

devoid of gyri. Since shearing forces and inertial loading are related to brain mass, small rodent brains can also tolerate much greater angular acceleration forces than animals with large gyrencephalic brains (Margulies and Coats, 2010).

Recognition of the contribution of neonatal craniocerebral anatomical features to the development of NAHI pathology is critical when selecting an animal model. Relative to its body size, the infant human head is significantly larger when compared to that of an adult, and the brain has a higher water content, is incompletely myelinated, and the subarachnoid space is relatively large. In addition, cervical paraspinal muscles are weak, so the infant has generally poor control of a disproportionately large head on a weak neck. Taken together, these factors may permit significant differential movement of the immature brain with respect to the skull during the rapid acceleration/deceleration produced by violent manual shaking. In view of the importance of

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these anatomical characteristics of the human infant, we selected a lamb model of NAHI as this species also has a relatively large, gyrencephalic brain, a large head relative to body size, and weak neck muscles.

It might be argued that the immature ovine brain may not sufficiently represent the human infant in that the human infant has a relatively undeveloped brain compared to the ovine brain, which has more functional maturity at birth. Human neonates, if classified by their relatively immature development of the body and motor skills, might be considered to be relatively underdeveloped at birth compared to sheep; but, in fact, the relatively advanced development of the human brain and many aspects of perceptual systems at birth suggests that, in many respects, a great deal of its development occurs prenatally (Dobbing and Sands, 1979).

In sheep, the cerebral hemispheres develop earliest, followed by the brainstem and spinal cord, then the cerebellum. Although the two growth spurts of the cerebral hemispheres occur at 40–90 days of gestation (~150 days) and after 95 days, most of the growth in other brain regions occurs postnatally. At postnatal day 7, for example, the cerebellum and brainstem are only at 50% of their final weight and the spinal cord 30%. Myelination in this species is largely complete by the first week of postnatal life, but there is a second, postnatal phase of myelination at postnatal days 10–20, especially in the spinal cord (Finnie et al., 2012). Hence, in several important respects, the brain of the neonate sheep is still developing and there are good reasons to consider this model as being relevant to the human infant.

4.2. Reproducibility

While all animals showed pathology usually associated with NAHI, there was heterogeneity across subjects that appeared to be explained primarily by variation in subject weight. It might be noted that substantial changes in subject weight would appear to occur over a very short period; the first group of animals were 7–9 days old and 8.5–12 kg, whereas the lighter group were 5 days old and 5–6 kg. Hence a logical next step would be to restrict the weight of subjects, which implies restricting subjects to a small window of postnatal development, requiring careful programming of experiments so that they occur at a specific number of days postpartum. Graded injury might be attained by more tightly controlling the insult, and introducing controlled variation into the shaking. The results presented herein provide a basis for an improved protocol, and suggest the nature of the kinematics that is required to produce clinically relevant injuries.

To conclude, this study represents a novel animal model of NAHI that is characterized by repetitive and cyclical manual shaking that can produce repeated impulsive contacts with the body of the animal itself and lower-magnitude impulses that are induced throughout the shake cycle. The manual shaking of lambs in this series was associated with widely distributed axonal injury, neuronal reaction, and albumin extravasation, with death supervening in lower body weight animals before the designated end point of the experiment. The magnitude of the input in this model was sufficient to cause substantial neural damage, and even death, in shaken lambs.

Author disclosure statement

No competing financial interests exist.

Conflict of interest statement

On behalf of all the authors I declare that no competing financial interests exist.

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Biomechanical Response of the Infant Head to Shaking: An Experimental Investigation

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Abstract

Controversy exists regarding whether violent shaking is harmful to infants in the absence of impact. In this study, our objective was to characterize the biomechanical response of the infant head during shaking through use of an instrumented anthropomorphic test device (commonly referred to as a ''crash test dummy'' or surrogate) representing a human infant and having improved biofidelity. A series of tests were conducted to simulate violent shaking of an infant surrogate. The *Aprica 2.5* infant surrogate represented a 5th percentile Japanese newborn. A 50th percentile Japanese adult male was recruited to shake the infant surrogate in the sagittal plane. Triaxial linear accelerometers positioned at the center of mass and apex of the head recorded accelerations during shaking. Five shaking test series, each 3–4 sec in duration, were conducted. Outcome measures derived from accelerometer recordings were examined for trends. Head/neck kinematics were characterized during shaking events; mean peak neck flexion was 1.98 radians (113 degrees) and mean peak neck extension was 2.16 radians (123 degrees). The maximum angular acceleration across all test series was 13,260 radians/sec^2 (during chin-to-chest contact). Peak angular velocity was 105.7 radians/sec (during chin-to-chest contact). Acceleration pulse durations ranged from 72.1 to 168.2 ms. Using an infant surrogate with improved biofidelity, we found higher angular acceleration and higher angular velocity than previously reported during infant surrogate shaking experiments. Findings highlight the importance of surrogate biofidelity when investigating shaking.

