IN THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF MISSOURI
WESTERN DIVISION

MICHAEL TAYLOR,	)	
	)	
Plaintiff,	)	
	)	Case No.
vs.	)	05-4173-CV-S-FJG
	)	
LARRY CRAWFORD, et al.,	)	
	)	JUNE 12, 2006
Defendant.	)	MORNING SESSION

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PAGES 1 - 136

TRANSCRIPT OF BENCH TRIAL PROCEEDINGS

BEFORE THE HONORABLE FERNANDO J. GAITAN, JR.
U.S. DISTRICT JUDGE

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I N D E X

EXHIBIT INDEX

PLAINTIFF'S	DESCRIPTION	RECEIVED
1 - 23	Discovery materials	86
24	Dr. Heath's CV	10
26	Print-out of package insert	32
28	Photo of triple lumen kit	62
29	Still picture of execution chamber	74
30	Still picture of execution chamber	86

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MONDAY, JUNE 12, 2006

THE COURT: Good morning. All right. Ready to begin?

MR. HELLMAN: Yes, Your Honor.

THE COURT: How about some introductions first.

MR. HELLMAN: Absolutely. I am Matthew Hellman for plaintiff Taylor.

MR. SIMON: John William Simon for plaintiff.

MR. ZAMAN: Shahid Zaman for plaintiff.

MR. BERGER: Eric Berger for plaintiff.

THE COURT: Ms. Anders I know. All right.

Let's begin.

As I previously indicated, no opening statements would be necessary. Your pretrial briefs were very informative and I think we ought to use our time wisely and proceed.

MR. HELLMAN: In that spirit then, Your Honor, plaintiff would just like to note for the record that although plaintiff had said in its pretrial brief that we would have seven witnesses available for the hearing today to testify, three expert witnesses and four of the party defendants, John Does One, Two, Three and Five. Despite our best efforts we have been unable to secure the presence of the Doe defendants. We have, because we don't know their names and have not tried to obtain their names, we

asked if we could serve their counsel, Mr. Pritchett, and pass on service to them. Counsel refused. And although we tried to effect service, service was refused.

Similarly, we attempted service on Director Crawford who is their employer and we thought that would be an appropriate person in this circumstance. Service was also refused there.

So we have been unable to secure their attendance and we believe it's inappropriate that these party defendants are not here. Opposing counsel is free to quash the subpoena, but -- or move to do so. But short of that, we believe service would be appropriate on them. We ask the court to rule as such.

THE COURT: Response?

MR. PRITCHETT: As I think was admitted, there was no service. Even if there had been service on either myself or on Mr. Crawford, it still would have been inappropriate and invalid service because service of subpoenas must be made on individuals.

Additionally, in terms of whether or not the subpoena should be quashed even if it had been served, we have noted several times during the course of this litigation the importance of maintaining the confidentiality, the privacy of the John Does, and we believe that interest outweighs any need for the testimony

of those individuals, especially given the written interrogatory responses from all of the Does, as well as the deposition of Dr. John Doe One.

THE COURT: Okay. I agree with the latter. Let's proceed.

MR. HELLMAN: And one final point, Your Honor. We understand that one of the defendants is in the courtroom today and we would invoke the rule against witnesses and ask that he not be present when our witnesses testify.

THE COURT: Who would that be?

MR. PRITCHETT: Mr. Crawford is a defendant in this case and I think as a defendant Mr. Crawford is entitled to be present during the testimony.

THE COURT: Is that who you are speaking of?

MR. HELLMAN: Yes, I am.

THE COURT: Objection is overruled.

MR. PRITCHETT: I will note for full disclosure, since the idea has been brought up, Terry Moore, director of the Division of Adult Institutions, who is not a defendant, is in the courtroom and if the rule as to witnesses is invoked we would ask that the expert witnesses, other than the ones testifying, be excluded as well.

MR. HELLMAN: It's my understanding that the

rule of exclusion does not apply to expert witnesses who are always able to hear all testimony whether expert or otherwise, but it does apply as a matter of course to a testifying defendant.

THE COURT: I think it's at the discretion of the court and it's the court's discretion that any witness that will be testifying will be excluded. Defendant's representative is entitled to be here and otherwise any other -- if you're invoking the rule, that's the way the rule is going to be applied. Is that your request?

MR. HELLMAN: I'm sorry, Your Honor. Are you saying that the defendant's witnesses may stay, but our experts may not?

THE COURT: No, I said the defendant's representative, Mr. Crawford, who is a party in the case, he's entitled to be in this proceeding. All other witnesses will be excluded.

MR. HELLMAN: Expert or otherwise?

THE COURT: That's what I said.

MR. HELLMAN: We would think normally experts

would be allowed --

THE COURT: I have already ruled on that. You're wasting time. Let's move.

MR. HELLMAN: All right. Thank you, Your Honor.

THE COURT: If you're an expert and you're going

to be testifying, it's time to step out of the courtroom, and any other witnesses.

MS. ANDERS: As a preliminary matter, Your Honor, before we call our first witness, plaintiff would like to admit a bunch of exhibits just up front, if that would be --

THE COURT: Is this by stipulation?

MS. ANDERS: I understand the defendants have stipulated to the authenticity, or will stipulate to the authenticity of the interrogatory responses of the Doe defendants and the document of the execution records received in discovery.

MR. PRITCHETT: That's correct, Your Honor, that we have agreed to stipulate to the authenticity of interrogatory responses and of the execution records that have been supplied by the State. I was reserving consent and stipulation to the merits, the relevance of them. I think I will withdraw that, but I would like to see specifically what they are before I would do that.

The interrogatory answers, I know what those are. And the execution records from the last six, is it everything?

MS. ANDERS: It is everything that you supplied

us.

MR. PRITCHETT: Okay. If we supplied it as part

of our discovery, we will stipulate to that.

Is there anything else other than those documents?

MS. ANDERS: There's also the answer of John Doe One in response to the court's interrogatories.

MR. PRITCHETT: We would stipulate to that.

MS. ANDERS: And the deposition transcript, the deposition of John Doe One. This is the unredacted version.

MR. PRITCHETT: We'll stipulate to the admission and use of the deposition of John Doe One. There is identifying information. There is a redacted version as well. We, of course, think the court would be able to use it for any purpose it wants. We would not like the nonredacted version to be part of the public record. We would like it to be under seal.

THE COURT: Is that agreed by agreement?

MS. ANDERS: That would be fine, Your Honor. There are a couple of quotations in the transcript on which we don't agree, we weren't able to agree on.

THE COURT: You don't agree that they're identifying testimony, is that what you're saying?

MS. ANDERS: There is one portion which we do not agree subject to a protective order. I don't think you've ruled on that, but everything else can be agreed to.

THE COURT: All right. With regard to the part that's in dispute we'll take up subsequent to this hearing in terms of whether it's subject to disclosure or not.

MS. ANDERS: So we should admit the unredacted --

THE COURT: Subject to -- and, you know, it would be nice to have all the exhibits stipulated to and we wouldn't have to waste the time this morning doing that. Maybe the way to do that is assume it's stipulated to unless some objection is raised to the contrary. Okay?

MS. ANDERS: Thank you, Your Honor.

MR. PRITCHETT: May I ask if there is a set of the exhibits that are marked so it will be easier for us to follow?

MS. ANDERS: Yes, we have a set that we're going to have admitted as exhibits.

MR. PRITCHETT: As we go along? Okay.

MS. ANDERS: And, Your Honor, would you like to place the unredacted version of the John Doe One transcript in your binder?

THE COURT: That's fine. I was part of the deposition so I really don't require one I don't think. At this time anyway. And I think we have a copy, not the redacted copy, but --

MS. ANDERS: And the last thing we would like to

admit is the transcript of the Crawford deposition.

MR. PRITCHETT: Although the witness is here to

testify, we'll consent to the deposition itself.

MS. ANDERS: At this point, Your Honor, plaintiff would like to call Dr. Mark Heath to the stand.

MARK HEATH, called as a witness on behalf of the Plaintiff, being first duly sworn, testified:

DIRECT EXAMINATION BY MS. ANDERS:

Q Dr. Heath, would you state your name, and spell it for the record, please.

A My name is Mark Heath. The first name is M-a-r-k. And the last name is H-e-a-t-h.

Q And what is your occupation?

A I'm an anesthesiologist.

Q Where do you practice?

A In New York City at Columbia University.

Q How long have you worked as anesthesiologist?

A Since I finished my training. For about 15 years.

Q Are you board-certified?

A I am, yes.

Q And do you induce general anesthesia as part of your practice in the operating room at Columbia?

A Yes, routinely.

MS. ANDERS: At this point I'd like to offer Dr. Heath's CV. For the record, I'm showing it to defense

counsel. This has been previously marked as Plaintiff's Exhibit No. 24.

May I approach the witness, Your Honor?

THE COURT: You may. It will be received, assuming there's no objection.

MR. HAWKE: No objection.
Q (By Ms. Anders) Is that your CV, Dr. Heath?
A Yes, it is.
Q Does it accurately reflect your training and qualifications?
A It does.
Q Have you previously participated in cases involving lethal injection?
A I have, yes.
Q About how many have you participated in?
A About 30 cases.
Q And as part of your -- in connection with your participation in these cases, what research have you done?
A I have reviewed the protocols and procedures from every state that conducts lethal injection and the federal government. I have attended hearings where participants in lethal injection procedures have testified. I have read depositions that they have provided. I have reviewed hundreds of autopsy reports from lethal injection procedures. Many toxicology reports. I have inspected the

facilities that -- the chambers, the work rooms where lethal injection is conducted from. I have corresponded with the individuals who initially created the first lethal injection protocols.
Q And so as part of that research, you have reviewed in detail other states' lethal injection protocol?
A I have, yes.
Q And are you familiar basically with other states'

practices with respect to safety?
A I am, yes.
MS. ANDERS: Your Honor, we'd like to offer Dr. Heath as an expert in anesthesiology and medicine and lethal injection procedures.
MR. HAWKE: No objection, Your Honor.
Q (By Ms. Anders) When did you begin participating in lethal injection litigation?
A I think it was in 2002.
Q At that time did you have a position on the death penalty?
A I did not at that time, no.
Q Do you have a position on the death penalty now?
A I do, yes.
Q And what is that?
A I think it's very problematic to try to arrive at the decision as to whether or not to execute a person based on

an adversarial process.
Q Do you think that lethal injection can be performed humanely?
A Yes, it can.
Q Could you explain your view on that?
A Well, many household pets, cats and dogs, are given lethal injection as part of what we call euthanasia or putting an animal to sleep and that's done by qualified veterinarians using appropriate drugs. It's done routinely thousands of times a day in our country. And I am very confident that the fashion in which it's being performed is

a humane process.
Q Why did you agree to testify in this case?
A One of the big problems is that the methods that are being used for lethal injection in Missouri and some other states conflicts with how it's being done for animals, with the humane method that is being used for animals, is being done in a completely different method that poses enormous and unacceptable risks.
Q And have you reviewed the documents produced in discovery by the defendants in this case?
A I have, yes.
Q Specifically, have you reviewed interrogatory responses by the John Doe defendants and defendant Crawford?

A I have, yes.
Q Have you reviewed the deposition testimony of John Doe One?
A Yes.
Q And did you attend an inspection of the execution facility at Bonne Terre, Missouri?
A I did.
Q At the inspection did you have the opportunity to observe the equipment as it was set up -- as it would be set up for an execution, and did you also have the opportunity to speak to people there about the equipment?
A Yes, I did.
Q I'm going to be asking you questions about some of the documents produced by the defendants so I'd just like to

hand you a couple of the exhibits that have already been admitted.

This is a verified record that I'm showing opposing counsel of John Doe One's answers to interrogatories, all three sets, that's Plaintiff's Exhibit 1, 6, and 11, as well as the redacted transcript of the John Doe deposition.

May I approach, Your Honor.

THE COURT: Okay. Ms. Anders, when you turn your back to the microphone I couldn't hear a word that you said. Which exhibits are you offering?

MS. ANDERS: I would like to hand the witness Plaintiff's Exhibits 1, 6, 11 and 12.

THE COURT: Okay. You may approach the witness.

MS. ANDERS: Thank you.

Q (By Ms. Anders) So, Dr. Heath, based on your review of Director Crawford's interrogatory answers, could you briefly state your general understanding of the components of the execution process in Missouri?

A Yes. There are four main stages to it. The first stage is the achieving of the intravenous access. The second stage is the administration of general anesthesia, and that's important because the third and fourth stages would be extremely painful if that second stage, the general anesthesia stage, was not properly performed. And then the third stage is the administration of a paralyzing drug that ensures that the procedure appears serene and peaceful. And then the fourth stage is the administration

of the actual drug that kills the prisoner, stops the heart.

Q And based on your review of the documents, is the manner of performing each of these component parts written down or formalized anywhere?

A It's -- no, it's not written down in any documents or procedures or policy manuals, if that's what you mean.

Q Based on what John Doe One has testified to, have

these components varied in previous executions?

A Yes, there has been variation of each of these four stages or components of the execution.

Q Could you just explain briefly how the stages have varied?

A Well, that first stage, which is the achieving of the intravenous access, in some occasions it's performed with a femoral vein access. In some occasions it's performed in what I believe is a subclavian access, under the collarbone that's also been described as being in the neck. And then there's also been at least one occasion where it was performed through what's called a peripheral IV, which is an IV in the hand or arm or the foot. So that's variations in that first stage.

Then in the second stage, which is the provision of the general anesthesia to reach the level of unconsciousness, there has been significant variations apparently in the doses of the thiopental, the drug that provides the anesthesia. The third stage is the delivery of the paralyzing drug, and there appear to have been

dosing variations in that drug. And the same applies for the fourth stage, the potassium that stops the heart, there have been variations for how much of that has been administered.

Q And based on your review of other states' practices

with respect to executions, is it standard in other states to provide written guidelines or instructions to be followed by the execution team?

A I wouldn't even call them guidelines. States have what are called protocols. It's a set of instructions that detail the drugs, the doses, the flush solutions, and a myriad of other features of the execution procedure. It's a complicated procedure, and those protocols set it forth in very clear sequential instructions exactly what the personnel need to do. And that's a standard in other states.

Q And based on your review of other states' procedures, do you think that maintaining a written protocol is a positive step towards ensuring that an execution is humane?

A I think it is extremely important. It's important to remember that in most cases the personnel who are performing the execution, to our knowledge, are not individuals who are familiar with the provision of general anesthesia or even the injection of medical drugs or setting up IVs, so it's very important that they are given very clear and clean, understandable instruction that they can follow to ensure that the procedure unfolds as it's supposed to.

Q And to your knowledge, does any other state besides Missouri not maintain a written protocol?

A Everywhere else, to my knowledge, has a written protocol.
Q Why do you think it is important to have a written protocol?
A Again, if there's no written protocol, then the interests of the State or the Department of Corrections, which are to ensure that the prisoner dies humanely, and the interest of the prisoner, which at the very least is to ensure that what happens to him is humane, are not defended against ad hoc changes or vagaries or misunderstandings or absent-mindedness or other problems that can occur when a complex endeavor is undertaken by a group of people.

Protocols are also important because it's very important to rehearse these procedures, and the only way you can rehearse something is if you have the steps written down. Just like rehearsing a play, you need to have a script to rehearse off of. And if you don't have the written procedures there's no way of reliably making sure all of these are followed in the rehearsals as well as when you actually perform it.
Q And based on your review of the evidence in this case, do you have an opinion as to who determines what happens in the execution?
A In Missouri?
Q Yes.

A John Doe One is the person who appears to be functionally in charge of everything that happens, of designing it and of how things are carried out.
Q And John Doe One is the doctor who participates in the execution in Missouri?
A That's right, yes.
Q And what is your understanding as to which parts of the execution procedure John Doe One has control over?
A My understanding is that he was involved at the very beginning of Missouri's modern execution history. He even talks about being involved in the cyanide decision, using cyanide, and then when they decided not to use a machine that they had been using, he was called in to take over the whole process.

As he says, there's nobody else involved in the process who has a medical background. And there are no other states where physicians are taking the role that he's taking so there is nobody else for him to talk to other than him, as he describes it.

So what the drugs are, the actions of the drugs, how the IV tubing is configured, how the IV access is achieved, how many syringes there are, how much fluid is in each syringe, how much drug is in each syringe, exactly what the execution injectors do, I think he's basically set up everything about this in terms of the nonsecurity

issues.
Q And to your knowledge, is there any other state in

which sole discretion of the medical aspects of the procedure is seated in a single person without any guiding protocol?

A The way it bureaucratically appears to work in most states is the commissioner of corrections or some administrative type person is ultimately responsible for everything that happens in the prison including everything that happens in the executions, but from a functional point of view, there's always a group of individuals who actually are in charge of the mechanics of the lethal injection procedure itself. So this is a unique situation where there is one individual and everything appears to have been vested in him. Everybody, including the administrators, do what he says. And often he doesn't even tell them what he's going to do or what changes he's made. And that's, to my knowledge, unique.

Q So just to clarify, the discretion about the medical aspects of the procedures is vested in John Doe One, to your understanding?

A Yes. That's how he describes it.

Q And have you reviewed John Doe One's answers to interrogatories and his deposition testimony?

A I have, yes.

Q And based on your medical knowledge and experience, have you reached any conclusions with respect to John Doe One's medical judgment and his competence with respect to certain issues?

A With respect to --

Q Certain issues. Have you reached any conclusions?
A Well, certainly with respect to issues about the induction and maintenance of general anesthesia, he's made numerous important factual statements that are completely wrong and make it clear that he's not a person who's trained or credentialed or proficient in administering or understanding general anesthesia and the drugs that we use.

He also has described a difficulty with numbers, which is very problematic for a person who is going to be supervising or drawing up drugs and the various quantitative aspects of that. And in the addition to flat-out factual errors, important factual errors, I also have concerns about judgments that he's made, medical judgments.

Q What do you base your opinion on?
A On reading his depositions, or testimony and interrogatories.
Q Okay. So first, I'd like to talk with you about John Doe One's determination and his recordkeeping with respect to the doses of thiopental given at an execution. Have you

reviewed John Doe One's testimony with respect to his determination of how much thiopental to give at the most recent executions?
A Yes, I have.
Q The previous five executions. And based on Doe One's deposition testimony, can you tell me how much thiopental Doe One prepared in each of the last five executions?
A I can give you my -- a guess, but it's very unclear

exactly what happened because he's -- he has a poor memory about what has transpired and has had to correct himself on several occasions going back and forth about what was given. And also he has, as he says, a numerical dyslexia, so it's difficult for him to be certain about numbers.

As best as I can tell, somewhere between -- somewhere five grams or below may have been given. In many it's possible that it was two and a half grams, but it's very difficult to see what happened.

MS. ANDERS: Your Honor, may the record reflect that I am showing defense counsel what has been marked as Plaintiff's Exhibit 25.

THE COURT: The record will reflect that.

MS. ANDERS: Thank you. And may I approach the witness, Your Honor?

THE COURT: You may. And you don't need to ask each time. Just go do what you need to do.

Q (By Ms. Anders) Have you seen this before?
A Yes, I have.
Q Is that the chemical log in which the -- how each drug is used is recorded?
A Yes, it is.
Q Okay. I'd like to draw your attention to a portion of the testimony of John Doe One, just looking at page 14, I'll read it to you so you don't need to follow along if you don't want to. He states, "I was unable to mix this. We show that we gave the five grams because we have no provision for showing that we disposed of three and gave

two, or disposed of two and gave three, because this has not been set up that way. We either show we used it all or disposed of it all."

Based on that testimony, what is your conclusion with respect to the accuracy of the chemical log that I just handed you?

A Well, the chemical log has a column for the amount that's injected, and the physician's testimony says that of the amount they drew up, of the amount that was available, some was given, some was not given, but there is no record of exactly how much was -- falls into each category. So there is a log here that says numbers, but according to the physician's testimony, they may or may not be accurate.

Q And is it possible the tell from the chemical log how

many thiopental bottles were checked out?

A Yes, it is.

Q And looking at the chemical log, has that number varied over the past five executions?

A Well, in some cases it says that ten bottles were checked out. In some cases -- one case it says ten bottles were checked out, but then that number is changed to an eight. In other cases -- in another case it says six. In another case it says five. So there's variation of probably between five and ten bottles.

Q And based on that fact and the doctor's testimony, do you think that both the intended dose and the actual dose of thiopental have varied in the past several executions?

A Well, clearly the intended dose has, in all

likelihood, varied. If they checked out ten bottles on some occasions and five bottles in other occasions, that appears to be an intent to give different amounts.

As far as the actual amount that's delivered, we have no way of knowing how much active thiopental drug was actually delivered into the prisoner's circulation.

Q And based on your review of the discovery responses, who oversees the process of recording the drugs that are given in the chemical log?

A The physician.

Q John Doe One?

A John Doe One.

Q And to your knowledge, is the actual dose given at the execution recorded anywhere?

A No, it's not.

Q In your practice inducing general anesthesia, do you record the dose of anesthetic that you give?

A Yes. It's very important to record the precise amount of drugs that are administered.

Q So that's standard practice to record doses?

A Yes. That's essential standard practice.

Q And do you train residents?

A I do, yes.

Q Do you teach residents about the importance of recording actual doses given?

A It's one of the first things they learn how to do is to complete an accurate chart or record of what was done during a procedure.

Q If a resident consistently fails to record doses, what would be the consequences?
A If they consistently failed, after being admonished and told they needed to do this properly, they wouldn't be allowed to continue through the residency.
Q Does John Doe One's apparent unconcern with recording precise actual doses raise concerns in your mind?
A Yes. It's very sloppy and it reflects a lack of

understanding of the importance of the quanity of drugs that are being given.
Q In an execution setting, does the actual dose of thiopental that was given matter?
A It matters enormously. As I described before, in the four phases of the execution or the lethal injection procedure, that second phase is the only phase that provides anesthesia. So if the amount of thiopental given is inadequate, then the anesthesia will be inadequate and the procedure will be agonizing.
Q Based on your review of materials produced in discovery, is it possible to conclude that an inmate was sufficiently anesthetized in any particular execution?
A No. Based on the material that's been provided, one can't conclude either way whether these prisoners were or were not properly anesthetized.
Q And is part of that because you don't how much thiopental was actually given?
A Part of that is because we don't know how much thiopental was successfully delivered into their

circulation and it's partly because the paralyzing drug is given, so regardless of whether or not the execution in fact is humane, it will appear to be peaceful and tranquil.

Q Thank you.

Now I'd like to ask you a few questions about

John Doe One's -- your opinions as to Joe Doe One's training with respect to general anesthesia. Do you have a conclusion as to whether Joe Doe One is qualified to oversee the induction of general anesthesia?

A No, he's not. If he were applying for a job as an anesthesiologist in any hospital in this country, there is no possibility that he would be hired as such. He's not qualified to do this in any manner.

Q So just to clarify, you do have a conclusion?

A Sorry. I do have a conclusion, yes, and that is it.

Q I'm sorry. Would you restate?

A My conclusion is that he is not in any way qualified to perform or supervise the administration and the induction, the maintenance of general anesthesia.

Q Does he have any training in general anesthesia?

A Apparently not.

Q Why is it necessary to have training in general anesthesia in order to determine doses of anesthetic and induce general anesthesia?

A Anesthesiology is a very complex task. It takes four years of medical school and then four years of post-graduate training to have acquired the knowledge base and skill set and judgment to carry it out in a safe and an

effective way.
Q And based on your review of John Doe One's testimony,

did he make any statements that raise concerns in your mind regarding his understanding of general anesthesia in general and thiopental specifically?
A Yes, he made numerous such statements and makes it clear that he has not undergone that training. He doesn't understand what this drug is and how it works.
Q I'd like to draw your attention to a statement that John Doe One made in his deposition. This is page 27 of the transcript, and I am reading now. He responds to a question about thiopental, he says, quote, "The problem with all these drugs is if you give the dose and you do not get the effect you need, you cannot simply add more drug to get the dose. You must repeat the entire dose." Do you agree with that statement?
A That's completely false. It flies in the face of our practice, what anesthesiologists do.
Q Why is that?
A When we give a dose of drug, we're anticipating a certain effect, but we're aware of variability between individuals and how they respond to drugs so if we don't achieve that effect, we gauge by how much we missed that intended or desired effect and we do sort of an on-the-fly calculation that's part art and part science as to how much additional drug would be required to remedy the situation, and that amount of additional drug might be less than what

we gave before or it might be more than what we gave before or it could, by coincidence, be the same amount. But his assertion that you have to go ahead and give the same amount again is ridiculous.

Q So do you consider this a significant factual error?

A Yes. It's consistent with him not understanding what anesthesiologists do, which isn't surprising. He hasn't been trained as an anesthesiologist.

Q I'd like to draw your attention to another statement from the deposition transcript. Page 26, line 17. And again in discussing thiopental the doctor said, and I quote, "The drug was chosen because it doesn't cause cardiac vascular depression so it means you can give a lot of it and your heart will still beat fine." First, could you define cardiac vascular depression for us?

A What he is talking about is some drugs can cause effects on the ability of the heart muscle to contract or squeeze and that means that the heartbeat or the pulse is weaker. The heart can't eject as much blood with each heartbeat. We also talk about vascular depressants, the drugs that lower blood pressure. Blood vessels have muscles that can constrict to tighten up or narrow the blood vessels and raise the blood pressure, and some drugs, some anesthetic drugs, as a side effect cause those muscles to relax and then that lowers the blood pressure. So a

drug that causes cardiac vascular depression is one that depresses the pumping function of the heart and also the

blood pressure.
Q And do you agree with John Doe One's statement that thiopental does not cause cardiac vassular depression?
A He's got it 100 percent backwards. Thiopental is notorious for causing cardiac vascular depression, especially in patients who have had trauma. John Doe One talks about anesthetizing people in trauma situations, which is a scary proposition if he thinks that thiopental does not cause cardiac vascular depression. There were many, many military deaths that occurred back in World War II and the Korean War when thiopental was given to trauma victims before people understood this effect.
Q So would you expect that an anesthesiologist would make this type of factual mistake?
A No, it's not conceivable.
Q Okay. I'd like to draw your attention to another statement from the deposition transcript. This is on page 95, line 4. Again in response to a question about thiopental, John Doe One stated, I quote, "You want a rapid onset of the drug, and these drugs are rapid onset drugs. If you give them slowly they just don't work." Do you agree with the statement that it's necessary to inject thiopental very quickly?

A That statement is false.
Q And why is that?
A I just know factually I have injected -- used thiopental many, many times to induce general anesthesia. I do not inject it as quickly as I can. I inject it at a

measured rate and it, nevertheless, achieves the desired effect, the effect that I'm looking for.

He also talks about the drug being metabolized while it's traveling up the arm, and that's just not true. That's not how thiopental works.

Q Do you consider this a significant error?

A Yes. It just shows that he doesn't know what he's talking about when it comes to the use of thiopental.

Q And again, would you expect anesthesiologists to make this type of factual error?

A No.

Q Is it necessary to understand the pharmacology of thiopental when determining the dose of thiopental to be used for induction of general anesthesia?

A Yes, it is.

Q And why is that?

A Thiopental is a complicated drug and a lot of its actions are counter-intuitive. It's a drug that we consider to have -- it's a high-risk or low safety margin drug, and it's important to understand how it works, how it

travels around the body, where it exerts its effects, and understand how different individuals -- how their responses can vary.

Q And does John Doe One have any training in the pharmacology of thiopental?

A No.

Q Based on his testimony and what we have spoken about so far, do you think that he understands the pharmacology

of thiopental?
A No, it's clear that he doesn't.
MS. ANDERS: May the record reflect that I am showing opposing counsel what has been marked as Plaintiff's Exhibit 26.
MR. HAWKE: We have not been provided a copy of that.
MS. ANDERS: I'm sorry.
Q (By Ms. Anders) Have you seen this before, what I just gave you?
A I have, yes.
Q And what is it?
A This is a printout of what's called a package insert. A lot of times when drugs come, they come in a box and there's a folded-up piece of paper inserted in that box that has a lot of technical information about the compound.
Q And would you and other anesthesiologists generally

rely on this when preparing and administering thiopental?
A Yes. It's always available so if you have a question, if you want to know something about a certain situation, then it's available in the kit. Like an instruction manual.
MS. ANDERS: I'd like to offer Plaintiff's Exhibit 26 into evidence.
MR. HAWKE: No objection, Your Honor.
THE COURT: It will be received.
Q (By Ms. Anders) If you'd look at page two for me, Dr. Heath, under the heading Warnings, could you read the

sentence that starts with the words "This drug"?
A It says, "This drug should be administered only by persons qualified in the use of intravenous anesthetic."
Q In your opinion, is John Doe One qualified in the use of intravenous anesthetics?
A No, he's not.
Q Are your concerns about John Doe One's understanding of intravenous anesthetics limited to thiopental?
A No. There are other intravenous anesthetics that he clearly doesn't understand what they are or what they do.
Q Is Versed a commonly-used intravenous anesthetic?
A Yes. Versed is one of the most commonly used anesthetic drugs in procedures.
Q In John Doe One's interrogatory answers he states

that midazolam is the antidote to Versed, and that's the answer to Interrogatory No. 37. Do you agree with that statement?
A I'm sorry. He says midazolam is the antidote --
Q To Versed.
A To Versed. No, that's completely incorrect. He has it 100 percent backwards.
Q And why is that?
A There is an antidote to Versed, but it's not midazolam. Midazolam in fact is Versed, and it has sedative properties. The antidote to Versed is something that would wake you up, make you more awake if you've been given Versed, so he's got it completely backwards.
Q Is that a factual error that you would expect

anesthesiologists to make?
A No. No anesthesiologist would make that error.
Q Does John Doe One's incorrect understanding of Versed raise doubts in your mind as to his understanding of intervenous anesthetics?
A Yes. If he's confusing midazolam and Versed and the antidotes, he doesn't know what he's talking about.
Q I'd like to draw your attention to another portion of the testimony of John Doe One's deposition. This is line 26 -- I'm sorry, page 26, and John Doe One states that he is dyslexic. Does the doctor's dyslexia also raise

concerns in your mind regarding his ability to adequately determine doses of general anesthesia and to proceed with induction of general anesthesia?
A Yes. He described difficulty completing a cable bill I think because he was transposing numbers and even though he had a couple of hours to work on it things weren't working properly for him in terms of getting the numbers right. And some people have that problem and those people are unsuitable for anesthesiology or other medical specialties that require a lot of calculations on the fly.
Q Would that affect his ability to be a surgeon necessarily?
A No, he could well be very gifted with his hands and with anatomy. That's a completely different kind of activity than having to make precise and rapid calculations about drug doses.
Q So in sum, do you think that John Doe One, based on

his training and testimony, is competent to determine doses of and induce general anesthesia?
A No. He should not be entrusted with the provision, the induction, the administration, or the maintenance of general anesthesia.
Q Do you think that entrusting John Doe One with those responsibilities creates a significant risk that an inmate will be inadequately anesthetized and, therefore, may

suffer severe pain during an execution?
A Yes, it does. Any time you entrust a complicated activity like that to somebody who isn't qualified or competent to do it, then that risk develops.
Q Now I'd like to ask you a few questions about John Doe One's stated inability to mix five grams of thiopental, so I'd like to direct your attention to John Doe One's answer to the court's interrogatories, this is No. 5, where John Doe One states that he was unable to administer the planned five-gram dose of thiopental because of, quote, difficulty dissolving powder in the solution that he was using.
In your experience, is the powder in the thiopental bottle soluable in solution?
A Yes, it is. One of those properties of that powder preparation is that we're able to dissolve it in solution.
Q And what does that mean?
A Like when you put sugar in iced tea, you take a spoonful of the sugar and you put it in the tea and you mix it around and that solid material, those crystals, disappear and they are now in solution in the iced tea.

It's the same with the thiopental powder. The powder is added into an aqueous or a water solution and one mixes it until it disappears.

Q What are the reasons that the powder in the thiopental bottle might not dissolve easily?

A Well, one of the properties of thiopental is it does dissolve quickly, just like the sugar that goes in the iced tea. If you put a spoonful of what you think is sugar in the iced tea and you mix it and there's still, no matter how much you mix it, grains of stuff left over, then there may be sand or something else in that sugar. It's not all sugar.

The same with thiopental. One of its properties is that you can put it in water and it will dissolve. So if it doesn't dissolve, then you have to worry that maybe the preparation is not pure thiopental, that it's degraded; or if there's been a manufacturing error, an error in the shipping or the handling of the thiopental or its storage; or that the solution that you're putting it into isn't the solution that you think it is. It isn't the right mixing solution, something is wrong; or you have done a calculation error. You're trying to put in a different amount than you think you are. Something is wrong with that picture. I don't know which of those things it is.

Q So you mentioned that the thiopental might be defective or might not have all the properties of thiopental. If that were the case, would the powder's anesthetic properties also be affected?

A Yes. If it's not a thiopental, then that's not an anesthetic anymore to provide anesthesia.

Q And if it was defective, it couldn't be dissolved, it could also not have the expected anesthetic properties?
A Right. If it can't be dissolved, then it's lacking the properties of thiopental and it may not properly induce or provide anesthesia.
Q If that were to occur, if thiopental were to be defective and the prisoner ended up inadequately anesthetized, wouldn't that be obvious during the execution?
A Are you saying that if the thiopental wasn't working properly, it wasn't thiopental, and the execution proceeded using that bad compound, are you saying would that be obvious to the witnesses?
Q Yes. I'm asking if you think that would be observable or obvious.
A No, I think things would look very similar. The first -- the drug would go in, the thiopental, but it wouldn't be thiopental so the prisoner, nothing would happen to him. And then the second drug would go in, which is the pancuronium, which in this dose would cause a rapid onset of paralysis so the prisoner would very rapidly develop a relaxed look on his face and his eyes would calmly close and he would look like he was peacefully asleep when in fact he would be wide awake and unable to draw a breath and was suffocating. And when the potassium

was administered, normally that would make him scream and struggle, but he would be unable to do that because the pancuronium would still be paralyzing him. So it would look pretty much the same I think.

Q I'd like to draw your attention to another statement from John Doe One's deposition. This is on page 45. In response to the question, "Did you ever consider the possibility that the thiopental might be defective," he answered, quote, "No. It's a compound. It's like salt or sugar. It's a chemical. There is nothing -- it deteriorates after it's been mixed, but there is nothing in pentothal that can out-date as long as it's in powder."

So do you agree with the statement that because pentothal is stable in powder form it couldn't possibly be defective?

A That statement is incorrect. There can be problems with the manufacture of thiopental so that it doesn't dissolve properly, so that it's not working properly. And so he's just wrong there.

Q To your knowledge, does the manufacturer of pentothal recognize that batches of thiopental could be defective?

A The package insert discusses what to do when the thiopental doesn't properly go into solution and it says one should not use that solution. It should be discarded.

Q And looking at another statement in John Doe One's deposition transcript, page 44, he states about the

thiopental, "Some medications have an inert compound in or a secondary compound to prevent improper dose." First, is there an inert compound in thiopental that limits its solubility in water?

A Thiopental is mixed with a powder which is sort of inert in the sense it doesn't cause anesthesia or any medical effects. It's mixed with a salt powder called sodium carbonate, but that does not hinder its solubility in any way.

Q On what are you basing this opinion?

A On the package insert. And I also, when I saw John Doe discussing especially the amount of changes he made in the thiopental mix, I telephoned the company that manufactures it to find out if in fact any such changes had been made that I wasn't aware of and I talked with a specialist at the manufacturing company who informed me there had not been any such changes or additives.

Q You mentioned speaking with the manufacturer. When you have a question about a drug, is it normal practice to call up the manufacturer and speak with a specialist?

A Sure. They put the number on the package insert just like an instruction manual for a computer or something. You can call them up and get answers to your questions.

Q And would you rely on those answers?

A Yes.

Q Do you think there should be any difference in the solubility effect of the thiopental between the five-gram vial and 500-milligram vial simply because of the different

amounts provided in the vials?
A No. The manufacturer should be making the exact same powder and the package insert applies for all the different sizes of vials, so the preparation should be identical regardless of how much is put in the bottle by the company.
Q And what is your conclusion with respect to John Doe One's theory as to why the thiopental was not soluable?
A It doesn't make any sense.
Q Have you reached any conclusions with respect to Doe One's decision, during the first execution in which he encountered the problem, to go ahead with the execution using the lower dose?
A That wasn't the right decision to make.
Q And why do you think that?
A Well, the concern is if the compound isn't behaving as it's supposed to, there may be some problem with the compound. If anything, one would want to increase the dose to ensure that one was getting the right amount in. So reducing it is trying to make a correction, but it's in the wrong direction.

Q Have you reached any conclusions with respect to John Doe One's failure to investigate the potential problem with thiopental after the first execution in which this occurred?
A Yes. It's very troubling.
Q And do you have any conclusion with respect to John Doe One's exercise of medical judgment in not simply preparing additional syringes of thiopental?

A That doesn't make any sense. He ought to have not used the preparation at all. That's what he should have done. That's what the manufacturer says. But given that he decided to go ahead, which was the wrong decision, he should have made up a lot more of it, not less of it.

Q And looking at his deposition testimony again, on page 29, he stated, quote, "I go to the execution chamber and we're on a time frame. I have minutes to get the drugs ready, minutes to ensure a perfect IV. There is no time to call the drug company at midnight, the Director, or nursing staff, to change. I am required to deal with what I'm given and make it come out right and make it happen I guess is the best way to say it."

In your experience, does time pressure exacerbate the risks of improperly mixing thiopental, or any other drug?

A Yes. When one is trying to undertake a complex

endeavor, if there's a lot of time pressure, then one is much more likely to make errors.

Q Does time pressure also exacerbate the difficulty of calculating and keeping track of how much thiopental has already been mixed?

A Yes, especially if I'm dyslexic.

Q In your practice, would you accept time constraints that you felt were overly restrictive in preparing a dose of anesthesia?

A Under exigent circumstances, if there is an emergency and somebody needs general anesthesia immediately, then

everything would be very rushed and we would be working under time pressure and we'd have to accept that because the risks of delay would outweigh the benefits.

