**EXCERPT FROM STATE’S DIRECT EXAMINATION OF**

**MEDICAL EXPERT IN SHAKEN BABY CASE**

**CONCEPT:** Define and explain the syndrome to the jury.

After Dr. A. is found to be an expert in pediatrics and in child abuse the ADA proceeds to direct examination.

**Q.** Doctor, are you familiar with the term Shaken Baby Syndrome?

**A.** Yes, I am.

**Q.** And can you describe to the jury what it is?
**A.** It refers to both the physical outcome and the biomechanics of an injury.

**Q.** What do you mean by biomechanics?

**A.** What it means is that we’re talking about a child who has these injuries as a consequence of being violently shaken back and forth, not once, but multiple times. And in essence, we’re talking about a mechanism of how it is you get these injuries in the first place. As far as the injuries themselves, what the primary injury you get is brain injury. It’s in the course of being violently shaken back and forth two and a half times a second for a full cycle the brain cells actually get damaged. They swell, they get little micro rips in some of the brain cells. Sometime they get big rips we can see at autopsy or more likely with imaging. But they get these little tears in it and that causes the swelling. That is ultimately what you die of in most of the instances is the brain swelling, so it’s a direct brain injury.

 The brain isn’t the only thing that is inside the head. There are other tissues, as well. So what we see is, in addition, we see blood vessels or one of the other tissues inside the head. And the blood vessels will get injured, as well. Those are what we call marker injuries. They show up more. They’re easier to see. And that would be bleeding between the brain and the skull which we call subdural or subarachnoid blood. And it’s in the exact location, but basically blood between the brain and skull.

And then the blood vessels in the back of the eye, in the retina, those also can be damaged. And about 90 percent or so of the time in shaken baby syndrome you’ll see them damaged, as well. And there’ll be bleeding that you could see when you look into the eye and look into the back of the eye.

**Q.** Doctor, could you explain to the jury why do they call it a syndrome?

**A.** Well, syndrome means collection of science and symptoms and it means that

you’re not looking at any one thing in isolation. That you’re not saying that just because you see one thing that necessarily means that you have this disease or something.

 A syndrome means you have to put the whole pattern together to be able to say it’s this. In a syndrome means it’s a distinctive pattern as opposed to not looking like other things.

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**Q.** What actually happens to the brain when the baby, when a baby is shaken?

**A.** The brain goes through what we call acceleration and deceleration, which is slowing down. And you get direct damage to the brain cells themselves. Different kind of brain cells, but they may sustain direct brain damage.

 You even get brain damage where layers of the brain may start to move different from each other, sort of like an earthquake where you might get a tear along some of the lines where some of these layers come together. That injures the brain cells and they start to swell and they swell in three dimensions. And as a result of that swelling they then are swelling and putting pressure on some of the blood vessels so the blood doesn’t flow through the brain as well.

 Because the blood is bringing oxygen, one of the effects then is that it hurts some of the already damaged cells even more because they’re not getting all the oxygen that they need and perhaps all the food that they need. And so that they’ll swell more yet, and so you can get into sort of a cascade where this swelling results in more swelling which results in more swelling. And as the brain swells parts of the brain are being forced to go in different directions. Some

of the directions are to try to go through openings that are in the head, so the brain is pushing up against the soft spot, which is called the fontanel, on the top of the head and may be able to observe that clinically. Also, pushing toward the base of the brain, in essence, trying to squeeze down ultimately toward the spinal cord coming into the base of the brain where there is a hole, and a lot of the downward pressure is putting pressure on the vital centers of the brain, the part that controls breathing and blood pressure and heart rate.

**Q.** So, what is the actual impact of brain swelling on your everyday functions, Doctor?

**A.** Well, if you have a significant brain swelling you start shutting down some of

those everyday functions. You’re not able to do that. Ultimately, if it’s bad enough brain swelling, you die.

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**Q.** Doctor, could you describe to the jury how the blood actually gets in the brain

when the baby is shaken?

**A.** Well, it gets within the skull, not necessarily within the brain substance itself,

although you can see that in some brain injuries where the shaking damaged blood vessels inside the brain itself, just around the brain. But primarily we see it with subdural and subarachnoid areas.