Keywords: biomechanics; child abuse; pediatric injury; shaking; traumatic brain injury

Introduction

Violent shaking of infants has been thought to cause serious brain damage since Guthkelch documented the injuries of two shaken infants in 1971.[1] In 1987, Duhaime and colleagues challenged this theory by constructing an infant surrogate and subjecting it to violent shaking and impacts.[2] They measured the rotational acceleration and velocity generated during shaking and impact and concluded that shaking alone did not reach expected biomechanical injury thresholds to cause concussion, subdural hematomas, or diffuse axonal injury. When the infant surrogate's head was struck against a hard surface, however, head injury thresholds were exceeded. They concluded that shaking alone would not be likely to cause serious traumatic brain injury (TBI) to an infant. This hypothesis has been tested by others using different surrogates, as well as by computer modeling, with varying results.[3–5]

Duhaime's work has led to a longstanding controversy as to whether it is possible to harm infants by violently shaking them. The concept that ''shaking doesn't hurt babies'' has been promoted in the popular media.[6–8] These sources highlight stories of people accused of abusing their children by shaking and quote defense experts who claim that biomechanical studies have shown that shaking an infant cannot cause subdural hemorrhages, encephalopathy, and retinal hemorrhages. Yet, extensive clinical experience resulting from a number of well-documented cases has demonstrated the harmful effects of shaking children.[9–14] In a number of cases, adults have voluntarily reported violently shaking babies, sometimes associated with impact and sometimes not.[15,16] These infants often are found to have serious or fatal brain injuries and, in survivors, a poor prognosis.[17–20] In addition, a program of intensive education of new parents about the dangers of shaking led to a substantial decrease in the incidence of serious infant TBI in Buffalo, New York.[21]

We are left with a situation in which clinical experience is not consistent with the biomechanical data from previous laboratory experiments.[2,3] We used an instrumented anthropomorphic test device (ATD; often referred to as a ''crash test dummy'' or surrogate) scaled to the size of a human infant to characterize infant head kinematics during shaking. The ATD was specifically designed to have biomechanical responses similar to that of a human infant, especially as it relates to the spine and head-neck

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regions. We used an instrumented ATD to acquire kinematic and temporal-spatial data during shaking by an adult male.

Methods

The purpose of our testing was to characterize head-neck kinematics associated with violent shaking. Events were simulated in a laboratory setting using an instrumented infant ATD and videography.

Shaking scenario

A 50th percentile Japanese adult male (172 cm; 65.3 kg) volunteer was used to shake the infant ATD in a manner consistent with accounts given by adults who confessed to infant shaking.

Five repeat trials consisting of multiple shaking cycles (minimum of 12 cycles/trial) were conducted. The volunteer was advised to grasp the infant ATD with both hands about the upper torso just below the axillary region, suspending it in an upright posture facing them. The volunteer was instructed to ''violently'' shake the ATD fore and aft for a period of 3–4 sec. Videography was used to capture shaking.

Infant anthropomorphic test device or surrogate

An *Aprica 2.5* infant ATD was used to conduct shaking experiments (Fig. 1). The *Aprica 2.5* is a customized 12-segment, instrumented infant ATD that represents a 5th percentile Japanese newborn (GESAC, Inc., Boonesboro, MD).[22] The *Aprica 2.5* has a mass of 2.6 kg and an overall length of 450 mm. Additional anthropometric and inertial properties of the ATD are provided in Table 1. As shown in Table 1, nearly one third of the ATD's mass (0.77 kg) is contained within the head, consistent with the ratio found in the human infant.[23]

FIG. 1. *Aprica 2.5* anthropomorphic test device (ATD). Color image is available online at www.liebertpub.com/neu

TABLE 1. ANTHROPOMETRIC AND INERTIAL PROPERTIES OF THE *APRICA 2.5* ANTHROPOMORPHIC TESTING DEVICE

Parameter	*Measurement*
Total height	450 mm
Total mass	2600 g
Overall center of gravity location (below top of head)	170 mm
Head circumference	340 mm
Head length	120 mm
Head width	94 mm
Head depth	110 mm
Top of head to C5/C6	135 mm
Top of head to occipital condyle	80 mm
Neck circumference	161 mm
Neck length	53 mm
Top of head to shoulder	110 mm
Chest circumference	298 mm
Width at chest	100 mm
Depth at chest	74 mm
Waist circumference	318 mm
Width at waist	114 mm
Depth at waist	79 mm
Hip circumference	285 mm
Hip breadth (distance between ball socket centers)	56 mm
Head mass	772 g
Neck mass	62 g
Torso mass	1244 g
Upper arm mass	39 g
Lower arm mass	32 g
Upper leg mass	79 g
Lower leg plus foot mass	73 g

Because of the paucity of biomechanical data describing infant response to mechanical phenomena, biofidelity of the *Aprica 2.5* was established by scaling response during head impact tests, head-neck pendulum tests, chest impact tests, and lumbar flexion tests. Data were scaled from existing pediatric ATDs ranging from 6 months to 10 years of age.[22] Given that neck response is expected to greatly influence outcome measures in shaking, particular attention was given to development of the *Aprica 2.5* neck. Little data exist to define the biomechanical response of a human infant neck. The ATD neck was constructed to produce an infant neck response to dynamic loading based upon scaling of adult ATD response characteristics.[24] The target neck stiffness for the *Aprica 2.5* neck was determined to be 17 Newton-meter/radian (Nm/rad).[24,25] A head/neck pendulum test was used to verify the dynamic neck response.[26] Rangarajan et al. has provided an overview of the development of the *Aprica 2.5* infant ATD. [22]

Anthropomorphic test device instrumentation

The *Aprica 2.5* ATD was instrumented with triaxial accelerometers (Kyowa ASM-200BA; Kyowa Electronic Instruments Co., Ltd., Tokyo, Japan) positioned at the center of mass of the head and at the apex of the head. Head accelerometers were oriented to allow for determination of angular acceleration in the sagittal plane. Accelerometers were calibrated following standardized procedures in accord with SAE J211.[27]

Data acquisition and analysis

Data were sampled and collected at 10,000 Hz according to SAE J211.[27] Accelerometer data were filtered using a low-pass Butterworth filter with a channel filter class of 1000 Hz.