Q And in a nonemergency situation, would you accept time constraints?

A No. In a nonemergency situation we arrive in time in the morning to set things up and have things in an orderly fashion to check and doublecheck everything to make sure that we have our ducks in a row and that we have done things properly.

Q From a medical perspective, is an execution an exigent circumstance.

A No. My understanding is there is a many-hour window in which it can legally occur, a many-day window. But

certainly I don't think it has to occur at a certain precise time. And even if it did, the physician could show up an hour or two hours earlier, whatever it took, to allow his team to set things up in a more orderly and considered fashion.

Q And given John Doe One's difficulties in mixing the thiopental, do you have concerns about whether the thiopental prepared was effective?

A Yeah, I don't know whether the -- it was effective or not.

Q Is it possible to be certain that inmates given insoluable thiopental were properly anesthetized during their executions?

A Not from the information we have available. Some

states perform toxicology. They measure the blood levels of thiopental after an execution. And that might have provided information in these executions, but I don't believe Missouri did that.

Q And do you believe that John Doe One's use of insoluable thiopental created considerable risk of pain in these executions?

A If the thiopental didn't work properly, if he wasn't given the amount of actual thiopentothal that he was intending to, then the prisoner's execution would have been excruciating.

Q I'd like to move on to another topic now. Have you reviewed John Doe One's statement regarding the risks and benefits of gaining venous access through the femoral vein?

A Yes, I have.

Q What are your conclusions with regard to those statements?

A He's again made factual statements that are not correct and then he's made errors of judgment.

Q Assuming that John Doe One testified that it's impossible to pierce the femoral artery, do you agree with that statement?

A No, that's completely false, and I know that because I have accidentally pierced the femoral artery while attempting to place a femoral venous access.

Q And mechanically how does one pierce the femoral artery; how does that occur?

A Well, we don't know by looking at the outside of a

person's body exactly where the femoral vein is. We use landmarks and our anatomical knowledge and feeling the pulse of the femoral artery, which is close to the femoral vein, to make our best guess as to where the femoral vein is. But there is variation between individuals and it's always a mixture of art and science to try and understand where the vein is.

So we go in with a needle, a hollow needle, and

we're aspirating with a syringe, drawing back and probing until we get a return of blood. And more often than not that initial blood is venous blood, and we can tell that because it's a dark blue or purple color, but sometimes the first blood that comes back is bright red, it's arterial blood, and that means to get that we have had to have punctured the femoral artery.

Q Is it possible to pierce the artery with a .22 gauge needle?

A Absolutely. You can pierce it with any needle.

Q And does the Seldinger method of catheterization used by John Doe One require the use of a needle?

A Yes. The Seldinger technique means that one pushes a needle into the blood vessel and then passes a wire through that needle and then uses that wire to insert the catheter. So one has to pierce blood vessels in order to perform the Seldinger technique.

Q So you disagree with John Doe One's statement that piercing the artery is impossible using the Seldinger method?

A It's just completely wrong. It's a well-recognized complication that the femoral artery can be punctured or pierced or lacerated during femoral venous access.
Q Would you say that arterial puncture is a particularly rare complication?

A No. I think it happens frequently.
Q What are the potential complications of an arterial puncture?
A Depends on how big the hole is and for how long it goes untreated. If the hole is large and nothing is done about it, then one can lose a tremendous amount of blood out of that hole.
Q Okay. So I'd like to show you a photo -- some photos that's contained in what's already been marked and admitted as Plaintiff's Exhibit 18. This is from the materials produced from the Johnston execution. Have you seen this photo before?
A I have, yes.
Q And have you reached any conclusions with respect to it?
A This photo appears to show a triple lumen catheter placed in the groin. It's probably in the femoral vein, although I can't be certain where the tip of the catheter is because I can't see that.
Q And I'd like to give you a hard copy of this so you can mark where you see.
A Okay.
THE COURT: He can mark at his location.

THE COURTROOM DEPUTY: Use your finger, and if you want to clear it, just press this (indicating.)

Q (By Ms. Anders) So using that, could you mark for us where you see the hematoma in this photograph?
A So -- can you hear me like that?
So hematoma is a mass of blood, a collection of blood that occurs inside the body where blood has leaked out of a blood vessel. And what you see here is the catheter going into the groin and there's a ridge at the end of the catheter, a raised ridge, that's got a blue discoloration, and that's a hematoma.
And then it's important to understand that in the thigh it can hold a lot of blood. Several -- it can hold a liter of blood, which is the size of a liter bottle of soda, can be concealed in the thigh. So when one is looking at the hematoma in the groin or the thigh, it's important to understand it may be the tip of the iceberg or you may be seeing all of it.
But what it looks to me is like the swelling is extended into the deeper tissue into a larger area causing this bulge under here in the side of the thigh. And there is also an area of blue discoloration in this zone here. So it looks like there's -- beneath this here is a larger area of blood collection and that this blue raised area is the superficial manifestation of that.
Q Okay. I'd like the record to reflect that Dr. Heath has marked an oval-shaped portion around the catheter

entrance that's shown on the photo.

Is the fact that a hematoma occurred here indicative of medical negligence or error?

A Not at all. Hematoma is a recognized complication of femoral venous access because as I said you can't know exactly where the artery and vein are. And it's happened to me. A hematoma can occur in the best of hands, and does occur in the best of hands. It happens to everybody, to all patients. Excuse me, it happens to many patients. It happens to all physicians who perform these things frequently.

Q I'd just like to refer you to another part of John Doe One's deposition testimony. When asked about the hematoma in the photo he stated, quote, "What they are seeing is the site where I injected my local anesthesia. It causes a little blue mark." Page 102.

In your experience in inserting a femoral line for the induction of anesthesia, local anesthesia, has it ever caused a blue mark?

A No, local anesthesia is a clear solution and it can't cause blue discoloration. I suppose when injecting the local anesthesia he could have ruptured a blood vessel and caused a hematoma, but either way, whatever it was that caused this, this is blue and it's from blood collecting there. It's not from local anesthetic. That's just not

possible.

Q Have you ever heard of a blue mark from local

anesthesia occurring, in your discussions with colleagues?
A No, unless they injected -- they caused a hematoma in the act of injecting it. But the local anesthetic itself doesn't cause a blue discoloration.
Q So does Doe One's explanation change your conclusion that there is a hematoma here?
A No. The photograph shows a hematoma.
Q Now I'd like to show you another photograph. This is contained in Plaintiff's Exhibit 21, which has been marked and admitted. This is from the Smith execution.
THE COURT: What exhibit? You say this is a different exhibit?
MS. ANDERS: Yes. This is from the Smith execution contained in Plaintiff's Exhibit 21.
Q (By Ms. Anders) So this is from another execution, the Smith execution. Do you see a blue mark on this photo?
A No, I don't.
Q And looking at this photo, is there any indication that any complication arose during this femoral procedure?
A No, there isn't.
Q But there is such evidence in the photo from the Johnston execution that we just saw?
A Yes. The photographs are very different. It clearly

shows a hematoma is present.
Q Does it raise concerns in your mind that John Doe One isn't admitting that the hematoma exists?
A Yes. It's right there in the photograph. It's a recognized complication that can occur. I don't understand

why he doesn't see it there.
Q Could hematoma such as the one that occurred during the Johnston execution be painful?
A Yes.
Q How does a hematoma cause pain?
A Well, when the hematoma forms in the groin it distends and stretches and distorts the tissue and the groin is an area that has a lot of nerve or sensory nerve innervation, it's a sensitive area, so when that tissue is distorted and stretched that causes pain.
Q Can you tell definitively whether the hematoma in the Johnston photo was painful?
A The only way you know for sure is to ask him whether it hurt. I don't know for sure. It looks painful.
Q How would someone behave if they were in pain?
A A restrained -- a nonrestrained person would wriggle around. Probably put their hand on the area that was hurting. He would probably try adjusting his position, flex his thigh, his groin, trying to find a comfortable position, those kind of movements.

He's restrained so I'm not sure how much movement you'd be able to see.
Q And what else could you rely on in ascertaining whether Johnston felt pain from the hematoma?
A You can't rely for sure on anything without asking him, but you can see how other people described his behavior.
Q So would you rely on an observer's account in

determining whether or ascertaining whether someone might have been in pain from the hematoma?
A Yes. I think that's one of the reasons the state wants witnesses to be there to be able to report whether or not pain occurred, whether or not it was humane.
Q I'd like to quote to you a newspaper article about the Johnston execution.
MR. HAWKE: Objection, Your Honor. This has not been part of discovery and appears to be hearsay.
MS. ANDERS: We're not admitting it in evidence. It's just something that he's relied on in testifying, whether it's consistent with --
THE COURT: I'm going to sustain the objection.
Q (By Ms. Anders) So do you agree with John Doe One's statement that there are no risks to the inmate from femoral catheterization?
A That statement is false.

Q And do you think that John Doe One fails to acknowledge some of the common complications of femoral catheterization?
A Yes, he does.
Q In your opinion, is it dangerous for a physician to perform a procedure and not to acknowledge the risks that could flow from the procedure?
A Yes. Before we're allowed to do them on our own without supervision we have to be able to recite what the complications are, what the risks are that can occur.
MS. ANDERS: I'd like to ask the witness about

something right now that was redacted from the Doe One transcript.

(Counsel approached the bench and conferred off the record.)

MS. ANDERS: I'm just going to ask a question or two about something that's been redacted from the John Doe One transcript.

Q (By Ms. Anders) Dr. Heath, in performing a femoral catheterization, is it important for the doctor doing it to be proficient in the procedure?

A Yes, it is.

Q Why is that?

A Any femoral line is a complex procedure and it's being done in a critical area of the body where there are large

blood vessels and a large nerve and if one is not proficient in this, then severe complications are more likely to ensue.

Q John Doe One stated in interrogatory responses that he has not regularly inserted femoral lines in the past few years. He testified in his deposition that he is not in active practice. Do those facts raise concerns in your mind about John Doe One's proficiency in performing femoral catheterizations?

A Yes. Part of what proficiency is, one element is a thing we call currency. It's like pilots flying planes. One has to be doing it with a certain frequency to be considered suitable to continue doing it. And if he hasn't been performing this for a number of years, then he lacks

the currency that would be necessary.
Q Is it your practice when performing femoral catheterization to sedate a patient before inserting the femoral line?
A Yes. Some of my patients are already under general anesthesia when I'm placing a central line or femoral line, but if somebody were not under general anesthesia, then I would start a peripheral IV to give them analgesics or painkillers and sedation.
Q Why would you do that?
A Because it's a very nasty procedure to endure without

any sedation or pain killer.
Q And to your knowledge, does John Doe One sedate prisoners before performing femoral catheterization?
A He does not, no.
Q In your testimony are you distinguishing between the local anesthetic and intravenous sedation?
A Right. Intravenous sedation obviously goes everywhere in the body including the brain and intravenous analgesics or painkillers also travel throughout the body, and so that's different from local anesthesia which is just given directly in the groin area and does not affect one's ability to experience pain or level of consciousness.
Q So do you believe that the failure to sedate an inmate before performing catheterization is indicative of questionable medical judgment on the part of John Doe One?
A Yes. It's standard, whenever possible when one can obtain a peripheral IV, which is the case in almost all

patients, that one first puts in a peripheral IV and uses that to give sedation and analgesia and then you put in the femoral venous line.

Q I'd like to draw your attention to some more of the deposition transcript. On page 104 John Doe One states he was unable to place a femoral line and therefore placed a subclavian line. Are there different risks inherent in placing a subclavian line?

A There certainly are, yes.

Q And could you describe them?

A Well, the subclavian line goes in right by the collarbone. It's close to the heart and close to the lungs. And it's a very well-recognized complication that the needle can open up the -- can damage the lung and cause air to enter the spaces that surround the lung and cause a compression of the lung which is a thing we call pneumothorax or tension pneumothorax, and that's an emergency situation that's extremely agonizing. One is basically suffocating to death and it needs emergency intervention.

Another problem that can occur when using a Seldinger technique, the subclavian technique, is that the wire tends to enter the heart and can cause arrhythmia, can cause the heart to beat improperly, or even stop the heart, and obviously that's another emergency situation that needs to be corrected immediately.

Q I'd like to draw your attention to a statement from the deposition transcript of John Doe One in discussing

subclavian line access. He says, quote, "Yes, but it requires significant modification of the facility. In other words, the bed must have the capability of being tilted with the feet up so these veins would dilate sufficiently to guarantee safety. Plus it would be

prudent to have chest tube capability available. I have rudimentary chest tube capability on this tray as I have selected. But if you said I would always do subclavian, I would have chest tube available on every occasion."

Is it your understanding from that testimony that John Doe One does not have the equipment necessary to treat the complications of subclavian access in the execution?

A Yes, that's right. He's saying that -- he's correctly stating that when one embarks on this procedure one needs to have available certain equipment and supplies including the equipment to put in a chest tube, which is a large tube about the size of one's finger that goes between the ribs into the space outside the lungs.

Q What complication would that chest tubing be necessary to treat?

A It would be necessary to treat what's called a tension pneumothorax which is where air is collecting outside the lung and inside the chest and collapsing or compressing the lung.

Q John Doe One also said in what I just read that there is rudimentary chest tube capability in the catheter tray that he uses. Do you know what he means by that?

A There is no chest tube capability. There is a small

catheter like the catheter that's used for putting in peripheral IVs. And he's quite right, that can be

introduced into the chest wall to -- as a temporary measure, as an initial measure, to help reduce the pneumothorax or stop it from getting worse, but that would be vastly below the standard of care to rely solely upon that very small catheter when in fact what is needed is a much larger tube and all the equipment to insert that tube and the presence of suction so that the chest can be evacuated.

Q In your practice, would you perform a procedure even once knowing you did not have the necessary equipment to treat that complication?

A Again, under an exigent circumstance, if somebody needed a subclavian line on the roadside or whatever and they are going to die if you didn't have it, then you would try to put it in and hope you didn't get any of these terrible complications. But in an elective procedure where it's scheduled ahead of time and one has time to obtain and deploy the necessary emergency equipment, then one of course needs to do that.

Q Okay. I'd like to discuss with you potassium chloride and whether it hurts when injected into the vein. Could you just explain for me what makes potassium hurt in the veins?

A Yes. Potassium is a salt solution that is used by nerve membranes and the membranes in the heart to regulate

their electrical activity, to regulate the voltage across the membrane. And when potassium is put on a nerve ending or in the heart it interferes with how the nerve maintains its voltage across the membrane and it makes the nerve fire signals so the nerve thinks it's being activated in the same way it would be if the tissue were being cut or heated or traumatized.

Q And looking at John Doe One's deposition testimony, on page 57 he states, in discussing potassium, "The only way it hurts is by causing spasm in a vessel in your hand or in your arm or in your leg." Do you agree with the statement that potassium does not hurt if the vein does not spasm?

A It's not the spasm that hurts. It's the activation of the nerves in the walls of the vessel. Anybody could potentially inject it into a vein or just in the muscle or under the skin and it would be extremely painful.

Q So potassium would be painful even in veins that do not spasm?

A It would be painful anywhere that has nerves, sensory nerves.

Q And looking at the directly following testimony on page 58 of the John Doe deposition transcipt, he states, "Plus the drug is diluted instantly. The amount of blood flowing through the interior vena cava amounts to a quart every two seconds, so it's instantly dissolved."

Could potassium not hurt in a femoral vein because it is diluted by blood volume?

A I think he's very wrong about that.
Q And why is that?
A I did some thumbnail calculations and discussed it with colleagues. We estimated that -- we know that the normal flow of blood in the body is about five liters every minute. And we estimated that about one liter a minute is coming from the lower part of the body and flowing past where the catheter tip would be in the configuration used in the Missouri executions. So you have one liter flowing through that vein every minute.

I think he describes the delivery of the potassium as occurring over about 30 seconds at one point. So in 30 seconds about half a liter or 500 mls would flow past the end of the catheter, and during that time they're injecting potassium. I'm not sure if they're injecting 120 milliequivalents or 240 milliequivalents because of the confusion about the dosing, but let's take the lower dose just to give him the benefit of the doubt. If 120 milliequivalents of potassium is injected into half a liter, that will result in a concentration of 240 milliequivalents per liter, plus the normal five milliequivalents per liter that's in the blood already so it will result in the concentration of potassium that's

20-fold higher -- is that right, I'm sorry. No, 40-fold higher than what's normally present in the blood, and more than 20 fold, and that would be far higher than necessary to maximally activate the nerve fibers.
Q And is the concentration of potassium high enough to

stop the heart?
A Yes. And it stops the heart in the same way that it activates nerve fibers. It's basically activating the nerve fibers -- or the fibers in the heart that are like the nerve fibers that carry electrical statements to the heart. So if you are giving enough to stop the heart, you're also giving enough to cause pain in the veins. And in fact we know from reports where accidentally in a therapeutic setting a high concentration of potassium was given to a patient, and it was a terrible mistake obviously, but before stopping the heart it causes extreme pain in the veins.
Q John Doe One states in his deposition testimony that it's not necessary to do any calculations to be sure that the potassium would be sufficiently diluted so that it doesn't hurt. That's on page 61. Do you agree with that?
A You can't know it's unnecessary to do calculations until you do them, so if you run through the numbers like I did, and again I'm making some assumptions, but I think they're all reasonable ones, then you end up with a

concentration that basically almost no matter what reasonable assumption one makes, it's a very high concentration and it would certainly activate nerve fibers.
Q I'd next like to draw your attention to the deposition testimony of John Doe One on page 61. He states, "We use the femoral vein to insert a catheter that I think is about 16 inches long, so actually from the femoral vein if you measure up to your xiphoid which would mean it's about two

inches from the heart, so the catheter is almost in the heart when -- so the drug is directly injected below the heart as it enters."

In your experience, do catheterization trays always come with such a long catheter?

A This -- the triple lumen catheter is what we're talking about here are not -- did you say 18 inches long?

Q 16 inches.

A They are not 16 inches long and they don't go anywhere near the heart.

MS. ANDERS: I'd like the record to reflect that I'm showing opposing counsel what's been marked as Plaintiff's Exhibit 28.

Q (By Ms. Anders) Do you recognize this photo, Dr. Heath?

A Yes. It's the package or kit that the triple lumen catheter is supplied in. It's a sterile and sealed kit.

Q So is this an accurate representation of the catheter tray that you observed during the tour of the execution facility?

A Yes, it is.

MS. ANDERS: I'd like to offer Exhibit No. 28 into evidence, Your Honor.

MR. HAWKE: No objection.

THE COURT: Be received.

Q (By Ms. Anders) Could you read the length of the catheter that is included in the catheter tray?

A Yes. It's in the first line here. It says that the

catheter is 5 and 7/8th inches long, almost 6 inches long.
Q Thank you. And even if the catheter did go all the way almost to the heart, could the potassium still hurt?
A Yes. The heart has many sensory fibers. We all know that because a heart attack is an extremely painful thing. And so in stopping the heart it's also activating those nerve fibers. Also, to be pumped through the actual muscle of the heart, the potassium has to travel through the right side of the heart, which is the side of the heart that pumps venous blood into the lungs, has to travel through the right side of the heart and has to be pumped through the lungs which themselves have a lot of sensory nerve endings, and then flow back from the lungs after it has picked up oxygen and be carried to the left side of the

heart, and from there it's pumped into the aorta and into the actual muscle of the heart.

It's quite possible that in order to get to the actual heart muscle it has to be pumped all the way through the lungs regardless of where it's being introduced. But in this setting, it's being introduced no way near the heart. It's being introduced down in the pelvis six inches from the groin where the catheter is inserted.
Q So more broadly, are John Doe One's statements with respect to the possibility of pain arising from the potassium injection, in your view, failure to acknowledge the risks of the execution?
A Yes. He's not acknowledging that there are numerous things that can go wrong and that those things can cause

problems with drug delivery and cause problems with the humaneness of the procedure.

Q In John Doe One's answers to the plaintiff's first interrogatories, this is No. 33, John Doe One states that pancuronium, quote, will mitigate likely seizure activity and involuntary movements and thus result in a more peaceful and humane death. Do you agree with that statement?

A He's partly correct. It will stop involuntary movements. It stops all movement, all the muscles in the body except the heart and the muscles in the blood vessels.

But it will stop the movement of all the muscles in the arms and the legs which are normally moving around in a seizure. But he's wrong, it won't stop the seizure. The seizure is actually a thing that happens in the brain. It's abnormal electrical activity in the brain, and when we see somebody jerking around in a seizure that's what we call the motor manifestations, the muscle manifestations of what's occurring in the brain, and pancuronium wouldn't afect that. It doesn't really enter the brain. And so while it will stop physical movement, it wouldn't stop the seizure from occurring. It certainly wouldn't make it any more humane.

Q Does pancuronium have any anesthetic or sedative effect?

A None whatsoever. The only effect it has is to stop one's ability to move muscles that we're normally able to control. It doesn't affect our thinking or ability to feel

pain, our consciousness or awareness, and it doesn't affect whether a seizure occurs or not.
Q So have John Doe One's statements in this case given you concerns about whether he's competent to ensure that executions are performed humanely?
A Well, given how these executions are being performed in a way that requires general anesthesia to first be successfully administered and monitored, no, he's not

competent to do that.
Q What are you basing that on?
A On the numerous factual errors, some of which you raised here, but he has things just completely backwards. It's like he's driving on the wrong side of the road and doesn't realize it. That's very concerning.
Q Do these factual errors raise concerns in your mind about John Doe One's medical judgment?
A Well, first of all, you can't have good medical judgment -- if your facts are wrong, then your judgment can't be good. But even if he had the right facts, some of the judgment calls that he's made are very concerning.
Q Do you believe that entrusting John Doe One with responsibility for inducing general anesthesia, including the preparation of thiopental, creates a significant risk that the inmate will be improperly anesthetized?
A It does, yes. He should never be entrusted with general anesthesia under any circumstances unless he's going to undergo a considerable amount of training.
Q So is there significant risk, therefore, that inmates

will suffer excruciating pain?
A Yes, there is.
Q And do you believe that entrusting John Doe One with responsibility for the femoral catheterization procedure also creates a significant risk that inmates will suffer

pain from the procedure?
A Yes.
Q Okay. Now I'd like to talk with you a little bit about the drug delivery system that's maintained in Missouri at Bonne Terre.
THE REPORTER: Ms. Anders, I need to change paper.
THE COURT: Why don't we take a recess, about ten minutes. Give you a chance to stand and stretch a little.
(Recess)
MS. ANDERS: Your Honor, just very quickly I'd like to ask if it's okay with the court if the expert witnesses sit in on the testimony. I think the parties have agreed that would be okay, and I'm very sorry. I think we misunderstood.
THE COURT: If there is an agreement there, I don't have a problem.
MR. HAWKE: There is. It's no problem.
MR. PRITCHETT: Just so it's clear, the agreement included Mr. Moore could come in as well.
THE COURT: I kind of figured.
Q (By Ms. Anders) I'd like to talk with you about your inspection of the execution facility at Bonne Terre and the

drug delivery system used by the Missouri execution team. I believe you testified before that as part of your

participation in the execution system you observed the equipment as well as the facility itself; is that correct?

A That's correct.

Q And did you draw any conclusions with respect to whether the drug delivery system allows the execution team to ensure a humane execution?

MR. HAWKE: Objection, Your Honor. This line of questioning is beyond the scope of the Court of Appeals' remand. The issues before the court concern the efficacy and humaneness of the three-drug protocol as well as the use of the femoral access. It does not involve drug delivery systems and things like that.

MS. ANDERS: Dr. Heath testified before that components of the execution procedure include the manner in which the drugs are delivered into the inmate, and a large part of the issue here is whether the anesthetic can be successfully delivered into the inmate's circulation. So because of that, the drug delivery system is very, very relevant.

THE COURT: I agree. Objection is overruled.

Q (By Ms. Anders) Dr. Heath, did you draw any conclusions with respect to whether the drug delivery system allows the execution team to ensure an humane execution?

A I did, yes.

Q And what are your conclusions?
A There are several problems with the layout in the execution chamber and the drug preparation room or the work room that's right next to the execution chamber. The drugs are delivered from one room through a wall into the room where the prisoner is and the IV tubing disappears into a hole in a desk and goes down under that desk and out through the wall and then runs along the bed underneath the sheet so one cannot survey as is necessary the tubing through which the drugs are supposed to flow.
Q So I believe it's implicit in your answer, but does the execution team administer the drugs from a different room?
A Yes, they're standing in one room, and in a completely separate isolated room is the prisoner who is being executed.
Q When, if ever, do anesthesiologists induce general anesthesia from a remote location?
A One would never induce general anesthesia from a remote location. That would be completely, deeply beneath any reasonable standard of care.
Q Does remote induction of general anesthesia create a risk of improper anesthetization?
A Yes, it does. One is unable, if one is in a different room, to assess whether one has achieved the desired or

necessary anesthetic depth.
Q Why is it -- what does monitoring anesthetic depth

entail?
A It's a very complicated thing. It's essential for an anesthesiologist to do. It involves integrating an array of different information from monitors, from different monitors, from what the patient is doing, and being able to touch the patient and perform various tests.
Q And why is it necessary to monitor anesthetic depth?
A Because anesthetic depth is not something that one can predict based on what one has done, so we give -- what we do is we do what's called titrating for effect. It's like somebody who is trying to get a certain level of intoxication from alcohol. They drink a certain amount. They see what effect they get and then they drink however much more they need to get to where they want to be.
Anesthesiologists are doing the same thing. We're giving drugs and we don't know exactly what they're going to do to any individual when you give the amount that we need to give to get an effect. And if we don't have that effect, then we continuously adjust that so we know how much more or less we need to give and we need to have some way of knowing how deep their level of anesthesia is.
Q Is it necessary to monitor anesthetic depth even when a large dose of thiopental is being given?

A Yes, it's always necessary to monitor anesthetic depth when you're using intravenous anesthetic drugs. With the gases that people inhale for anesthesia, we can actually measure how much gas they're breathing in and breathing out and that tells us in real time how much drug is present in

their body. But with intravenous anesthetics we don't have any, unfortunately, have any tests or devices or machines that tell us the concentration of drug in the body, so we have to do the next best thing which is rely on different monitors and other tests and to integrate that information in a continuous real time basis to come up with our best estimate of what the anesthetic depth is.

Q And so is there any other way besides monitoring anesthetic depth to determine that the entire intended dose of anesthetic has been delivered and has the desired effect?

A No. We think we're getting a certain amount of the drug, but we don't know that for sure unless -- we don't know that we have given the right amount, that it's successfully entered the circulation until we test or assess what the result was, and that's why it's always important to test anesthetic depth before initiating any painful or uncomfortable procedure.

Q And so is it necessary to monitor anesthetic depth even if there is no need to bring the inmate out of the

anesthesia?

A It's important for you to know that for a humane execution to take place. If you care about that, then you have to in some way assess and show that a surgical plane of anesthesia, which is a deep enough level of anesthesia that you could do surgery on a person and it wouldn't cause them pain or suffering. So if you want to know that it's humane, you need to show that there is a surgical plane of

anesthesia.
Q Based on your observation during your inspection of the execution facility, does the execution team's vantage point in another room allow them to monitor anesthetic depth?
A No. They only have one -- they have two monitors, but only one useful monitor for assessing anesthetic depth and that's the monitor giving them the heart rate information and that's a monitor that can be used, when integrated with many other monitors, other medical signs, to give indication of anesthetic depth. But they can't, as we need to be, be physically in contact with the patient, standing right by their head and able to test various reflexes and do tests along those lines. And they don't have other monitors like blood pressure and other things that we use. So from where they are, they cannot make any meaningful determination of anesthetic depth.

Q Can a heart rate monitor alone give you a meaningful reading or meaningful sense of anesthetic depth?
A Not by itself. It's one of many different monitors and clinical signs that we continuously integrate. We continuously absorb that stream of information from many sources and use it to synthesize our assessment of what the anesthetic depth is.
Q And how does the execution team visually observe the inmate?
A They're standing in a different room. There is a window between the execution room and the -- I'm sorry,

there is a window between the room where the executioners are standing and where the prisoner is lying on the bed. So they're looking down with a view from the head of the prisoner down towards his feet.

Q While at the inspection, did you perform a simulation to determine what view the execution team had through the window into the execution chamber?

A Yes. We had one of the people who was present lay down on the bed that's used at the executions and then the door to the execution chamber was closed and everybody went into the work room where they inject the drugs from and the camera person stood at each of the locations where each of the executioners were standing to record a video version of the view that they would have during the execution.

Q And could you describe the view through the window?

A Well, it's difficult to describe. Maybe a picture would help. But you're looking down from the head of the prisoner towards his feet and all you can see is the top of his head or a very shallow view of his face. And then you're looking through a venetian blind, a screen that partly obstructs the view. And then the window is also -- it's a one-way mirror, a partly silvered mirror, so -- a window, so I think it's kind of like looking through sunglasses. It obstructs some of the flow of the light.

Q I'd like the record to show I'm showing opposing counsel what has been marked as Plaintiff's Exhibit 29.

Do you recognize this scene, Dr. Heath?

A Yes, I do.

Q And what is it?
A This is a picture taken by the video filmer of one of the people who was present at the inspection and he's lying on the bed that's used for the executions and he's covered with a sheet, which is how the prison personnel describe the execution being done. And to his -- to the right of his head you can see a window and I believe that's where some of the witnesses sit. I'm not sure if it's the official witnesses or family members. And then to the left of his head, which is sort of above his head, is a window that leads into a different room where the execution

personnel and the physician and other individuals are present.

You can see under that window there's a hole in the wall and IV tubing coming out from that hole and under the sheet, and then it runs into the groin of the condemned prisoner. So that IV tubing was set up to simulate -- set up by the prison personnel to show how things are set up during an execution.

Q So based on your observation during the execution chamber tour, this is an accurate rendition of the view on the gurney?
A This is what we saw on the tour, and the prison personnel indicated this is how things generally look during an actual execution.
Q Thank you.

MS. ANDERS: I'd like to admit Exhibit 29 into evidence.

MR. HAWKE: No objection, Your Honor.
THE COURT: Received.
Do you plan on offering the videotape at some point in time?
MS. ANDERS: Yes, I believe --
THE COURT: Because if this is contained on that, we can save some time. It will be part of the record. It's of no real value for me to see this because I have

seen it.
MS. ANDERS: We don't have the videotape here.
MR. HELLMAN: But we can offer it, yes, Your Honor.
MS. ANDERS: We would like to offer the videotape of the tour into evidence.
THE COURT: We'll make it part of the record, if there are no objections.
MR. HAWKE: No objections.
MS. ANDERS: Thank you, Your Honor.
Q (By Ms. Anders) So from this perspective --
THE COURT: What would the number of that be?
MS. ANDERS: I'm sorry. The number of the videotape will be 47.
THE COURT: Show it received.
Q (By Ms. Anders) So, Dr. Heath, from this perspective, is it possible to see the inmate's face?
A Yes.
Q And is it possible to see the IV tubing?
A I can see a little bit of the IV tubing, yes.

Q And I show you another photo that is part of Plaintiff's Exhibit 47. Have you seen this scene before?
A Yes, I have.
Q And could you describe what this photo shows?
A This is a simulation again of the prisoner lying on

the bed or the gurney. Now, this is in a different room. This is in the work room or the room where the executioner stands, and it's looking down from where the IV tubing, the end of the tubing is and where the drugs are injected from, looking down at the top of the person's head. It would be the prisoner's head.
Q And do you believe that you'd be able to ascertain whether general anesthesia has been successfully induced using this view?
A No, you can't make any such assessment.
Q Why not?
A You're in a different room. You can't see the person's face well. The top of the head doesn't really show, or doesn't show any indications of whether somebody is anesthetized or not. The face can reveal information about that. You can't see any part of his body, and again, there are no -- there aren't the monitors that we normally deploy to help us assess anesthetic depth. And you certainly can't touch the person, which is one of the important things or methods we have available to us to assess anesthetic depth.
Q I'd like to draw your attention to a statement from the John Doe One deposition transcript, page 41, in

response to the question, "Did you monitor Mr. Gray's anesthetic depth during execution?" He stated, quote, "The

only thing that can be monitored is facial expression and you can judge when the effect of the drug is accomplished, and that can be seen from across the room through a window."

Do you agree with that statement based on your observations of your view into the execution chamber?

A Well, first of all, you don't have a good view of the face. You certainly don't have the kind of view that you would need to monitor facial expression if you're using it to monitor anesthetic depth. But much more importantly, he's totally wrong about being able to use facial expression in this context to monitor anesthetic depth. If the thiopental didn't work properly, when the pancuronium goes in, it will cause a relaxed facial expression, similar or identical to what expression we get with thiopental. So from being -- even if one were standing right next to the person, the rapid onset of pancuronium and the rapid onset of thiopental would be very similar.

Q And based on your observation of the IV tubing, is it possible to monitor the flow of drugs through the IV?

A No. You only see a very small part of the IV, maybe and few inches where it comes out of the hole in the desk, and you can't see any of the rest of the extent of the IV. Most importantly, you can't see the connection where the IV plugs into the triple lumen catheter. That's underneath

the blanket or the sheet.
Q So if the IV tubing can't be seen, are there potential problems that could arise with the IV tubing that cannot be detected?
A Yes. It can disconnect or partly disconnect and leak. It can have a hole in it. It can kink. There are numerous problems. And that's why it's our standard of care when we're inducing general anesthesia in a patient whenever possible to have the full extent of the IV tubing completely visible and laid out in a neat fashion so that we can clearly see that the conduit through which the drugs will flow is working properly.
Q And based on your observation of the IV tubing, do you know whether the execution team uses an IV bag or drip?
A They do not use an IV bag or drip. They just inject straight into the end of the IV tubing.
Q Is it standard medical practice to use an IV bag and drip of saline or other solution when inducing general anesthesia?
A Yes. What we normally do is connect a bag with a drip chamber so we can see the rate of fluid as it enters the IV and when we introduce the drugs into the IV line, we can see that the fluid is flowing properly.
Q So to your knowledge, does any other state not use an IV bag in its execution procedure?

A Everywhere else that I'm aware of, unless they have made a recent change that I'm not aware of, does use IV

bags.
Q When you are injecting drugs through IV tubing, are there any tactile clues that can help you ascertain whether the drugs are flowing properly?
A Yes. There is a thing that we call back pressure. When you are pushing on the plunger of the syringe, there is a certain amount of resistance to pushing that plunger in, and it depends on many factors. If there's just air in the syringe, you can push that plunger very easily. If there is fluid in the syringe, then you have to push harder. And it depends on the viscosity of the fluid. And if it's connected to an IV tubing into a catheter, then one needs to push even harder.

And we learn from experience what the normal feel of that pressure is for a given size syringe, and if we're not feeling that normal feeling that's one of the indications that we have that something is going wrong with the injection. It's hard to describe in words. Sort of like riding a bicycle. It's something you need to get a feel for, how a plunger should normally feel.
Q So how does a person acquire that feel for the back pressure?
A The way you learn that something is going wrong is

if you have -- over time from learning how to inject drugs and how to induce anesthesia, one has bedside experience in giving the drugs and seeing what happens. And sometimes we do have an infiltration or a problem or a leakage, and, for example, if you're injecting and there's a leakage, things

won't feel right and you'll see a leakage and you connect that in your brain and you know in the future when things don't feel right that maybe that's what the problem is.

Q Do the persons who inject the drugs have any medical training?

A Apparently not.

Q And do they perform rehearsals or train in pushing the syringes, based on your review of the documents?

A No, they don't. There are some states where there is rigorous training protocols where the guards or the injection personnel are timed injecting the syringe at a certain rate and knowing what the feel -- what the back pressure feels like. But there is no indication that that's been done here.

Q And are rehearsals important to the execution procedure?

A Yes, it is very important. One needs to have a protocol and one needs to rehearse that protocol because several people are involved in effecting the execution. It's a series of steps that have to be taken in the right

order and the right way. Everybody has to know what their responsibilities are and where to stand. And the rehearsal process allows a quality assurance. It allows one to work out the kinks and the bugs that are inevitably present in a complex endeavor.

Q Based on your observations of the execution chamber, is it possible to see the catheter site?

A No. That's covered up by the sheet that's placed over

the prisoner.
Q So if the catheter had infiltrated would the execution team be able to detect it?
A By infiltration you mean if the fluid was leaving the catheter and not going into the vein, what we call extravascular position of the catheter tip, they would not be able to see that in this configuration.
Q And if a large hematoma had formed, would the execution team be able to detect it?
A Not in this configuration unless the sheet became blood-soaked. That might give them a clue that something was going wrong, but that would require the blood to actually be leaving the body as opposed to collecting inside the body in a hematoma.
Q I'd like to draw your attention to a statement from the transcript of John Doe One's testimony in his deposition, page 31 of the transcript, he states, "The

people who do the injections are nonmedical and they're in the dark so they have a small flashlight that they're able to quickly identify the syringes." Does injecting the drugs in the dark create a risk of mistakenly injecting the syringes in the wrong order?
A Yes. That's a ridiculous thing that they're being asked to work in this encumbered or hindered situation where they don't have good visibility of what they're doing. That's a completely needless set-up for a problem.
Q So in general, do the problems in monitoring the inmate for anesthetic depth exacerbate the risk that

complications could go undetected?
A Yes, they do.
Q Does the inability of the execution team to detect problems or complications exacerbate a risk that a mistake by John Doe One or any other member of the team could go undetected?
A Yes.
Q So is it your -- do you have an opinion as to whether the drug delivery system used by Missouri creates a significant risk of pain to the inmate?
A It does, a significant and needless remedial risk.
Q Assuming that the doctor -- John Doe One's discretion is in the future limited and he is required to give five grams of thiopental, does that allay your concerns

regarding the doctor's lack of qualifications to induce anesthesia?
A No, it doesn't. First of all, my understanding is that ultimately the warden or the director of the Department of Corrections is responsible for all -- everything that happens regarding an execution, including the details. But the doctor has said that he's the person, the only person they have to advise him about any of this -- of these features of the execution, of any of the medical aspects, so it's pretty clear that any directive that would come from the higher-level person would be initiated by the doctor himself. So it's just sort of a bureaucratic work-around and it leaves him basically as the sole person who is guiding what's occurring.