**Q.** How does the blood actually get in those areas?

**A.** Well. It’s a breaking of blood vessels with the brain compressing and uncompressing in certain areas. It’s not so much that it rattles around inside because the brain pretty much fills up the whole skull. But it puts pressure in stretching on the blood vessels, so blood vessels are bridging veins between the brain and skull, and when those break they break in an area that is just underneath this dura, and it’s called subdural, meaning beneath the dura. And that opens up

some tissue that normally is closed and you get what is called a subdural hemorrhage.

 The subarachnoid is a layer deeper. But again, it’s blood between the brain and the skull and similar sort of mechanism, there are veins there and those veins are damaged because of the brain going, having all of this compression back and forth. And when those break then they bleed, but that bleeds not into the tissue layer, it bleeds into spinal fluid, spinal fluid that laces our brains and goes up and down our spinal cord so the blood mixes and it’s slightly different in terms of anatomy.

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**Q.** Doctor, what can the other injuries, non-fatal injuries, be in Shaken Baby Syndrome?

**A.** The injuries typically would be decreased IQ because of the brain damage, problems with motor coordination ranging from clumsiness to somebody with cerebral palsy, to somebody who can’t move at all, and then the third area would be visual problems, typically on the basis, not of the eyes, but of the brain. The portion of the brain that receives the vision signals is damaged, and that can be anywhere from some visual defect or even an eye muscle defect, sometimes, to

blindness.

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**Q.** Can you tell us, explain to the jury, what tools are useful in the timing and dating of shaking injuries?

**A.** It’s helpful to look at a variety of medical data. One of the tools we look at is radiologic tools that we are sometimes able to look at the blood radiologically and the blood shows up easier than some other stuff and using that marker we may be able to look at the color of the blood and say what age is this. And that’s from known standards of how blood looks over time on say, CT scans.

 We can also look at brain swelling on some of these scans and that also follows a course,

and there are determinations that can be made that way as well. At autopsy we can look at a healing process, and sometimes make a determination there, in terms of depending on the time from the incident to when the child is being autopsied. What, if any, healing has occurred and sometimes there are various biochemical techniques you can look at as well, as opposed to direct microscopic techniques, and that helps give us sort of a window into which way things occurred. We can look at, prior to autopsy in a child that’s going to live, spinal fluid and sometimes there would be clues there, sometimes looking at the composition of the blood that’s in the spinal fluid, is that old or new blood, and that can help us make some determinations in some cases.

 The most important thing in medicine, in the vast majority of conditions, and true in

shaken baby syndrome as well, is we look at the history, and that’s our most important medical tool of all. In essence, the clinical circumstances is what drives our timing and makes it most precise, most of the time.

**Q.** What do you look at in terms of the history of the child in the hours prior to admission to the hospital, what are the questions you ask?

**A.** Well, we want to get a good 24 hour or 12 hour, some sort of time line, exactly how was this child doing at each given point; what were they doing; is this a child that talks or is this a child that babbles or something, what are the vocalizations; and what the feeding pattern is like, how well are they feeding, do they seem to want to feed; what kind of consciousness level are they, are they sleeping all the time, is that really sleep after all or is it a head injury. We want to get a sense are they interactive at all with another person or not. So we are trying to look at a whole bunch of behavioral, feeding sort of dimensions to see how the child is doing for all the moments up until at least the time that the emergency responders come on the scene.

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**Q.** Doctor, to a reasonable degree of medical certainty, in your opinion, how soon after a

fatal shaking will symptoms occur?

**A.** The symptoms will occur immediately.

**Q.** Why is that?

**A.** Well, the why is two parts. One, the why is because that’s what we see. If you see children that have great falls or children that are in a car crash, certainly right away they have symptoms, but the why, in terms of the reason for it physiologically is because you have just suffered damage to those brain cells, and at that moment, they are all in shock, they are all damaged and that damage doesn’t get better. It doesn’t heal up or go away or anything, so the symptoms will be there right away. The symptoms may evolve somewhat over time, but there are going to be some symptoms right away because you have the damage right away.

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**Q.** Can you tell the jury did you become familiar with the symptoms that this baby exhibited in the emergency room at Long Island Jewish Hospital?

**A.** Yes.

**Q.** Can you tell us what those were?

**A.** The symptoms were that there was a bulging fontanel. This was a child that was listless, actually was having seizures anywhere from three to four to five times according to the various records. This was a child that was gasping, was having periods of not breathing well, apneic is the term used with that.

**Q.** To a reasonable degree of medical certainty, Doctor, what significance do those symptoms have to you in the context of a shaken baby case?