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FIG. 2. Kinematic sequence of one shaking cycle. Color image is available online at www.liebertpub.com/neu

Angular acceleration in the sagittal plane was derived from linear accelerometer data. At critical levels, angular acceleration of the head has been shown to correlate with concussion, diffuse axonal injury, and subdural hematomas.[28,29] Assuming that primary motion of the head was in the sagittal plane, an estimate of head angular acceleration can be determined by the difference of the linear accelerations in the anterior/posterior direction measured at two points in the sagittal plane divided by the distance between them (Equation 1).

$$\alpha = \frac{a_2 - a_1}{r} \quad (1)$$

where:
α = angular acceleration
a_1 = linear acceleration measured at head center of mass
a_2 = linear acceleration measured at superior aspect of head
r = distance between the accelerometers

The distance between the accelerometers positioned at the center of mass of the head and the apex of the head was 0.0432 m.

Peak values of head angular acceleration, angular velocity, maximum change in angular velocity, and time of exposure were determined for each shaking cycle, and mean peaks with 95% confidence intervals (CIs) are reported for a given trial and across all trials. Mean and 95% CIs of sagittal plane angular displacement time histories for a representative test series were also described to assess repeatability in shaking events.

Results

Five shaking test series, each 3–4 sec in duration, were completed using the *Aprica 2.5* ATD surrogate and volunteer shaker. Figure 2 illustrates the sequence of a representative shaking event. As the volunteer flexed his elbows pulling the ATD toward himself, the neck/head of the ATD extended rearward in the sagittal plane. As the volunteer extended his elbows pushing the ATD away from himself, the neck/head flexed forward in the sagittal plane. This visual sequence also illustrates that the ATD chin impacted the chest at peak neck flexion. Given the flexibility of the torso, the occiput did not contact the posterior upper torso at peak neck extension because the torso arched forward.

Mean peak neck flexion was approximately 1.98 radians (rad; 113 degrees [deg]; 95% CI, 1.68–2.28) and mean peak neck extension was approximately 2.16 rad (123 deg; 95% CI, 1.83–2.49) during a typical shaking cycle (Fig. 3). Relatively tight CIs illustrate the repeatability of the shaking cycles. As shown in Figure 3, one cycle occurs over approximately 0.25 sec, yielding a shaking frequency of 4 Hz.

Mean peak angular head accelerations in the sagittal plane fell within a range of 7035 rad/sec^2 (radians/second^2; 95% CI, 6168–7902) to 10,379 rad/sec^2 (95% CI, 9304–11,452) across the five test series (Fig. 4). Peaks occurred during chin-to-chest contact. The maximum angular head acceleration across all shaking events was 13,260 rad/sec^2 (Table 2), occurring during chin-to-chest contact in Test Series 4 during chin-to-chest contact.

Mean peak angular head velocity measured in the sagittal plane ranged from 71.2 radians/second (rad/sec; 95% CI, 68.5–73.9) to 98.4 rad/sec (95% CI, 95.71–101.1) across the test series (Fig. 5). The maximum angular velocity occurred in Test Series 2 and was 105.7 rad/sec (Table 2).

The mean peak change in angular velocity was between 132 rad/sec (95% CI, 128.6–136.4) and 167 rad/sec (95% CI, 164.3–170.0) across all test series (Fig. 6). The maximum peak change in angular head velocity was 174 rad/sec in Test Series 2 and 3 (Table 2).

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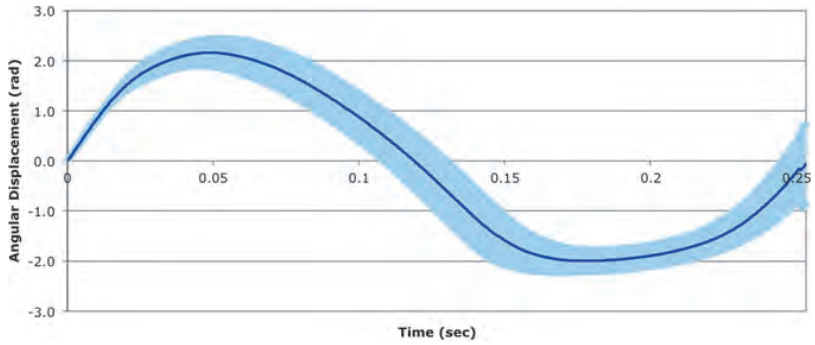

FIG. 3. Mean angular head displacement time history for individual cycles of shaking for a representative test series (Test Series No. 3). One cycle occurs over approximately 0.25 sec (4 Hz). Positive values represent extension and negative values represent flexion. Error bars (appear as shading) represent 95% confidence intervals. Note: 1 radian = 57.3 degrees. rad, radians. Color image is available online at www.liebertpub.com/neu

Figure 7 presents the combinations of mean angular accelerations and mean peak change in angular velocities resulting from each test series.

The mean time duration of acceleration/deceleration across the five test series ranged from 98.5 msec (95% CI, 93.2–103.8) to 137.1 msec (95% CI, 132.9–141.3; Fig. 8). The shortest duration (72.1 msec) occurred in Test Series 1, whereas the longest duration (168.2 msec) occurred in Test Series 5.

Discussion

The controversy over whether shaking alone can lead to severe TBI in infants began with the study by Duhaime and colleagues in 1987.[2] Using an infant surrogate constructed from a doll, Duhaime and colleagues found that lower angular and linear accelerations of the head were generated with shaking of the surrogate than by inflicted impact. They reported a mean angular head acceleration of 1138 rad/sec^2, with a mean angular velocity of 61 rad/sec and a mean acceleration pulse duration of 107 msec in their shaking experiments.