And as we have discussed, he's completely lacking in the credentials and qualifications and knowledge, skill set and experience to be entrusted with the delivery of general anesthesia, especially in an incredibly important thing like an execution.

Q And does determining the intended dose of thiopental ensure that that is the dose that will be delivered successfully into circulation?

A I'm sorry. Could you ask that again?

Q Does determining with certainty what the intended dose of thiopental is, does that guarantee that that intended

dose will be delivered successfully into the circulation?

A No. You could be intending to give five grams, you could be intending to give 50 grams, it doesn't really matter. When you give intravenous drugs you need to undertake some independent method of assessing what the effects of that intended dose is and find out what in fact actually happened. That's absolutely essential.

Q Earlier you testified about the components of a written execution protocol. Is a directive that specifies the dosage of the drugs the equivalent, in your opinion, of a written execution protocol?

A No. It's more like you're saying it's a list that says the name of a drug and the dose of the drug. That's just a list of ingredients. What you really need is a full protocol that lays out in clear and concise detailed instructions everything that needs to happen. If you don't put that in writing, then it might not happen and that

jeopardizes the interests of the state and the Department of Corrections and of the prisoner.

Q Assuming that the doctor still has discretion to determine alternative means of IV access, do you have concerns regarding the safety of the IV access procedure?

A This doctor has made a huge error in judgment in how he decided to obtain IV access. No other state to my knowledge proceeds by putting a femoral line or a

subclavian line in a person when a peripheral IV catheter placement can be achieved. So he should not -- he's just made, I think, too many mistakes and he shouldn't be entrusted with any part of this process.

Q Are there complications that can arise during any part of the execution that would require a doctor to make quick decisions using his medical judgment?

A Oh, sure. Sometimes things go wrong when we're inducing general anesthesia, just like they can go wrong when the plane is taking off or whatever, and you want the pilot of the plane and you want the anesthesiologist to be nimble and adept in figuring out what to do, and that includes making on-the-fly-calculations and understanding doses of drugs.

This doctor in his deposition basically said he'd have a hard time doing this stuff. He has his nurses help him out with these things, and he's no good with numbers. If he can't do his cable bill, then he should not be charged with making these on-the-fly ad hoc changes that sometimes a doctor would need to make inducing and

maintaining general anesthesia.
Q So then given that John Doe One would still be participating in or overseeing the execution procedures, or assuming that he would be, do you still think there would be a significant risk of unnecessary pain in the execution

procedure?
A Yes, I do.
MS. ANDERS: Your Honor, if I could have a moment.
That concludes my direct examination, Your Honor, but I'd just like to confirm that the Exhibits 1 through 23, which are the discovery materials, have been admitted into evidence.
THE COURT: Those are the ones agreed upon in advance?
MR. HAWKE: Yes, Your Honor.
THE COURT: Okay.
MS. ANDERS: The photo stills that we showed from the video, we separately marked those as exhibits. Would it be acceptable if we enter those into evidence, just for convenience?
THE COURT: I have no problem with that. They are part of the video anyway.
MR. HAWKE: No objection.
MS. ANDERS: Thank you.
CROSS-EXAMINATION BY MR. HAWKE:
Q Can you describe for the record what the execution chamber at the Eastern Reception and Diagnostic Center

looks like?
A The chamber itself, or the overall layout of all the

rooms?
Q The chamber itself.
A It's a room, I'd make a very broad estimate, of maybe twenty feet by twelve feet or something along those lines. There's very little in the room. The main thing is the bed that the prisoner is placed on, and I believe there are windows on all four walls of that room and I believe there were I think at least two doors to that room, one going to a work room where the executioners stand and one I think leading to the area where the prisoner -- the holding cell where he's kept before the execution.
Q And is the room constructed of block material, concrete block material?
A I'm sorry. I don't recall what the construction was. I think the walls might have been painted, so I'm not sure what it was made of.
Q And can you describe -- I believe you said during direct examination there was a window between the execution chamber and what was described as the execution support room?
A Yes, sir, there is.
Q What was the size of the window between those two rooms?
THE COURT: Get to the point here, because we already know, it's a matter of record what it looks like,

Mr. Hawke. If you have a specific question, get to that question.

Q (By Mr. Hawke) Would you describe that window as a large window?

A Yes, it's a full-sized window.

Q And I believe you said that there were blinds on that window?

A There's a venetian blind, yes.

THE COURT: Is this the window here (indicating)?

THE WITNESS: Yes. You have the picture where I can see the top of his head?

THE COURT: Yes.

THE WITNESS: Yes, that's the window.

Q (By Mr. Hawke) And when you're in the execution support room you can view what is occurring in the execution chamber through that window?

A Yes.

Q With the limitations you described during direct examination.

A That's correct.

Q And I believe the photograph reflects that there are thin black lines where the venetian blinds are?

A Yes, the slats of the blind are there, yes.

Q But the offender can still be observed through that blind?

A There's a limited ability to observe, yes. It's partly obscured by the things that I talked about. And if

I could just clarify, the blinds are at an angle so one's head has to be at just the right height to be able to see the prisoner's face, so one has to be standing in just the right place. So for some people, depending on their height and where they're standing, their view would be more obscured than others because of the angle of the slats of the venetian blind. It can only be -- its maximal transparency is only present at one angle.

Q Do you know what the purpose of the blinds is?

A We were told during the tour. We were given a reason for their presence, yes.

Q What was the reason?

A We were told that there are witnesses in the opposite side of the -- in the room that's opposite the work room and that there's a concern that those witnesses would be able to see through the window, even though it's a one-way mirrored window, and see what's happening in that room and they would be able to identify the individuals who were standing there. And it's a needless concern because when I stood in that same room we played with the blinds and regardless of the configuration of the blinds, you can't see the people who are in there. And even if you could, that situation could easily be remedied by having them wear

surgical masks or something else that would obscure their identity.

Q A disguise?

A Well, a disguise implies making them look like somebody else. I'm talking about something that would

make them unable to see who they are. That can easily be achieved.
Q Now, I believe you testified during direct examination that the tubing between the execution support chamber and the condemned could not be observed.
A Large parts of it cannot be observed. The end of it can be observed where one injects the drug.
Q So in the area that we're describing as the execution support room, the tubing can be observed?
A A very small tip of the end of it. If you're talking about a snake, it's like seeing just the very tail of that snake. So, yes, I suppose you could say that you're observing the tubing, but you're not observing the tubing in its full extent.
Q Now -- and the people who do the injection of the drugs observe the syringe; is that correct?
A I'm not sure I'd describe it as observing. It's a darkened room, but they do have their hands on the syringe and they're getting some tactile feedback in terms of back pressure on the plunger. I don't know if they're looking

at the prisoner or if they're looking at the syringe, so I don't want to characterize exactly what they're observing.
Q And how many people are in this area that is capable of observing the offender during an execution?
A Whomever is standing looking at this picture, that's the window there, and in front of them is a bench at about waist height and I believe that there's a line of three people standing pretty much shoulder-to-shoulder because

it's a small space behind that bench. And then also to the right-hand side of the bench, on the end of the bench, is another individual. And then there's the physician who I understand stands behind those three people but might also move around. His position is less fixed. And then it's not clear to me, I think there's the John Doe Two, the nurse who participates in the execution, and I'm not sure where that individual stands, or if they are one of those people.

Q Okay. Now, you testified during direct examination that you would not induce anesthesia from a remote location; is that correct?

A I have tried to think of circumstances where that might happen. It's very hard to come up with a realistic one where that would be needed.

Q And when you testified to that effect, I assume what you are describing there you would not induce anesthesia

for the purpose of surgery from a remote location; is that correct?

A For any purpose.

Q For any purpose. But what you're basing that on is your experience as an anesthesiologist who induces anesthesia for the purpose of surgery; is that correct?

A Well, we induce anesthesia for other reasons in addition to surgery, but if you're saying I'm basing it on my clinical experience and training, then that would be correct.

Q And you have not participated as a person involved in

the preparation and planning of an execution?
A I have not.
Q Now --
A If I can clarify that, because I have been involved in I wouldn't call it an execution of an animal but the euthanasia of an animal by intravenous techniques.
Q But that's not what is being done here; is that correct?
A No. What is being done here is not done to the same standard as what is being done to an animal during euthanasia.
Q And this is not surgery, is it?
A There is a surgical procedure that's already taken place with the placement of the central line.

Q But that's already passed.
A That's right.
Q Now, you stated during direct examination that you would always want to monitor the depth of anesthesia; is that correct?
A When administering anesthesia one does need to monitor its depth, yes.
Q And you base that upon your clinical practice?
A Yes, and my practice during animal research and also during my research about lethal injection.
Q Now, can you describe for the court why that is necessary, or is that necessary when a massive dose of sodium pentothal is given as the initial drug?
A It's necessary because while I may be intending, and I

believe there is an intent to give a massive dose, I'm very comfortable that it was John Doe One's intent to give these multi-gram doses, call them massive doses, just because that intent exists does not mean that translates into the successful delivery into the prisoner's circulation and delivered to the brain of that dose of thiopental.

Q And I believe during direct examination you used the example of alcohol, drinking; is that correct?

A I think I was using that as an example of what we call titrating effects. I was trying to describe how a person intoxicates themselves to a desired level by drinking a

certain amount and seeing what effect it has and then drinking more.

Q And if an individual were to consume, for example, five cases of beer, would you need to observe that individual drinking before classifying that person as drunk?

A Absolutely.

Q So you would want to actually see him do the drinking rather than categorize him as drunk after his ingestion of five cases?

A Well, again to characterize somebody as drunk you have to either do a behavioral test to show that they're intoxicated, I think that's what the police officers do on the roadside, sobriety test I think it's called, or you have to undertake some chemical measurement like a breathalyzer test to show the alcohol is there. So if you drink five cases of beer, it could be non-alcoholic beer

like the beer I had last night and I wouldn't expect them in any way to be intoxicated from that.
Q So your testimony today is that a dosing of five grams of sodium pentothal would be insufficient to induce anesthesia in Missouri?
A You are mischaracterizing my testimony.
Q Did you testify to that effect during direct examination?

A That was not my intent to testify to that effect. My intent was to say if one successfully achieves delivery of five grams of thiopental into a prisoner's circulation and the circulation successfully carries that throughout the body, including the brain, then that would be a sufficient dose to guarantee a surgical plane of anesthesia. But intending to give five grams is not the same as successfully achieving the delivery of five grams.
Q So to make sure I understand, if five grams goes in, then that's adequate anesthesia?
A If five grams, not just goes into the prisoner's body, but goes into his circulation and the circulation is active and carries it throughout the body including part of it to the brain then -- and there is nothing to obstruct the flow of blood to the brain, then that would deliver anesthesia.
Q And if 2.5 grams goes in, would that be sufficient?
A Yes, that would be. Again, not just going in, but being delivered into the vein and carried by the circulation throughout the body.
Q What number would you say would be insufficient?

A Well, you can't put a specific number on any individual person. That's enormous person-to-person variation and it's in response to many drugs, including anesthetic drugs and including thiopental. So some people, just like your beer analogy, can be rendered unconscious by

probably one beer and there are other people who I think can drink, I don't know, whatever large amount, like a case or something, and still manage to drive a car. So there's enormous variation. I can't put a specific number on it. It depends on other factors like the person's weight, whether they have been taking drugs like anti-seizure medications or many other drugs, anti-anxiety drugs that can affect their resistance to drugs like thiopental.

Q Have you ever monitored a condemned person during an execution?

A No.

Q So you have not observed a person being executed who was not under the effect of anesthesia, either in Missouri or around the country?

A I have never been present to observe the induction of general anesthesia during any execution procedure.

Q Now, I believe you testified that there was a monitoring device at the execution chamber. Is that an EKG monitor?

A My recollection is there is a thing called a pulse oximeter and another device called an EKG which monitors the electrical activity of the heart.

Q And the purpose of that is to determine when the

offender has passed away?
A I believe that's correct, yes. It is not being used

to monitor anesthetic depth.
Q Up on your computer screen is Exhibit 30. Do you know where in the execution support chamber that picture was selected? Whether that's the position of John Doe One, John Doe Two, John Doe Three or John Doe Five?
A I don't know for sure. I know it's not -- well, you have to understand that the video camera has a zoom function, so I can't tell from this picture how far the videographer was standing from the window when it was taken. I think it could either be from the person who is standing directly behind the bench or it could be from a person who is looking over their shoulder or between two of the people who are standing behind the bench, but I can't say for sure because of that zoom effect.
Q Now --
A But there's a wall behind that area, quite close behind it, so they couldn't have been more than probably -- I'd say that's at most five feet, probably more like four feet from the window.
Q Now, you said that there could be a problem with the IV access because it would become disconnected; is that right?
A Yes.
Q If it becomes disconnected, then none of the drugs enter the offender; isn't that correct?

A If it's fully disconnected, then no drug would enter. In fact, there would be blood leaking back out of the triple lumen catheter. If it became partially disconnected, which is another kind of disconnection, then there would be -- one would expect only a partial delivery of the drugs.

I'll make this comment. The way it's set up with a mattress is different from other -- many other execution chambers. Other execution chambers just have a hard metallic gurney and any leaking would immediately drip through onto the floor. But in this setting there's a mattress there that in all likelihood would absorb a considerable amount of fluid before it showed up on the floor. And again, the IV introduction site is deliberately kept visible to the personnel so they can see if a leak is occurring. And neither of these conditions are applied here.

Q Now, for it to be disconnected, the entire length of the catheter would have to come out of the offender; isn't that correct?

A No, that's incorrect.

Q So there is a connection between the catheter and the tubing that you're saying could become dislodged?

A That's correct. There is a piece of tubing, I forget how long it was, maybe six or seven or eight feet,

something like that, and then that is attached to the end of the triple lumen -- the end that's outside the prisoner

of the triple lumen catheter.
Q And if that were to happen, none of the drugs would go into the offender; isn't that correct?
A If there was a partial disconnection, then there would be a partial reduction in the delivery of drugs. If there was a complete disconnection, then there would be a complete obliteration of all drug delivery.
Q And similarly, if there is, as you described it, a kink in the line, then the drugs, none of the drugs would go into the offender; isn't that correct?
A No, that's not correct.
Q Okay. If there's a kink in the line are you saying they would go into the offender more slowly?
A A kink in the line could be a complete obstruction so that no drugs could go in, or it could be a partial obstruction, increasing resistance. Just like your garden hose, you can kink it so no water comes out the end of it, but you can also kink it in a way where the flow is just decreased. So another possibility is if the tubing could be kinked. And the way it's configured, there's a real risk of that, and that would increase the resistance to injecting drugs and it would also interfere with the ability to assess the back pressure, which, as I described,

is an important thing.
Q So when that happens, the person who is doing the injection has to plunge harder?
A My understanding in this context is they are unable to plunge harder because they are already plunging as hard as

they can, so they would be unable to do anything greater than what they were already trying to do.
Q So in that scenario is the effect of the kink the drugs would go in more slowly?
A That's correct.
Q Now, your understanding of the Missouri protocol is that there's one -- is it correct that your understanding is that there is the first drug, sodium pentothal, followed by a flush, followed by a second drug, Pavalon, followed by a flush, followed by the third drug, potassium chloride, followed by a flush?
A Just to clarify, there is no protocol. But in terms of what has been done in the past, that's a fair representation of the drug phase. But as I described, I think it's useful to break this whole thing into four phases, with the first phase being achieving an IV access, and that's something that warrants protocol surrounding that. And then there's the second phase, which is delivery of the anesthetic. The third phase, the paralyzing drug. And the fourth phase is the drug that causes death.

Q But that is a correct description of the order that the drugs are injected?
A That's correct, that's the order they're intending to inject them.
Q And if there is a kink in the line, that would not change the order of the drugs that are being injected?
A No, it wouldn't, unless a person said something is wrong and stopped and they said we better stop this and

they went and decided to run a different line of tubing or maybe plug it into a different one of the three catheters in the triple lumen catheter and they forgot where they were, or the syringes got knocked around in that process. So there are ways where a kink -- anything that disrupts the sequence of injection in an unexpected way can cause disorder and, therefore, disrupt the smooth performance of the procedure.

Q And are you telling the court this morning that there should be a written protocol that covers all of those contingencies?

A When you have individuals who are not competent or qualified to adapt to unexpected events and contingencies, then you need to have some written instructions for them about what they would need to do.

Q To cover all contingencies?

A I think all reasonably foreseeable contingencies. One

needs to plan properly for an important event like this. Obviously there are things that can happen that nobody can reasonably expect or anticipate, and that's why in the end you also want to have people who are able to adapt.

Q When you say reasonably foreseeable, what percentage of a possibility are you placing on that? Is it like a one percent chance of something happening or a tenth of a percent chance of something happening or a hundredth of a percent chance of something happening? What are you telling the court?

A You can't put numbers on it. It's like teaching

somebody to drive to be safe to take a motor vehicle on the road. They have learned a lot of procedures as it were, how to use their hand brake and how to signal and how to do various things. They learn how to make hand signals if their signals go out. But there are things that you can't anticipate, so they need to have a certain demonstrative level of training and proficiency in driving a car before you allow them to go out on the road. And there are unexpected things that you can't put down in the driver ed manual that can happen. A cow crossing the road, that's probably not in the book, but the person needs to be able to figure out what to do if a cow crosses the road, that there might be other cows coming around and they need to slow down and take it easy.

Q Now, you state that other states do not use an IV bag, is that correct, in their execution protocol?
A If I stated that, I misspoke. Other states do use IV bags.
Q And Missouri is the only state that does not?
A To my knowledge, yes. I should clarify that while most states have revealed their written protocols in some cases to the public and in other cases under protective orders, not every state has done that.
Q Now, the reason -- is there a reason that they use an IV bag?
A I'm not inside their head so I don't know what is their thinking, but there is a good reason to use IV bags for the induction of anesthesia.

Q Now, in Missouri the execution process is a very quick process; isn't that correct?
A Can you describe quick? Quick as compared to what?
Q Compared to surgery, what you're used to.
A We're not talking about surgery. We're talking about the induction of general anesthesia, and I'd say within boundaries it's approximately the same kind of time frame as induction of general anesthesia tends to occur during a clinical setting.
Q Now, assuming that an execution is scheduled at midnight, do you recall when the insertion of the catheter

occurs?
A I'm sorry, I don't recall, but I believe it was in a relatively short time frame beforehand. It was not the day before or anything like that.
Q And the purpose of using the catheter would be -- is only for the execution; is that correct?
A That's right. It's not being put in for any therapeutic purpose.
Q So once it's used, there's no further use for it?
A Once the execution has been achieved?
Q Yes.
A Yes. Assuming the execution is not stayed, assuming the execution is actually carried out, then that catheter does not serve any useful purpose, although for autopsy purposes it's standard procedure to leave all catheters in their normal place.
Q I believe you stated during direct examination that if

there was leakage, that the syringe -- that the pressure on the syringe would not feel right. Am I summarizing your testimony correctly?

A It might not feel right, that's correct, yes. Depending on the leakage and whether there were things like kinking or other problems interfering. And also implicit in that, knowing that it would feel right implies that the person has in their head a notion of what feeling right and

feeling wrong is. If they lack that, then there is no feel right or feel wrong for them to experience.

Q Are you familiar with the experience of John Doe Three and John Doe Five in the execution process as injectors?

A I'm sorry, I don't have in my head exactly who -- I know who John Doe One is, not who they are but I know what their responsibilities are, John Doe One, the physician, John Doe Two, the nurse. But if you could refresh me on what John Does Three, Four and Five specifically do. I don't want to confuse the record.

Q Three and Five are the current injectors.

A They're the individuals pushing the drugs?

Q Yes.

A Okay.

Q Are you familiar with their experience at doing that job?

A I don't know their life history, how many executions they have participated in, how many times they have injected through central lines and all of those things, no.

Further, I believe those are just titled

positions. They could be occupied by any individual, just like the presidency or a senator. So it's a titled position, No. 1, No. 2, No. 3, that any individual could occupy. If John Doe Three was sick that day, somebody else would step in to fill his place, I believe. So I don't

know the backgrounds of whomever might be available to step in.

Q Now, the syringes that are used at the execution support room, do you recall that those syringes are labeled?

A You'll have to refresh me. I don't want to confuse the record. I have seen many different methods used in different states. I believe that the name was written on the syringe, but I'm not sure whether it was -- a paper label was put on or whether it was written directly on the syringe, so if you could describe for me what is done, that would be helpful.

Q You don't remember?

A I don't remember precisely. I believe they wrote with a magic marker on the actual plastic of the syringe.

Q And do you recall that the syringes are placed on a block of wood in a particular order in the execution support chamber?

A Yes, I do recall that there's an especially shaped block of wood with concave depressions in it for the syringes to lie in.

Q And they go onto that block of wood in the order in which they are to be given; isn't that correct?

A That's the plan. That's what is supposed to happen, but there is no protocol dictating that.

Q I believe you testified during direct examination, and correct me if I'm wrong on that, that even if Missouri intended to use 50 grams of sodium pentothal, you would still find the Missouri practice to be unacceptable?
A If that were the only change that were made, yes. When you use potassium to kill a person or any animal, which is what is being -- what the Department of Corrections is choosing to do in this setting, it's essential that the person who is performing the administration of the potassium, intravenous potassium, is experienced in the assessment of anesthetic depth and experienced in the administration of intravenous anesthetics and, further, that they undertake specific tests to ensure that the person or the animal is properly anesthetized, they're at a surgical plane of anesthesia.
So if the only change that were made to Missouri protocol were just to increase the dose of thiopental, that would still be deeply adequate. It's very important to have a person who knows how to check anesthetic depth, who knows how to administer intravenous anesthetics, actually go and assess that the animal, if it's a veterinarian procedure, or the prisoner in an execution, if you want the execution to be humane, they have to assess that the surgical plane of anesthesia has been achieved. If they don't do that, it's inadequate.

Q So a massive overdose of the first drug, sodium thiopental, is insufficient, in your estimate?
A The intent to deliver a massive overdose is insufficient. When veterinarians use potassium to put down dogs, they have an intent to give a massive overdose of barbiturates. They are also professionals who are trained and experienced in the administration of intravenous anesthetics. Even in that setting, even when they're right there in the same room, they are required to be knowledgeable in assessing anesthetic depth and are experienced, and they are required to undertake certain tests to demonstrate a surgical plane of anesthesia.

So you can be intending to give any amount of thiopental. It doesn't matter if you're going to use potassium to kill an animal or a person, you need to first demonstrate a surgical plane of anesthesia. You need to assess anesthetic depth.

Q So giving a massive overdose is insufficient?
A Intending to give a massive overdose is insufficient. If you successfully achieve delivery into the circulation, which is something that can never be assumed with intravenous anesthetic, then a 50-gram dose would certainly be sufficient, but you can never make that assumption.
Q Is there any barbiturate that would satisfy you?
A If one is going to use potassium to cause cardiac

arrest, to achieve the death, then it doesn't matter what drug you use to provide the anesthesia or how much you're

intending to use. You must assess the anesthetic depth. You must demonstrate the animal or the person is in a surgical plane of anesthesia, which is a very deep plane of anesthesia.

Q Now, you stated during direct examination that Missouri was the only state to use femoral venous access; is that correct?

A If I stated that, that was a misstatement. It's the only state that I'm aware of that does not first attempt to obtain peripheral IV access and only proceeds to femoral -- proceeds to a femoral access in people who do not need femoral access.

Q Now, peripheral access is through the arm, or is it through the leg as well?

A Either one of those would count as peripheral IV access. The hands, the wrists, the arms. Anything -- I don't think there is exactly a bright line, but anything in the extremities would count as peripheral access. And I should just say the groin is -- the end of the catheter is inside the main part of the body, the trunk of the body, and most people would call that peripheral access.

Q And would you agree, generally speaking, that those peripheral veins are the ones that drug addicts use for the

injection of illicit drugs?

A That's right.

Q And that use of illicit drugs damages those veins?

A Over time it tends to do that, yes. It's not just drug addicts who have that problem. It can be people who

have never used intravenous drugs of abuse.
Q And would you agree with the statement that use of a femoral vein provides an effective access to the venous system, to the circulation system?
A When the catheter is properly placed, it does provide effective access, that's right.
Q And it puts the drugs -- it puts the poisons where they need to be, close to the heart; would you agree?
A Well, first of all, they're not poisons. They're medications. Secondly, the circulation is what carries them where they need to be. The place where they need to be is not close to the heart. The place where they need to be is different for each of those three medications. The thiopental needs to be in the brain and the spinal cord. The pancuronium needs to be in the muscles. And the potassium needs to be in the heart. The central line does not put them close to the heart. The circulation is what brings them to the heart and into the other places.
Q The central line places the potassium close to the heart; would you agree?

A Define close. What's your definition of close in this context?
Q Why don't you define it for the court?
A Well, just to clarify, I will say that peripheral IV access can be closer to the heart than central IV access. A catheter placed in the elbow right here has -- the drug would have to travel from about here to the end of the catheter, a distance of about one foot, to reach the heart.

And that contrasts with a femoral catheter that's down in the groin. If that catheter is six inches long, it comes up to somewhere in the lower pelvis, but it would still have to travel a considerable distance to get to the heart.

The surgeon mischaracterized his catheter and where its location is. He's very wrong. He's off by about --I think about ten inches, and that's a great distance.

Q About like that (indicating)?

A Yes. He's saying it's under the xiphoid, I think two inches from the xiphoid process, which is the bottom of the breast bone and very close to the heart, and he's wrong.

Q Now, you started your direct examination by stating that you had practiced anesthesiology for 15 years; is that correct?

A That's right. I think it's actually more like 18 years now since I became attending anesthesiologist.

Q But your practice does not include participation in the lethal injection process of any state?

A Not for human beings. I have done animal research where we have used IV intravenous drugs to end the animal's life after an experiment.

Q So when you stated that you induced anesthesia, that would be for a clinical purpose. Not for the purpose of lethal injection?

A In human beings, that's correct.

Q Now, you stated that you had been involved in lethal -- in testifying in other lethal injection cases; is that correct?
A That's correct.
Q And is there a state or a commonwealth where the government has retained your services to testify about the government's execution protocol?
A I know -- just to be clear what your question is --
Q The government being the state or a prison official.
A No, no one has ever asked me to testify in that regard.
Q So generally speaking then, it is fair to characterize your testimony as being at the behest of the offender; you are retained by the offender?

A In most cases. Sometimes it's been by another party, but not the state. There was an execution in Connecticut where the offender was volunteering, wanted to proceed and other parties did not want the execution to proceed, or the other parties were concerned about the manner in which the execution was going to be conducted.
Q In Connecticut, did they set up the peripheral access with two peripheral sites, or with one?
A I believe the Connecticut protocol calls for two access sites, but I don't recall specifically in that execution whether they put one or two in. In some cases there is difficulty in securing a second line and it's abandoned, so I don't know specifically. I can't recall that autopsy report.

Q In those states that use peripheral access, do they set up two peripheral IVs?
A Yes.
Q And in those states, do they use one of the access and keep the other as a back-up, or do they use them both?
A It varies from state to state.
Q Okay. So some states just have one in reserve if it's needed?
A That's correct.
Q And other states actually actively use both accesses?
A That's correct.

Q But --
A At least that's their representation. I'm not there to see what they actually do.
Q I understand. And I believe you testified that you had observed the execution chambers of other states.
A If I did, I -- only one other state.
Q One other state. Which state was that?
A California.
Q And did you approve of what you observed in the California execution chamber?
MS. ANDERS: Objection, Your Honor; relevance.
THE COURT: I'll allow the question.
A Well, I wasn't in the posture of approving or not approving. I don't have the authority to do that.
Q (By Mr. Hawke) Have you written a report about the California chamber?
A I'm -- I'm not sure that I have. I have written stuff

about it before seeing it. I just can't recall whether I was asked to provide a report after that inspection. I honestly don't know.

Q Let me approach the question a little bit differently. Are you critical of what you observed in California?

A There are some features of what is being done that is very problematic and some features that are not

problematic.

Q That's fine. Now, I believe you stated that you corresponded with the first person who set up the lethal injection process?

A Yes.

Q Who was that person?

A A person named Dr. Chapman. When I say set up, that's probably the -- when you say set up, that's not the term. The person who -- he's not the person who conceived the concept of lethal injection. I think that was actually done during -- by the German government in World War II, but he's the person who -- he's not the person who conceived the introduction of lethal injection in the United States. That was done by a legislator in Oklahoma, but he's the person who conceived the use of these three -- or the use of the drugs that are used in lethal injection. He didn't really go beyond that to talk about exactly how they are given as they are given now.

Q And he's the doctor from Oklahoma; is that correct?

A He is a doctor from Oklahoma.

Q Now, during direct examination I believe you stated that today you find use of capital punishment, and what I wrote down was, problematic when applied after the adversarial process. Is that --
A That's correct.

Q By that, I think I understand you to say that you disapprove of capital punishment. Am I understanding your testimony correctly?
A The problem is how you get to decide. In my view, one of the problems is how one decides who should get it and who shouldn't, and it's not -- it's a result of our judicial system, which has got to be the best judicial system in the world, but it's still designed to reach an outcome which is necessary for maintaining order in society, and generally that outcome is the same as a righteous or truthful outcome.

But the system is not perfect and errors can occur in the sense that the correct outcome might not be arrived at. And if the outcome is to do something irreversible, mainly to execute someone, then I think the protection can be arrived at in a open, truth-seeking method as opposed to an adversarial one.
Q So as it's currently administered today in the United States, you would be opposed to the imposition of capital punishment?
A That's correct. I should clarify I didn't really have a position on this before I found out what drugs were being used and how it was being done. It really wasn't on my

radar. It wasn't something that I thought much about.
Q Now, you stated during direct examination that your

review of the Missouri process showed that there were what you described as variations in the quantity of sodium pentothal given to the offender; is that correct?
A It showed variations in the amount that they were intending to give.
Q And those variations range between 2.5 grams and 5 grams; is that correct?
A No, we don't really know -- well, we know how many bottles -- sorry, kits, containers, each of which have half a gram, they took out. So it's accurate that it sets a ceiling of how much they were given. If ten kits, each containing half a gram, were checked out as it were, then it sets an apparent ceiling of five grams. There's no floor set here because as the doctor describes, they give some, they waste some, and they put down the total of those two amounts and so you can't tell.
And even with the doctor's intention, given what we know about these individuals working in the dark, under time pressure, a person who has difficulty completing a cable bill, who has numeric dyslexia, who has to rely on the nurse because he's not good with figuring out percentages and milligrams and things like that, you really don't know how much was delivered to those prisoners.
Q Okay. Now, the other states that you have studied, what is their intent on the quantity of sodium pentothal to

be administered to the offender?
A That also ranges -- the highest I have seen is five grams.
Q And what's the lowest?
A The lowest I have seen is around one or one and a quarter grams.
Q One or one and a quarter. Okay. So one, one and a quarter up to five is the intent of those other states that you have studied?
A To my knowledge, yes, although I'm also aware of consideration of protocol revisions that would change those amounts.
Q Downward or upward?
A Upward.
Q Upward. Okay. Is any state contemplating a change to an amount higher than five?
A I believe California is.
Q To an amount higher than five?
A I believe so, yes.
Q Okay.
A I think the latest iteration of their protocol included a bolus amount and also an infusion of a continuous drip, and that would result in a higher amount than five, but I'd have to refresh myself to be certain about that.

Q And on the second drug, the Pavalon, you stated there were also variations in the amounts that were given?

A There's apparent variations. Again, we don't know exactly how much was delivered. All we know is there was an intended amount.
Q Okay. And is it true to say that for every state we don't know what amount is actually given, only the intended amount?
A Well, many states perform toxicology testing, so after the prisoner is dead blood is drawn and used to measure the concentrations of the thiopental and/or the pancuronium and/or the potassium and that, in some settings, can be used to provide information about the amount of thiopental in the prisoner.
Q You might draw an inference; isn't that correct?
A Correct. You are sampling from one part of the body. The only way to know the total amount delivered would be to take the entire body and extract all the thiopental from the entire body.
Q And those measurements from the blood, it depends on where that blood is drawn; isn't that correct?
A That's correct. Among other things.
Q Now, I believe you stated during direct examination that no other state has a physician participate in the lethal injection process.

A I didn't mean to -- if I said that, it's not what I meant. No other state has participation to this level and this level of authority vested in one sole physician.
Q Okay. Do other states have medical personnel assist before the lethal injection occurs?

A Yes.
Q During direct examination you were shown Plaintiff's Exhibit 25, the drug log. What is the purpose of that log?
A If you could clarify the question, because purpose implies an intent in some person's head, and I need to know who -- the purpose for what person.
Q Do you know why that record is kept?
A I believe it's kept because the person who completes it has been instructed to fill out this information.
Q What is the purpose of recording that information, according to your understanding?
A It's to keep track of the flow of drugs, or the -- I guess the transfer of the chain of custody of drugs from one place and one person to another to know how much you started out with, how much was given, how much was injected, how much was discarded or flushed, and to keep track of -- it's a tracking system I suppose one could call it.
Q Okay. Now, in your clinical practice you state that you record the amount of drug, anesthetic, that you

administer to an individual; is that correct?
A The amount that we intend to administer, yes; we believe we administered.
Q But in Missouri, in this case we're dealing with an execution, not a surgical process.
A We're dealing with the induction of general anesthesia and after the induction of general anesthesia hopefully is achieved, one then goes on to kill the prisoner with the

injection of potassium. So there's a medical process there, a necessary medical process, the induction of general anesthesia. And that is followed by a step that causes the prisoner's death, the injection of a lethal dose of potassium.

Q And the purpose of recording the number, the amount of the drug given in your practice, your clinical practice, what purpose is that? Why do you write that number down?

A It serves several purposes. It allow us to know what we have given, to know how a prisoner is responding when we assess anesthetic depth. Since our memories aren't perfect, we need to have a written record of what we have done.

It's also used for tracking, again, the use of drugs to make sure that the amount of a controlled substance, say a narcotic, that's taken out by a doctor, that none of it is diverted for purposes of abuse, that

it's either all given to the patient or it's flushed.

Q And you stated during direct examination that you would not want to give an entire dose of an anesthetic or an anesthesia after already giving a dose; is that correct?

A That's not what I was trying to say, no. I'm not sure of the context, so you need to clarify your question, please.

Q The doctor stated during his deposition that he would give the entire dose of the anesthetic again in order to achieve the effect that was needed, and you criticized the doctor for trying to do that.

A What he said, I believe, was that you have to give the entire full dose. You can't just give, the second time around, a partial amount of the amount you initially gave. So, for example, if you were trying to give ten grams the first time and you didn't get the desired effect, he said you'd have to give ten grams again. And that's not true and that's why I disagreed with it.
Q And you disagree with it based upon your clinical practice, not with the goal of achieving an execution?
A I base it on the context that in order for the execution to be humane, there is a phase of the execution which is the induction of general anesthesia. The procedure is very painful, it's a death-causing procedure. The injection of potassium is very painful and requires a

surgical plane of anesthesia. You have to induce general anesthesia successfully before you do that final painful step. So I'm talking about a context of inducing general anesthesia.
Q Now, you stated that sodium pentothal depressed the cardiovascular system?
A That's correct.
Q How efficient is -- how quickly does that depression occur?
A That depends on numerous factors. It can be rapid or it can be slower. Depends on how much is given, how quickly it's given, what the cardiovascular status is of the patient or the prisoner when it's given, what their cardiac output is, what their blood pressure is and the

status of their cardiovascular system. Those are some of the factors that would affect that answer.
Q So if it's robust, it fails more quickly, or if it's sick, it's a bad heart, does it fail more quickly?
A We're not talking about failing. We're talking about depression. We're talking about reducing the function of it, and that effect will start very quickly after the drug is administered. Basically as soon as it is pumped through the heart it starts to depress the function of the heart, and as soon as it's pumped into blood vessels it starts to depress the tone of those blood vessels and lower the blood

pressure that way. So it's basically very, very rapid once it reaches the thing that it's going to depress.
Q Now, the doctor, John Doe One, stated in his deposition that the rapid onset of the effect of the drugs is desirable, but I believe you testified that you disagreed with that.
A Could you show me where he -- I don't remember discussing -- I don't recall discussing that in my direct.
Q The reference given was page 95, line 4.
A I'm sorry.
Q Page 95, line 4.
A That was the questions of the direct examination.
Q Would you agree with me then, independently of that, that the rapid injection of the drugs is a beneficial feature of the Missouri execution process?
A No, that's not necessary to -- I believe the interests of the execution process are, number one, to achieve

justice by causing the death of the individual, and even though it's not stated, I believe it's legally important that it be conducted in a humane fashion, and that does not require what I think you're characterizing as rapid injection, that a humane execution could be a successful injection of general anesthesia and anesthesia can be achieved by injecting drugs at a rapid rate.

THE COURT: I thought your concern was as long as

the anesthesia had been effectively distributed within the body, that was your primary concern.

THE WITNESS: You're exactly right.

THE COURT: And after that, it doesn't matter?

THE WITNESS: You're exactly right. So long as it's delivered and maintained at a sufficient level to keep the person asleep, how fast you gave it really doesn't matter.

Q (By Mr. Hawke) Now, during direct examination you were asked about Plaintiff's Exhibit 26, the package insert. Does the package insert give information on what a dose of sodium pentothal would be for the induction of anesthesia for a surgery?

A It gives some approximate doses about -- these are intended doses, doses that you would try to deliver. And again, it's not for performing surgery. It's for inducing anesthesia to a level where we can take control of the airway.

Q Perhaps a step towards surgery, before surgery begins?