**A.** A child that’s very seriously ill, a child that needs emergency management, needs intensive care unit management.

**Q.** Doctor, did you review the CAT scans and CAT scan reports in connection with this case?

**A.** Yes.

**Q.** Can you tell us what you learned from that?
**A.** Well, I learned that there was subdural and subarachnoid blood in the head; that there was brain swelling as well; and that there were large portions of the brain that we call black brain that were damaged, dying parts of the brain. That was actually, at least as far as the upper parts of the brain, that was most of the brain.

**Q.** Can you describe to the jury what the findings you saw on the CAT scan, how would that affect M’s functions?

**A.** Well, with that degree of injury, I guess I would be expecting a dying child. Rarely would you live with all that. I would expect somebody that would have difficulty breathing and ultimately not able to breathe by herself, certainly a child that would not have much in the way of any consciousness and certainly not after some time has gone by, a child that wouldn’t be responsive very well, perhaps initially, to the pain, and then probably lose that function as well.

 I would expect pupils eventually to be fixed and dilated, I mean open and not being responsive to light, a child that wouldn’t be interacting, a child that wouldn’t be feeding.

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**Q.** Did you review the eye findings in this case from the Long Island Jewish Hospital and St. Vincent’s Hospital medical records?

**A.** Yes, I did.

**Q.** Describe to the jury what you found and what the significance of those findings were?
**A.** There were diffused retinal hemorrhages, meaning that there were lots of spots of blood

where the blood vessels have broken in the back of the eye, the retina of the eye, and they were diffused and scattered, and they weren’t just near the optic nerves, sort of in the straight back, but sort of went up all along the sides. This was in both eyes.

 And the significance of that is that that’s classical for a Shaken Baby Syndrome to see

those particular findings, and it indicates, in general, the more retinal hemorrhages you see the worse the brain outcome.

**Q.** Were the retinal hemorrhages in this case bad?
**A.** They were.

**Q.** Doctor, in what other circumstances would you see severe retinal hemorrhages like this in an infant?
**A.** I can’t think of any situation that you will see severe retinal hemorrhages like this at all other than Shaken Baby Syndrome.

**Q.** To a reasonable degree of medical certainty, Doctor, based upon M’s presentation in the emergency room, the result of the CAT scans that you observed, the eye findings in M’s brain and the autopsy findings a couple of weeks later, can you give an opinion as to what caused her death?
**A.** Yes.
**Q.** Tell us about it?
**A.** That this is Shaken Baby Syndrome.

**Q.** Upon what do you base your opinion?
**A.** Well, based upon what you just mentioned which is that it’s the classical triad of brain swelling with brain injury, the primary problem, with the secondary marker injuries of intercranial bleed, in this case subarachnoid and subdural hemorrhages, and then with the retinal hemorrhages which you see most of the time, and in this case seeing them in both eyes.

**Q.** To a reasonable degree of medical certainty, Doctor, can you tell the jury, in your opinion, what is the level of force necessary to put M. into this condition, what was the level of force?
**A.** Well, the level of force was an extremely violent force. It was a huge amount of force.

**Q.** Upon what do you base that opinion?
**A.** Based upon the sorts of forces it takes to cause other kinds of brain injuries, the sorts of forces that we have had described to us on some occasions where people have admitted to doing this.

**Q.** You have reviewed cases across the country in the area of Shaken Baby Syndrome. On a spectrum of the most severe injuries to the least severe injuries, can you tell us where does this case fall?

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**A.** This would be one of the most severe cases.

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**Q.** What kinds of things would she (M.) exhibit after this kind of shaking?

**A.** She should look like she is dying. She would look, initially, like she was knocked out. If eased somewhat she would still have an altered level of consciousness, not really having good, meaningful interaction with the environment, certainly not eating, potentially throwing up, she may or may not be doing that, irregular respirations would be kicking in at some point.

**Q.** Do you have an opinion regarding how long after these injuries were inflicted to M. would you expect to see some of those symptoms?
**A.** Yes.
**Q.** What’s your opinion?
**A.** That you would see some of those symptoms immediately.
**Q.** Why?
**A.** Again, direct brain injury, the brain cells are damaged right away, at least a substantial number of them are, and they are going to cause those particular symptoms.

**Q.** To a reasonable degree of medical certainty could a baby suck down a bottle after the infliction of this type of injury?
**A.** No.