Prange and colleagues repeated this study, attempting to improve the biofidelity of the infant surrogate, and found that inflicted impacts against hard surfaces were more likely to be associated with angular accelerations reaching injury thresholds than shaking or falls from 1.5 m or less.[3] Compared to the Prange et al. study, a recent study by Coats et al. found markedly *lower* peak angular acceleration and velocity, and increased pulse durations during similar impact events using an ATD with a more biofidelic neck design, a deformable, sutured skull, and a more biofidelic body mass distribution.[30] The Coats et al. study did not investigate shaking, but their differing findings compared to those of Prange for head impacts highlights the marked influence ATD design can have on injury-related outcomes.

The findings of our study differed substantially from those of Duhaime and Prange. Our maximum angular head acceleration was found to be 13,260 rad/sec^2 occurring during chin-to-chest contact, a 10-fold increase over Duhaime's findings and more than twice that reported by Prange and colleagues. Further, peak angular head accelerations across all test series in our study exceeded those reported by Prange and Duhaime. Similarly, peak change in angular velocity measured in our study (174 rad/sec) was almost 3 times greater than that measured by Prange and Duhaime. The mean angular acceleration pulse duration for shaking measured in our study ranged from 98 to 137 msec and was similar to that found by Duhaime and Prange.

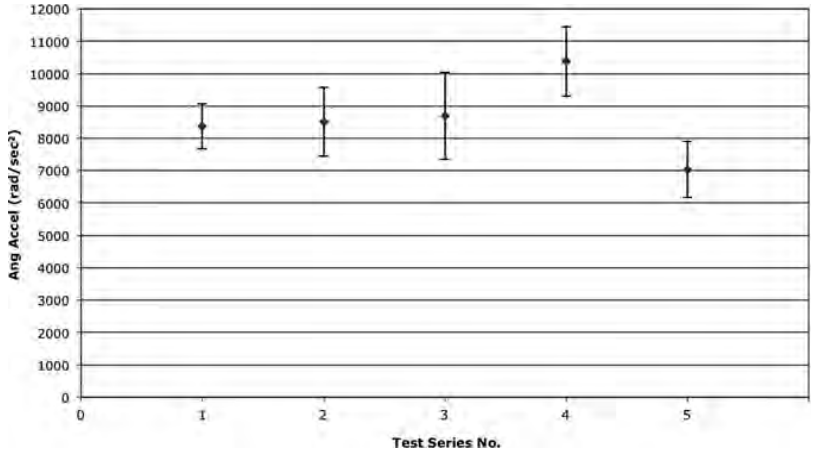

FIG. 4. Mean peak sagittal plane angular head accelerations for each test series. Error bars represent 95% confidence intervals. Ang Accel, angular acceleration; rad/sec^2, radians per second^2.

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TABLE 2. PEAK ANGULAR HEAD ACCELERATION, PEAK CHANGE IN ANGULAR HEAD VELOCITY, AND PEAK ANGULAR HEAD VELOCITY FOR EACH TEST SERIES

Test series no.	*Peak angular head acceleration (rad/sec^2)*	*Peak change in angular head velocity (rad/sec)*	*Peak angular head velocity (rad/sec)*
1	10,630	143	80
2	12,150	174	106
3	12,030	174	104
4	13,260	173	102
5	9,613	167	100

rad/sec, radians per second; rad/sec^2, radians per second^2.

Differences between our findings and those of Duhaime and Prange are likely attributed to differences in the surrogates used to represent an infant and, possibly, differences in the delivery of shaking by volunteers both potentially leading to differences in head kinematics. When considered in isolation, differences in surrogate design that could lead to increases or decreases in head accelerations include the following.

Body design

The ATD used by Prange used a torso that combined the mass of arms and legs of an infant, represented as wooden structure, along with a neck and a head. The surrogate used in our study consisted of a segmented flexible torso/spine, along with a head, neck, and upper and lower extremities. A less than complete ATD body, such as that used by Prange, would reduce the overall inertial resistance to motion during shaking and could increase torso acceleration. That is, the lack of upper and lower extremities would offer less resistance to the back-and-forth motion of the torso during shaking, allowing for greater ease of torso motion.

Surrogate mass

The mass of our ATD was 2.6 kg, whereas the mass of the surrogates used by Prange and Duhaime were 4.83 and 3.0–4.0 kg, respectively. Increased mass increases the inertial resistance of the surrogate body to motion and tends to decrease torso acceleration.

Head mass

The mass of the surrogate head used in our study was 0.77 kg, wheras the head mass of ATDs used by Prange and Duhaime was 1.13 and 0.77–0.87 kg, respectively. The lower head mass used in our study would offer less inertial resistance, leading to higher head accelerations with shaking.

Neck structure and stiffness

Neck structure and stiffness play a critical role in the head's response to shaking. Duhaime and colleagues examined the effects of various neck designs and found that a resistance-free hinged neck design was associated with the highest head accelerations with shaking.[2] Prange and colleagues utilized a negligible-resistance hinge neck to generate a worst-case head acceleration scenario.[3] The neck assembly used in our surrogate consisted of urethane tubing with a centered safety cable joining superior and inferior aluminum plates that allowed for head-neck rotation in the sagittal, coronal, and transverse planes. The safety cable was adjusted to provide desired neck-bending properties (Fig. 9).[22] Duhaime and Prange did not report on neck properties of their surrogates, but given the negligible resistance offered by their hinge structures, we estimate that our surrogate neck was likely stiffer and provided greater resistance to head-neck motion during shaking. Both surrogates used by Duhaime and Prange constrained head-neck motions to the sagittal plane (anterior-posterior directions) by utilizing a hinged neck (worst-case scenario), whereas our surrogate's neck