A The way it's supposed to work is before you undertake

surgery you first induce and then maintain for a period of time general anesthesia.
Q And what is the recommended quantity of sodium pentothal that the package insert suggests?
A Can you refer me to the --

Q Page four. It's your exhibit.
A It starts off on page three talking about dosing and administration. There's a long paragraph there and then it goes into other things that doesn't relate to surgery like treating convulsive states and procedures and psychiatric disorders and so if you could just refer me to what --
Q Why don't you take a look at page four, what appears to be the second -- I'm sorry, the first full paragraph, the last sentence.
A Okay. I see where you're talking about now. It talks about three to four milligrams per kilogram. And just to clarify that, for a typical adult male who would weigh around 70 kilograms, that would be an amount of about 200 plus milligrams, 210 milligrams, 280 milligrams.
Q Okay. And that sentence reads, "As an initial dose 210 to 280 milligrams of pentothal is usually required for rapid induction in the average adult."
A That's correct, yes.
Q And for those of us who are numerically challenged, that would be point -- .2, almost .3 grams?
A Correct.
MS. ANDERS: Your Honor, I'd like to object here not to the substance of the cross, but the fact that his

cross is counting against plaintiff's time.
THE COURT: I'll be the judge of that.

How much more time do you intend to take, Mr. Hawke?
MR. HAWKE: I'm going to say twenty minutes.
THE COURT: I'll give you ten.
A I should clarify also, that that text there is accompanied by a detailed description of how one assesses anesthetic depth because these are just estimated initial amounts. Like we discussed, these are intended amounts.
Q (By Mr. Hawke) For the purpose of surgery, not for the purpose of execution?
A For the purpose of induction of anesthesia, whether it relates to surgery or an execution.
Q And there's no instruction in there on monitoring anesthetic depth for an intended dose of five grams, is there?
A I believe the instructions for monitoring anesthetic depth are just generic instructions of how one can do that. I don't believe it's curtailed or restrained to any specific dose range.
Q You said that the doctor found the sodium pentothal to be hard to dissolve from which you concluded that the sodium penothal was defective; is that correct?
A I didn't draw that as a firm conclusion, but it certainly raises that concern. That's one possible explanation.

Q The manufacturer is Abbott Laboratories?
A It used to be Abbott Laboratories, but it no longer is.
Q Okay. Has the manufacturer of sodium pentothal recalled any ampules of sodium pentothal in the past three, four years?
A I wouldn't know the answer to that question. I haven't asked. I wouldn't be privy to it, I believe, even if I did ask.
Q You wouldn't be privy to a recall of a drug you use every day?
A First of all, I don't use thiopental every day, and very few anesthesiologists do.
Q So you're unaware of any recall?
A I'm not aware of a recall of thiopental in recent history.
Q Now, I believe you said that the doctor found sodium --
A If I could clarify. Also recall is something that's done when a whole batch of -- let's say the products of one week's worth of manufacturing is all pulled back, not knowing whether the individual lots are damaged or not. But it is -- it definitely does happen with drugs. They come to a specific hospital that there's problems with --
THE COURT: Doctor, if you don't know, there's no

need to clarify.
THE WITNESS: Okay.

Q (By Mr. Hawke) Did John Doe One state in his written interrogatory that he was unable to dissolve the sodium thiopental?
A I think the word used was difficulty, there was difficulty dissolving it and unable to dissolve the full dose into the proper volume. He was only able to partly dissolve it.
Q I believe you testified already that access to the venous system through the femoral vein is an effective means of obtaining access to the circulation system; is that correct?
A When it's performed properly and the catheter is in the right place, that's correct.
Q And you made reference to use of a needle during this process.
A Yes.
Q Okay. Now, how broad, how wide is that needle?
A Do you mean specifically in the Missouri executions?
Q Yes.
A I'd have to look at the photograph of the kit.
Q I believe it says .18 gauge. So how wide is that?
A I don't know in terms of the number of -- it's a little bit narrower than a coat hanger, a little bit

narrower than a coat hanger wire or a guitar string, approximately.
Q But you're not able to tell the court how many millimeters?
A I don't know how many millimeters an .18 gauge is. I

believe it is -- it also refers to the -- it may refer to the inner diameter of the needle, not the outer diameter of it.

Q Now, you state that piercing an artery happens frequently; is that correct?

A Yes.

Q Dose that happen one out of two, one out of three, one out of ten, one out of a thousand? What's the probability of that?

A It really depends on the hands of the practitioner, the experience they bring to the table, and on the characteristics of the individual. But it's happened to me many times. I don't want to put a number on it, but I'm not at all surprised when I'm probing for the femoral vein that I see blood that's from the femoral artery.

Q And when that happens, there's no remedy for that; is that correct?

A That's not correct.

Q Oh, there is a solution to that problem. What is it?

A If there's a puncture of the artery and blood is

leaking or being pumped out of the artery and collecting in a hematoma, then there are a series of things that one might need to do depending on how severe the injury is to the artery.

Q Okay. So it is something that can be remedied?

A Generally, yes. It may require a surgical procedure. It may require opening up the groin to close the injury directly.

Q Now, on Plaintiff's Exhibit 18, where is that raised ridge that you discussed?
A Maybe you should bring the picture back up. It's hard to --
Q It's plaintiff's exhibit. I assume you have it.
Where is that raised ridge on that two-dimensional picture?
A I'm sorry. Do you have the picture in front of you. I can't see what you can see.
Okay. Right at the tip of the catheter is the middle of that ridge. The ridge extends at about -- it would be in the direction of 2 o'clock if it were a clock face.
Q And that's raised?
A Yeah. You can see by the way the light is reflecting off of it that it's -- even though I agree you're looking at a two-dimensional picture, one's eye can render a

three-dimensional interpretation of that. We can see that his thigh there is not flat. We can see that the catheter is closer to us, as it were, than his thigh is. One interprets three-dimensional information based on reflection of light and coloration from that image.
Q Is it bigger than a goose egg?
A What you can see there is smaller, but this again can be the tip of the iceberg. I don't know how big the hematoma is. It could be larger or smaller than a goose egg.
Q Is it smaller than a hen's egg?

A I'm not a farmer.
Q Okay. Now, where is the blue you kept talking about?
A At the tip of where the white catheter goes in, there is a bluish discoloration, and --
Q Where is that?
A You see the white -- the white part of the triple lumen catheter, it's got a black piece of plastic on top of it. If you go about the same distance as the length of that black piece of plastic, beyond the end of that black piece of plastic, there is a clear bluish-purple discolored area there.
Q Okay. Now --
THE COURT: By my count, you should know you have about three minutes left.

MR. HAWKE: I appreciate that.
Q (By Mr. Hawke) Does everybody who receives access through the femoral vein receive -- in a clinical setting, does everybody receive a sedative?
A In some cases it's not possible to achieve peripheral access because somebody has bad veins and so you have to go directly to putting in a central line, perhaps a femoral line, without having given them sedation, but it's a very undesirable situation both for the patient and the practitioner. It's far better to give both a sedative and an analgesic, a painkiller, and that's done through an IV line so one can titrate the correct amount to that individual patient.
Q And people who receive dialysis, is that done through

the femoral vein?
A Usually it's done through a shunt that's usually placed in the arm.
Q Before these people receive a shunt, is there access for purpose of dialysis through the femoral vein?
A That's one place that can be used. Through the neck or femoral vein.
Q And do these people receive sedation before that happens?
A In my practice, yes.
Q Is that universal?

A I don't know the full universe of practitioners, but putting in a central line is a nasty and painful procedure and it's appropriate to do one's best to provide sedation and analgesia. Any of us in this room, if we had to have this procedure done to us, would want to have sedation and analgesia provided.

MR. HAWKE: If I could have a minute with cocounsel, Your Honor.

That concludes. Thank you.

REDIRECT EXAMINATION BY MS. ANDERS:
Q I just have a couple of questions for you, Dr. Heath.

Is it your understanding that when Joe Doe One had difficulty mixing the thiopental, he testified he did not have time to call the manager -- the manufacturer, I'm sorry, and ask them about that?
A Yes. I think he referred to it being late at night and they don't have time, yes.

Q Is that something that raises concerns in your mind with respect to his judgment?
A Yes. It's not an exigent circumstance where one has to do things at a certain time. One can call the manufacturer. They have 24-hour hot-lines and can connect one to somebody who can provide the necessary information, and I have done that on a number of occasions.
Q And have you seen, or is there any evidence or data

from Missouri executions from which it is possible to conclude or draw inferences that a particular inmate was sufficiently anesthetized?
A We have no information whatsoever as it currently stands to know whether or not these individuals were or were not properly anesthetized. We don't have toxicology. They have been paralyzed so we can't tell. We just do not know whether or not they received sufficient or any anesthesia.
Q And is execution by lethal injection as currently performed in Missouri a medicalized procedure?
A I'm not sure what you mean by the word medicalized, but as it is currently structured if one wanted to be humane, one has to first induce general anesthesia, and that's a medical procedure. And as it's being done now, one is placing a femoral catheter or perhaps a subclavian catheter, and those are medical procedures.
The execution itself I think really distills down to the administration of the drug that causes death, the potassium. The other facets are things that are done

to set one up to do the execution.
Q And so it's your view that the induction of general anesthesia, whether in an execution setting or any other setting, is a medical procedure?
A Yes. Therefore, in that context this is a medicalized

procedure. It's being done in a way that requires a medical procedure to precede it.

MS. ANDERS: Nothing further.

MR. HAWKE: Nothing further.

THE COURT: Thank you, Doctor.

Why don't we take about a 30-minute break and we'll resume. Okay.

(Lunch recess)

24

25

IN THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF MISSOURI
WESTERN DIVISION

MICHAEL TAYLOR,	)	
	)	
Plaintiff,	)	
	)	Case No.
vs.	)	05-4173-CV-S-FJG
	)	
LARRY CRAWFORD, et al.,	)	
	)	JUNE 12, 2006
Defendant.	)	AFTERNOON SESSION

VOLUME II
PAGES 137 - 261

TRANSCRIPT OF BENCH TRIAL PROCEEDINGS

BEFORE THE HONORABLE FERNANDO J. GAITAN, JR.
U.S. DISTRICT JUDGE

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I N D E X

EXHIBIT INDEX

PLAINTIFF'S	DESCRIPTION	RECEIVED
1 - 23	Discovery materials	86
24	Dr. Heath's CV	10
26	Print-out of package insert	32
28	Photo of triple lumen kit	62
29	Still picture of execution chamber	74
30	Still picture of execution chamber	86

31	Dr. Johnson's CV	140
32	Diagram of venous system	144
33	Demonstrative IV tubing & syringe kit	166
34	Dr. Henthorn's CV	188
35 & 36	Diagrams of circulatory system	192
39	Figure 1 prepared by Dr. Henthorn	201
40	Figure 2 prepared by Dr. Henthorn	206
41	Affidavit of Dr. Dershitz	209
42	Figure 3 prepared by Dr. Henthorn	210
43	Figure 4 prepared by Dr. Henthorn	214
44	Letter from State	219
45	Figure 5 prepared by Dr. Henthorn	220
46	Figure 6 prepared by Dr. Henthorn	222
47	Videotape of execution chamber	75
DEFT'S		
2	Excerpt of Dr. Dershwitz' paper re BIS	277

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THE COURT: Ready to go?

MR. HELLMAN: Thank you, Your Honor. Before we begin we'd just like to confirm, by our count we have used approximately three hours of time for Dr. Heath's direct cross and redirect. Is that consistent with your accounting, and do we have approximately three hours left?

THE COURT: I'd say that's correct.

MR. HELLMAN: Thank you, Your Honor.

We'd like to call our next witness, Dr. Stephen Johnson.

STEPHEN JOHNSON, called as a witness on behalf of the

Plaintiff, being first duly sworn, testified:
DIRECT EXAMINATION BY MR. HELLMAN:
Q Good afternoon, Mr. Johnson. Would you please state and spell your name for the record?
A Stephen Paul Johnson. Stephen, S-t-e-p-h-e-n. Paul, P-a-u-l. Johnson, J-o-h-n-s-o-n.
Q And what position do you currently hold?
A I'm chief of interventional radiology at the University of Colorado.
Q And degrees do you hold?
A I hold a bachelor of science and an M.D.
Q And what board qualifications do you hold?
A I'm a board-certified radiologist and I have a certificate of ABA qualification in interventional

radiology.
Q Could you please describe what interventional radiology is?
A Interventional radiology is a subspecialty in which we use imaging, ultrasound, CT to perform surgical procedures.
Q What types of surgical procedures do you perform?
A Actually I personally perform over 150 different types of procedures and the common link is that we use the imaging to accomplish those procedures.
Q So then you currently practice medicine?
A Yes, sir.
Q Where have you practiced medicine?
A Well, I trained at Northeastern Iowa College of Medicine and interned at St. Thomas Hospital in Akron,

Ohio. Did my residency at the University of Cincinnati. Did a fellowship training, additional training in interventional radiology at the University of Colorado. I practiced for four years on active duty in the Air Force down in San Antonio at Wilford Hall, and then I've been back at the University of Colorado and at Denver Medical Center as well as Denver Health -- the VA Hospital in Denver ever since.

Q In your practice, do you place central lines?

A Yes, I do.

Q And how long have you been placing central lines?

A Well, I've been placing central lines since I started my training as a radiologist in 1989.

Q Do you have a sense of how many central lines you have placed in your career?

A Whenever you asked me to review that, we have a database and I think since 1996 or '97 when I came back to Colorado I've placed over 1800 central lines.

Q And how many of those placements were through femoral catheterization?

A The majority that I place are through the jugular or the subclavian, but a couple hundred femoral catheters.

Q Is that a large number for someone with your age and experience?

A Yes, absolutely.

MR. HELLMAN: At this time I'd like the record to reflect I'm holding Plaintiff's Exhibit No. 31, which is Dr. Johnson's curriculum vitae. I'm showing that to

opposing counsel. I'm just going to bring this to the witness, if that's all right.

Q (By Mr. Hellman) Dr. Johnson, do you know what this document is?

A Yes, I do.

Q And what is it?

A This is my CV.

Q Did you prepare it?

A Yes.

Q Is it an accurate statement of your accomplishments and degrees?

A I believe so.

MR. HELLMAN: I'd like to move Plaintiff's Exhibit No. 31 into evidence.

MR. HAWKE: No objection.

THE COURT: Be received.

Q (By Mr. Hellman) Have you given testimony in a legal proceeding before?

A One other time.

Q Did that case involve lethal injection?

A No, it did not.

Q What documents have you reviewed to prepare for today's testimony?

A I primarily reviewed John Doe One or the physician's deposition, and I did a review of the literature on central line placement, and then I looked at my own database of cases as well.

Q Did you review materials obtained in discovery besides

John Doe One's deposition, including photographs of execution marks?
A Yes, I did as well.
Q And are you familiar with the manner in which Missouri places femoral lines for executions?

A Yes, I am.
MR. HELLMAN: At this time plaintiff would like to tender Dr. Johnson as an expert witness on the subject of central line placement, and femoral line placement in particular.
MR. HAWKE: No objection.
Q (By Mr. Hellman) I'd like to ask you now if you reached any conclusions upon your review, and what those conclusions are.
First, have you reached any conclusion with respect to whether it's necessary for Missouri to use a femoral line to conduct executions?
A Yes, I have.
Q And what is that conclusion?
A The routine use of central lines for administering medication for lethal injection in my opinion is in a large majority of cases completely unnecessary.
Q Second, have you reached any conclusion about whether Missouri's use of a femoral line creates a significant likelihood that the inmate will experience painful complications?
A Yes, I have.
Q And what is that conclusion?

A The decision to place a central line from a femoral approach in my opinion increases significantly the chances

of pain and complications as opposed to peripheral IV access.
Q So then, third, I take it then you have reached a conclusion whether the risk of painful complications would be reduced if Missouri were to use peripheral access to administer its lethal injection drugs?
A Yes, that is my opinion.
Q That it would reduce it significantly, the risk of complications?
A That peripheral IV access has a lot less complications and pain associated with it.
Q To what degree of medical certainty do you hold these conclusions?
A A high degree of certainty.
Q Why did you choose to testify in this case?
A Well, I'm asked to look, because of my position, at a number of legal cases. When I looked at this, I just found it completely unnecessary, in my opinion, to go straight to placement of a central line for all executions, if a peripheral IV is obtainable. I just find it to be an unnecessary risk and unnecessarily painful.
Q And may I ask what do you think of the death penalty in general?
A I'm not categorically against the death penalty. I think that -- and actually I see a lot of trauma. I see a

lot of violence in my profession. I'm basically on staff at a trauma hospital, the county hospital there in Denver, and I actually worked on a number of the Columbine kids that day. In my opinion, the death penalty should be reserved for the most heinous crimes in this society, and so I'm not categorically against it.

I have some concerns about socioeconomic status and race and how it's distributed, and also have some concerns that I know that there have been people on death row that have been completely exonerated by later evidence. So I think personally it should be used in very limited circumstances, but I'm comfortable with it.

Q All right, Doctor. Thank you.

Now I'd like to talk a little bit about some of the basics of femoral line insertion.

MR. HELLMAN: I'd like the record to show that I am holding what's marked as Plaintiff's Exhibit No. 32, which is a diagram of the venous system of the human body. I'm now showing that to counsel for the state.

MR. HAWKE: Do you have a copy for the state?

MR. HELLMAN: Yes, I do. Actually if counsel doesn't mind, I'm going to put it up on the screen.

MR. HAWKE: So at the back end of the trial we'll get copies of things we have seen?

MR. HELLMAN: Absolutely.

Q (By Mr. Hellman) Doctor, is this diagram familiar to you?

A Yes. This is a drawing, anatomic -- standard anatomic drawing by Dr. Netter.
Q Are drawings by Dr. Netter relied on by experts in your field?
A Yes, they are.
Q And do you believe this drawing is accurate?
A Yes.
MR. HELLMAN: I'd like to move it into evidence as Plaintiff's Exhibit No. 32.
MR. HAWKE: No objection.
THE COURT: Be received.
Q (By Mr. Hellman) Doctor, could you point to where the femoral vein is on this diagram using the electronic system we have here?
A The femoral vein is located in the groin, as indicated in the drawing.
Q And is that where the femoral vein is accessed if a femoral vein catheterization is used?
A Yes, it is.
Q Based on your review of the documents in this case, can you give us an overview of how Missouri performs femoral access?
A Yes. John Doe's deposition indicates that he does a

femoral access basically with a blind technique using a Seldinger needle. In layman's terms what that means is you essentially do a surgical prep of the area. You've got to prep your central line kit which all takes time of course. He provides local anesthesia and then he places his fingers

over the femoral, or what he determines should be the location of the femoral artery. Of course the femoral artery is pulsing so you're feeling pulsations on the surface of the skin.

The femoral artery, nerve and vein lie deep to the skin, several centimeters. And that varies obviously depending on how obese the patient is. If you have an obese inmate or patient, then it can be a number of centimeters below the skin.

Then what you do with the Seldinger needle, you feel the artery and then you aim medial to the artery, to the location where you think the vein is, and you basically put the needle down until you hit bone, pull the stylet out. Then you hook the needle to a syringe and aspirate as you are withdrawing the needle and then you get a flash of blood. You can get a flash of blood if you're in the artery. You can get a flash of blood if you're in the vein. Obviously the artery is usually going to be brighter and pulsatile and the vein is usually going to be darker and non-pulsatile. If you don't hit the vein, then

basically you redirect the needle, repeat the steps until you get access into the vein. Then --

Q I'm sorry --

A I'll just finish it up. Then once you get blood return through the needle, which is usually an .18 or .19 gauge needle, you advance the guidewire through the center or the lumen of the needle. That wire goes up into the vein and then you pull the needle out and then you

advance the catheter over that wire and pull the wire out for your access.

Q Is this procedure typically used to administer drugs in medical practice?

A No, it's not typical.

Q Is the femoral vein typically used to administer anesthetics?

A No, it's not.

Q And why is that?

A Well, there are a lot of other more readily accessible, less risky alternatives. I predominantly prefer a peripheral IV. That's the way we standardly administer medications in anesthesia. And actually the femoral vein for administering medications is usually reserved for emergency situations, patients who, you know, are having cardiopulmonary arrest. And you're basically aiming at a large, deep structure, but, you know, it's not

typically used for standard IV access.

Q What risks are associated with femoral vein access?

A Well, there are a number of additional risks as opposed to peripheral IV access. One, you can hit the artery. The artery and the vein lie immediately adjacent to each other. You're basically using the pulsation you're feeling on the skin to get the general location, but the reality of it is you not infrequently hit the femoral artery if you're blindly trying to get access to the femoral vein. If you look at the literature, that's up to 17 percent of the cases.

With the Seldinger needle or the Seldinger technique that he's using, you're actually doing through-and-through puncture of the vessels. You're putting two holes into the vessel. If you hit the artery, you've created two holes. So bleeding occurs every time you put a puncture into the artery.

It hurts. The Seldinger technique is designed so you put the needle down until you hit the bone. And any time you hit the bone with a needle, if you have ever had your tooth numbed up when they go in with the anesthetic needle and hit the bone, it hurts. So that's additional pain, in my opinion, that's totally unnecessary.

The femoral nerve lies immediately adjacent to the vein so they run basically in a sheath together and

when you hit the femoral nerve, which also occurs a significant percentage of time, then you usually feel very bad about it, because what happens is it's like sciatica, instantaneously you get a jolt of basically pain down your leg.

Then there is the additional complication, one of the reasons we don't use femoral access routinely, it's right next to the scrotum. There is chance of contamination, chance of infection. And then any time you put a central line in the vein there is a chance of getting a blood clot and that's a longer-term complication of getting a deep vein thrombosis, but that's an additional complication.

Q So, Doctor, putting all of these risks together

collectively, could you give a range or an assessment of what the likelihood is that a complication would occur under clinical settings?
A It again does depend on the patient's body habits, how fat they are basically, and the experience, but 10 to 15 or 10 to 20 percent of the time, collectively, this total complication rate can occur.
Q You mentioned a puncturing of the artery. I'd just like to get a sense of how painful that is. Sometimes people talk about a scale of pain from one to ten where one is a trivial pain and ten is excruciating pain. Could you

give a number associated with arterial puncture?
A Well, it's not the puncture of the artery that's painful, but it's the bleeding that occurs. And depending on the amount of bleeding, it can be quite painful. The reality of it is when you hit the artery you immediately pull the needle out and you hold pressure on the artery. I mean, that's how you get bleeding stopped. And you usually have got to compress on somebody's groin for 15 minutes, that's standard. Usually we're administering some sedative at that point and some analgesic, because it hurts. On a scale, I'd say six to eight.
Q Six to eight out of a scale of one to ten for pain?
A Yes.
Q And about how quickly will the pain result with the bleeding, is a long-term onset or is it quick?
A Well, the pain is going to happen immediately. The bleeding happens immediately. You're pushing on the groin

and trying to control the bleeding, so it's an immediate effect, yes.

Q Are there factors that would increase the likelihood of a puncture with a patient?

A Well, I mentioned earlier how large the patient was. That's one. The deeper the vessel, the more difficult it is to accurately locate it by just palpating. Two, high blood pressure. If you hit the artery and somebody has

high blood pressure, then obviously you're going to get an increased rate of bleeding. A lot of people who are either going to go into a surgical procedure or obviously if they're going to be executed, their blood pressure is going to be up.

If you are resisting, you know, or if the patient is uncooperative, you know, intoxicated patients, trauma, whatever, in this particular type situation if the inmate resisted at all, and I think it is very hard to immobilize somebody, particularly if you're talking about the core body muscles, that increases your likelihood you're going to hit the artery.

Q Do you administer a sedative to your patients before giving femoral catheterization?

A As -- I agree with Dr. Heath, yes. Typically we do, unless we don't have a peripheral IV.

Q Is the medical standard of care to administer a sedative whenever possible?

A I think that -- it's accurate to say that would be the medical standard of care at this point, yes.

Q Do you use any additional technology to help you find the femoral vein and avoid hitting the femoral artery in your practice?
A One of the reasons interventional radiologists are putting these lines in now is because we're using the

imaging to increase the accuracy and the safety of these procedures. We usually put an ultrasound device on the groin. You can directly visualize the artery and the vein, and you can watch the needle go into the vein in the large majority of cases, which decreases the overall incidence of hitting the artery, which is a big complication.

Two, we use the X-ray to watch the guidewire go up into the correct vein, because there are branch vessels coming off the iliac system, so you want to be sure the guidewire is going into the correct location and you advance the catheter and confirm the catheter position.

Q Does Missouri use this technology in conducting its executions?
A No, it does not.
Q Does Missouri give its inmates a sedative before all executions?
A I don't know about all executions. The five ones that I was available to review, they did not, no.
Q Doctor, I want to cover briefly, just so we understand it, could you give in your own words exactly what a hematoma is.
A Well, a hematoma is essentially bleeding. It's localized bleeding. And any time that you -- even hitting

the vein, although the vein is not under the pressure that the artery is, you get bleeding. When the bleeding occurs

in a contained space, that's called a hematoma.

Q Doctor, I'd like to now read you a bit of testimony given by John Doe One in his deposition on page 77 of that deposition regarding bleeding and hematomas. The question presented to the doctor was, "So just hypothetically, if you were attempting to insert a femoral catheter on anyone and they moved and you ended up lacerating the femoral artery, what would you do about that? Answer. It would never happen."

What do you think of John Doe One's response?

A Well, I think he's incorrect. Number one, I think the literature, it's not just my experience, but the literature supports the fact that you do have complications hitting the artery and getting bleeding occurs. And so categorically to say it doesn't I think is incorrect.

Q Have you reviewed the photographs of the execution logs that you were provided with in this case?

A Yes, sir.

Q Have you reviewed the photographs of the Timothy Johnston execution?

A Yes, I have.

Q I'd like to now go back to what was part of Plaintiff's Exhibit 18, which is one of two photos from that execution. I'm going to put it up on the screen so everyone can see it.

Doctor, can you describe what you see here?
A Yeah. The first thing that is obvious is the amount of blood in the field, and the blood that's in the field is bright red, which indicates to me that it's oxygenated. Obviously everybody has seen or had a peripheral IV put in. You don't get this kind of blood-letting during the insertion of a peripheral IV. And the fact that it's oxygenated, and the degree of it, would indicate to me that the artery was hit in this particular case.
If you look at the catheter, look at the blood within the catheter, it's a significantly darker color, non-oxygenated blood, so that would indicate to me that that's venous blood.
And then around the site, as Dr. Heath pointed out, and I agree with him, there's swelling, significant swelling right in this location (indicating.) That indicates to me that there's hematoma present.
Q And just so that everything is clear, I'd like to also show you the same picture that Dr. Heath was looking at as well. It's from the same site, the same exhibit.
A This is a different angle of the same patient, or same execution, pardon me. And again, just so that there's -- again, there's a lot of blood in the field. It looks like oxygenated blood indicating that this was arterial blood. And then there's swelling around the catheter that

indicates a hematoma.
Q And just to give you a chance to comment, I'd like to

read what Dr. Doe said in response to the question about whether or not there was a hematoma here. The question was, and this is on page 102 of his deposition, which I believe is a question from his own counsel: "What would you see or what would you expect to see if there was a hematoma? How can you say there's not one here? Answer: What they're seeing is the site where I injected by local anesthesia. It causes a little blue mark. A hematoma would be the size of a tennis ball."

Can you please comment on Dr. Doe's explanation.

A Yeah, to me that doesn't make sense because the lidocaine that you inject is clear, number one. Number two, the amount of lidocaine that comes off these central lines kits is a small volume, anywhere from five to ten cc's. Here you're seeing a lump basically that is distending the skin, and you don't see that with your normal lidocaine administration. And the blue coloration indicates to me that that's blood, not lidocaine. So I would disagree with his assessment of that.

Q I want to talk a little bit more now about what happens if a bleeding or a hematoma would develop. I believe you were here when you heard the colloquy between state's counsel and Dr. Heath about whether or not a

hematoma and bleeding were treatable. If a doctor punctures the artery, you have said it will bleed. How does one stop the bleeding?

A The standard technique is you hold manual compression, significant manual compression, because what you're trying

to do is create more pressure outside that artery than is from within the artery. That will control the bleeding. Then you have to allow the body's coagulation system to form a blood clot in the hole, and that takes time.

So the standard way of dealing with this, which by the way is not 100 percent successful, is essentially really to squish on the groin, hold pressure for 15, 20 minutes, and then restart your procedure.

Q Did you say 15 to 20 minutes? I'm sorry, I couldn't --

A Yes, 15 to 20 minutes.

Q I'm going to read you now John Doe One's explanation as to what he would proceed to do if a hematoma developed. This is on page 78 of his deposition transcript and it's a couple paragraphs long so please bear with me, and stop me if you'd like to comment.

"Question: And just assuming for a second that a hematoma developed, what would you do about that? Answer: Reach over on the tray, take the knife that's provided with the tray, open it and vent it and it would be controlled.

Actually under this setting, the hematoma would actually stop bleeding better than actually -- the medical treatment would be to drain it, but in this setting the hematoma is actually useful and it will stop the bleeding in a matter of seconds by itself. So there's a medical reason why you drain a hematoma, but the reason in this situation was the hematoma would actually stop the bleeding. But we have never and could not possibly see a hematoma in this setting

because of the small needles used. Question: So when you say the hematoma would stop the bleeding, I really don't follow that. Answer: As it bleeds into the space, it increases the pressure around the vessel. The pressure of the hematoma is going to stop the bleeding no matter where the bleeding is."

I'll stop right there for the moment. First, Doctor, is it proper procedure to open and vent a hematoma?

A No. No. I mean, you would not make an incision in the skin and allow the bleeding just to basically well up in front of you. That would be a totally inappropriate way to deal with a hematoma.

Q And then I'm going to continue reading. The question that follows immediately the passage that I just read says, "Question: So the bleeding would stop on its own? Answer: It would stop on its own."

Now, would the bleeding stop on its own if a

hematoma developed?

A Highly unlikely. That would be a very painful way of dealing with that particular problem, because essentially you'd allow blood just to accumulate in the leg, dissect up into the abdomen, and then what's he's basically indicating he's allowing enough bleeding to create pressure in the groin and that pressure which basically is what I described as the physician usually applies, would -- that would be a lot of blood in the groin. That would be an extremely painful way of dealing with that particular issue. And that is not how you deal with it. You don't sit there and

watch a hematoma expand and expand, generate enough pressure.
Q Would it eventually --
A I mean, you could bleed to death that way, yeah, but that would be a very painful way to go.
Q If the artery were punctured, could that femoral line still be used?
A Well, now it makes it harder because the artery has got a lot of muscle in it and it's hard to compress an artery. The vein has a muscular wall, but it's a lot thinner so it's easy to compress a vein. And it's not under pressure. So as soon as you start having a hematoma develop in the groin, it squishes on the vein and it makes it a lot more difficult to get your femoral line in. So

it's possible, but it becomes a lot tougher.
Q If the doctor were to use another site, say the other leg, would the inmate experience pain while another site was found?
A If there's continued bleeding, absolutely. I mean, if your method of dealing with it is just to let it bleed out and go to the other leg, yeah, absolutely.
Q I just want to read you again for your comment a passage continuing on page 78 where I left off. "If that happened" -- this is the question: "If that happened while you were trying to get the catheter in for an execution, how would you then get the catheter in? Answer: He's got two legs. Question: So you'd go to the other leg? Answer: Yes."

What do you take to mean by the two legs comment?
A Well, basically what I -- I take it as if they botched up the first line attempt on the one leg, that they abandon it and go to the other leg. But the statement seems a bit crass to me, a bit unprofessional.
Q I'd like to talk now about a couple of the other risks of femoral access. You described hitting the bone. How often does that happen?
A Well, if it's the Seldinger technique, that's part of the procedure because the femoral head lies just behind the artery and the vein and you can use the Seldinger technique

to get into either one. But essentially what you do is you do a through-and-through puncture of the artery or the vein and then when you hit the bone you stop and pull the stylet out and then slowly retract the needle until you get blood return.
Q So this happens every time under the Seldinger technique?
A Yes. You can do a single-wall technique where you just try to puncture through the front side and that's usually what I use when I'm using image guidance. But the Seldinger technique is designed to hit the bone.
Q And how painful, on a scale of one to ten in the way that we described, is hitting the bone would you say?
A Well, it hurts. It hurts. I would say again in the six to eight range, and this is part of the reason you give some sedation before you do the central line.
Q Would a local anesthetic be sufficient to eliminate

that pain?
A Well, again, you've got to hit the bone to put the anesthesia in so you can get deep anesthesia down on the surface of the bone, but really when you hit the bone for the first time, again I'll use that analogy of your tooth, when the needle hits the bone you feel that and it's a pretty intense pain.
Q And is this a pain that becomes painful immediately?

A Oh, yeah. It's instantaneous.
Q And you mentioned another risk in terms of hitting the femoral nerve. Could you describe what happens when that complication occurs?
A Well, again, when you hit the nerve it's very instantaneous. I mean, there's no mistaking it because your patient will let you know immediately, because, one, involuntarily they -- their leg jerks and they get a shooting sensation down their leg.
Q And on a scale of one to ten, just so we have a rough measure of comparison, how painful is that?
A That's like having very intense sciatica. I would bump that up to the seven to eight range. It's a pretty painful thing.
Q The complications we've talked about, are they the type of thing that can be eliminated with practice?
A They cannot be completely eliminated, particularly if you're doing all this blindly. Experience matters, there's no denying that, but complications occur. There's just -- I mean, that's a fact of medical practice.

Q I want to read you another passage from Dr. Doe's deposition, from page 89 of that deposition. The question was: "So are there any complications that could make themselves -- that could become visible after you have left the execution chamber?" The answer is: "No.

Complications can occur months and weeks later due to long-standing problem, but the complications that you are referring to that occur with the insertion, these only occur on a person that is doing his first five insertions. After someone has done ten of anything he'll never have another complication for the rest of his life."

Do you agree with that statement?

A I categorically disagree with that statement.

Q In reading that, is it your opinion that Defendant Doe One understands the risks of the procedure that he is performing?

A No, I don't think he does. If he's making a blanket statement like that, that sounds like denial to me.

Q Do you think his apprehension, or misapprehension if that's the word you would use, of those risks would affect his ability to properly perform and treat femoral catheterization and any complications that ensued?

A I think that, number one, if he assumes he cannot have a complication, then he's probably not even, first of all, looking for that complication. And his description on how he would address those complications is incorrect as well, in my opinion.

Q Now, I'd like to turn to your thoughts on femoral

access vs. peripheral access specifically. I know we have talked a little bit about it, but now I'd like to get to

some specific questions. Could Missouri's drugs that they use currently in their execution process be administered through the peripheral veins?

A Yes.

Q With peripheral access, is the risk of painful complications reduced?

A Very significantly.

Q How would peripheral access work?

A Peripheral access is basically placing the standard IV. Your choices are in the top of your hand, in your wrist. There are two large veins that are in your antecubital fossa. You put a tourniquet on, put a little bit of alcohol on the skin. You advance essentially a standard IV. When you see a flash of blood, you advance the plastic tubing into the vein. Hook it up to the IV. One of the very first things you do is you hook that to an IV bag. One indication that it's working is you see the dripping of the IV fluid which indicates there's no obstruction.

Two, it's very standard to flush the IV. You flush it, manually observe it. No swelling, no resistance. Perfectly good intravenous access.

Q Would you say peripheral access is less invasive?

A By far. Way less invasive.

Q Could a hematoma result from peripheral access?

A The vein is running right beneath the skin. Most of the hematomas that we're talking about happen when you hit the artery. So a significant hematoma from a peripheral IV, you might get a little bruise, but no is my answer.
Q Is it possible to hit a nerve with peripheral access?
A Very, very unlikely because these are superficial veins. They're not deep veins, okay. And the deep vein and artery and nerve run together. So with peripheral access you're placing the IV in a vein that essentially is running right beneath the skin.
Q Is it possible to hit the bone with peripheral access?
A Highly unlikely.
Q And are IVs, in general, administered peripherally in medical practice?
A Absolutely. Routinely.
Q Are you aware of any indications in this case that would make femoral access appropriate?
A The only indication, in my opinion, here that they would choose to use a central access like femoral access is they could not establish peripheral IV.
Q Do you have any reason to believe that that would not be possible in this case?
A I'm not aware in this case that this patient is a chronic IV drug abuser which would probably be the primary indication in an inmate.

Q I want to read you a few statements that John Doe One has made with respect to peripheral access as compared to

femoral access and get your thoughts.
A Okay.
Q Question on page 86 of the Doe deposition: "And if a complication occurred using femoral access for an execution, would you consider changing back to peripheral access? Answer: No. Question: Why not? Answer: It isn't reliable or predictable or safe."
Do you believe that's an accurate statement of the relative benefits and disadvantages of peripheral as compared to femoral access?
A That's an incorrect statement. And do you want me to elaborate? I mean, during my review of his deposition they even admitted that they tried a femoral access in one inmate and couldn't get it in because the vein was probably thrombosed. So, one, I think probably one of their reasons, and he may have mentioned this in his deposition, is to avoid any type publicity problems and having to go explain to the press why they struggled with the IV access. You can struggle with central venous access. One.
Two, if you follow standard procedures, placing an IV, checking it, flushing it, it is very reliable, very safe, and you can rapidly administer medications through it. As a matter of fact, every day in CAT scan, CT scan,

you get a peripheral IV in and you can inject three to five cc's a second for a total of 150 cc's. That's a big bolus of contrast which can be a desiccant or basically can cause sloughing of the skin. But that rarely, rarely happens because they do standard techniques, put the IV in, check

to make sure it's an adequate IV. So I just disagree with that statement.

Q In his deposition the doctor suggested that femoral access would yield quicker administration of the drugs. Do you believe that to be correct?

A Not how they're currently doing it. It makes sense the larger caliber a tube, the faster a fluid can go through it, but they have elected to connect either, well, the central line here to eight feet of tubing. And by doing that, they admit that what they next have to do -- to fill up eight feet of tubing, that requires 10 or 15 cc's of your injection, and then you've got to follow it with a flush.

Even given all that, with the exhibit there I'd like to show the court you can very rapidly administer 40 cc's through a peripheral IV.

MR. HELLMAN: At this time I'd like to offer into evidence Plaintiff's Exhibit No. 33 which is a 60 cc syringe and eight feet of IV tubing. I'm now showing that to state counsel.

And now with the court's permission I'm going to present it to the witness who will use it as a demonstrative aid.

THE COURT: No objection?

MR. HAWKE: No objection.

THE WITNESS: So this is a standard peripheral IV. That's the size of an IV that's placed in the arm, typically. The rate of injection also depends on the size

of the syringe. If you used a five or ten cc syringe you can create a lot more pressure than a 60 cc syringe. They have done this to simplify their procedure.

And, Your Honor, I don't know if you have a secondhand on your watch, but I just want to show -- this is 40 cc's which is what the standard volume that they were injecting. And if we take a peak at the clock, I'll just show you that basically you can inject this within 30 seconds.

(Witness demonstrates.)

So even power injecting a peripheral IV, if it's working, is completely adequate for -- for what they say they need to accomplish, which is very rapid injection.

MR. HELLMAN: Thank you, Doctor.

Plaintiff would like to move this equipment, Plaintiff's Exhibit No. 33, to be put into evidence.

THE COURT: I think we did that earlier.

MR. HELLMAN: I wanted to be sure that happened.

MR. HAWKE: No objection.

MR. HELLMAN: Very good.

Q (By Mr. Hellman) I just want to read you one more statement from Defendant Doe One regarding the relative virtues of femoral and peripheral access. Actually, I take that back. It's the next to the last statement I'm going to read. The next to the last statement is this, and I believe it comes from pages 87 and 88 of the Doe deposition. "Question: I see. And when you said that the femoral procedure is safe, what did you mean? Answer: No

complications. I can't puncture a lung. Can't hit the wrong thing. The vein is protected by muscle on one side and the artery, which I can feel with my finger. So if I can feel the artery with my finger and my finger is on top of the artery, I'm not going to stick my finger. And the nerve is on the other side of all of this, so nerve and artery lacerations are impossible."

Again, I'd just like to get your comment in light of what you reviewed in this case.

A Well, I think I illustrated for the court how that can and does occur, and it certainly -- the literature shows that as well. It's just not my opinion. You do in fact hit the artery and nerve, and not insignificantly when you're doing it blindly as they're doing here.

Q And then the last statement I'd like to draw the witness's attention to is on page 83 of that deposition. "Question: And in making your recommendation, did you consider the risks and benefits of femoral catheterization? Answer: Yes. Question: And what risks and benefits did you consider? Answer: No risk. All benefit. Question: And what are the benefits? Answer: All benefits. There's no way it can fail and no risk to the inmate. Question. So there's no risk of complication? Answer: Really, no."

Do these statements strike you as someone with sound medical judgment when it comes to femoral line catheterization?

A It sounds like statements from somebody who doesn't

understand the risks of this procedure. I think I have illustrated, hopefully, for the court that it hurts. It's significantly more invasive, and it involves risks that are basically avoidable by putting a peripheral IV in.

Q And if I told that you Missouri was the only state in the union to use femoral access, what would your response be?

A My response would be that that -- they're in agreement with me, that in the large, large majority of cases this is totally unnecessary and avoidable.

MR. HELLMAN: Thank you, Doctor. No further

questions at this time.

CROSS-EXAMINATION BY MR. HAWKE:

Q My name is Stephen Hawke. I'm an assistant attorney general with the state of Missouri, and I have a few questions I will need to ask you for cross-examination this afternoon.

The demonstration you did a couple minutes ago, that represented the injection through -- into a peripheral port; is that correct?

A That was a peripheral IV.

Q Peripheral IV. And during your demonstration, you did not make a comparison of a peripheral IV vs. a femoral IV, did you?

A I did not.

Q Okay. And during the demonstration, you were -- I assume the liquid in the vial was water; is that correct?

A That's correct.

Q And the receptacle of the water leaving the syringe was a plastic bag; is that correct?
A That's correct.
Q I just want to make sure the record reflects that.
Now, are you familiar with the execution practices of other states?
A No, I'm not.
Q So you have no knowledge --

A I have no knowledge.
Q Okay. So you don't know if Missouri is the only state that uses a femoral vein access?
A No, no, sir.
Q Just don't know. Okay. Now, during the -- during the initial discussions you stated that you had been placing central lines since 1989; is that correct?
A That's correct.
Q And during your practice, your radiology practice, that is primarily the insertion of central lines in the arteries; isn't that correct?
A No, that's incorrect. I place probably 80 percent of the venous catheters for the hospital. Myself and my two colleagues.
Q Okay. So you are a vein person, a person that uses a vein?
A We use both, depending on the procedure. We place central lines primarily for chemotherapy. We place central lines when you require long-term access and they're going to come back and have multiple injections, and we place

them for pretty much all the dialysis patients.
Q Dialysis patients. When a person receives a central line access for dialysis, does that person receive sedation?
A Yes, in my practice.

Q And is that standard in your community?
A Yes, it is.
Q Now, you stated that when you use a -- or when you use the femoral access, that there is a risk of hitting the artery; is that correct?
A Yes, sir.
Q And from your experience, what percentage of the time does that happen?
A Well, depends on the technique, okay. If you use image guidance like I described, you still can hit the artery probably one to two percent of the time. If you are blindly sticking the artery -- or blindly sticking the vein without any guidance, then that incidence has been shown to be up to 17 percent of the cases.
Q 17 percent of the cases. And that is based on the study in France back the end of 1990?
A I've seen I think several articles basically documenting the risks of femoral venous line placement, that's correct.
Q And I believe that 17 percent included all risk of complications, not just hitting the artery.
A Well, we'd have -- I'd have to relook at that document to accurately state that.

Q Do you have that with you?
A I don't know. I don't have it with me, no. The

incidence of bleeding I believe, at least in one of the documents I submitted, was ten percent, significant bleeding, hematoma formation. Inadvertent femoral artery puncture I think was actually 17 percent.
Q And that study from France involved critically ill people, did it not?
A That particular one did, yes.
Q And in fact, all of these studies involve people who are in need of this for some clinical purpose.
A Usually because there is no peripheral femoral access, or the patient, yes, is in an emergent type of situation which is the only real reason to put it in.
Q So those people who are ill are not really comparable with a person who is condemned to death, are they?
A I'd say anatomically, yes, they're very comparable. They're --
Q But the circumstances under which the procedure is administered is certainly different.
A I would say yes, I would agree with that statement.
Q Now, during direct examination you were shown, or you showed us the diagram by Dr. Nets, or Netzi?
A Netter.
Q Neter. And the picture that it showed of the femoral vein, at least to my eye, it appeared substantially larger than the other veins around it, did it not?

A It is the largest vein in that particular anatomic region, yes.
Q Is it -- it's bigger than a straw of spaghetti; is that correct?
A Yes.
Q And is it bigger than a person's little finger?
A I would say in general that's probably pretty accurate.
Q Okay. Is there another anatomical landmark that you can compare it to, to say it's the exact same size as --
A It depends on the patient. You know, a small, five foot two female, it's going to be significantly smaller than that. A 300-pound male, it would be a little bit bigger than that.

One thing I didn't talk about, it depends on where you access it as far as your degree of actually hitting the artery as well. If you access it a little bit lower -- the artery splits into two arteries and the one artery goes directly in front of the vein, and without any imaging, you know, you don't know exactly where you're entering or trying to enter that vein. So that's another anatomic description that I didn't bring up earlier.
Q And I recall you discussing during direct examination that the artery does have a pulse to it; is that correct?
A Yes. But it's continuously under pressure would be my

point. Diastole and systole. During systole when the heart is contracting, the pressure is significantly

elevated, say 140. During diastole, there's still pressure in that vessel, and that's the lower pressure in your blood pressure. 60, you know.

Q And the vein does not pulse?

A The vein does not pulse, that is correct.

Q Okay. When you described the Selman method of doing this --

A The Seldinger technique, yes.

Q -- it involved running a needle through the front of the vein through the vein; is that correct?

A Well, what the Seldinger needle is, it's a needle that has a stylet and it goes through the central hole of the needle, okay. And what basically that needle is designed to do is to puncture through-and-through the vessel. Then you pull the stylet out so -- in the center of the needle is a hole, so when you pull back, when you enter the blood vessel, you get a return of blood. That's one reason it's designed for that.

The other reason it's designed for that is so then you can put a guidewire through the center of that hole which allows you access into the blood vessel.

Q Okay. And I believe you stated during direct examination that femoral vein access was not typically used

for drug administration or for anesthesia administration; is that correct?

A That's correct.

Q But it certainly can be used for both of those things; is that correct?

A Yes. And I would say would be one of my last choices.
Q And it is certainly typically used for medical procedures, is it not?
A It definitely can be used for therapeutic procedures, absolutely.
Q Now, I believe during direct examination you testified that the -- that all the complications put together, the likelihood of complications was between 10 and 15 percent?
A I think -- I gave a range. I thought I said 10 to 20 percent if you put it together, but --
Q 10 to 20 percent.
A But again, it is extremely variable. But if you look at the literature, that would be your range typically.
Q And hitting the artery I believe you testified was at 17 percent?
A I said up to 17 percent in the literature. There's a range again.
Q And hitting the bone you said happens all the time with this technique; is that correct?
A It's a pretty routine part of the procedure because of

the Seldinger technique as I described it.
Q So that is not a complication then?
A No, but it's painful.
Q And hitting the femoral nerve, you used the word a significant percentage. What did you mean by that?
A It lies immediately adjacent to the vein, just like the artery, and I don't think -- I don't think there's any actual reported incidence of that in the literature.

However, when I say significant, I mean, you know, at least 10 percent of the time, just like the artery.
Q So it's not reported in the literature. What is your basis for saying it's 10 percent?
A Because I have hit it.
Q 10 percent of the time?
A Particularly before we used imaging guidance. And you know it. It's immediate. It's painful. But it doesn't have long-term sequelae.
Q Now, with the lethal injection process, is really the risk of infection a complication to be worried about?
A Only if there's a stay of execution.
Q And again, in the lethal injection context, is the risk of a, quote unquote, blood clot really something to be worried about?
A Again, only if there's a stay of execution.
Q So help me with my math here. Hitting the artery

happens up to 17 percent of the time. Hitting the nerve happens 10 percent of the time. But total complication is 10 to 20 percent of the time?
A That's -- that's my testimony, yeah.
Q Okay. Now, can you describe in the literature the work that was done to support your opinion, the study that has been done to support your opinion that puncturing an artery constitutes a pain rating of I believe you said 6 to 8 on a scale of 10.
A That is my professional opinion from my experience as a practitioner. He asked me to rate it.

Q Okay. So there's not any literature then that supports that conclusion?
A Not that I brought to the courtroom, no.
Q Okay. And as I recall, you said that -- are the people that you use the femoral vein access on, have they been sedated?
A A large majority get sedation beforehand, absolutely.
Q So a large majority, or all?
A Well, only if we don't have a peripheral IV access, okay. And that means potentially in a life-threatening situation, or when we don't have or are unable to access a peripheral IV.
Q So the sedated people, you did not ask them what the pain felt like then?

A It still hurts, believe me.
Q But you didn't ask those sedated people?
A Sure. Every time we do a procedure, our nurse is documenting the pain scale. Are you in pain? What is your 1 to 10 pain scale? That's actually now a standard part of conscious sedation.
Q And the nurse, when they're asking this question, do they ask the patient to distinguish between the pain that they have from the trauma that's requiring the femoral vein access as compared to what you just did to them by hitting the artery?
A I don't know, how you phrase that question. Essentially when you hit the bone, when you hit the nerve, when you get bleeding, you have just caused significant

pain in your patient. They're hurting. Our nurses are going, Are you in pain, yes. What's your degree of pain, 6, 8. That's where I base my clinical opinion from.
Q And these are the same people that have come in and are in sufficient trauma to require you to do a femoral vein access?
A They're all patients essentially. Now, the reason we use conscious sedation is because a local anesthesia hurts, number one. Number two, it relaxes that person, brings the blood pressure down which decreases the degree and, you know, the likelihood of a complication, but it doesn't

eliminate completely the pain when you hit the nerve, when you hit the bone. And usually you titrate your medication through the procedure to deal with these additional problems.
Q I think I understand. Now, you say this pain is immediate. By that do you mean within a minute, five minutes, ten minutes, an hour? What do you mean?
A Well, we talked about a number of different instances, a number of different problems. One, when you hit the nerve, that's instantaneous pain, okay. When you hit the bone, that's instantaneous pain. When you start bleeding, that hurts. And if the bleeding continues and a hematoma continues to expand, and if you sit there and watch it and let it expand, that pain is going to progressively increase.
Q Okay. And I believe you testified that there are ways of preventing the hematoma from becoming a problem.

A Not always. If you're blindly sticking the blood vessel -- the one situation you can't deal with is if you stick the femoral vein above the inguinal ligament there, so essentially you do your Seldinger technique, if you poke a hole in the back wall of the artery that's in the abdominal cavity and you start bleeding out, it's very difficult to manually control that. There definitely are cases when you send a patient to the operating room, just

like Dr. Heath had talked about, where they have to do a cut-down and sew up the artery to stop the bleeding.

Q And you are unfamiliar with that being necessary in Missouri during the past five executions?

A Yes, I am unaware of that occurring.

Q Now, are you aware if Missouri offers the offender a sedative before the execution -- during the period before the execution occurs?

A From the documents that I looked at, it said sedative offered, yes.

Q Now, this afternoon you were shown a couple of photographs in which you said that there was a lot of blood.

A Well, what I said was if you look at this field, there is a significant amount of blood in the field. If you compare that to the amount of blood that you see with a typical IV, which I think most people in the room have some experience having an IV put in, or one of their loved ones, that's a significant -- that's a lot more blood than occurs when you have a peripheral IV established. Absolutely.

Q And that appears to be a teaspoon of blood, two teaspoons of blood, a cup, a quart; what number would you give it?
A It's difficult to quantify that because you can see the gauze is absorbed with blood. It's difficult to

quantify that.
Q The gauze is certainly covered with blood.
A Well, it's soaked.
Q And I believe that there is oxygen in the air; is that correct?
A Hopefully.
Q And that explains why the blood is red, doesn't it?
A That's incorrect, in my opinion.
Q You described the blood as being oxygenated?
A Oxygenated blood is -- obviously the blood that's located within the artery is coming from the lungs which is oxygenated. That's a physiological response.
This is instantaneous, and this to me indicates basically when they pulled that Seldinger needle out, to get this kind of volume of blood, that coloration, they obviously hit the artery, in my opinion.
Q And when blood is exposed to air it's red, is it not?
A It -- different varying degrees of red. I'll give you that, absolutely.
Q And in the catheter you described the blood as being darker; is that correct?
A Yes.
Q And blood in the catheter has not been exposed to air,

has it?
A Most likely not.

182

Q All right. Now, can you explain to the court the risk that you explain to your patients when you -- before you do a peripheral IV on them?
A We don't consent for peripheral IVs.
Q A patient does not consent?
A Absolutely not. There basically are no legitimate risks for putting in a peripheral IV. I mean, you might not be able to get it in, but we don't have patients signing consent to have a peripheral IV. You would be having thousands of consents signed every day. Absolutely not. Because the risks are so minimal that it doesn't justify a formal consent.
Q A formal consent. Well, let's phrase the question differently. If you're talking with the patient and the patient asks you what risks are there from a peripheral IV, what will you tell the patient?
A I would tell the patient primarily it may take us one or two pokes to get an IV in. If we've got an established IV, there is essentially very, very little risk. There is a small risk of extravasation which, because it's on the surface of the skin, we will immediately detect.
I mean, you know, if you're trying to, in my mind, increase the overall risks of a peripheral IV I'm just going to disagree with that, because they're just an essentially well-functioning IV that you can see sitting on

183

the surface of your skin that poses very little, minuscule risk for the patient.

Q And you do not inform the patient of those risks before you do a stick?

A No.

Q Okay. And is that the standard of care that I can expect in Colorado?

A I would think that is the standard of care, absolutely. You talk about the surgical risk of the procedure you're doing, et cetera, et cetera. But the risk for a peripheral IV, no.

Q Okay. So from your perspective, there's no risk of bleeding?

A Not significant bleeding, no.

Q I didn't say significant.

A You might get a few -- a tiny bruise. Nothing that's going to require surgery or evacuation. The vein is not under pressure, no. Significant bleeding, absolutely not.

Q And is there a risk of pain?

A Relative, yes. I would say the initial -- the initial pin-prick, sure. It's a much smaller catheter. Absolutely.

Q And there's no risk of hitting a nerve?

A I have never -- I personally have never hit a nerve putting a peripheral IV in. So is there a chance? Yeah, I

would say, but it's not a significant chance.

Q Not enough that --

A Way less than a percent.
Q -- you would inform your patient.
Now, would you agree as a general matter that the more experience one has doing a peripheral IV or doing a femoral vein access, the more proficient one becomes at it?
A I would agree with that. And I'd also like to state that his statement that there is no risk is just categorically wrong.
Q Now --
THE COURT: Mr. Hawke, I hope you're winding down now.
MR. HAWKE: I am.
Q (By Mr. Hawke) Are there certain patients where you would not advise them to use a peripheral IV?
A For which particular type of procedure? I mean, in general, patients who are going to need a long-term IV access, okay, for multiple infusions of chemotherapy, you would not put a peripheral IV in that type of patient. Dialysis, in which you require flow rates of 350 to 450 cc's a minute, obviously you're not going to do that through a peripheral IV.
MR. HAWKE: If I could have a moment with counsel.

That concludes my questioning, Your Honor.
MR. HELLMAN: Just a brief redirect, Your Honor.
REDIRECT EXAMINATION BY MR. HELLMAN:
Q Dr. Johnson, is there any difference in the anatomy relative to femoral catheterization between an older person

or a sick person and a prison inmate, the best you can tell?
A The anatomy is pretty standard, yeah. There's no change in the anatomy, no.
Q Do you believe that a prison inmate about to undergo execution might suffer from high blood pressure?
A Absolutely.
Q Is that a factor that would increase the risk over the general population of femoral access?
A Well, I -- hypertension definitely increases the chance of getting significant bleeding, yes.
Q Would you call it a significant increase over the general population?
A In a nonsedated person, I would say in a nonsedated person, because you can generalize that to the acute critical stage when you couldn't sedate somebody as well, yes, that situation increases your chance of complications.
Q Are you aware if Missouri, when it offers sedation to an inmate, explains the risks of femoral access and the possible painful complications that could result?

A I see no documentation of that, no, because they have stated there are no risks.
Q If a severe bleeding were to occur as a result of an arterial puncture, does Missouri have equipment in the execution facility to properly care and remedy that type of injury?
A Not that I'm aware of. If they had to go to the operating room to repair the hole in the artery, no, I'm

not aware of that. But I personally haven't toured the facility.
Q Just for the record, what type of equipment would be necessary to do that?
A Well, you're talking major surgical procedure. You need to have general anesthesia. You need to have a sterile surgical field, as well as all of the sterile surgical steps required to do a femoral arterial cut-down and repair the artery.
Q Going back to the exhibits from the Johnston execution, I just want to be sure I understood your testimony. The color of the blood that is outside the catheter is a lighter red than the color of the blood inside. What is your medical opinion about why the reason the blood outside the catheter is lighter?
A Because it came from a femoral source. It's oxygenated compared to the venous blood.

Q To what degree of certainty do you hold that opinion?
A A high degree of certainty.
MR. HELLMAN: One second, Your Honor.
Those are all the questions I have for Dr. Johnson.
MR. HAWKE: Nothing else, Your Honor.
THE COURT: Thank you, Doctor.
MR. BERGER: Your Honor, I apologize for this, but our third expert, Dr. Thomas Henthorn's flight was delayed by about two and a half hours. He landed in Kansas City about 20 minutes ago and should be here within a half

hour, hopefully much sooner. We certainly apologize to the court for the inconvenience in time, but I'm wondering if you wouldn't mind if we could take a short recess to allow Dr. Henthorn to get into the courtroom. We certainly believe his testimony is important to this case.

THE COURT: Well, if it was important he would be here sooner rather than later. I'll take a brief recess, but I'm going to recalculate your time as well.

Thank you.

(Recess)

MR. BERGER: Your Honor, I'd like to call Dr. Thomas Henthorn to the stand.

THOMAS HENTHORN, called as a witness on behalf of the Plaintiff, being first duly sworn, testified:

DIRECT EXAMINATION BY MR. BERGER:

Q Please state your name.

A My name is Thomas Henthorn.

Q For the record please spell your name.

A First name T-h-o-m-a-s. Last name H-e-n-t-h-o-r-n.

MR. BERGER: Let the record reflect that I'm showing opposing counsel your CV marked as Plaintiff's Exhibit 34.

May I approach the witness.

Q (By Mr. Berger) Is this your CV, Dr. Henthorn?

A Yes, it is.

MR. BERGER: Plaintiffs would like to move Plaintiff's Exhibit 34 into evidence, Your Honor.

MR. PRITCHETT: No objection.

THE COURT: Received.
Q (By Mr. Berger) Please state your position.
A I am currently the -- professor and chair of the Department of Anesthesiology at the University of Colorado in Denver.
Q And you have researched the pharmacokinetics of thiopental; right?
A Yes, I have.
Q And you are also a practicing anesthesiologist?
A Yes.
Q How long have you been an anesthesiologist?

A 23 years.
Q And about how many patients do you anesthetize a week?
A These days it's about 20 a week.
Q And you were on call last night too, weren't you?
A Yes, I was.
Q Until about what time?
A About 7 this morning.
Q Did you get any sleep?
A I got two hours.
Q And did you review any of Missouri's execution records in preparing for this hearing?
A Yes. I reviewed the last six, I believe.
Q And did you rely on these records in forming your opinions of Missouri's lethal injection procedure?
A Yes, I did.
MR. BERGER: Your Honor, we would like to tender Dr. Thomas Henthorn as an expert witness.

MR. PRITCHETT: No objection.
THE COURT: Okay.
Q (By Mr. Berger) Did these Missouri records you reviewed include for each of the six inmates the ECG reports?
A Yes, they did.
Q And did you also review the interrogatory responses of John Does One through Five?

A Yes.
Q And did you also review the Crawford interrogatory answers?
A Yes.
Q And did you review Mr. Crawford's deposition transcript?
A Yes, sir.
Q And did you review the deposition transcript of John Doe One?
A Yes.
Q Have you ever testified before in a lethal injection case?
A No.
Q Would you be testifying in this case if you didn't think there were problems with Missouri's lethal injection procedure?
A No.
Q In your medical opinion, based on your review of the execution materials provided by Missouri, does Missouri's lethal injection procedure leave enough time for the

thiopental to take effect before injecting the potassium chloride?
A No, it does not.
Q So in your opinion, do you think the lethal injection procedure causes significant risk of unnecessary pain?

A Yes.
Q Now, is thiopental one of your areas of expertise?
A Yes, it is.
Q And as you understand it, does Missouri use thiopental in its lethal injection procedure?
A Yes, it does.
Q What is thiopental, briefly?
A Thiopental is a barbiturate that acts on the brain to produce sedation and sleep or hypnosis.
Q And is sodium pentothal just another word for thiopental?
A Yes, it is.
Q Where does thiopental need to get into the body to take effect?
A Well, it needs to enter the brain.
Q Can it take effect before it gets into the brain?
A No, it cannot.
Q Do you understand Missouri's lethal injection procedure to inject thiopental into the femoral vein?
A Yes, that's true.
MR. BERGER: Your Honor, let the record reflect that I'm showing the opposing counsel Plaintiff's Exhibit 35 and 36.

Q (By Mr. Berger) Is this an accurate picture regarding the human circulatory system?

192

A Diagrammatically it appears to be accurate.
Q Is this the system through which thiopental must travel on its way to the brain?
A Yes, it includes that.
MR. BERGER: Your Honor, we offer into evidence Exhibit 35, Plaintiff's Exhibit 35.
MR. PRITCHETT: No objection.
THE COURT: It will be received.
Q (By Mr. Berger) Please describe the course of thiopental, starting when it is first injected. And could you mark the path of the thiopental on the screen. It actually will show up so we can all see it.
A Yes. It would be injected into the femoral -- there it is -- into the femoral vein. It would then travel into the pelvis through the iliac vein, which is here. And then into the inferior vena cava and from the vena cava it would travel up to the heart in the chest.
Q Okay. Thank you. Let the record reflect the screen is now showing Plaintiff's Exhibit 36. Is this an accurate depiction of the heart and lungs?
A Yes.
MR. BERGER: Your Honor, we offer into evidence Exhibit 36.
MR. PRITCHETT: No objection.
THE COURT: Be received.

193

A Okay to proceed?

Okay. Thanks. From here it would enter the right side of the heart, specifically the right atrium. It would travel down into the left -- the right ventricle which is a powerful pump which will pump the blood out into the pulmonary artery. Here the artery is marked as being blue because the blood is not oxygenated. Then it goes out into the capillaries of the lung.

The blood re-collects in these red vessels which brings the blood back into the left side of the heart, the left atrium. From the left atrium it goes into the left ventricle and the ventricle contracts and would then send the blood up the aorta into the arteries and very rapidly after that it would be in the tissues of the body.

Q Dr. Henthorn, from the time the injection is first started, how long does it take the thiopental to travel this course and get to the brain?

A If you include the injection tubing, it's about 45 seconds.

Q And once the thiopental is in the brain, does it take affect instantly?

A No, it does not.

Q Why not?

A It must move across the concentration gradient Initially the concentrations in the blood are very high.

It then diffuses into the brain tissue and the concentrations in the brain begin to rise.

Q Please describe briefly the concept of depth of anesthesia.
A Well, depth of anesthesia refers to interplay between unconsciousness and a stimuli that might interrupt that unconsciousness. At the farthest end of the curve would be no stimuli whatsoever. Somebody may appear to be unconscious, they close their eyes or fall asleep spontaneously. Next up would be a stimulus of voice, a voice command. Beyond that would be like touch. And then various levels of pain would be moderate pain and high pain and extreme pain.
Q So is it possible to not be able to respond to voice, but to be able to respond to touch?
A Yes. I have to think about that. I'm slow after no sleep.
Q And is it possible not to be able to respond to touch, but to be able to respond to moderate pain?
A Yes.
Q And is it possible to not be able to respond to moderate pain, but be able to respond to a higher level of pain?
A Yes, it is.
Q Have you read Dr. Dershwitz' affidavits in the

Johnston litigation in Missouri?
A Yes.
Q Have you read Dr. Dershwitz' affidavits in the Brown case in North Carolina?
A Yes.

Q In those affidavits, what depth of anesthesia does Dr. Dershwitz select as appropriate for a lethal injection?
A He uses for his modeling response to voice command, or lack of response to voice command.
Q Do you think voice recognition loss of consciouness is the correct depth of anesthesia to choose?
A Not for something painful.
Q Why not?
A Because there could still be a response to pain.
Q What depth of anesthesia would you select as appropriate for a lethal injection execution?
A I would select silence of the cerebral cortex that corresponds to an isoelectric or flat line ECG. It's also known as burst suppression.
Q Why is burst suppression the appropriate method of determining consciousness for a lethal injection execution?
A Because without having cerebral activity there is no chance that there would be any conscience recognition of pain.
Q So if someone has been anesthetized but has not

reached burst suppression, is it possible for them to feel pain?
A Yes, it is.
Q But if someone has reached burst suppression, is it possible for them consciously to feel pain?
A In my best medical opinion, no, it's not possible for them to feel pain, or experience pain.
Q Why do trained anesthesiologists monitor anesthetic

depth during surgery?
A To be sure that the anesthetic drugs are working, that they're working properly.
Q Can we be sure that anesthesia is working without monitoring anesthetic depth?
A In my opinion, no.
Q And in the execution context, what can go wrong that can prevent anesthesia from working?
A Well, with these large doses, the thing that could prevent it from working would be delivery, so it could be a leaking tube, leaking stopcocks, things like that, could be extravasation into the tissue instead of into the blood vessels. It could be prevention of the blood to freely flow if there were straps on an arm or something like that, if it were going into a peripheral IV. Or the dose could be incorrect, either prepared improperly or was a defective dose.

Q Let the record reflect that the screen is now showing a photo of the executioner and doctor's view of the gurney.
MR. BERGER: My understanding is this has already been admitted into evidence as part of the video from the tour of the facility.
MR. PRITCHETT: I understand that as well. No objection to the still photograph.
Q (By Mr. Berger) There's a person lying on the gurney here. The first of these photos shows a person lying on the gurney as seen from the execution support room from the

view approximately of one of the plungers. Dr. Henthorn, in your medical opinion, could a person untrained in anesthesiology properly judge anesthetic depth given this view?

A No.

Q Why not?

A Well, first of all, the individual is covered up so many of the signs of late anesthesia, movement, et cetera, would not be discernible with someone covered up. Second of all, you can't even really see the facial expression. And most importantly, there is an object in the way that prevents you from interacting with the patient -- or the inmate, sorry.

Q What is that object?

A It's the window with blinds on it.

Q In your medical opinion, could a trained anesthesiologist properly judge anesthetic depth given this view?

A They would be extremely hesitant to because most anesthesiologists would believe you could not do that, and I believe that as well.

Q And this is also a picture from the execution support room of a person lying on the gurney with a slightly different angle. This would be the view of one of the other plungers. In your medical opinion, could a person untrained in anesthesiology properly judge anesthetic depth given this view?

A No.

Q Would that be for substantially the same reasons that you said before?
A The same reasons.
Q And in your medical opinion, could a trained anesthesiologist properly judge anesthetic depth?
A No.
Q Also for the same reasons?
A The same reasons.
Q When we talk about the word pharmacokinetics, what does that mean?
A It's the study of the timed course of drugs in the

body. Specifically, it would be the distribution of drugs through body tissues, and the other would be metabolism of the drug or its elimination.
Q Does thiopental take effect immediately?
A No, it does not.
Q And the affidavits you referred to above, does Dr. Dershwitz' affidavits take into account the time it takes for thiopental to take effect?
A It was not evident to me that he used those in his calculations.
Q Have you read the transcript of John Doe One's deposition?
A Yes.
Q Based on your reading of the transcript, how long does he say it will take for thiopental to take effect?
A He says it will take effect within 15 seconds.
Q In your medical opinion, is this right?

A This is not correct.
Q Dr. Dershwitz testified in this case on January 30th, 2006. He said, quote, the typical time to lose consciousness will be somewhere between 30 seconds and one and a half minutes.
Defining loss of consciousness as Dr. Dershwitz does as being unable to respond correctly to verbal commands, do you agree that loss of consciousness might

arrive within a minute and a half?
A Yes, it's possible.
Q Would burst suppression arrive within one and a half minutes with a five-gram dose?
A It's unlikely, according to my calculations.
Q Would burst suppression arrive within a minute and a half with a two-and-a-half-gram dose?
A Well, actually -- you said the first one was five?
Q Yes.
A Let me backtrack. It would be likely at a minute and a half to have burst suppression, but not with a 2.5.
Q And would burst suppression arrive -- strike that. Would burst suppression within the minute and a half with a five-gram dose still be likely if we considered the reduction in cardiac output?
A No, not with reduction in cardiac output.
Q Do you consider reduction in cardiac output likely?
A Extremely likely.
Q And would burst suppression arrive within a minute and a half with a two-gram dose?

A It's -- it's unlikely with a two-gram dose.
Q So while Dr. Dershwitz does recognize that thiopental needs time to take effect, is he correct that a minute and a half is the longest it would take for thiopental to reach the necessary level of anesthesia to assure that the inmate

would not feel pain?
A No. It's too short.
Q In your medical opinion, is there a significant risk that the protocol as carried out by Missouri causes unnecessary pain?
A Yes.
MR. BERGER: Your Honor, let the record reflect that I'm showing opposing counsel Figure 1.
Your Honor, would you like me to bring each of the figures up to the witness that are on the screen, the physical figures?
THE COURT: Are they the same thing that's on the screen?
THE WITNESS: The same. I don't need them.
THE COURT: He doesn't need them.
Q (By Mr. Berger) What is this, Dr. Henthorn?
A This is a graph that first shows the course of thiopental as it works its way from the injecting syringe to the brain, which takes about 45 seconds.
Q How do you know what this is?
A I prepared this.
MR. BERGER: Your Honor, we offer Plaintiff's Exhibit 39 into evidence.

MR. PRITCHETT: No objection.
THE COURT: It will be received.

202

Q (By Mr. Berger) So please take us through the thiopental's path through the body and how long each step takes. How long does it take for the thiopental to get to the end of the tubing from the syringe?
A 7.5 seconds.
Q And how long does it take from there to get to the heart?
A 12 seconds.
Q And at that point, once the thiopental is in the heart, what is the arterial concentration of thiopental?
A As it shows in this graph, it is zero.
Q And what is the brain concentration of thiopental at that point?
A It would also be zero.
Q Does the thiopental go to the lung next?
A Yes.
Q And about how long does it take for it to go to the lung?
A About 13 seconds.
Q What is the arterial concentration of thiopental then?
A Still zero.
Q And the brain concentration at that point?
A It's still zero.
Q Does the thiopental then go back to the heart?
A Yes.

203

Q About how long does it take to get back to the heart?
A Approximately another 13 seconds.
Q And then does it go to the arteries?
A Yes, it does.
Q And from there how long does it take to get to the brain?
A Best guess would be -- not a guess, but it would be one to three seconds.
Q Once the thiopental is in the brain, does it take instant effect?
A No, it does not.
Q What needs to happen for it to work in the brain?
A What needs to happen is it needs to diffuse from the arteries in the brain -- the capillaries in the brain, into the brain tissue.
Q The graphs here plot both arterial plasma concentration and brain concentration. Which measure is a better indicator of when a patient or inmate will be at burst suppression?
A It would be the brain concentration, or the effect side concentration.
Q And does it take longer for the thiopental modeling to run to the arteries or in the brain?
A It's more rapid in the arteries. It's longer in the brain.

Q In your opinion, does Missouri give enough time for the thiopental to take effect before the potassium chloride

is injected?
A No.
Q What knowledge did you base this modeling on?
A This modeling is based on modeling that was developed in our laboratory, mostly by myself, and it's based on experiments over a number of years.
Q How much experience do you have performing this kind of modeling?
A I exclusively did this sort of modeling for at least twelve years, and with thiopental for I believe about six manuscripts. We also -- yeah.
Q And have you tested your models in the scientific community?
A Yes. These have been subjected to peer review in very good journals. They have been published and well-received there. And in addition, this was the basis of my National Institute of Health research.
Q And what has the response of the scientific community been to your models?
A It was favorable. We got quite a good score and we were funded for -- I was funded for eleven straight years to do this kind of work.
Q How many people in the country would you say have as

much experience as you do modeling the pharmacokinetics of thiopental?
A If we're talking about the specifics of onset and the intensity of onset, I would say it's less than six.
Q Do you know Dr. Mark Dershwitz?

A Yes, I do.
Q Did you teach Dr. Dershwitz pharmacokinetics at Northwestern?
A I was the teaching assistant for the pharmacology course where we had an intense experience with pharmacokinetics.
Q Is Dr. Dershwitz considered an expert in the onset of the effect of thiopental?
A No, he's not.
Q Let the record reflect that the screen is now showing Figure 2 and I'm showing Figure 2 to opposing counsel.
What is this, Dr. Henthorn?
A This is a graph showing the difference in onset time between simple loss of consciousness as defined by loss of voice recognition to a deeper level of anesthesia.
Q And how do you know what it is?
A I prepared it.
MR. BERGER: Your Honor, plaintiff offers Figure 2, otherwise known as Exhibit 40, into evidence.
MR. PRITCHETT: No objection.

THE COURT: It will be received.
Q (By Mr. Berger) What does the X axis in this graph represent?
A It's time and it shows the first two minutes after beginning the injection of thiopental.
Q And just to be clear, the X axis is the horizontal axis?
A Yes.

Q And what does the Y axis represent?
A It would be the vertical axis, and it looks at the probability of effect.
Q And what probability of effect are you most interested in as an anesthesiologist?
A As an anesthesiologist, and actually most clinicians, but we are interested in 95 percent probability.
Q Why do you choose 95 percent?
A This -- because it's, first of all, it's a standard in pharmacology. We understand the mathematics behind it. And it also means that virtually all, or the vast majority of individuals will have reacted to the drug. So it's a good way of calibrating a dose.
Q And what does the dotted line on the left represent?
A The dotted line on the left is -- represents the probability of having loss of consciousness vs. time after starting infusion at time zero.

Q And what does the solid line on the right represent?
A Basically the same thing. Starting at time zero, but this one is looking at a deeper level of anesthesia. Specifically burst suppression.
Q And again, which depth of anesthesia do you believe is necessary to assure that a person will not feel pain?
A The one represented by the solid line, EEG burst suppression.
Q How much longer does it take to achieve a 95 percent likelihood of burst suppression compared to achieve a 95 percent likelihood of lack of voice recognition

consciousness?
A It's going to depend on a number of things, including dose. This was modeled with a five-gram dose, so you can see with a five-gram dose it's only about 20 seconds difference.
Q And how did you choose that amount of five grams?
A From the Crawford affidavit saying that was the dose used in Missouri.
Q If you found out that Missouri used a different amount of thiopental or that not all the thiopental that was used was delivered successfully into the inmate's veins, would that change the result?
A It would -- the only result that would change would be moving the curve to the right, which would mean that the

effects would come on slower.
Q Does this figure take into account the reduction in cardiac output that might be caused by thiopental?
A No. This -- it was simply to show the difference in time between the two kinds of effect of thiopental.
Q Is a reduction in cardiac output likely?
A With a five-gram dose, yes, it is.
Q Why did you exclude that assumption from this graph?
A This -- because it would affect both. And the idea here was just to illustrate that there is a time differential between loss of consciousness and achieving a deeper level of anesthesia from the same dose.
Q And what effect does a reduction in cardiac output have on the circulation?