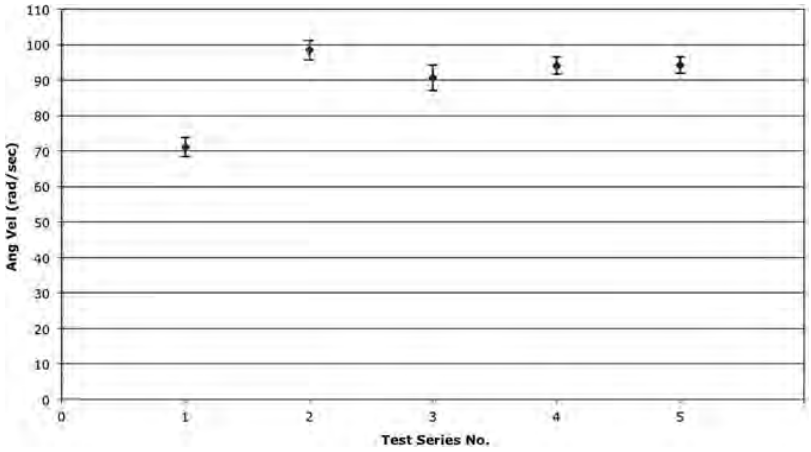

FIG. 5. Mean sagittal plane peak angular head velocity for each test series. Error bars represent 95% confidence intervals. Ang Vel, angular velocity; rad/sec, radians per second.

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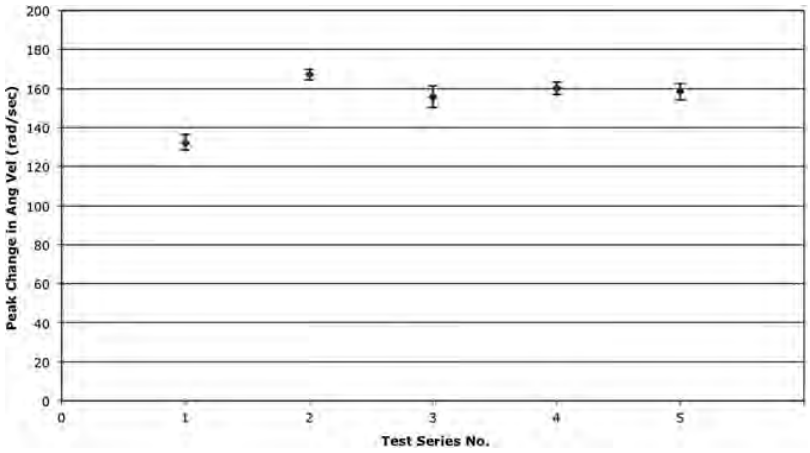

FIG. 6. Mean peak change in sagittal plane angular head velocity for each test series. Error bars represent 95% confidence intervals. Ang Vel, angular velocity; rad/sec, radians per second.

was free to move in three planes. When considering the constraint of head-neck motion in the sagittal plane in isolation, it would tend to increase head accelerations during shaking, given that out-of-plane lateral motion is not permitted.

Whereas it is interesting to study surrogate design characteristics in isolation of one another, one characteristic may outweigh or nullify the influence of another characteristic when the surrogate is considered as a whole (i.e., all characteristics together). Such is the case with head motion constraint or lack thereof. That is, even though the lack of head motion constraint tends to decrease head acceleration (as compared to constrained head motion), other design characteristics had a greater bearing on the resulting head acceleration in our experiments. It is the combination of surrogate design characteristics (e.g., head mass, neck length, torso stiffness, surrogate mass, neck stiffness, etc.), along with severity of shaking that dictate the resulting head acceleration. Together, these factors drive key kinematic features of the head, such as chin-to-chest contact, which can generate large peaks in head acceleration. Chin-to-chest contact occurred in our experiments and was associated with peak head accelerations, but was not reported in experiments conducted by Duhaime and Prange. This kinematic feature likely contributed to head accelerations exceeding those measured by Duhaime and Prange during shaking experiments.

Another study examining biomechanical outcomes during shaking of an infant surrogate was conducted by Cory and colleagues.[4] They reproduced the Duhaime 1987 experiments using an adjustable replica of their surrogate to determine the influence of surrogate parameters on head response outcomes during shaking, varying head-neck joint location (i.e., occipital condyle location), neck construction (rubber neck vs. hinged neck), torso padding (cotton wool vs. silicone), and location of the surrogate center of gravity (CG). Under a combination of worst-case parameters, Cory measured a peak angular head acceleration of 10,217 rad/sec^2 and a peak angular head velocity of 61 rad/sec. Cory's results exceeded peak angular accelerations reported by both Duhaime and Prange and approach those measured in our experiments.[2,3] Cory found