A It would slow the circulation down.
Q And what effect does a reduction in circulation have on when thiopental is delivered to the brain?
A It would slow that down as well, so it would take longer to take effect.
Q And what effect does less thiopental in the brain have on the time it takes to reach burst suppression?
A It would prolong that as well.
Q Let the record reflect I'm showing Exhibit 41 to opposing counsel.
This is an affidavit submitted by Dr. Dershwitz

in the Page case in North Carolina. Have you read this?
A Yes.
Q Let me read a short portion. Dr. Dershwitz writes, "During an execution by lethal injection" --
MR. PRITCHETT: Where are you reading from?
MR. BERGER: I'm sorry. My apologies. Page 9, paragraph 22.
MR. PRITCHETT: Thank you.
MR. BERGER: My apologies.
Q (By Mr. Berger) "During an execution by lethal injection, circulation is slowed or stopped immediately by the administration of thiopental."
MR. BERGER: Your Honor, we offer Exhibit 41 into evidence.
MR. PRITCHETT: No objection.
THE COURT: Be received.
Q (By Mr. Berger) Do you agree with Dr. Dershwitz'

assessment that the thiopental slows circulation?
A Yes, I do.
Q Do you agree with Dr. Dershwitz' assessment that the slowing would happen immediately?
A No. It would take time for it to reach the arterial side of the circulation so it would take approximately 45 seconds to a minute.
Q Do you agree with Dr. Dershwitz' assessment that the

heart could stop?
A In some patients with heart disease it might be able to stop their heart, but I don't think it would stop their heart.
Q Have you seen evidence of the heart stopping on the ECGs you studied?
A Not in the ones from Missouri. It continued to beat after the thiopental.
Q For the record, I am now showing Figure 3, Exhibit 42, on the screen. What does this figure represent?
A This figure illustrates the effect of onset time to 95 percent probability of an effect as the heart function decreases. More specifically, that the cardiac output decreases.
Q And how do you know?
A I prepared this one as well.
MR. BERGER: Your Honor, I would like to enter Exhibit 42 into evidence.
MR. PRITCHETT: No objection.
THE COURT: It will be received.

Q (By Mr. Berger) So would a reduction in cardiac output delay the onset of thiopental?
A Yes.
Q Will the reduction in cardiac output delay loss of consciousness?

A Yes.
Q And will the reduction in cardiac output also delay burst suppression?
A Yes.
Q Have you seen the timetables provided by defendant Crawford to plaintiff's first interrogatories?
A Yes, I have.
Q Is it correct that these timetables represent that each injection is typically given within a minute of each other, or less?
A Yes.
Q And have you read Mr. Crawford's answers at his deposition?
A Yes, I have.
Q And does he represent that Missouri injects the drugs about as quickly as it can?
A Yes.
Q And have you seen the ECG reports from the last six executions?
A Yes.
Q From these ECGs, can you usually tell when each drug was injected?
A In five of the six it was pretty easy to tell.

Q And have you relied on the ECGs and these markings in your analysis?

212

A Yes, I have.
Q And have you read John Doe Two's interrogatory answer stating that he or she marks on the ECG report when each injection begins and when it ends?
A Yes.
Q Which is on page two, No. 17, of John Doe Two's interrogatory answer.
A Yes. I was happy to read that because I already assumed that was the case.
MR. BERGER: I believe this is already in evidence.
Q (By Mr. Berger) And based on this testimony, these ECGs, would you say that Missouri generally injects the drugs extremely quickly?
A Yes.
Q Do you remember the Vernon Brown ECG?
A Yes, I do.
Q Based on the Vernon Brown ECG report, how long after the thiopental was first injected did the potassium chloride reach the veins?
A I believe it was 128 seconds.
Q In your medical opinion, with any dose of thiopental, five grams or less, is it likely that burst suppression was reached by the time that potassium chloride reached the veins in the Vernon Brown case, based on those times?

213

A I'm sorry. You said any dose less?
Q Yes. With any dose of thiopental five grams or less, is it likely that burst suppression was reached, counting in the cardiac -- the effects on cardiac output?
A No.
Q And from your analysis of the ECGs, is the Vernon Brown timing pretty representative of the timing of the injections in the other five -- the other four executions for which we have records and markings on the ECGs?
A Yes, it was.
Q And if we look at defendant Crawford's timetables for other executions for which we do not have the ECGs, are some of the timings even faster?
A Yes. There were two that -- actually No. 7 and No. 8 were probably less than two minutes.
Q Let the record reflect I am now showing Figure 4, Exhibit 43 on the screen. What is this, Dr. Henthorn?
A This is a graph showing when potassium is in the veins, that's the shaded part, in relation to when -- the probability of burst suppression occurring under different conditions.
Q And how do you know what it is?
A I prepared this one.
MR. BERGER: Your Honor, we offer Plaintiff's Exhibit 43 into evidence.

MR. PRITCHETT: No objection.
THE COURT: It will be received.

Q (By Mr. Berger) How much thiopental does this graph assume?
A Five grams.
Q And what again does the box represent?
A This would be the time that thiopental was entering the femoral vein.
Q And what does the left-hand side of the box then represent?
A That would be when it first arrives in the femoral vein.
Q So assuming that cardiac output is unchanged by thiopental, what is the probability of thiopental achieving burst suppression when the potassium chloride reaches the veins in about one and a half minutes?
A It's approximately a 98 percent certainty.
Q And how can you see this on the graph?
A Well, that is where the left-hand part of the box, or the left-hand edge of that box hits the solid line which represents that cardiac output has no effect -- I mean, thiopental has no effect on the cardiac output, and this would be the probabilities of achieving burst suppression. And as you can see, it's near the top of the box -- or the line, so it's about 98 percent.

Q What are the chances that with a five-gram dose of thiopental there would be no effect on cardiac output?
A I think it's virtually zero.
Q So if we assume that there is, say, a 25 percent reduction on cardiac output so that cardiac output is 75

percent of the baseline, what are the chances that thiopental would have reached burst suppression when the potassium chloride reaches the veins in about a minute and a half?
A That reduces it to -- it's now 75 percent.
Q And if we assume that there is a 50 percent reduction in cardiac output, so that cardiac output is 50 percent of the baseline, what are the chances that the thiopental would have reached burst suppression when the potassium chloride reaches the veins in a minute and a half?
A As you can see, these are very steep curves, and at this point the probability is about two or three percent.
Q And if we assume that there's a 75 percent reduction in cardiac output, so that cardiac output is 25 percent of the baseline, what are the chances thiopental would have reached burst suppression when the potassium chloride enters the veins?
A It would be infinitesimally small.
Q And again, is it likely that there will be some effect on cardiac output with a five-gram dose?

A I think it's a virtual certainty.
Q With a five-gram dose would you expect that effect on cardiac output to be big or small?
A I would expect it to be large.
Q So would you expect that the reduction in cardiac output following a dose of that size would likely be somewhere between 50 and 75 percent?
A It would be at least 50 percent, in my best medical

opinion.
Q And possibly more?
A And possibly more.
Q And assuming such a reduction in cardiac output, is it likely that the thiopental will have achieved burst suppression at one and a half minutes when the potassium chloride reached the veins in Vernon Brown's execution?
A It would be very unlikely.
Q And once again, is the timing of the injection of thiopental and potassium chloride in the Vernon Brown execution typical of the timing of the other -- of the injections in the other executions you have reviewed?
A Yes.
Q Is Figure 4 up on the screen, Exhibit 43, identical to what was known as Figure 5 which was attached to your expert report, representing the same thing?
A No.

Q What changed on it?
A Well, the main thing that changed was that it became clear after reviewing the ECG records that the injection time was not one minute as it had been on the record, on the handwritten record, just writing the times that the injection began and ended. I used those initially and it was one minute.
When you actually look at the ECG it's almost exactly 30 seconds. So I sped up the injection time for these.
Q So does the new graph make your findings more

accurate?
A I believe they do.
Q And would it be fair to say that the new graph is more in favor of the state than the old graph was?
A Yes, it is.
Q Now, what is the probability of burst suppression if there is no change in cardiac output, in the new graph?
A I'm sorry?
Q Am I correct that you just said the probability of burst suppression in the new graph, if there is no change in cardiac output, is about 98 percent?
A Yes.
Q Do you remember what it was in the old graph?
A I think it was closer to 60 percent.

Q And in the new graph, what is the likelihood of burst suppression if cardiac output is at 50 percent?
A It's two percent.
Q And what is the probability of burst suppression at 50 percent in the old graph?
A I believe it was also quite small, but I don't remember the number.
Q But would it have been less than --
A It was less than two percent, yes.
Q And again, what is the probability of burst suppression -- strike that. How likely is it that a five-gram dose of thiopental will have a 50 percent effect on cardiac output, or more?
A I think it's very likely.

Q Have you reviewed the chemical log provided by the state?
A Yes.
Q Do you remember what amount of thiopental was indicated for the Marlin Gray execution? Let me show it to you. Do you remember -- in those last two executions how much thiopental was used, according to the chemical log?
A 2.5.
Q And what effect will a reduced dose of thiopental have on the time it takes for thiopental to reach burst suppression?

A It will prolong the time.
Q And have you read the letter of the state admitting that they used 2.5 grams?
A Yes.
MR. BERGER: Let the record reflect that I'm showing opposing counsel Plaintiff's Exhibit 44.
Q (By Mr. Berger) Is this that letter, Dr. Henthorn?
A Yes.
MR. BERGER: Your Honor, we move to admit Plaintiff's Exhibit 44.
MR. PRITCHETT: I think it's already in the record, but to the extent it needs to be admitted as an exhibit we don't object.
THE COURT: Okay.
Q (By Mr. Berger) And you have already said that you have reviewed portions of John Doe One's deposition?
A Yes.

Q And if we turn to that deposition, at page 21, he says, "I'll get out five. I'll use 2.5." And at page 30, he says, "I do remember when we used only 2.5."

Based on your understanding of John Doe One's deposition testimony, has Missouri given a five-gram dose of thiopental in any of the past six executions?

A No.

Q Can you tell how much thiopental he actually gave?

A No.

Q If we assume that he gave 2.5, let's -- let the record reflect that the screen now shows Figure 5, which is Plaintiff's Exhibit 45, which assumes a 2.5 gram dose. Can you briefly describe what this is?

A This is very similar to the last graph. It shows the -- when the potassium was in the vein in relation to the probability of achieving an effect.

Q And how do you know what it is?

A I prepared this one.

MR. BERGER: Your Honor, we offer Plaintiff's Exhibit 45 into evidence.

MR. PRITCHETT: No objection.

THE COURT: Received.

Q (By Mr. Berger) And again, what amount of thiopental does this figure assume?

A 2.5 grams.

Q So assuming this 2.5 grams of thiopental and that cardiac output is unchanged by thiopental, what is the probability of thiopental achieving burst suppression in

1.5 minutes?
A It's about 75 percent.
Q If we then assume 25 percent reduction in cardiac output, what are the chances it would have gotten to burst suppression at that point?

A It's about seven or eight percent.
Q And with a 50 percent reduction?
A It's less than one percent.
Q And with a 75 percent reduction?
A Again, it's infinitesimally small.
Q And is it likely that there will be some effect on cardiac output with a 2.5 gram dose?
A Yes. This is still a very large dose. Again -- not again, but these doses are not well-studied. Clinical doses are well-studied and those produce a reduction in cardiac output. So there is every probability that there will be a substantial reduction in cardiac output from 2.5.
Q And roughly what change in cardiac output do you consider most likely with a 2.5 gram dose?
A Based on what I have observed with thiopental in the past I would say 50 percent. It's very likely, and conservative.
Q And with any of those scenarios with reduced cardiac output, is it likely that the 2.5 grams of thiopental here would have achieved burst suppression at one and a half minutes when the potassium chloride was injected -- entered Vernon Brown's veins?
A No.

Q Let the record reflect the screen now shows Plaintiff's Exhibit 46, which is Figure 6.

Please describe what this is.
A Almost identical to the last graph. It again shows when the potassium is in the vein in relation to the probability of effect.
Q And how do you know what this is?
A I prepared this one as well.
MR. BERGER: Your Honor, we offer Plaintiff's Exhibit 46 into evidence.
MR. PRITCHETT: No objection.
THE COURT: It will be received.
Q (By Mr. Berger) And based on your reading of John Doe One's deposition transcript, do you think he actually used 2.5 grams?
A I think it would be very difficult, based on his description of what he was doing, to actually get the full content of every syringe withdrawn and put into another syringe, so I think it's probably less.
Q So if we assume a two-gram dose, what are the chances that the thiopental would have achieved burst suppression before the potassium chloride reaches the veins at 1.5 minutes?
A Again, with no change in cardiac output, the probability has now fallen to just under 40 percent.
Q And with a two-gram dose, do you consider a change in cardiac output likely?

A Yes.
Q And with a change in cardiac output, with a 25 percent change in cardiac output, what would be the likelihood of burst suppression?
A It's about three percent.
Q And with a 50 percent change?
A It's way less than one percent.
Q And with a 75 percent change?
A Again it's -- it has actually fallen to even more than infinitesimal.
Q And what change in cardiac output would you expect to be most likely with a two-gram dose?
A Again, I don't think it would be substantially different from the 2.5 gram dose. I think it would be in the neighborhood of 50 percent.
Q And is the dose of thiopental necessary to model the onset effect of thiopental?
A Yes.
Q So if you don't know the dose, can you know the time it takes effect?
A No. You will know that -- regardless of dose, you will know when it reaches the arteries, but the next step, which is the diffusion into the brain, is dependent on concentration, so a bigger dose produces higher concentrations so it would speed things up, and a smaller

dose would slow things down.
Q So assuming that whoever is mixing the thiopental does

not know exactly what amount he is mixing, can that person know when the thiopental will take effect?
A It's unlikely.
Q And even if a person knows how much he's mixing, if the full amount of the thiopental that has been mixed is not delivered successfully into the person's veins, is it possible to know when the thiopental will take effect?
A No.
Q Assume that the thiopental did not achieve burst suppression and that a patient or an inmate suffered pain, let's assume it's an inmate, how likely is it that a participant in an execution would be able to see that pain?
A I think it would be unlikely.
Q What effect might thiopental have that could prevent an onlooker from being able to see an inmate's pain?
A Well, already before the pain would arrive, they would have been relaxed and their ability to respond would be curtailed.
Q Will it be harder for a witness to see the pain if they're looking through a window from another room?
A Yes, I believe so.
Q Would it be harder to see the pain if there's a sheet covering the inmate?

A Yes.
Q And would it be harder to see the pain if there's a venetian blind partially drawn over the window?
A Yes to that as well.
Q In making the models that we have just reviewed,

Dr. Henthorn, do you have to make certain assumptions?
A Yes.
Q Are these assumptions discussed in your expert report?
A Yes, they are.
Q Did you choose eight feet of tubing?
A Yes.
Q Why did you choose that amount of tubing?
A That was based on the report from the Department of Corrections.
Q And did you choose seven and a half second mean transit time to reach the patient?
A Yes.
Q And why did you choose seven and a half second mean transit time?
A Well, the dead space, again from the report from Missouri, was that the dead space of that eight feet of tubing was 15 milliliters. So dividing the 15 milliliters by two milliliters (sic) per second would give you a mean time for injection would be 7.5.
Q And did you choose an injection speed of two cc's per

second?
A I did in these revised graphs, yes.
Q And why did you choose that injection speed?
A Well, because that's what Mr. Crawford said, first of all. And second, if you look at the ECG and look at the timing as marked from the beginning of the injection to the end of the injection, it is remarkably close to the time of two cc's per second. A 60 cc syringe is emptied in about

30 seconds.
Q And did you choose a 12-second mean transit time from the femoral vein to the heart?
A Yes.
Q And why did you choose that?
A That was based on the diameter of the vena cava and the length of the vena cava giving a volume of approximately 600 cc's. And that half of the cardiac output would be going through the vena cava. You have to realize that the vena cava picks up speed as it gets closer to the heart, so it would probably be less than half the cardiac output at the beginning and more than half at the end, but on average it should be about half.
Q And do you assume normal cardiac output of five liters per minute?
A Yes.
Q Why?

A This is based on my own experiments. When we looked at individuals very carefully in pharmacokinetic studies, this was a resting male around 80 kilos has a cardiac output at rest of approximately five liters per minute.
Q And you assumed about an 80, 82 kilogram healthy male inmate?
A Yes. My experiment actually I believe was 82 and I think Dr. Dershwitz is assuming 80 kilos. There would be really no difference between the two.
Q And do you assume essential blood volume of 2.5 liters?

A Yes.
Q Why do you assume that blood volume?
A Approximately a quarter to a third or even half of the blood volume can be in the thorax. And certainly when someone is recumbent that number goes higher.
The other thing you have to understand is when I am modeling thiopental, it's more than just the blood volume. There would be an interaction of the drug. It diffuses into the lung on its passage through the lung and it would pick up an additional volume there, so there's an additional 500 cc's.
Q So in your medical opinion, does Missouri's injection times allow enough time for the thiopental to take full effect before the potassium chloride enters the veins?

A No.
Q And in your medical opinion, do you think the lethal injection procedure causes significant risk of unnecessary pain?
A Yes, I do.
Q And if Missouri waited another two minutes after injecting the thiopental before injecting the next drug, could it substantially reduce the risk of pain?
A Very much so, yes.
Q And are there any drawbacks in waiting this additional time to allow the thiopental to take effect?
A None that I can think of.
Q In your work as an anesthesiologist, do you place central lines?

A Yes, I do.
Q And in your work as an anesthesiologist, do you make decisions about whether to place a central line or peripheral line?
A Yes.
Q Are you aware that Missouri injects these chemicals through a femoral line?
A Yes.
Q Would you ever select a femoral line as your first option for injecting these drugs if the peripheral veins were not compromised?

A No, I would not.
Q Does the femoral line create the possibility of more complications than the peripheral line?
A Yes.
Q Can these complications be painful?
A Yes.
Q Can some of these complications be very painful?
A I believe so, yes.
Q How often do these complications arise with femoral insertions?
A I would say slightly less than 20 percent.
Q Do the drugs take effect much quicker if they are injected into a femoral line rather than a peripheral line?
A No.
Q So does the femoral line injection make the thiopental take effect more quickly than with a peripheral injection so that burst suppression will be achieved before the

injection of the potassium chloride?
A No, not substantially.
MR. BERGER: One moment, Your Honor.
Let the record reflect that the photos from Plaintiff's Exhibit 18 are on the screen.
Q (By Mr. Berger) Can you please describe what you see, Dr. Henthorn?
A I believe this is a photo from the Johnston execution

and what I see is a line in the groin, in the right groin, with quite a lot of blood on the field. If you notice there's -- on the left there's a sponge that's almost completely soaked, and it's soaked in bright red blood. Also you note above the tip of catheter some bluish discoloration and some swelling.
Q What do you think happened here, Dr. Henthorn?
A It's impossible to know for sure just by looking at this one photo, but my best guess is that perhaps the artery was punctured and the blood coming back was bright red, and in a large amount, because the arteries are under high pressure.
Q And what are you basing this view on?
A Experience, having seen arteries punctured in the past.
Q Could this be painful?
A Yes, it can be painful.
Q Is this the kind of complication -- is this kind of complication unusual with a femoral line insertion?
A I think this is one of the more common complications,

because the femoral vein and the femoral artery run right next to each other. It's very difficult to always be certain when you're placing a needle in the groin that you're going to hit the right structure.

Q Is this kind of complication possible with a

peripheral line insertion?

A No.

Q Do you see a hematoma in this picture?

A Well, I believe so. As I say, just to -- above the catheter insertion site there is some purplish discoloration and some swelling.

Q What makes you think that's a hematoma?

A Well, it's right where you put the needle, so it would be likely that this would be a hematoma and not something else, because if there was a hematoma it would be right there. It's also because -- what you usually see with a hematoma is some discoloration under the skin and some swelling. This seems to have both.

Q And in addition to the complications you have just discussed as probable in the Johnston photo, what other complications can arise from a femoral line insertion?

A Well, first of all, I want to say I'm not an expert on femoral line insertion. Most of my insertions are higher up in the neck or the subclavian. But as with any line placement, there's the potential for hitting an artery and causing a hematoma. There is potential for hitting the vein and going through the back wall and causing a hematoma. That can be what this is from as well. Less

likely would be hitting the femoral nerve. And as you can also tell, we're very close, within an inch or two, of the

pelvis, and it's possible to place the needle into the pelvic structure such as the bladder, et cetera.

Q And once again, how likely collectively are these complications?

A I believe there's a paper in -- well, I have seen a paper in the Journal of American Medical Association by More - ray (phonetic spelling), and it's approximately one in six.

Q And are these complications painful?

A Some of them can be. I mean, a hematoma is going to cause pain just from the swelling alone.

Q And are some of them very painful?

A I have seen people require treatment of these hematomas with painkillers. So I would say that's pretty painful.

MR. BERGER: One moment.

No further questions, Your Honor.

CROSS-EXAMINATION BY MR. PRITCHETT:

Q Good afternoon, Doctor. My Name is Mike Pritchett. I'm here representing the state in this case.

A Okay. Thank you.

Q I'd like to start out, if I could, with some areas where I think you will agree with Dr. Dershwitz' position. Don't you agree that the administration of five grams of thiopental will produce unconsciousness in any human being

for many hours?
A I would agree with the first part of the statement, in virtually every individual. And I would take some exception with the duration, if you're defining it based on burst suppression vs. some lesser definition of consciousness, unconsciousness, but otherwise, yes, for a very long time.
Q Could you tell us how long you think burst suppression would last with a five-gram dose of thiopental?
A Well, one way to approach that very quickly is knowing the half-life of the drug is six hours and you're looking at two decrements of half life. Of course, there's some redistribution going on as well. So in my best opinion without having performed the simulation, I don't have a computer in front of me so I don't know, but I would say it would be 45 minutes at least.
Q Wouldn't you agree also that a dose down even as low as 1.67 grams will produce a state of deep unconsciousness in almost all people?
A Yes, it would produce even burst suppression in almost everyone.
Q And is it correct to say that you have no argument with the affidavit that's been provided by Dr. Dershwitz about the time frame of about four minutes after the administration of the thiopental until -- well, through the

next five hours?
A Yes, except for the definition of unconsciousness.

That's going to affect the calculation slightly.
Q Okay. But as a general matter, the --
A As a general matter, he did a good job on that.
Q So your conclusion, I think, is that an administration of five grams of thiopental will obtain burst suppression after what amount of time? Let's assume your best guess of 50 degree cardiac output reduction.
A Well, again, I would like to refer to the graph, but I'm going to say that it was just under -- around two minutes.
Q Would you like to see the graph?
A That would be great. Thank you.
Q I'm referring to what I think is Figure 4.
MR. PRITCHETT: If we could either get a copy for the doctor or call it up on the machine. It's the one titled, I think, onset of thiopental effect, probability of effect, 5.0 gram dose.
Q And we're looking at -- I'm looking at your view as to when burst suppression, the 95 percent chance of burst suppression, is likely to happen on your best guess with 50 percent cardiac output reduction.
A It looks like about a minute and 40 seconds.
Q And in order for us to trace that, we would go to the

line that equates to the 50 percent baseline, which is the third one from the right?
A Correct.
Q And we would just follow up that line until we hit 95 percent on the left axis. Am I right?

A You're right.
Q Thank you. And then with the five-gram dose of thiopental, we're presuming burst suppression would last, did you tell us 45 minutes at least?
A At a minimum.
Q At a minimum?
A I think it was probably closer to Dr. Dershwitz' calculations.
Q You have chosen burst suppression as the level of unconsciousness that should be achieved before the administration of potassium chloride, am I correct?
A Correct.
Q Burst suppression is a very deep state of unconsciousness, isn't it?
A Yes. It's complete unconsciousness.
Q Isn't it true that burst suppression is even a deeper level of unconsciousness than is achieved during -- of a person undergoing surgical procedures?
A Yes. It can be reached at times, but it's not -- certainly isn't the target.

Q So in surgical procedures where a person is being cut into, the target is not as low as burst suppression?
A Correct. But you have to realize that in that situation there's an expert in anesthesia monitoring very closely. In the absence of monitors or someone who is an expert, I think a higher level is necessary.
Q Once you have reached burst suppression, which you have indicated with your best estimate of the 50 percent

cardiac reduction occurring at somewhere around a minute and I think you said -- somewhere between a minute and a half and two minutes?

A Right.

Q Once you hit burst suppression, even under your own definition of the appropriate state of consciousness, is there any need at that point to have any monitoring of the level of consciousness if the person is going to be at burst suppression for the next 45 minutes to a few hours?

A Well, what you would also need is some determination that the effect is occurring, so you would need to see the trajectory of the effect. So to be sure the drug has reached the brain, you need to see some effect. Once you have seen some effect, then I believe waiting the appropriate amount of time would be reasonable.

Q So assuming the individual, the condemned prisoner,

actually gets a five-gram dose, once you get burst suppression, once the condemned prisoner gets to burst suppression, there's no longer any need to monitor. It's just a matter of realizing whether the inmate is at that level?

A Correct. Because that would last a long time.

Q Do you have any reason to believe that in executions in Missouri, whatever dose of thiopental has been given, it's not fully being entered into the inmate's circulatory system?

A I haven't seen evidence actually one way or the other.

Q Okay. So you wouldn't tell me -- you wouldn't argue with me that it's not happening, but you couldn't tell me you're sure it is happening.
A Exactly.
Q You have indicated that Dr. Dershwitz chose a level of unconsciousness that I think you call the voice command level.
A Correct.
Q Were you able -- did you read the testimony from the trial at the end -- the first part of this trial at the end of January from Dr. Dershwitz?
A I did, yes.
Q And an affidavit was presented. And is it your recollection -- isn't it your recollection that his

statements with regard to how long a person would be unconscious would -- the person would be unconscious and unable to experience pain?
A Correct.
Q So a level of unable to experience pain is a level below voice command unconsciousness, isn't it?
A Maybe I answered that incorrectly.
Q Okay. Do you have a recollection of the framing of those questions as to whether it was --
A Well, what I have a recollection of are his graphs, and what he shows on the graphs is that the 50 percent probability corresponds to the effect side concentration or brain level that would be required to produce loss of voice command. So I'm looking at the actual data he has in his

graph to form that opinion. I really wasn't thinking exactly the wording that he said.

Q Okay. But we can rely on what the transcript says for that, presumably.

In terms of being able to monitor the condemned inmate, you gave us some opinions based on a couple of still photographs. Were you able to have the opportunity to see the videotape of the execution room that was taken a few weeks ago?

A No.

Q One of the photographs you saw was looking through the

window kind of straight on at not an inmate but a person on the bed.

MR. PRITCHETT: And if you wouldn't mind, I know there's two photographs that you have used, still photos. There was one looking straight through the window and then there was one off to the side. Yeah, this photograph here.

Q (By Mr. Pritchett) That's looking straight down from the top of the person's head through the window, correct?

A Yes.

Q And then the other photograph, if you wouldn't mind, that's a side view, and I understand that from the still photograph we really can't see very well, but isn't this an angle from which the aspect of an individual in that bed could be determined by a person looking at him?

A The aspect perhaps, yes.

Q Isn't that one of the things that an anesthesiologist would do in assessing anesthetic depth?

A It's one of the very lowest things that we would use. It's very unreliable.
Q But it is a step?
A It's a step. We use any information we can get.
Q You have had to make some assumptions, haven't you, with regard to the effect of huge doses, two and a half to five grams of thiopental, on human cardiac output?
A Yes.

Q Okay. Isn't it true that the magnitude of the effect of these kinds of large doses of thiopental is something that has not been well researched?
A Correct.
Q And the effect of these large doses is poorly documented?
A Absolutely.
Q So isn't actually the degree to which the heart will be affected in the minutes following a massive dose of thiopental a matter of some speculation?
A Yes, and that's why I provided various curves.
Q Okay. And isn't it also true that the time it takes for a massive dose of thiopental to begin to decrease cardiac output is a matter of some speculation as well?
A Well, it would be the same -- the way I approached this was that the material will be in the arteries for sure by the time I started modeling at one minute.
And also I have had many occasions to have patients on continuous cardiac output monitors and watch what happens with clinical doses, and the changes begin at

45 seconds or a minute or so. So it's not unreasonable to use that as a basis.
Q You're making some extrapolations, though, without any hard data.
A Absolutely.

Q So at least to some degree your conclusions here with regard to the amount of time it would take for thiopental to diffuse through the brain is based on some speculation?
A Well, there would be some -- yes, there is some speculation, but as I said, I have seen clinical doses do this in healthy people. And also we can see from the potassium chloride injection and when it starts to have an effect on the circulation. It's in the right ballpark.
Q Now, next I'd like to look at a couple of the figures that you have done and if you would bear with me. The numbers of the figures have changed a bit from the initial report you gave so it's going to take me a minute to try to sort out which is which.

What was Figure 6, assuming a 2.5 gram dose of thiopental, I think is Figure 5 now. If we could call that up, please.

Even with a dose of thiopental at the 2.5 gram dose reduces cardiac output to 25 percent of the baseline of normal, doesn't your graph show that a 95 percent chance of burst suppression still occurs at something just over two and a half minutes?
A Oh, okay. Yes.
Q And did you do, and I don't know that this was

introduced, did you do an approximation of a 1.67 gram dose of thiopental?

A Yes, I did.
Q Do you recall when burst suppression on that occurred with regard to the maximum reduction of 75 percent of normal?
A No, not specifically, but I would assume it would be later than even two and a half minutes. What I believe it was very close to was that maximum concentration had to be reached for a dose in that range, so -- when the peak effect occurs with thiopental, so I'm guessing it's very close to three minutes.
Q Okay. Still something short of three minutes, though?
A Probably, yes.
Q I guess since we do have this as an exhibit, the 2.0 gram dose, 95 percent burst suppression --
A Go to the next one.
Q Even at the maximum effect it might have a 75 percent reduction, we're still hitting 95 percent with a two-gram dose short of three minutes, aren't we?
A Yes.
Q Would it be possible to track the effect of thiopental, a large dose of thiopental by means of the EKG strips you've seen?
A The EKGs, no. Well, I answered very rapidly and said no, but one of the things you can see when there's a cardiac effect of thiopental is an increase in the heart

rate as it is compensating for a decrease in cardiac output, but it's not reliable. You'll see it sometimes but not others. But I do recollect seeing that on one or two of the inmates.

Q Would that compensate, a more rapid heart beat, for the suppression of the function?

A Exactly. Cardiac output is a function of stroke volume, which is the force of the contraction.

Q If the heart sped up as a result, the heart rate increased, would that alter your conclusions and your figures?

A No. It would indicate to me there was a reduction in cardiac output, there was an attempt by the body to compensate. It probably can't compensate for something that large, but it was trying. It detected it.

Q Are you aware of a recent execution that occurred in North Carolina in which the condemned prisoner was monitored by means of a BIS monitor?

A I was made aware of that by Mr. Berger.

Q And can you tell us what a BIS monitor is?

A It's a bispectral indexed specroscopy, I believe.

Q What are they used for, generally?

A They're used during anesthesia to monitor depth of anesthesia.

Q Is it a scale 0 to 100?

A It is, but it's a nonlinear scale.

Q Okay. By that, I understand it makes sort of an

S-curve?
A Well, that, and I guess the other thing to say, it's a nonparametric, and what I mean by that, a value of 30 is not half the value of 60.
Q I understand.
A Okay.
Q At what level in surgery is targeted on a BIS monitor?
A Well, it would vary based on the stimulus being used.
Q Let's say a hernia operation.
A We probably would be in the 40 or 50 range.
Q Does burst suppression equate to a number on the BIS monitor?
A Not really. Although there is some question of whether it can recognize a flat line EEG. When zero pops up it might mean that there's an isoelectric EEG, but it's not designed for that.
Q Are you aware of the readings of the BIS monitor after the thiopental was injected into the inmate in North Carolina?
A No.
Q If it had been reported that the BIS monitor dropped to near zero by the time the thiopental and the following flush was fully administered, would that cause you to

question some of the assumptions you have made and your conclusions?
A No, because I would have to see what the timings of those injections were. It's very possible a slow injection, over two minutes, would make perfect sense.

Q Have you reviewed, as far as you know, all the expert reports that have been generated in this case, both by the defense and by the plaintiff?
A No, I haven't seen Dr. Heath's or Dr. Johnson's.
Q Have you seen a report of Dr. Sri Melathil?
A No.
Q Are you aware that his view was a decline in the level of thiopental in the brain is quite rapid and his concern was the diminishment of thiopental in the brain instead of the onset of the thiopental?
A I wasn't aware of that. I can understand where that comes from because that's from clinical teaching and clinical doses. I think, yes, there would be a very rapid drop-off. If you look at my Figure 1, if you would look at that, I think you'll see the reason for it. And -- but basically what's going to happen is that concentrations are going to flow across a gradient. And initially during the onset, the arterial concentrations are much higher in the tissue. Drugs goes into the tissue including the brain. As the drug distributes to various body tissues and is

metabolized, it will start flowing back, and that's what removes the effect.
However, if that flow-back starts at a very high concentration, you'll still be unconscious even though that flow is out of the brain and into the blood.
Q So huge doses like we're talking about will last --
A He's right, but without him doing those calculations he's probably a little in the dark.

Q So the effect of a massive dose, again somewhere between 45 seconds to hours?
A 45 minutes to hours.
Q Execuse me. 45 minutes. Thank you. 45 minutes to hours.
A Uh-huh.
Q You were also referred to a photograph of the femoral catheter in Mr. Johnston at his execution. I don't know if you mentioned it in testimony. In your report you noted the brightness of the blood. Couldn't that be an effect of the imaging --
A Yes.
Q -- of the photograph?
A Could be.
Q And wouldn't blood, even venous blood, once it hits oxygen in the air, become redder than it is inside the body?

A It could, but you would see gradations depending on its depth in the sponge.
Q And the bluish area you noted in the photograph of Mr. Johnston, couldn't the coloring be also an effect of the photograph imaging program that was used?
A It could be. I'm not an expert on these things so, I mean, in aggregate, as I said, those things suggested to me that's what happened.
Q Your level of certainty, though, it sounded like was not very great just from looking at the picture; is that correct?

A I would say it's -- yeah, I would say it's about 50/50, in my mind, looking at the photograph.
Q Is it impossible to determine from the photograph whether there might have been an insertion into an artery in Mr. Johnston's case?
A That's correct, it is impossible to tell exactly where that insertion was made.
Q You noted a paper with regard to femoral vein access that set out a 17 percent complication rate with regard to central venous access. Was it just femoral vein access?
A It looked at all of them and it categorized the risk according to where.
Q Was the 17 percent complication rate for femoral access?

A I believe it was.
Q Does that complication rate include complications that would have resulted from persons new to the procedure and inexperienced in the placement of the lines?
A I would have to go back and check the methods very carefully to be sure, but it may have been at a teaching hospital and it may have happened that way, yes.
Q As far as you know, are there any papers reporting complication rates with regard to experienced physicians who have made femoral IV access a regular part of their practice?
A No, that's not my area of expertise.
Q You indicated early in your testimony that a problem with delivery of thiopental into the body so we get the

full effect of it, one thing could be an impact of restraints on the body which is possible with an execution. Would the restraints have an effect if it's peripheral access through the arm, assuming straps across the torso?
A It could, yes.
Q Wouldn't that restraint effect be less with femoral access?
A It might. Would depend on where the other restraints were and how tight they were. If they were across the abdomen it could compress the vena cava.

Q Would the effect of a bit of compression on the vena cava be less as a percentage of outflow than compression of say a peripheral vein?
A Certainly peripheral veins are easier to compress.
Q With regard to potential complications and any IV access, isn't migration of the catheter a problem; its leaving the vein that it's meant to be inserted into?
A It's a very rare complication.
Q Isn't it more likely to happen in a peripheral access than it is in a femoral central line access?
A Again, this is not an area of great interest to me and I haven't read the literature on that so I can't give you a heads-up answer.
Q You noted a complication in your report being potential delivery of the drugs into subcutaneous tissue rather than into the vein.
A Uh-huh.

Q Isn't that kind of complication less likely to happen with femoral access?
A Well, yes and no. I have seen many instances where because of where the femoral vein is and where the central circulation is, you can't always observe extravasation, so it could be happening but you don't see it. Certainly with a peripheral if it happens, you know it's happening. You can see it.

Q But you're not aware of the differences and the likelihood of it happening peripheral vein vs. central vein?
A I can't even imagine someone setting out to study that. That would be a tough question to try to collect data on and be fair.
Q The output of a femoral IV is closer to the heart than the peripheral access, isn't it?
A Would you restate that?
Q I'll try. It wasn't a very good question. The catheter in a femoral IV, where it has the output where the drugs come in, isn't that area closer to the heart than where the drugs first enter the bloodstream in a peripheral IV?
A The answer to that would be not necessarily, because what we're looking at is time. The flow is less in the arm, but the volume is much greater in the vena cava. So the time it takes is the -- is the volume divided by the flow. So both factor in.
Q And those factors work different ways?

A We have done many studies where we've given drugs peripherally and if it has a good flush behind it, it actually can centralize, if you will, the drug.
Q Doesn't that kind of occur automatically with central venous access through the femoral vein?

A Yes and no. Not necessarily, because there was no baseline infusion going here, so it was totally reliant on the syringe. Whereas if it was given into a free-flowing IV, that's not only going to bring it into the circulation quick, it's going to push it up the circulation. So my answer is a little equivocal because I'm not a hundred percent sure that you can say one way or the other, not knowing all the facts.
Q Do you insert femoral IVs on occasion?
A Very rarely.
Q What's your understanding as to the method by which a physician would determine where the vein is? Isn't there an anatomical landmark, the femoral artery?
A There would be the same as we do for internal jugular catheterization of the neck. The old way of doing things was to feel the artery and then go adjacent. In the case of the femoral vein, it's just medial.
Q It's just medial?
A Uh-huh.
Q In other words, it's next to --
A Next to.
Q -- the femoral artery?
A Right. So if you had your finger on the femoral

artery you would reduce your chances of hitting the femoral artery and increase your chances of hitting the femoral

vein, although I will say that many places now are moving towards ultrasound imaging, so there's a greater degree of certainty.