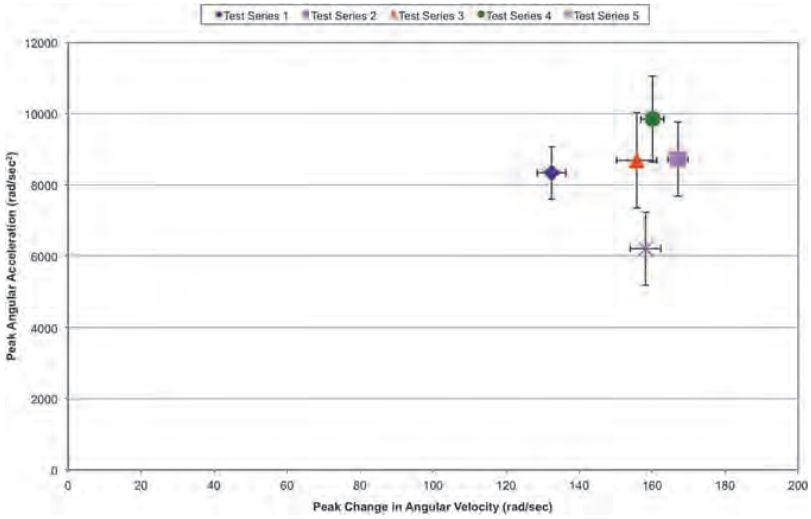

FIG. 7. Combinations of mean angular accelerations and mean peak change in angular velocities for each test series. Error bars represent 95% confidence intervals. rad/sec^2, radians per second^2; rad/sec, radians per second. Color image is available online at www.liebertpub.com/neu

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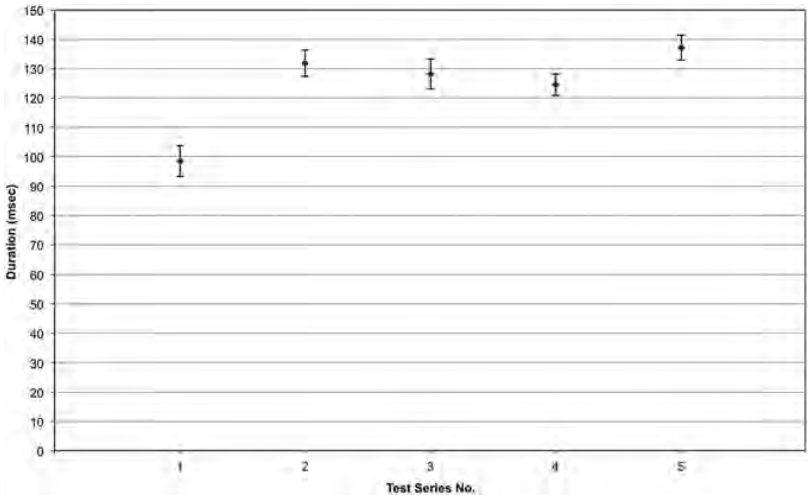

FIG. 8. Mean time duration of acceleration/deceleration pulse for each shaking cycle each test series. Error bars represent 95% confidence intervals.

that the combination of a high surrogate CG, hinged neck, and cotton wool padded torso produced worst-case angular head acceleration values.

One of the differences between the *Aprica 2.5* ATD and the surrogate used by Cory is the flexibility of the thoracic spine and torso stiffness. During shaking, Cory and colleagues described both chin-to-chest and posterior head-to-posterior torso contact (likely contributing to higher accelerations than those measured by Duhaime and Prange). The *Aprica 2.5* ATD also displayed chin-to-chest contact, but the posterior aspect of the head did not contact the torso during shaking. The *Aprica 2.5* ATD has a flexible thoracic spine, allowing for arching of the torso during the extension portion of shaking, which diminishes the likelihood of head contact torso, thoracic spine, or with the posterior torso. Cory and colleagues did not quantify torso, thoracic spine, or neck properties of the surrogate used in their study, and thus a direct comparison with the *Aprica 2.5* ATD torso, thoracic spine, and neck was not possible.

The location of the center of rotation of the head also influences the rotational response of the head to shaking. That is, for a given shaking event, as the distance to the center of rotation increases in length, the angular acceleration would decrease, assuming all other parameters were held constant. Although the *Aprica 2.5* ATD neck joins the torso at a point 5 cm below the base of the skull, the design of the neck allows for a moving center of rotation as the head rotates. This can effectively provide a radius of rotation that is less than 5 cm in length at various points in the head's rotation about the neck. In contrast, the surrogates used by Duhaime, Cory, and Prange that led to worst-case head accelerations had fixed centers of rotation that were located 3.3, 3.3, and 4.5 cm, respectively, below the base of the skull. The *Aprica 2.5* ATD neck allowed for a moving center of rotation mimicking that of a human infant. Given this moving center of rotation (i.e., the center of rotation can change during neck flexion/extension), it is difficult to evaluate how the neck center of rotation would affect angular head acceleration in

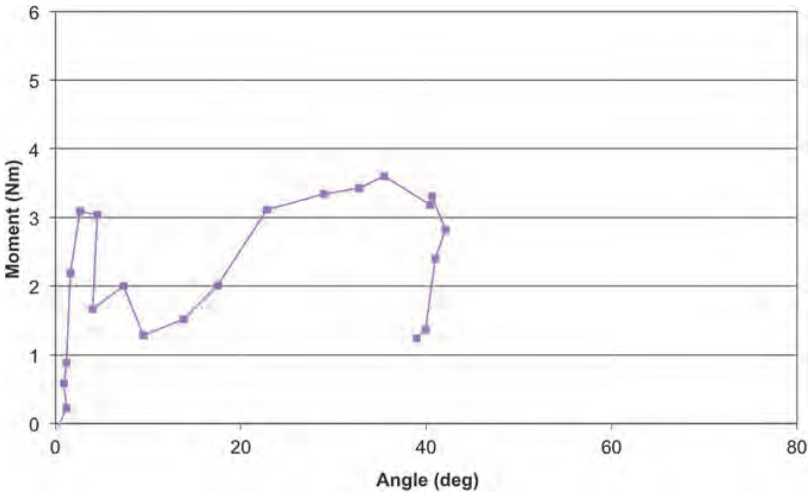

FIG. 9. *Aprica 2.5* ATD neck flexion properties derived from pendulum impact testing. deg, degrees. Color image is available online at www.liebertpub.com/neu

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comparison to the surrogates used by Duhaime, Cory, and Prange. In general, if the *Aprica 2.5* ATD center of head rotation was located such that the radius of rotation was less than that of the other surrogates, there would be a tendency toward increased angular head acceleration for a given shaking input.