Q Is that true of -- you said many places. Is that true of every medical facility?

A No.

Q And the femoral vein is on the opposite side of the femoral artery -- excuse me. The femoral nerve is on the opposite side of the femoral artery than the femoral vein is?

A Yes.

Q Isn't it true that femoral IVs are commonly inserted into awake and unsedated patients?

A In my experience, they are usually sedated.

Q Okay. Nephrologists, isn't it true they commonly use femoral vein IV access for kidney patients who haven't yet gotten the shunt or the fistula, whatever it's called, for common -- for periodic dialysis?

MR. BERGER: Objection, Your Honor. Beyond the scope.

MR. PRITCHETT: I disagree, Judge. I think it goes to the testimony we have had with regard to --

THE COURT: Objection is overruled.

MR. PRITCHETT: Thank you, Judge.

Q (By Mr. Pritchett) Nephrologists use femoral IV

access at least on occasion for new patients going on dialysis, don't they?

A Yes.

Q And isn't it common that those femoral IVs are placed for dialysis with local anesthetic but without sedation?

A I don't have any direct knowledge of that. I'm not with them when they place them.

MR. PRITCHETT: Thank you very much, Doctor. I appreciate it. That's all I have at least for the moment.

And thank you for allowing me to use your high tech equipment.

MR. HELLMAN: Sure thing.

REDIRECT EXAMINATION BY MR. BERGER:

Q I have a few questions for you, Dr. Henthorn.

Are all of your graphs based on the assumptions that the full dose of the amount considered will make it into the venous system?

A Yes, they are.

Q So if some of the prepared dose did not make it into the veins, would the graph conclusions hold true?

A No.

MR. PRITCHETT: Objection. I think this is beyond the scope of the direct and cross.

THE COURT: Well, I don't think it's outside the spirit of either. Objection is overruled.

Q (By Mr. Berger) And if in fact less than the prepared dose made it into the veins, what effect would that have on

when the thiopental takes effect?
A Well, it would depend on the percentage. If you consider a reasonably close percentage, or -- of the dose, then it would only slow it down. If it was much smaller, you might not get the effect you're looking for.
Q And are all the opinions you are giving here given to a reasonable degree of medical certainty?
A Yes.
Q Why is burst suppression appropriate for executions even when it's not always used for surgery?
A The reason is that since there is no one monitoring the onset of anesthesia, there is the possibility that when something painful happens, such as injecting potassium chloride, that there will be movement, there could be a reaction. And I think it's very important to be able to say that this reaction did not involve consciousness. It could be simply a reflex lower in the system.
Q In surgery are you also concerned with the patient waking up?
A Yes.
Q If you were not -- if you were concerned only about pain and not about waking a patient up during surgery, would burst suppression be the level of anesthesia one

would want to use? In other words, in the execution setting, do those factors render burst suppression more appropriate?
A Well, I think the process is very similar. I think the difference is there is no one monitoring to say whether

or not this is conscious or not conscious. If there is burst suppression, there's no consciousness.

Q And without monitoring the depth of anesthesia, can you be certain that the inmate will be properly anesthetized?

A I don't believe so, no.

Q Is there such a thing as certainty that drugs are delivered successfully?

A I don't -- I don't believe so, no.

Q And is this lack of certainty one of the reasons why one needs to monitor the delivery of the drugs and the depth of anesthesia?

A Oh, absolutely. If you look at the ASA -- that's our society's recent guidelines on awareness, the first thing to consider is are the drugs being delivered the way you think they are, are your infusions working. Is the gas on, if you want -- if you're using that. So I think that is always on our mind, because it does happen.

Q Can you properly judge anesthetic depth based on the view that you saw through the window in those figures?

A No.

Q When Mr. Pritchett was examining you, you said that the aspect is a step in monitoring anesthetic depth. Is that step enough to monitor anesthetic depth?

A No, it's not.

Q In discussing his graphs, Dr. Dershwitz stated, quote, "So in a typical experiment where one is giving medication to try to determine if a person is conscious, the person

would be asked to perform a simple task. If they cannot perform the task, they are deemed as unconscious." What does that tell you about the measure of consciousness used by Dr. Dershwitz in his graphs?

A Well, it indicates that is the end point that he was modeling was loss of the voice command.

Q Can one feel pain at that level?

A Yes.

Q Then in the transcript Dr. Dershwitz says, "When one considers the very, very large dose and the long duration of the effects that occurs when one is given five grams of thiopental, the effect is complete, total inability to interact with the environment or perceive one's environment for a very long time."

Assuming successful delivery into the circulation, Dr. Henthorn, do you agree?

A Well, to a certain point he's absolutely right. I

think the point that we -- what's really disturbing here is the onset time. That seems to be just overlooked completely in these Missouri executions. The timing is so rapid that there's no time for that to happen. But if you give it enough time, then I would say Dr. Dershwitz' conclusions are correct.

Q But at the level of consciousness used by Dr. Dershwitz, that is inability to correctly respond to verbal commands, can people feel pain?

A Yes, but you have to -- he was -- he selected -- he's doing simply the very thing -- something very similar to

what I'm doing, which is simulating the pharmacokinetics, and he's selecting a blood level that is less than the one I'm selecting. But in either case with a five-gram dose both brain levels are achieved.

Q But they would not be -- would they be achieved immediately?

A No.

Q And would the level that he is selecting take effect quicker than the level you are selecting?

A Yes.

Q And if the level he has selected has taken effect but the level that you have selected has not yet taken effect, can a person experience pain?

A Absolutely.

Q Why do you --

THE COURT: Mr. Berger, it sounds like we are getting back into redirect again. Let's stick with the cross and wrap this up.

MR. BERGER: Okay, Your Honor.

Q (By Mr. Berger) Why do you select 50 to 75 percent as the most likely reduction in cardiac output?

A Because this fits with anything in the literature. It also fits with what I have observed when I have had continuous monitors of cardiac output. And in fact, Dr. Dershwitz basically believes the exact same thing.

Q And in your clinical practice, do smaller doses of thiopental also have an effect on cardiac output?

A Yes, they do.

Q Have you tested the extrapolations you make on the scientific community, the extrapolations you make in your model that Mr. Pritchett questioned you about?
A Yes.
Q And have you revised your conclusions over the years as you understand it better?
A Oh, absolutely, yes.
Q Dr. Henthorn, Mr. Pritchett asked you about the BIS monitor. Is the BIS monitor a reliable indicator of deep unconsciousness?
A It is not -- the literature does not support that it

is reliable.
Q What are some of the problems of the BIS monitor?
A It does not predict what it is meant to predict, which is awareness. It's -- it's useful. Some people believe it's useful, but it's not an absolute measure, and for that reason it was not included in the recent ASA guidelines awareness.
Q Dr. Henthorn, is it possible for an anesthesiologist or a pharmacokineticist who has not done the calculations or the modeling that you have done to know when thiopental will take effect?
A Well, they can rely on their empirical knowledge, but I think when you're dealing with dose -- that's one of the reasons you do pharmacokinetics is so that when you are presented with a dose or a drug administration scheme that you haven't performed, you can reasonably come up with what will happen. It's predictive.

Q Dr. Henthorn, Mr. Pritchett asked you some questions about the photo of Mr. Johnston. Was your view that this is a hematoma based just on the color of the blood?
A No.
Q Was it based on a number of factors?
A Yes.
Q What were those factors?
A It was the proximity -- it was the blue discoloration

under the skin. There was swelling in the skin and it was proximate to the insertion site.
Q Would you ever choose to deliver these drugs through the femoral vein when peripheral access is available?
A No.
Q Based on your review of the Missouri execution records, does potassium chloride enter the veins at a minute and a half?
A Yes.
Q And would thiopental likely have taken effect yet, based on any of the doses John Doe One says Missouri uses?
A No.
MR. BERGER: One moment, Your Honor.
No further questions, Your Honor.
MR. PRITCHETT: I think one, Judge.
RECROSS-EXAMINATION BY MR. PRITCHETT:
Q We have talked about voice command level of unconsciousness and burst suppression level of unconsciousness. Is there some level of unconsciousness in between those two poles, let's call them, where the person

who is receiving the thiopental will not feel pain?
A Probably there would be, but it's a gray area. You don't know unless there's someone there monitoring. That's my point.
MR. PRITCHETT: Thank you.

MR. BERGER: Your Honor, may I ask one question in response?
THE COURT: Go ahead.
FURTHER REDIRECT EXAMINATION BY MR. BERGER:
Q Dr. Henthorn, if a patient or an inmate is not at burst suppression, is it possible for them to feel pain?
A Yes.
MR. BERGER: Thank you.
MR. PRITCHETT: Nothing further, Judge.
THE COURT: We have heard that one a couple times.
Thank you, Doctor. You can step down.
THE WITNESS: Thank you.
THE COURT: It's my understanding that other than the Doe witnesses, this is plaintiff's case. Is that correct?
MR. HELLMAN: Those are our witnesses who are present, Your Honor.
THE COURT: All right. Then we'll resume tomorrow at 9 o'clock and the defense will have an opportunity to have its witnesses present and ready to go. Okay?
MR. PRITCHETT: Yes, Judge.

(Adjourned to Tuesday, June 13, 2006)

IN THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF MISSOURI
WESTERN DIVISION

MICHAEL TAYLOR,	)	
	)	
Plaintiff,	)	
	)	Case No.
vs.	)	05-4173-CV-S-FJG
	)	
LARRY CRAWFORD, et al.,	)	
	)	JUNE 13, 2006
Defendant.	)	

VOLUME III
PAGES 262 - 395

TRANSCRIPT OF BENCH TRIAL PROCEEDINGS

BEFORE THE HONORABLE FERNANDO J. GAITAN, JR.
U.S. DISTRICT JUDGE

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I N D E X

EXHIBIT INDEX

PLAINTIFF'S	DESCRIPTION	RECEIVED
1 - 23	Discovery materials	86
24	Dr. Heath's CV	10
26	Print-out of package insert	32
28	Photo of triple lumen kit	62
29	Still picture of execution chamber	74
30	Still picture of execution chamber	86

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TUESDAY, JUNE 13, 2006

THE COURT: Ready to go?

MR. PRITCHETT: Yes, Your Honor. Ready for me to call my witness, Judge?

THE COURT: Certainly am.

MR. PRITCHETT: I call Dr. Mark Dershwitz to the stand, please.

MARK DERSHWITZ, called as a witness on behalf of the Defendant, being first duly sworn, testified:

DIRECT EXAMINATION BY MR. PRITCHETT:

Q Good morning, Doctor.

A Good morning.
Q Would you state your name for the record, please.
A Mark Dershwitz.
Q What's your occupation, Dr. Dershwitz?
A I'm an anesthesiologist and faculty member at the University of Massachusetts.
Q And have you testified already in this case at an earlier stage?
A Yes, I have.
Q Just briefly tell us what your degrees are, if you would, please.
A I have a bachelor's degree in chemistry and then obtained my medical degree as well as a Ph.D in pharmacology.

Q Where did those degrees come from?
A My graduate degree is from Oakland University in Rochester, Michigan, and both my MD and Ph.D are from Northwestern University.
Q Did you supply a copy of your CV at your earlier testimony that we provided into evidence?
A Yes.
Q Now that we have reconvened this trial, additional discovery has occurred. Have you had the opportunity to review that additional discovery that's been provided by both sides in this case?
A Yes.
Q And did this review include the post-remand discovery responses of both Director Crawford as well as the John

Does?
A Yes.
Q And did it also include a review of the deposition of Dr. John Doe One?
A Yes.
Q So are you aware that the dose of thiopental used at the last several executions in Missouri was not five grams as we understood in January?
A Yes.
Q How, if at all -- excuse me. What is your understanding of the amount of thiopental that was actually

given at the last several executions?
A I believe it was 2.5 grams.
Q How, if at all, does the administration of 2.5 grams of thiopental the last few executions impact your opinions regarding executions in Missouri?
A By decreasing the dose from five grams to 2.5 grams, the probability of consciousness increases by a tiny and minuscule amount. Other states use as little as two grams of thiopental, and even in that situation the likelihood of consciousness during the period of time that an execution requires is a tiny fraction of one percent.
Q What's the key factor, in your opinion, regarding the humaneness of executions in Missouri in particular and then throughout the country in general?
A Well, in my opinion for an execution to be humane an adequate dose of hypnotic agent like thiopental has to be administered prior to the paralytic or the potassium

chloride. And in the other states in which I have performed calculations I would say that probably the minimum acceptable dose would be 1.5 grams, and anything above that is associated with diminishing likelihood of consciousness.

Q Did your review of the new discovery in this case alter your opinions that you gave back in January with regard to the drugs used in Missouri and the dosages as

we now understand them?

A Well, I redid the calculations, and changing the dose from five grams to 2.5 grams has a minuscule and not clinically relevant effect on the probability of consciousness throughout the duration of time that an execution requires.

Q Did your review of the new discovery in the case alter your opinions as given back in January with regard to the use of the femoral catheter as a means of administration of the drugs?

A No.

Q Can you explain why?

A Well, since the thiopental is given after the femoral catheter is placed, the dose of thiopental itself has no meaningful effect on the placement of the femoral catheter.

Q In reaching your conclusions as expressed in your earlier testimony, what definition of unconsciousness were you using?

A The definition of consciousness that I typically use is that which is used as a standard in the field of

anesthesiology when looking at the time course of the production of unconsciousness during a clinical anesthesia, and the end point is whether or not the person is capable of consciously processing a verbal command. And so, therefore, if the person is told raise your right arm or

raise your left leg, if they follow that command appropriately they are deemed conscious. If they are unable to follow that command, and the assumption is that they are motivated to -- would be motivated to follow the command if they could, if they could not follow that command they would be deemed unconscious.

Q Why do you use this definition of consciousness vs. unconsciousness, ability to respond accurately to verbal commands?

A It is the most common end point used in research on consciousness and unconsciousness in anesthesia. And, for example, it is the end point that was used in the development of the depth of anesthesia monitors that are becoming more commonly used in anesthesia practice.

Q We'll get to that in a bit, but what's the name of the monitor you're referring to?

A One of them is called the bispectral index monitor or BIS monitor, but there are a number of other monitors made by other companies also.

Q Because you use a definition of consciousness vs. unconsciousness that concluded a person who can -- let me back up and rephrase that.

When you used the BIS definition of consciousness

vs. unconsciousness, does that mean that you concluded that the person who has received thiopental remains at that

267

level of consciousness?

A No. That is the point at which they would lose consciousness. And of course, consciousness can become much deeper and have other end points, but that is a readily measured end point. And for the purposes of providing clinical anesthesia, it's a very clinically meaningful end point, because in our practice we want to make sure that the person is asleep, unable to process information, which would mean in a clinical way they would be unable to form a memory, which of course we would consider to be very desirable. The inability to form a memory would be very desirable in anesthesia.

Q So given a dose of thiopental at the level of 2.5, or five grams if it makes a difference both ways, how quickly is a person moving from the level of unconsciousness, unable to respond accurately to voice commands, how quickly does a person move from that stage to a deeper level of unconsciousness?

A It actually happens very rapidly. The amount of thiopental that it takes the average person to lose consciousness is approximately 200 to 300 milligrams. And once 200 to 300 milligrams are placed intravenously in the body, loss of consciousness occurs typically in a matter of 20 to 30 seconds. As the dose is increased, the depth of consciousness as well as the duration of unconsciousness

268

continues to progress.
Q You said that at a level of two to 300 milligrams of thiopental, it takes about I believe you said around 30 seconds?
A 20 to 30 seconds from the time 200 to 300 milligrams reach the peripheral circulation through an intravenous catheter.
Q How is it you are aware of that conclusion?
A Well, first of all, that is based on more than twenty years of clinical experience of myself, as well as the experience of many, many anesthesiologists, as well as clinical studies that have been done using many different measures of the depth of consciousness. Before we had readily available EEG monitors, one of the ways that patients were deemed to be unconscious is they would be given, for instance, a syringe or a pencil to hold and told hold on to this as long as you can, and when they dropped it they were deemed to be unconscious. That was a technique that was used, for instance, in the 1960s and 1970s.

And using that end point, and also using a typical dose of the hypnotic agent, consciousness is lost typically in 20 to 30 seconds from the time the drug reaches the IV catheter.
Q Is there a fairly common medical practice that also

confirms your view, from a practical point of view, that loss of consciousness occurs in 20 to 30 seconds?

A Typically if we are inducing general anesthesia, typically we wish to confirm that the patient is asleep before giving, for instance, a paralytic drug or performing a noxious stimulation, and clinically we may apply observational techniques like speaking the person's name and asking them to open their eyes for instance, or giving them a command like take a deep breath. We are often telling them to breathe deeply before they fall asleep, and when they stop doing that volitionally, that's another way. And then we can look for reflexes, like we take our finger and gently stroke their eyelash and see if they still have what we call a lid reflex and that's a normal response that a person has to blink when their eyelash is stroked.

Q Is there a practice, though, in which general anesthesia is induced and it's induced very quickly and there is essentially no monitoring of the anesthetic depth?

A Yes.

Q What is that?

A That's called a rapid sequence induction, and in a situation where we are concerned about the risk of aspiration, which would mean passage of the abdominal contents back into the throat and then going down the trachea into the lung, certain patients are at higher risk

for this passive regurgitation and aspiration. Those patients include patients who are having anesthesia who have not been properly fasted; patients who have certain anatomic abnormalities like a hiatal hernia; patients who have a history of esophageal reflux; patients who have

increased intra-abdominal pressure perhaps due to a tumor, all of these people are at high risk for aspiration.

And during the period of time after they lose consciousness and before we secure their airway with an endotracheal tube, that is a period of time of great vulnerability for aspiration to occur. So in order to decrease this window of opportunity for aspiration to occur, we perform what's called a rapid sequence induction.

And in that scenario we give the hypnotic agent, like thiopental, followed by a paralytic agent immediately, without assessing depth of anesthesia, followed by the -- a passage of about 30 seconds which is how long it takes the paralytic agent in this case to work, and then the insertion of the laryngoscope to visualize the airway and then placement of the endotracheal tube.

So in the situation of a rapid sequence induction, from the time we first begin administering the hypnotic agent --

Q And what dose is typically used in the rapid sequence induction of the hypnotic agent?

A If we were using thiopental as a hypnotic agent, a typical dose would be 300 to 400 milligrams, and it would take an average ten seconds to administer the thiopental, five seconds to administer the paralytic agent, or less. Waiting 20 to 30 seconds for the paralytic agent to begin, and since this particular paralytic agent causes widespread muscle twitching, we know when the paralytic agent is working because it's very easily seen visually. At that

point, we immediately put in the laryngoscope to visualize the airway and put the endotracheal tube in.

So in this scenario we are instrumenting the airway, which is very, very uncomfortable, well under a minute after the thiopental administration was first given. And based upon, you know, my extensive clinical experience as well as the clinical experience of essentially everybody who gives anesthesia, the likelihood of awareness during this procedure is very, very small.

Q And we're talking about a time period between the administration of the thiopental to the introduction of the laryngoscope, how long between those two end points?

A Under a minute. Probably closer to 45 seconds.

Q And is there essentially any kind of monitoring of the patient during the course of that time?

A Well, we would of course continue to monitor their electrocardiogram and their heart rate and their oxygen

level because those are standard things that we monitor in everybody. But as far as any attempt to monitor the depth of anesthesia in a rapid sequence induction, that is not done. And the assumption is made that the initial dose of the hypnotic agent, like thiopental, is adequate to achieve unconsciousness for the duration of the placement of the endotracheal tube.

Q And I think this should be obvious, but that assumption is one that has been confirmed at least in your experience and the experience of your colleagues?

A Yes. It is certainly the standard description of how

to perform a rapid sequence induction in our standard textbooks.
Q Is the rapid sequence induction an uncommon procedure?
A No, not at all. It would be the standard way of providing anesthesia for essentially everybody who is having emergency or unscheduled surgery because most of those patients are not properly fasted, and people who complain of things like a hiatal hernia or gastro-esophageal reflux, that represents a significant fraction of the population. So people who undergo rapid sequence induction, it's not the majority of anesthetics but it's a significant minority.
Q Would you say it's a process that happens every day in hospitals?

A Yes, every day in essentially every hospital in which endotracheal anesthesia is provided.
Q What's your understanding, from your review of the documents in this case, as to the level of consciousness, unconsciousness that was used by Dr. Henthorn in reaching his conclusions about when the second and the third drug should be administered in an execution circumstance?
A My understanding is that he used an EEG end point that he called burst suppression. And in further reviewing his written materials, I believe he was using a definition of burst suppression that was equivalent to a suppression ratio of 50 percent, meaning that 50 percent of the time the EEG had flat line and 50 percent of the time the EEG had typical waves.

Q In your medical judgment, is that the proper level to be thinking we need to get to, that is needed to get to in an execution circumstance when we get to the second and the third drug?
A Well, this level of anesthesia in which we have what's called a suppression ratio of 50 percent is far in excess of what is needed in clinical anesthesia. Now, certainly with the doses of thiopental that are employed in a lethal injection, ultimately not only are you going to reach burst suppression, you're going to reach a complete flat line, a completely isoelectric EEG.

But at the point in time in which you can reliably perform something uncomfortable and be convinced that the person is not going to experience any pain or suffering will occur much earlier, because one does not need to go to an end point of burst suppression to prevent the perception of noxious stimuli. And, in fact, when we do clinical anesthesia for surgery, if we were monitoring the patient with an EEG, which is something that, for instance, I regularly do, the end point of burst suppression is an unnecessarily deep level of anesthesia. It's not harmful to the patient, but it is associated with a prolonged wake-up at the end of the case. In other words, it means that I'm not providing an efficient anesthetic.
So a level of unconsciousness that is higher than the point at which one reaches burst suppression is still consistent with adequate surgical anesthesia and

would be certainly associated with the inability to perceive any noxious stimulus, as for example during a judicial execution.

Q Is the level of unconsciousness, burst suppression as used by Dr. Henthorn, a much deeper level of unconsciousness than that that's targeted in surgery?

A Yes.

Q You mentioned the bispectral index and the S is for

the -- the BIS monitor, what does BIS stand for?

A Well, BIS is a shortened term for bispectral.

Q Okay. The bispectral index monitor. What is this monitor built to measure?

A This is a monitor that is designed to facilitate using EEG monitoring by anesthesiologists who are typically not well-trained in the interpretation of complex EEG waves. So the monitor consists of applying electrodes to the forehead that acquire EEG waves from the brain. The EEG signal is then processed by a computer, and although the EEG waves are displayed on the screen, a person who is not well-versed in their interpretation does not need to rely on their appearance or pattern to use the monitor.

The monitor then displays a number between zero and a hundred which is used to correlate with the probability of unconsciousness. And the relationship between the actual BIS value and the probability of unconsciousness is a complex curve. It's called a sigmoid curve. But clinically, anesthesiologists know that if they target the anesthetic depth to a BIS value of between 40

and 60 they know, based upon a huge body of clinical data, that the probability of consciousness during the surgery is minuscule.

Q So for surgery the BIS monitor is targeted at 40 to 60?

A Correct.

Q Burst suppression as used by Dr. Henthorn, what level is that? What number on the scale, approximately, would that be?

A Well, first of all, the appearance of any burst suppression occurs as a BIS value of 40. And a 50 percent suppression ratio, which as I described is what I believe the end point he was using where we have a 50 percent flat line, 50 percent EEG waves, that corresponds to a BIS value of approximately 15 to 20, approximately.

Q I'd like to show you what's been labeled Defendant's Exhibit 2 and I have already provided -- let me hand this to you.

MR. PRITCHETT: And, Judge, I could give you a copy if you would like to follow along.

THE COURT: Yes, if you would.

Thank you.

Q (By Mr. Pritchett) What is Exhibit 2, Defendant's Exhibit 2?

A This is actually an exhibit from one of the papers that I have published. I was a participant in one of the early studies in which the algorithm underlying the BIS monitor was developed, and this is some data from that

paper. And so on the X axis, we have the BIS value and on the Y axis we have probability of response.

Q Before you go any further, you prepared this document?
A Yes. This is from a paper in which I am the coauthor.
Q And you have described what it is.
MR. PRITCHETT: I'd offer Defendant's Exhibit 2 in evidence for illustrative purposes.
MS. ANDERS: No objection.
THE COURT: Be received.
MR. PRITCHETT: Thank you.
Q (By Mr. Pritchett) Now, if you could explain for us the meaning of the chart, and particularly I think it would be helpful to talk about the relationship between the probability of response vs. the BIS number read-out.
A So on the X axis we have the BIS value and on the Y axis we have the probability of response, which in this case again was properly and accurately following the command like raise your right arm, raise your left leg. And as you can see, the curve is shaped in a sigmoid in which as the BIS value proceeds from 40 through the mid 50s, essentially the probability of response or the probability of consciousness is very tiny.
And then after a point in the mid to high 50s, the curve takes a rapid upturn, and by the time the BIS value is in the high 70s, almost everybody is conscious.
Now, in the same experiment we also determined whether or not the patient would have recall. And the way

that was determined, immediately following giving the patient the command to raise your right arm, raise your left leg, they were also told something like John, I want you to remember the word table. John, the word table is very important. Please remember it. And then after the experiment was over, they were asked to recall the words that they were told.

And as you can see, there's a separate curve which plots the probability of recall vs. the BIS value. And these two curves are separated by approximately 15 to 20 BIS points on the X axis. The reason that clinicians have chosen to target a BIS of 40 to 60 for clinical anesthesia is that even though 15 -- approximately 15 percent of the population may have some degree of consciousness at a BIS of 60, the probability of recall is still extremely low. And it is thought that awareness under anesthesia and the absence of recall is probably not harmful.

The reason that a BIS value of 40 is chosen as the lower limit in clinical anesthesia is because anything below that is thought to be unnecessarily deep and is thought to be associated with a prolonged awakening at the end of the case.

Q Thank you for the description, Doctor.

In your medical judgment, does a BIS monitor

reliably measure the depth of consciousness?

A Yes.

Q And why do you say that?
A Well, it's borne out by a number of clinical trials that have been published so far on thousands of patients. Like any clinical test, it is not perfect. There are certain people in whom it may not work well, especially those with underlying abnormalities in their EEGs, but in the vast majority of people it is a reliable clinical monitor and has made our ability to deliver anesthesia better and safer.
Q Are you aware of the use of a BIS monitor in a recent execution in North Carolina?
A Yes, I am.
Q And what is your understanding of the read-out, the impact of the use of thiopental as measured by the BIS monitor at that execution?
A In the protocol that North Carolina applied, the execution team placed a BIS monitor on the patient or on the inmate before the beginning of the injection sequence. And the protocol has built into it a pause at the conclusion of the administration of the flush solution following thiopental. And at this point in the protocol the physician and nurse who were monitoring the BIS monitor would then give the go-ahead to the execution team to

proceed with the administration of pancuronium and then potassium chloride. And the protocol mandated that the BIS value was to be below 60 prior to the administration of the second and third drugs. And the physician and nurse who were monitoring the BIS monitor had the authority to order

additional thiopental had the person not reached a BIS value of 60 in a reasonable amount of time.

In fact, in that execution there was no pause that was required because by the time the flush solution had completed being injected, the BIS value was zero and the EEG was flat line. So this is the lowest measurable level of consciousness that one can achieve medically because one cannot measure any depth of consciousness below the complete cessation of electrical activity in the brain.

Q What's the dose of thiopental that was used in North Carolina on this occasion?

A Three grams.

Q How long did it take the BIS monitor to drop to zero after the beginning of the administration of the thiopental?

A Well, the BIS value dropped continuously after the thiopental started going in. It took approximately between a minute and a minute and a half to complete the entire injection sequence of the thiopental and the flush solution. And prior to the completion of the flush

solution, the BIS value had already reached zero and the electrical activity of the brain was already flat line.

Q Is that actual experience in North Carolina consistent with Dr. Henthorn's conclusions regarding the time needed for thiopental to result in burst suppression?

A I think that his predictions are resulting in an unnecessarily long time to the point at which burst suppression will occur.

Q And that's supported in part by the North Carolina example?
A It's supported by the North Carolina example, and as I said, it's also supported by many, many years of clinical experience among many anesthesiologists who do rapid sequence induction without having their patients awake or have recall during the placement of the endotracheal tube.
Q You have had a chance to examine Dr. Henthorn's modeling, I think?
A Yes.
Q And have you determined that there is a mistake or an incorrect assumption in the analysis?
A I'm not sure I would phrase it as a mistake, but there is an assumption with which I do not agree.
Q What is that assumption?
A Can we look at that figure so I could have it in front of me?

Q Yes.
MR. PRITCHETT: What the doctor is asking for is what I think was Plaintiff's Exhibit 43. 43, Figure 4.
MR. BERGER: Your Honor, we object on the grounds that this wasn't covered in Dr. Dershwitz' expert report.
MR. PRITCHETT: I think the doctor did indicate that he had looked at Dr. Henthorn's report and considered that it did not accurately reflect what would occur.
MR. BERGER: Your Honor, Dr. Dershwitz' report didn't give any bases for what that -- you know, what that would be. It said with no detail at all what his attack

would be on these models.
MR. PRITCHETT: It says the doctor's assumptions are based -- the predictions are unscientifically sound and are based upon assumptions that result in an over-lengthy predicted time between the beginning of the thiopental administration and the loss of consciousness.
MR. BERGER: I think it said they may, isn't that right?
MR. PRITCHETT: They may be based.
MR. BERGER: That wouldn't have given us adequate notice to think about and deal with Dr. Dershwitz' conclusions.
THE COURT: I'll sustain the objection.
Q (By Mr. Pritchett) Did you consider in your report,

in your review of this case, the onset time of the effectiveness of thiopental to put a person at a sufficient level of unconsciousness so that it would be appropriate to administer the second two drugs in an execution?
A Yes, I did.
Q And how did you take account of that in your analysis?
A Well, I had to work under various scenarios. First of all, in the graphs that I submitted prior to my testimony in January I basically assumed that the five grams of thiopental would be in 200 milliliters of volume because that is the volume that we typically use clinically and I used a one milliliter per second injection time. And in that scenario the probability of consciousness at the time that the second drug would be administered is a minuscule

fraction of one percent. And that number is specified in my report. I don't remember how many 9s after 99 percent it is, but it's a tiny number.

I now understand that that assumption was probably not accurate in terms of how the thiopental was mixed and administered.

Q How do you understand the thiopental has been mixed and administered in Missouri now?

A In the recent executions my understanding is that when 2.5 grams were used, the smallest volume of diluent that could be achieved as far as getting the drug into solution

was used. And that the injection was probably completed in a minute or less. Even in that scenario, the probability of consciousness at the time the second drug would begin to be given is still a tiny fraction of one percent.

Q If five grams of thiopental was administered at an execution, and let's assume that it's actually brought into the body, is there any need for a monitoring of the anesthetic depth of the condemned prisoner, in your view?

A I don't think it's necessary.

Q And can you tell us why not?

A Because it is inconceivable that there's any human who could possibly remain awake after such a large dose of thiopental being properly administered into a working intravenous catheter.

Q Would the same be true at a somewhat lower dose of thiopental, say 2.5 grams?

A Yes. And in fact, I have testified elsewhere that

even doses as low as 1.5 grams will provide a high enough probability of unconsciousness so that, in my opinion, an execution would be humane.

Q Based on your clinical experience, based on the North Carolina experience and the recent execution, what do you conclude with regard to the effective onset time of the administration of, say, five grams of thiopental?

A Well, as I have said before, loss of consciousness in

the typical human occurs after the successful delivery of approximately 200 to 300 milligrams of thiopental. And so the delivery of increasing doses acts to decrease the level of consciousness as well as to increase the duration of unconsciousness.

However, I also have to mention that at these large multi-gram doses, duration is not a meaningful term because although I could predict that the duration of unconsciousness would last for hours, and I believe Dr. Henthorn confirmed that in his calculations, in reality if we do not support the circulation and ventilation of the person, the person will die from decreased oxygen delivery to, you know, peripheral tissues, so duration is not in my opinion a very meaningful term to discuss in this context.

I think everyone agrees on both sides of this issue that if several grams are successfully administered, the person will remain unconscious for a period of time far in excess of that which is required to complete a typical execution.

Q Stepping back from the durational component to the

initial effective onset, how long it takes the thiopental to reach a level at which an individual will be unconscious, a five-gram dose will reach, in your view, that level of unconsciousness after approximately what time?

A Well, first of all, unconsciousness will be achieved once the first two to 300 milligrams circulate, and that will take, you know, typically 30 seconds to 45 seconds in the average person. And so as increasing amounts of thiopental are given, from the person's perspective who is receiving the drug nothing is different because once unconsciousness is achieved, the depth of unconsciousness, although perceptible to a clinician who is looking at an EEG, is not perceptible to a person receiving the drug. And so once the first few hundred milligrams circulate, which typically takes 30 to 45 seconds, the person is unconscious and they will remain unconscious for quite a period of time after the rest of the dose is given.

Q Are you aware of scenarios in the induction of general anesthesia when an anesthesiologist in an ordinary medical practice is not at the edge of the bed of the patient receiving the anesthesia?

A It does happen occasionally. One scenario that I could envision, because this has happened to me, when we provide care for a patient undergoing certain procedures like an MRI scan, typically the anesthesia providers are located in an adjacent room and all of our equipment is located in the adjacent room because our equipment is not

typically compatible with a strong magnetic field in an MRI scanner. And so a scenario in which I can envision this

happening is -- and I should tell you, first of all, the vast majority of patients who need MRI scans do not need anesthesia. The vast majority of people could properly go into the scanner and lie there still and undergo their scan without any problem.

When they ask an anesthesiologist to become involved it's typically in a critically ill patient or in a patient who for whatever reason is unable to hold still or be cooperative. And sometimes we will provide intravenous sedation so that the person is sleepy but not unconscious. Sometimes we deliberately induce general anesthesia to render the person completely unconscious. And sometimes, and this has happened at my experience, where we attempted to provide intravenous sedation, partway through the procedure the radiologist said the patient is either moving too much and then we make the decision to go from sedation to general anesthesia, and we may do that remotely, meaning I give additional medication from my point of observation in the control room approximately 15 feet away from the patient and have them make the transition from sedation to general anesthesia.

Q And how are you able to, in this situation, administer additional anesthesia to the patient who is in the MRI machine?

A Typically we're giving the anesthetic medications

intravenously so I would tell the infusion pump to give an additional and higher dose.

Q I'm at a much more basic level. How does it get from where you are to the patient?

A Through 15 feet or so of intravenous tubing.

Q I'd like to change topics here and talk about potassium chloride for a second. Without use of anesthesia, would the administration of potassium chloride cause pain in an individual when it reaches the heart?

MS. ANDERS: Objection, Your Honor. It's not covered in the expert report.

THE COURT: We can't have both of you objecting. Only one of you is covering this witness and you need to make up your mind which one it is.

Objection will be overruled.

A First of all, whether or not potassium chloride harms the person or causes pain on injection is dependent upon the concentration and the cumulative dose. So, for example, we routinely give dilute potassium chloride to patients as part of our routine intravenous fluids. When the concentration of potassium chloride is high, it could cause irritation to veins and cause pain. When the cumulative dose of potassium chloride is very high, it will cause the heart to stop and for a few seconds before consciousness is lost the person will experience pain in

the chest that is similar to what a person experiences when they're having a heart attack.

Q So without anesthesia, when potassium hits the heart, and I'm not talking about the administration and getting to the heart yet. When it gets to the heart, how long will consciousness last, approximately?
A Well, if we assume that when the potassium chloride reaches the heart, the heart stops --
Q And I'm talking about a dose like we use in executions.
A So when hundreds of milliequivalents are given, when that potassium chloride reaches the heart and the heart is monitored with an electrocardiogram, electrical activity in the heart stops almost immediately. And so the heart will stop beating and circulation will cease.

Typically when circulation ceases consciousness lasts, and again in an unmedicated person, approximately ten seconds, because the brain has essentially no significant oxygen or energy reserves. And during that ten-second period with the heart not receiving any blood, the person would experience angina pain similar to the pain that a person is having when they're having a heart attack.
Q So if I understand correctly, without anesthesia when a huge dose of potassium chloride gets to the heart it would render -- it would cause some pain comparable to a

heart attack?
A Yes.
Q And last for ten seconds at most?
A Yeah. The typical person loses consciousness about ten seconds after cessation of circulation.

Q So in that scenario, Doctor, is it accurate to say the pain would last the five to ten seconds of the cessation of circulation?
A Approximately.
Q I'd like to turn now to femoral IV access. Can you describe for us advantages to the use of femoral IV access over peripheral IV access?
A I think in general one could say that a femoral IV would be more reliable in terms of it being less likely to migrate to a place where it's not supposed to be, like outside of the vessel. And it is located closer to the central circulation so that the medication or anything given through the femoral catheter is going to reach the heart a little more quickly. And since the goal of giving intravenous medication is to make sure that it is induced in the vein and not somewhere else. Although peripheral IVs tend to be very reliable when properly placed, I would say femoral IV is very, very reliable. So it just increases the reliability, and the likelihood of failure is decreased.

Q What about with regard to an incorrect insertion of the catheter that would lead to the delivery of drugs instead of into the vein into subcutaneous tissue; which, the peripheral or femoral, is more likely to avoid that complication?
A Certainly hitting the femoral vein is easy because it's huge in the typical person, so once the catheter is in place it's very easy to check that it is intravascular

because one can readily withdraw blood from it, or through it. So confirmation of it being in the right place is easy. And once it's there, it tends to stay put.

Q How would you compare peripheral access vs. femoral access with regard to the chance of perforation or rupture or leakage of the vein?

A Well, in both cases it's small, but with a femoral catheter it's even smaller because the vessel itself is larger, has a thicker wall, is stronger, it's harder to perforate, et cetera.

Q So in general, would it be fair to say that drugs administered through a femoral IV access are more likely to be delivered into the vein as we expect to do than with regard to a peripheral IV?