To determine the likelihood of injury from exposure to a given phenomenon (i.e., impact or shaking), outcome measures known to be associated with injury risk are typically compared to published injury thresholds. During *Aprica 2.5* ATD shaking experiments, injury threshold levels for concussion reported for primates with 400-g brains (similar in mass to a young infant) were exceeded,[31] whereas published injury thresholds for diffuse axonal injury were not exceeded.[29] To date, however, there are no validated infant brain injury thresholds. Scaling thresholds from adult cadaver and primate studies to infants based on brain mass alone can produce misleading pediatric TBI thresholds.[32] Other factors, such as brain material properties and geometry, must also be considered when attempting to assess brain injury risk.[33] Further, published pediatric TBI thresholds fail to account for repetitive exposure to acceleration or deceleration that occurs in shaking, but instead consider only exposure to a single event. Repetitive TBIs in animal models have been shown to cause greater injury at lower peak rotational velocities than do single impulse loads.[34] The effects of repetitive cyclic events, such as those involved in shaking, have not been systematically studied in animal models other than mice and piglets.[35,36]

The duration of exposure to acceleration is also an important factor when attempting to predict the risk of and type of brain injury that can result from an event. In our experiments, duration of exposure (i.e., acceleration pulse duration) ranged from 72.1 to 168.2 msec. Löwenhielm and colleagues described accelerations and associated pulse durations of 15–44 msec leading to subdural hematomas, substantially shorter pulse durations than experienced by our ATD during shaking.[37] Ommaya and colleagues found that lower levels of acceleration are capable of producing injury in cases of longer pulse duration.[38] Genaralli and Thibault suggested that longer acceleration pulse durations permit brain tissue strains resulting from accelerations to propagate deeper into the brain, leading to functional damage found in cerebral concussion or structural damage found in axonal injury.[28]

Other studies have noted the extreme vulnerability of the infant brain to the metabolic effects of brain injury when compared to the adult brain.[39,40] This would suggest that the infant brain is more susceptible to injury and might account for the poor outcomes noted in children surviving abusive head trauma (AHT).[18,19] Another worrisome aspect of infant abuse that could account for the hypoxic injury to the brain is the finding that in a large percentage of infant abuse cases resulting in death, subtle injury to the high cervical cord and lower brain stem is observed on autopsy.[41] It is postulated that these cord injuries could lead to apnea or changes in autoregulation of cerebral blood flow, causing the typical hypoxic changes observed in infant victims of AHT.

The influence of shaking on the infant brain and the pathophysiology of infant brain injury is more complicated than can be represented in existing surrogate models used in biomechanical shaking experiments. For example, the immature brain could be more vulnerable to angular acceleration than the adult brain. Raghupathi and colleagues found the immature piglet brain to be more vulnerable to a single inertial load than that of the adult pig brain.[42] They also found that repeating an inertial load on the piglet head twice, 15 min apart, led to more diffuse axonal injury in the piglet brain and to a significant decrease in arterial blood pressure 60 min post-injury.[36] Given that violent shaking of infants involves repetitive inertial events occurring within a few seconds, the mechanical phenomena necessary to cause injury in the immature brain could be less severe than would be necessary to cause a single impact injury. In addition, surrogate experimental outcomes do not take into account the well-known deficits in cerebral autoregulation that occur after infant brain injury, leading to profound cerebral hypotension and hypoperfusion.[43]

These factors suggest that the infant brain is likely more susceptible to injury than the adult brain. Taking these factors into account, predictions of risk based upon comparison with published brain injury thresholds are not likely to be reliable given the limitations inherent in these thresholds.

Another factor that complicates the estimation of infant brain injury thresholds is the fact that infants who experience AHT are often subjected to multiple bouts of trauma over days to weeks. Several studies have shown that infants presenting with AHT are likely to have suffered previous AHT.[44–46] Using an animal model, Huh and colleagues demonstrated a graded pathological response to repetitive mild injury in immature rats.[34] Rats experiencing three mild impacts to the head (not resulting in fracture) over 15 min developed axonal injury and brain atrophy, compared to rat pups receiving only a single mild impact. When an immature brain experiences multiple injuries, some ''priming'' might occur that makes the brain more susceptible to damage from subsequent injuries. Additionally, vulnerable infant axons within the brain may not be capable of repair between bouts of trauma. These phenomena may effectively lower infant brain injury thresholds, which are used to predict probability of injury when compared to experimental outcomes such as angular acceleration.

In addition to the lack of data on the biomechanical properties of the infant neck, animal models may not adequately represent the lack of supporting musculature found in the human infant neck.[47] However, the neck of a newborn goat has been estimated to be equivalent in strength to the neck of a 1-year-old human.[48] When studying the effects of shaking, the lack of protective infant neck musculature is a key factor that must be represented in any model.

This study is limited by the inability of *any* currently available ATD to represent the biomechanical characteristics of an infant with complete accuracy. The *Aprica 2.5* ATD, however, was designed to match a newborn infant's anthropometrics and to be biofidelic within the limits of technology and published human response data. In addition, only one volunteer was used to induce shaking of the ATD. Using multiple individuals for ATD shaking may produce varying inputs, leading to a different biomechanical response. However, our intent was to investigate shaking response generated by a nominal representative average (50th percentile) male, providing the first step toward understanding the influence of improved ATD biofidelity. Similarly, one's interpretation of the instruction to ''violently'' shake the ATD is subjective and may vary across individual shakers. However, the volunteer shaker used in this study was educated on perpetrator actions when abusively shaking a child and was asked to replicate shaking that would occur during rage or anger. Methods used to estimate angular acceleration and velocity were limited by ATD instrumentation. Finally, the *Aprica 2.5* ATD represents a small newborn infant. Shaking an ATD representing an older infant would undoubtedly lead to a differing biomechanical response attributed to differences in mass, neck flexibility, and torso/spine flexibility.

Higher levels of angular acceleration and angular velocity measured using the instrumented *Aprica 2.5* ATD during shaking, and

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attributed to chin-to-chest contact, suggest a higher potential for injury with shaking alone than previously reported. These findings parallel clinical experience documenting that violent shaking of infants is potentially harmful.[49–51] This study also demonstrated the importance of biofidelic ATD torso/spine and head-neck regions when investigating kinematics associated with shaking. Although biofidelic ATDs can improve our understanding of kinematics during shaking, infant neuropathological response to measured accelerations and velocities still remains unclear.

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Author Disclosure Statement

Drs. Jenny, Bertocci, and Rangarajan have testified in courts of law regarding infant TBI.

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Letter to the Editor

Shaken baby syndrome: A flawed biomechanical analysis

Keywords: Injury; Infant; Shaken; Baby; Rotational; Acceleration/deceleration; Syndrome; Neck

To the Editor,

We are gravely concerned that the conclusions reached by Bandak [1] may be invalid due to apparent numerical errors in his estimation of forces experienced in an infant neck during vigorous shaking. More specifically, we have repeated the author's calculations and we find values of neck forces that are actually more than 10 times *lower* than those presented in Bandak's Table 3.

Using the free body diagram of the infant head and neck (Fig. 3), Bandak identified the two components of neck force during rotation of the head—the tangential force F_t and the normal force F_n. Bandak described the basic equations for neck forces during a simplified shaking event, but did not present detailed methods for calculating the upper neck loads. We define them here for completeness:

$$F_t = m_{head} a_t = m_{head} r \frac{d^2\theta}{dt^2} \quad (1)$$

$$F_n = m_{head} \frac{v^2}{r} = m_{head} r \left(\frac{d\theta}{dt}\right)^2 \quad (2)$$

where r is the length of the neck in meters, m_{head} the mass of the head in kilograms, a_t the tangential linear head acceleration in meters per second squared, $d^2\theta/dt^2$ the angular acceleration of the head in radians per second squared, v the linear velocity of the head in meters per second, and $d\theta/dt$ the angular velocity of the head in radians per second.[1] As Bandak pointed out, when F_n reaches its maximum value, F_t is at a minimum, so it would be incorrect to sum or otherwise combine peak F_n and F_t to estimate peak neck forces. Yet, using the same angular acceleration and velocity values Bandak reported from the literature, we calculate forces 10 times lower than those presented in Bandak's Table 3.

For example, to calculate neck forces for the most severe shaking event reported in Bandak's Table 3, we used the largest angular acceleration and angular velocity values, the longest neck length and the heaviest head mass provided in Table 3 (15,000 rad/s^2, 150 rad/s, 6.35 cm, and 1.59 kg, respectively). Substituting these values into Eqs. (1) and (2) above, we find that normal force F_n exceeds the tangential force F_t, and is calculated as follows:

$$F_{n,high} = m_{head}(r)\left(\frac{d\theta}{dt}\right)^2 = (1.59\,\text{kg})\left(6.35\,\text{cm}\times\frac{1\,\text{m}}{100\,\text{cm}}\right)\left(150\frac{\text{rad}}{\text{s}}\right)^2 = 2272\,\text{N}$$

However, Bandak reported $F_{n,high}$ at 35,931 N in Table 3, a value 15.8 times higher than the correct value. Similarly, to calculate forces for the least severe shaking event discussed by Bandak, we used the minimum values of each parameter range provided by Bandak's Table 3 and calculated the lower range of the normal force as:

$$F_{n,low} = m_{head}(r)\left(\frac{d\theta}{dt}\right)^2 = (0.68\,\text{kg})\left(3.81\,\text{cm}\times\frac{1\,\text{m}}{100\,\text{cm}}\right)\left(50\frac{\text{rad}}{\text{s}}\right)^2 = 65\,\text{N}$$

The corresponding value reported by Bandak in Table 3 is 1027 N.

We repeated the force calculations for all values in Bandak's Table 3 and our attempts to reproduce these neck force calculations consistently yield values that are at least 10 times *lower* than those reported for shaking in Table 3 and Fig. 4 of Bandak's paper. While in some cases the error appears to be a failure to include the neck length, there is no single, simple explanation responsible for the errors that appear in *every* value in Table 3. Also, Prange and Myers [2] analysis of the same data yielded neck forces similar to what we have calculated here.

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[1] It is important to note that the equations for tangential and normal acceleration in Bandak's methods and repeated in this letter do not account for chest acceleration, and it is not known if the actual neck forces would be higher or lower if chest acceleration were considered.

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Based upon his flawed calculations, Bandak erroneously concluded that the neck forces in even the least severe shaking event far exceed the published injury tolerance of the infant neck. However, when accurately calculated, the range of neck forces is considerably lower, and includes values that are far *below* the threshold for injury. In light of the numerical errors in Bandak's neck force estimations, we question the resolute tenor of Bandak's conclusions that neck injuries would occur in all shaking events. Rather, we propose that a more appropriate conclusion is that the possibility exists for neck injury to occur during a severe shaking event without impact.

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