A Well, again very slightly increased reliability because even a peripheral IV properly placed has a very high degree of reliability, but that degree is increased

ever so slightly more by having it in the femoral vein.

Q We have had testimony in the case about an article in the Journal of the American Medical Association regarding a 17 percent complication rate for femoral IV access. Are you aware of that article?

A I actually read it.

Q What type of patients were being studied in regard to that article that reached the 17 percent complication rate?

A Well, all of these people were critically ill and in the intensive care unit.

Q And what significance does that have with regard to

whether they would be more likely to have complications or less likely to have complications?

A Well, first of all, although the authors did not specify specific risk factors, one of the characteristics of many, many patients in intensive care units is their decreased ability to coagulate blood. So many patients in ICUs are deliberately anticoagulated. And in addition, many patients have a decreased ability to clot blood simply because of their underlying disease, like if they have sepsis. Sepsis is associated with a decreased ability to clot. So it's not the least bit surprising that they would have a high incidence of hematoma because they're sticking these catheters in people who have a decreased ability -- many of whom have a decreased ability, you know, to clot,

just based on the fact that they're intensive care patients.

Similarly, patients who are in the intensive care unit, many of them have low blood pressure. That's why they're there. And a patient with low blood pressure is going to have weaker peripheral pulses. And in my experience, it is a little harder to locate the landmark, which is the femoral artery, which should have a very strong pulse. And in some critically ill patients, the patients do not have a strong pulse because they're critically ill.

Q Did the report, at least as far as can be told, look at complication rates of physicians with all levels of experience?

A Well, one of the noteworthy things that the paper commented on, it was done at eight hospitals in France, and although they didn't specify which was which, two of the hospitals were noted to have a significantly increased or higher complication rate than the other six. And although I certainly can't say this with any certainty, one possible explanation is that at the two hospitals that had higher complication rates, the people doing the procedures may have been less experienced. For instance, they may have been residents or fellows in training.

Q The complications that were reviewed in this article,

did that include complications that would not even manifest themselves for a length of time, say covering days?

A One of the major things that the paper discussed was the infection rate, and of course an infection that is visible to a physician would take hours to days to manifest itself after the placement of the catheter.

Q How long is a femoral catheter typically left in in a medical situation, a medical practice?

A It could be weeks and weeks and weeks. For instance, lots of patients who have femoral catheters for dialysis, the femoral catheter is kept in while waiting for their surgical dialysis access to mature.

Q And how long, in your understanding, is the femoral IV catheter useful in an inmate being executed?

A It's typically a matter of minutes.

Q In your clinical experience, what's the likelihood of damage to a femoral nerve that's caused as a result of an

attempt to achieve femoral IV access, femoral venous access?
A Well, thankfully it's never happened to me, and I view the likelihood of hitting the femoral nerve to be particularly remote.
Q And why is that?
A Because the landmark for placing a femoral venous catheter is the femoral artery which is the strongest pulse

in the body, and although the femoral nerve is indeed located just adjacent to the femoral artery, so is the vein, but they're on opposite sides. So as long as one is making the injection on the proper side of the artery, the likelihood of hitting the nerve is, in my mind, unbelievably remote.
Q With regard to possible puncture of the femoral artery as opposed to the femoral vein, what's your experience as to the likelihood of that complication occurring?
A Well, first of all, the femoral artery sometimes is contacted, but when the femoral venous catheter is placed, the typical procedure involves using what's called a finder needle first. And a finder needle, depending on the manufacturer and the kit, is typically a .22 or .25 gauge needle, which is a small, a small needle. And one probes with this needle to make sure that one is in the right place. And it's typically pretty easy to tell the difference between being in the vein and being in the artery because the arterial blood is bright red and the venous blood is not. And the arterial blood pulses at high

pressure and the venous blood does not.

If one accidentally goes into the femoral artery with a .22 or .25 gauge needle, then one could apply pressure for a few seconds and there will be essentially no bleeding. And then one also knows that if they have gone

into the artery, they need to move over a little bit more to get into the femoral vein.

Once the femoral vein is properly entered with the small needle, typically .22 or .25 gauge, then that needle is removed and a second needle is inserted in the same site and in the same direction. That's typically an .18 gauge needle, and it is that needle through which the wire is then placed and then the catheter itself is threaded over the wire.

Q So in your clinical experience, what's the significance of, when it does happen, going into the femoral artery rather than the femoral vein as it's being inserted?

A It's generally not a big deal at all. We have all hit the femoral artery on occasion and I have never had a complication that required intervention, personally.

Q And I think you said the solution, the action to take is to put pressure --

A Correct.

Q -- on the puncture site, I guess?

A Correct.

Q And how long?

A Depending on the size of the hole, but with a .22 or

.25 gauge finder needle, if one applies pressure for a minute or two in a person, a normal person, the hole will

clot and bleeding will not occur.

Q What's the likelihood, in your clinical experience, that a hematoma that results from an attempted femoral access will be clinically significant?

A Well, sometimes there will be some blood leaking out around the catheter, and when the catheter is in the femoral vein, normal venous pressure is just a few millimeters of mercury, so even if some blood leaks out, because it's leaking out into a closed space, a process called tamponade will occur whereby the pressure in the enclosed space will then exceed the pressure in the vein and the bleeding will stop. So if somebody is going to get a hematoma from a femoral venous catheter, it's more likely to occur in somebody who is anticoagulated or has some other abnormality like that. But in a normal person, significant hematoma formation from a femoral venous line is not typical, and I can't remember ever needing to take care of a patient who came to the O.R. whose hematoma was due to femoral venous catheterization.

Q There's been some testimony in this case from Dr. Johnson that a typical step, a standard step in the insertion of a femoral IV by means of the Seldinger method is to poke the needle through the vein and into the bone that lies beneath the vein.

In your experience, is going through the vein

and hitting the bone a usual and intended event in the insertion of a femoral catheter?

A Well, it's not the way I do it and it's not the way I teach my residents to do it. The way I do it is I insert first a finder needle to locate the site and the approximate depth of the vein and then remove that needle and insert the .18 gauge needle. And as soon as I achieve venous blood flow, with the tip of the needle in the middle of the lumen of the vein, I then thread the wire and remove the needle.

So I'm not saying it's impossible to perforate the back wall of the vessel or hit the bone, but it is certainly not deliberate on my part and it's certainly not something, the way I would teach other people to do it.

Q Is the injection of potassium chloride into the femoral vein less likely to be a painful process than injection of potassium chloride through a peripheral vein?

A Yes, I believe so, although in clinical medicine we don't use potassium chloride quite as concentrated as is used during a lethal injection. It is commonplace to administer potassium chloride at a concentration that would not be recommended peripherally. So the particular concentration of potassium employed when it's used in my hospital therapeutically is 0.4 milliequivalents per milliliter. That would be 20 milliequivalents in a volume

of 50 milliliters. That solution is not permitted in my hospital, and in other hospitals with which I have been

associated, that's not permitted to be given through a peripheral IV. It has to be given through a central vein, and through a central vein at that concentration patients do not experience pain.

Q And why is it less likely to have pain and in this case not pain at all from the administration of potassium chloride in a femoral vein vs. a peripheral vein. Physiologically, what's going on that makes it less painful?

A When it's going into a femoral vein or the subclavian vein or other large vein that's near the central circulation, the blood flow is much higher than in the arm in terms of the milliliters per second that are flowing past that point in the vessel. And the volume in which the medication is being diluted is much greater. So it's the actual concentration of the potassium chloride that hurts. And so once the potassium chloride is diluted, it's going to hurt less. And it's going to be more readily and more rapidly diluted when it is placed into a central vein as compared to a peripheral vein.

Q Are you aware of any jurisdictions in the United States that have chosen femoral IV access as the standard for executions besides Missouri?

A My understanding is the federal government also uses the femoral venous route as its preferred route.

Q Are you aware of any class of physicians that would commonly obtain femoral IV access with the use of local anesthesia only?

A Yes. In my experience and the hospital in which I work now, as well as in other hospitals with which I have been affiliated, although surgeons sometimes bring patients to the operating room for placement of some types of catheters, nephrologists, who are the specialists who deal with patients with chronic renal failure, they're the ones who are often consulted when a patient is needing dialysis, and surgeons may be asked to perform surgery to create a permanent and long-lasting dialysis access. But typically from the time the surgeon does the operation to the time that it's ready to be used is measured as weeks or months. And in the meantime temporary dialysis catheters are often inserted by nephrologists. It's typically a bedside procedure, and it's typically done with local anesthesia to provide comfort and no sedation whatsoever.

Q I believe you said that's at least a fairly common practice at the medical facilities that you're familiar with?

A Yes. Temporary dialysis catheters are placed by nephrologists in my institution all the time. These

patients don't come to the operating room. They don't go to the recovery room afterward. They don't get sedation. And, you know, this is not considered by the nephrologist or by the patients to be a particularly noxious procedure.

Q So in your view, is the use of femoral IV access for the administration of lethal chemicals in the case we're here for today a reasonable choice to be made?

A I think it is a reasonable option, balancing the

advantages and disadvantages of all the different options.

MR. PRITCHETT: I think I am at an end, or near an end, Judge. If I could have a moment to consult with cocounsel.

Just briefly, Judge.

Q The low doses that are typically used in a surgical procedure, do those have an effect on cardiac output?

A You're speaking of low doses of thiopental?

Q Yes. Thank you. Sorry. I did not specify that.

A The typical dose of thiopental, a few hundred milligrams, may drop the blood pressure by a small amount, but it typically does not affect the cardiac output to a meaningful degree as far as the circulation time.

MR. PRITCHETT: Thank you very much, Doctor. That's all I have for you at this time.

CROSS-EXAMINATION BY MS. ANDERS:

Q Good morning. Have you published anything on

thiopental?

A I have published a fair number of chapters about general anesthetic, intravenous anesthetic, in review books and, for example, in one of the major standard textbooks of anesthesiology that is in the process of being revised I have a chapter on intravenous anesthetic which certainly includes an extensive discussion of the pharmacology of thiopental. I have also written about it and its use in other chapters I have written elsewhere.

Q So textbook chapters, you rely on other sources for that; is that correct?

A Typically, yes.
Q You cite other sources. Have you published any human studies on thiopental in peer review journals?
A No.
Q And I believe that Dr. Henthorn has done extensive research and studies in thiopental, particularly the onset of thiopental, the onset time; is that correct?
A Yes. He and I have done very similar work. His work on thiopental is very similar to my work on propofol, which is another hypnotic.
Q Have you ever received a grant to study thiopental?
A No.
Q And would you seek out Dr. Henthorn's judgment if you had a question about the onset of thiopental particularly?

A Well, his work on the rapid and early circulation of thiopental is one of the sources that I have considered, as well as the work of others.
Q And I believe you stated in your expert report that the graphs you've done in this case are based on the work by Dr. Henthorn; is that correct?
A A portion of the consideration is based upon his work as well as the work of others. I did not rely on the kinetic set based solely on one person's work because I wanted to make sure it was more extrapolatable to the general population. But I certainly did include consideration of his published work.
Q What other published works did you rely on?
A Another lab that has done a fair bit of work on

thiopental is the lab at Stanford and Doctors Stanski and Shafer and Mada are amongst the authors who published extensively on the kinetics of thiopental.
Q And where was the data that was relied on published? Is there an article you can cite?
A Off the top of my head I would say it was probably in the Journal of Anesthesiology or at least some of the papers were in the Journal of Anesthesiology, but I'd have to go back and look again.
Q Do you remember about when those papers were published?

A Late '80s, early '90s approximately, I believe.
Q And I believe you testified previously that in this case, that -- and this is on page 32 of the transcript, the detailed -- I quote, "The detailed kinetic and dynamic predictions that I made for thiopental rely on state-of-the-art studies that were performed on human volunteers." So I take it you were referring to Dr. Henthorn's article and the Stanski article as well; is that correct?
A Yes, both of them published lots of things in human volunteers.
Q And I believe that Dr. Henthorn's article that you cited specifically was published in 1989; is that correct?
A In clinical pharmacology and therapeutics, yes.
Q And I think you just testified that the Stanski and Shafer articles were also about the late '80s or early '90s?

A They were contemporaneously published within a year or two of each year.
Q So do you consider data from 1989 to be state-of-the-art in this field?
A Yes, simply because since thiopental was essentially abandoned in anesthesia use in the early '90s, people stopped doing high-level research on thiopental and chose to explore other drugs like propofol.

Q Are you aware of whether Dr. Henthorn has continued publishing on thiopental?
A He may have. I can't cite any papers off the top of my head beyond the early '90s.
Q Would you be surprised if I told you that Dr. Henthorn has received eleven years of grants to study thiopental and that has continued into the past few years?
A No, that wouldn't surprise me at all, but the area in which he is studying is not exactly the same as which he did in the late '80s and early '90s.
Q I see. So I believe you testified that it's not necessary to monitor anesthetic depth assuming a five-gram dose or 2.5 gram dose of thiopental is successfully given; is that correct?
A Yes. And my understanding is that people -- anesthesiologists on both sides of this issue have agreed that the successful delivery of this large dose of thiopental will result in a humane execution.
Q And I believe -- well, let me ask you. When you did your graphs back in January for this case and you

testified, did you assume that a five-gram dose of thiopental would be successfully given into the circulation?
A Yes.
Q And that turned out to be false, didn't it?

A No.
Q Why not?
A I have no evidence that the catheter malfunctioned or that the medication was not delivered into the central circulation.
Q What is your understanding of the intended dose of thiopental in the past five executions in Missouri?
A Well, now I understand. The intended dose was five grams and the delivered dose was 2.5, grams and as far as I know, there's no reason to think that the delivered dose was not delivered successfully into the central circulation.
Q And are you able to tell definitively from the documents in this case and the testimony, deposition testimony of John Doe One, precisely how much thiopental was given on a particular occasion?
A Well, I believe he said it was 2.5 grams resulting from the preparation of five 500-milligram injection kits.
Q And are you certain about that?
A I'm as certain as he was when he testified to that point.
Q Are you aware of discrepancies in the chemical log with respect to how many vials of thiopental were checked

out and precisely how much thiopental was given?
A I have read references to that and I have to admit I

don't understand what is going on there.
Q Have you reviewed the chemical log yourself?
A No.
Q And I believe you stated that you made an assumption with respect to the amount of diluent, is that correct, back in January?
A Correct. I assumed that the solution to be injected would be 2.5 percent, which is that concentration that is clinically used.
Q And that assumption turned out not to be correct in terms of the facts in this case?
A That appears to be the case.
Q And did you also make an assumption with regard to the injection times in Missouri?
A Well, originally I assumed that the five grams would be injected at the rate of one milliliter per second.
Q And that turned out not to be correct?
A Correct.
Q And if there's a leakage to the connection between the tubing and the catheter -- a partial disconnect, could that be undetected in an execution?
A Anything is possible. However, once the IV tubing is put together, in my experience, I have a very difficult time imagining a disconnect just happening, because the pieces screw together. But I will concede that anything

is possible.
Q Are you aware of whether the execution team in Missouri can observe the catheter site?
A I don't know if they can actually see the catheter site itself.
Q So you don't know whether there's a sheet covering it or not?
A I believe that there is a sheet covering the inmate and they can see parts of the IV tubing and can't see all of it.
Q If I told you that the sheet went up to the inmate's neck and came fully down both sides of the bed, would you have an opinion as to whether they can see the catheter site?
A They probably can't see the catheter site itself.
Q If 80 percent of the drugs leaked at some point through the tubing or the catheter site, how much thiopental went into the body?
A Well, if the intended dose was five grams and 80 percent of it leaked, then only one gram would reach the patient.
Q And do you agree that one gram of thiopental is an insufficient dose for chronic drug addicts?
A Well, first of all, it's inconceivable to me that an inmate on death row is currently using illicit drugs. So

if a person has a remote history of drug abuse but has been clean for years, then they are expected to respond normally

to a dose of thiopental. I would say, though, that in my opinion, one gram of thiopental is probably not an adequate dose for a judicial execution in anybody. But I don't think that a former drug addict is any different from anybody else, assuming they have not been able to use illicit drugs while confined in the penitentiary.

Q So you don't think the fact that somebody who is a chronic drug addict particularly would render one gram of thiopental an insufficient dose?

A As I said, in my opinion, one gram is not an adequate dose for a judicial execution. If a person has a prior history of drug use but has been clean for years, they don't respond differently than somebody who has never had a history of drug abuse. And so for a person to be considered different, I would want to see evidence that they continued to use in the recent past, which I would think would be very difficult to imagine in an incarcerated inmate. But if you showed me evidence to the contrary, then I would consider it.

Q So you say that one gram would be, in your view, insufficient for a judicial execution. Would it be insufficient to ensure that a drug addict were sedated, just taking out the execution situation?

A Well, certainly a gram of thiopental is going to sedate everybody to some degree or another because the drug is a sedative. It's going to cause loss of consciousness in a substantial fraction of people. In my opinion, the percentage of the population that would be reliably

rendered unconscious by one gram is not high enough for a judicial execution. But I'm saying this not with regard to drug addicts. I'm saying this with regard to everybody in the population.

Q So if I told you that John Doe One, the physician, in his deposition, page 12, stated that, "I was quite aware that one gram in chronic addicts was an insufficient dose to ensure that they would be sedated," would you disagree with that statement?

A I think it depends on your definition of a drug addict. If the person was using up until the recent past, that's one type of patient. But a person who has been forced to be abstaining from drugs because they're incarcerated is a completely different type of patient.

THE COURT: Why don't we take a brief recess here, about ten minutes or so.

And I will remind you, Ms. Anders, that you do have a limited amount of time. You may, at your peril, not get to critical issues to cover in this examination.

We'll stand in recess.

(Recess)

Q (By Ms. Anders) Just to go back to a previous question briefly, Dr. Dershwitz. If the intended dose of thiopental is 2.5 grams and 80 percent of it leaks, how much thiopental would enter the circulation?

A I think 500.

Q 500 --

A Milligrams.

Q Milligrams. So I think -- I believe you testified that in a rapid sequence induction you skipped the testing of anesthetic depth because of a medical indication?
A Yes.
Q So is it fair to say that you don't skip the testing of anesthetic depth all the time with every patient?
A No. We assess the depth of anesthesia if it's medically indicated and we don't if it's medically contraindicated.
Q And I believe you testified about the medical indications of a rapid sequence induction. Those involved the person not having properly fasted, things like that; is that correct?
A Yes.
Q Is it fair to say that most of those situations are emergency situations?
A No, because a huge proportion of the population has

symptoms of acid reflux and so people with that symptom are also at higher risk for aspiration so those are people who we would do rapid sequence induction also.
Q So it's specific medical issue that requires you to do rapid sequence induction?
A Yes.
Q And what is the medical indication of lethal injection?
A Lethal injection is not a medical procedure.
Q So why is it -- are there medical factors involved in an execution that require as a medical matter the use of

something like a rapid sequence induction?
A Well, I'm not sure I can answer the question because from start to finish it's not a medical procedure so I can't say that only a fraction of it is or is not.
Q Is it necessary to induce general anesthesia in an execution?
A It's necessary to provide unconsciousness.
Q And providing unconsciousness using an anesthetic, is that a medical procedure?
A Again, when it's ordered by the State I do not consider it a medical procedure.
Q But the same actions are taken, the same drug, medical drug is used or a drug that is used in medicine; is that correct?

313

A Well, the drug is the same. I won't say that the same actions are taken, but I would say of course the medications are used -- that are used are also typically used in clinical medicine.
Q So unconsciousness is induced in an inmate through the use of medication?
A Yes.
Q And so in that process, what justifies taking the increased risk of not monitoring anesthetic depth?
A That's not for me to decide.
Q I believe you discussed the BIS monitor briefly. If you give a conscious person a large dose of a paralytic drug like pancuronium, what will happen to the BIS value?
A As far as I know, no one knows because it's never been

studied. Certainly one of the parameters that goes into the BIS value is the degree of muscle tone in the frontalis muscle, which is the muscle in the forehead, so the BIS value will drop to some indeterminate -- by some indeterminate degree if you paralyze someone awake, but as far as I know, that experiment has never been done.

Q So you're not aware of a study in which that actually -- the use of a paralytic drug with a BIS monitor actually was studied?

A I am unaware of a study in which a human was given a large dose of a paralytic drug with no sedation and had

their BIS measured concurrently.

Q So if the BIS monitor -- if the BIS value goes down upon the administration or after administration of pancuronium, can it provide an accurate measure of consciousness after the pancuronium is administered?

A Absolutely, because it will drop like a rock after the thiopental is given.

Q After the thiopental is given, yes, but after the thiopental is given and after the pancuronium is given can you trust its accuracy at that point?

A Absolutely, because that's how we use it in clinical medicine. Almost all of our patients -- a significant fraction of our patients under clinical anesthesia are also paralyzed and the BIS monitor works very reliably.

Q Is the BIS monitor the only monitor that you use to measure anesthetic depth?

A Of course not.

Q What other monitors do you use?
A We may use clinical factors like observation by the anesthesia team as well as observation by the surgeon.
Q And is using a BIS monitor alone to monitor anesthetic depth, is that something that anesthesiologists generally do?
A Not during surgery.
Q During any procedure requiring general anesthesia?

A Well, I can't think of any procedure that requires general anesthesia where nothing else is done later. But another corollary might be in patients who are mechanically ventilated in intensive care units and are not undergoing surgery, the BIS monitor is commonly applied there to titrate the sedation to an adequate depth of sedation or loss of consciousness. So in that scenario, the only procedure that's being performed is mechanical ventilation, and the primary end point to which the sedating medication is being titrated is the BIS value. So in that scenario it is the primary monitor when it's chosen to be used in an intensive care unit.
Q And that's not a situation in which the patient is subjected to painful stimulus; is that correct?
A Well, having an endotracheal tube is painful.
Q Do all anesthesiologists use a BIS monitor during general anesthesia?
A Of course not.
Q And should they?
A In my opinion, yes, and I have written that. With the

caveat that there are some subset of patients in whom the monitor is not appropriate, but I have written several review articles in which I advocated the use of the BIS monitor routinely in general anesthesia except when it was medically impossible.

Q And are you aware that the American Society of Anesthesiologists has issued a document stating that the BIS monitor is not the general standard of care?
A Well, that's actually not what they said. They recommended that the BIS monitor be considered on a case-by-case basis and that clinicians are free to choose to use it when they wish. And they also recognized that there are certain subsets of the population for whom a higher risk of awareness is possible.
Q They also stated that the BIS monitor is not indicated for sole use because there are other important measures of anesthetic depth; is that correct?
A During surgery, that's true. That's actually not the case when it's used in the intensive care unit, but the ASA policy statement did not address the use in the ICU.
Q And I believe you testified that the injection time for thiopental in North Carolina is between 1 and 1.5 minutes is that correct?
A That's an approximation.
Q Do you know how many seconds precisely the injection takes in North Carolina?
A No, I do not.
Q Do you know how many seconds it takes to inject the

thiopental in Missouri?
A No, I do not.

317

Q Isn't it true that if thiopental is injected relatively slowly, it may have taken effect in the brain by the time the injection is complete?
A The speed of the injection is less relevant than how long it takes to get the first few hundred milligrams in, and when one is using a concentrated solution it does not take very long to get two or 300 milligrams into the circulation. How fast the overall syringe plunger is pushed is not terribly meaningful to this discussion.
Q And the solution which the thiopental is mixed in Missouri, it's very concentrated; is that correct?
A I believe the intent is to make it as concentrated as is achievable.
Q So if the solution is extremely concentrated and the drug pushed quite quickly, do you have -- can you be certain whether the North Carolina execution is comparable to Missouri in terms of injection speed and the concentration of thiopental?
A I actually think that it's probably not a meaningful difference because what's truly critical is the point at which we go from having no thiopental to let's say approximately 300 milligrams of thiopental. And in the two scenarios that you described we're still talking about a difference of only a few seconds. So, therefore, it is not a clinically meaningful difference.

318

Q But you're not sure how great that difference is; is that correct?
A I don't know exactly. I don't know a lot of things exactly. But we're talking about a matter of just a few seconds; a few being a small number.
Q Did you see the BIS monitor read-outs from the Brown execution?
A I was not there.
Q So on what source are you basing your assertions about the BIS monitor in North Carolina?
A The information was provided to me by the Attorney General's Office.
Q Did you at that point see the BIS monitor read-outs?
A I told you I was not there. The material -- the information was provided to me by the Attorney General's Office.
Q And did you bring with you today any of the information that was provided to you by the AG's Office?
A No. Well, I actually do have a copy of the e-mail on my computer.
Q So you have an e-mail from the AG's Office?
A Yes, I do.
Q And would you rely on that in a medical situation?
A I would rely on it in a judicial execution situation, which is obviously, in my opinion, not a medical situation.

Q Do you know Dr. Henthorn?
A Very well. We were medical school classmates.

Q Do you believe he's a reasonable person?
A I sure do. He's also capable of making a mistake sometimes, as we all are.
Q He knows more about the onset time of thiopental than you do; is that correct?
A Not anymore.
Q Have you received any funding to study the onset of --
THE COURT: Let's not get into argument with the Doctor. Let's move on. Your time is limited.
Q (By Ms. Anders) So is there a debate about the onset time of thiopental in the medical community?
A There is now.
Q So this is a situation which reasonable doctors can disagree; is that correct?
A And I will be interested to see how much he disagrees once he realizes the mistake that he made.
Q Are you certain that he's wrong?
A Yes.
Q Have you performed his models yourself?
A Not in as great detail, but I discovered a flaw in an assumption on which the rest of his calculation is based.
Q I believe you testified about an MRI situation where you maintain general anesthesia from a remote location; is

that correct?
A Yes.
Q In that situation, do you ever induce general anesthesia in an awake patient from a remote location?
A Yes.

Q And when do you do that?
A As I said, it happens occasionally in the MRI environment.
Q And the patient starts out awake?
A Correct, awake but sedated. And then the decision was made to switch from sedation to general anesthesia in the middle of the procedure and then I alter my anesthetic dosing so that the patient proceeds from a sedated state to an unconscious state.
Q How many times have you done this?
A A few. I can't remember exactly. It's not common, but it's certainly happened to me.
Q Do you have any idea how many times in the past six months?
A I can't put a number on it. It's a small number. It's in single digits, but I can't tell you exactly.
Q In those situations was the patient already intubated?
A Yes.
Q And that means the patient was already heavily sedated; is that correct?

A I guess it depends on your definition of heavily sedated. They were not heavily sedated. They were sedated to the point that they were comfortable but awake so they could follow commands.
Q I believe you stated that being intubated is a fairly painful procedure, correct?
A Correct, but sedation per se does not mitigate the pain. We would provide analgesics for pain relief and

sedation for comfort.
Q And did you monitor anesthetic depth when you used general anesthesia in those patients?
A Actually the BIS monitor is not compatible in an MRI environment so I can't use it in that environment.
Q Did you use any other monitor to measure anesthetic depth?
A No, I didn't. But may I add something. The patient stopped moving and the radiologist told me it was -- the conditions were adequate for -- to proceed. So I used that as a reasonable end point.
Q I believe you testified before that a typical clinical concentration of potassium is about .4 milliequivalents per milliliter, correct?
A That is the concentration that we use when we're delivering a large amount to a central vein. The concentration that would be delivered to a peripheral vein

is much lower.
Q Thank you. And do you know what the concentration of potassium used in Missouri is?
A I believe it's two milliequivalents per milliliter.
Q How much higher is that than .4 milliequivalents per milliliter?
A Well, it's two versus point four.
Q So it's quite a bit higher?
A Slightly higher.
Q So a two to one ratio versus a four to one ratio; is that correct?

A No, it's -- the concentration that Missouri uses is 2 milliequivalents per milliliter. The highest concentration that I'm aware of any hospital using is 0.4 milliequivalents per milliliter. So it's a difference 1.6 milliequivalents per milliliter.
Q Right. But in terms of the concentration, how many times -- let me ask it this way. How many times greater concentration is 2 milliequivalents per milliliter than .4 milliequivalents per milliliter?
A That question doesn't make sense to me. The highest concentration used clinically, as far as I'm aware, is .4 milliequivalents per milliliter. The concentration used in Missouri is two milliequivalents per milliliter, so that is a difference of 1.6 milliequivalents per milliliter. It's

1.6 milliequivalents per milliliter higher in the judicial execution in Missouri than the highest concentration used in a hospital, of which I'm aware.
Q And is the concentration of two milliequivalents per milliliter ever used in a clinical setting?
A Not that I'm aware of.
Q Has any research been done on it?
A I wouldn't know.
Q So you don't know whether two milliequivalents per milliliter concentration would hurt in the femoral vein; is that correct?
A If it did hurt it would hurt a lot less in the femoral vein than it would hurt peripherally, and my suspicion is, knowing the other highly-irritating drugs that are given

centrally, that as far as I'm aware, no medication that hurts peripherally hurts when it's given centrally.
Q Do you know what the concentration of the potassium would end up being in the femoral vein assuming that 240 milliequivalents were injected within a minute?
A It would depend on blood flow. It's a complicated calculation. I can't do it in my head, but it depends on blood flow.
Q Can you estimate the blood flow?
A Not in my head.
Q Okay. So then you're not sure what the concentration

of potassium would be in the femoral vein if it were injected --
A It would be very high, but I can't tell you exactly what it is.
Q So in your opinion should lethal injection for execution be performed using a femoral vein catheter rather than a peripheral IV?
A I believe that that is a public policy decision that should be made by those responsible, balancing the benefits and the risks. It's not my job to decide what is, quote unquote, better. I would make every effort to describe the advantages and disadvantages, the risks and benefits, and let those responsible for making the decision make the decision.
Q And I believe you testified that a femoral vein has a very -- quote, I believe this is a quote, has a very slight increased degree of reliability as opposed to peripheral IV

access.
A Yes.
Q So -- and you believe that peripheral IV access is also reliable?
A Yes, but it is also deemed unreliable by some of your experts, so when one balances the benefits vs. the risks, the increased reliability of a femoral venous catheter is worth considering based upon some of the statements that

your own experts have made.
Q If a peripheral IV were placed by a board-certified surgeon, do you believe it would be reliable?
A I think an IV placed by anybody with any significant amount of experience is probably reliable.
Q So if both types of IV access are medically reliable in your view, what are the medical indications for using femoral access?
A Well, in my experience when I use a femoral IV it's typically because either we do not have access to the upper extremities or the neck because of the nature of the patient's condition, or, for example, in certain trauma patients we want to have a reliable IV below the diaphragm as well as having reliable IV access above the diaphragm.
Q So is it fair to say you don't routinely use femoral catheterization as your first choice method in inducing anesthesia?
A Well, it depends on the nature of the patient. With certain trauma patients it's definitely our first choice for IV catheterization. But I will tell you that's a small

fraction of the over-all population. But depending on the person's presentation, the femoral IV catheter might very well be the preferred and initial site for IV placement.
Q So whether the femoral IV is the preferred initial site for placement depends on the patient; is that correct?

A In a clinical scenario, that's my experience.
Q How many femoral venous catheters have you placed in the last year?
A I have no idea. I don't keep track of these things.
Q Do you know how many you placed in the last month?
A No.
Q Can you estimate?
A No. It's -- it's not something that I keep track of, nor could I tell you how many Big Macs I ate in the last month. They have about the same level of importance to me.
Q Would you say that you put in femoral lines frequently?
A I guess it depends on your definition of frequently. I work in a major trauma center so it happens. Sometimes the surgeons or emergency department surgeons or emergency department doctors get to the patient before the anesthesia team and they may have secured the femoral line before I do, or my team does. But it's certainly something that we use with some regularity.
Q I see. With some regularity. So would you be surprised if I told you that somebody who performs femoral catheterization all the time, thousands of times in their career, sees a 10 to 20 percent over-all complication rate

in their clinical practice?
A I think it's very important that, first of all, one

define complication and one also define the purpose for which the catheter is inserted. I can certainly tell you that when femoral catheters are put in long-term for dialysis patients, nobody would agree that there's a 20 percent incidence of complications, because it just doesn't happen.
Q And if an artery were punctured in the course of femoral catheterization, would the hematoma be bigger than just a venous puncture?
A Assuming that the hole was the same size in the arterial venous puncture, more blood would leak out through the artery until tamponade is achieved than from a vein because the pressure is higher.
Q I see. And I believe you testified that the appropriate treatment is to use pressure to stop the bleeding?
A Yes.
Q So you would disagree that the appropriate treatment from an arterial puncture is to allow the -- allow the puncture to bleed until the blood is naturally stopped by the pressure?
A First of all, I would apply pressure and between pressure and the blood's normal clotting ability, the hole generally seals in a matter of seconds, or a minute or two. Also, again, dependent upon the size of the hole,

there may be continued leakage. Sometimes it's imperceptible to the person standing there whether or not there's continued leakage, and it typically does end up sealing itself after a period of time due to the tamponade effect.

Q About how much blood would be -- do you have any idea about how much blood would come out before it sealed itself?

A It depends on so many variables - the site, the exact site at which it's punctured and the physical make-up of the patient - that I cannot even begin to estimate how much blood could be present in a hematoma there.

Q So you have no way of knowing in the abstract how serious that kind of hematoma would be?

A Certainly it depends on your definition of serious. If you define serious as life-threatening, that's very difficult to imagine.

Q So you have no way -- then let me rephrase. You have no way of knowing how painful a hematoma might be from an arterial puncture, in the abstract?

A Well, if I was concerned that the person were in pain I would ask.

Q Are some people relatively resistant to the effects of thiopental?

A There are some people who require slightly greater

doses than others and the most common reason would be the co-administration of concurrent medications or the frequent

ingestion of alcohol.
Q So does that relative resistance have anything to do with metabolizing thiopental?
A No, because in the context of a judicial execution, which takes a few minutes, metabolism is a completely unimportant and irrelevant paramater.
Q So if I told you that John Doe One stated in his deposition, Page 27, quote: "The extra gram" -- or "One gram of thiopental will cause 90 percent of the population to be unconscious. The extra gram is for that small percentage of drug addicts that had excessive drug use. They produce enzymes in the liver that allows them to metabolize pentothal at a much more rapid rate," would you agree or disagree with that statement?
A Well, it depends upon two things. First of all, it assumes that the person has been recently and regularly using drugs, and second of all, it assumes that their abuse drug is something that does produce liver enzymes. But if both of those things were true, then that's a true statement.
Q But I believe you just said before that metabolism of pentothal is not a relevant factor in determining consciousness.

A Metabolism per se does not affect the probability of consciousness or the time to awakening when large doses of thiopental are used in a judicial execution.
Q Is thiopental best described as a sedative or an anesthetic?

A Pharmacologically we describe it as a sedative hypnotic drug meaning that at low doses it produces sedation and at high doses it produces hypnosis. Now, to a pharmacologist, hypnosis means loss of consciousness. It has nothing to do with what they do in nightclubs. It's a pharmacological term meaning loss of consciousness.
Q So at high doses thiopental has hypnotic properties?
A No. In the context of producing unconsciousness it can produce an anesthetic state.
Q So you disagree with the statement that thiopental has no anesthetic properties whatsoever?
A I think that that is misstated as far as being linguistically correct.
Q So if I told you that John Doe One stated that, you would feel that was incorrect?
A Well, I read his deposition and I disagree with that statement.
MS. ANDERS: If I could have a moment, Your Honor.
Q (By Ms. Anders) Is mixing the thiopental difficult?

A No.
Q And I think you actually testified that it was not difficult; is that correct?
A That's correct.
Q So if I told you that John Doe One stated, "I am the one that always mixes the pentothal because it's very difficult for someone who is not used to this to accomplish it." You disagree with that statement?

A I think it depends upon a person's background and training, but certainly most people who are intelligent can be taught to mix up a drug like thiopental properly. It's not intuitively obvious how to do it when you're handed the materials, but I don't think training somebody to do it is difficult.
Q And you think a board-certified surgeon would have the expertise to mix thiopental properly?
A I would hope so.
Q Does propofol have to be administered through a continuous infusion?
A Propofol? We are switching to propofol now?
Q Just a question.
A I just want to make sure. Propofol can be given by bolus or by infusion, either way.
Q So you disagree with the statement that it requires a continuous IV infusion?

A I think in that context, propofol is much shorter acting than thiopental, so if one wants a prolonged effect one would give repeated boluses or a continuous infusion for a prolonged effect.
Q Thank you.
MS. ANDERS: Nothing further, Your Honor.
REDIRECT EXAMINATION BY MR. PRITCHETT:
Q Early in the cross-examination you were asked whether or not the amount of the thiopental that was given in the last few executions was what you presumed it to be in your modeling, your charts, when you testified in January.

A Yes.
Q And I believe you indicated that the dose of thiopental that was actually given was less, 2.5 instead of five grams.
A Yes.
Q And I believe you also testified that the amount of the diluent was different than what you had assumed in making your initial analysis in this case that you provided testimony on in January.
A Yes.
Q And the amount of diluent was reduced to less than what you had assumed back in January.
A Yes.
Q And the rate of administration was also different than

what you had assumed in your initial analysis; is that correct?
A Yes.
Q And the rate of administration was greater than what you had thought.
A Yes, the time to complete the administration was less.
Q Despite all those differences, the decrease in the thiopental, the decrease in the diluent, the increase in the administration rate of the drug, does that have any meaningful -- does that make any meaningful difference in your conclusions that you testified to in January?
A No, because these changes result in changes in probabilities of consciousness that are extremely tiny to begin with, and if we change one very tiny number to

another very tiny number, in my opinion it makes no meaningful scientific difference in whether or not the execution meets what most people would consider the definition of humaneness, meaning a very high probability of unconsciousness.

Q Did I hear you testify as part of the cross-examination that you saw no clinical difference between the use of the execution process in Missouri and that that was used in North Carolina in the recent execution with the BIS machine?

A Yes. Missouri has recently used 2.5 grams, which is

slightly different from the three grams that they use in North Carolina, and the time to administer may be a little different. In Missouri the 2.5 grams is dissolved in a much lower volume of diluent than they use in North Carolina. However, in North Carolina the three grams, although it is dissolved in the usual clinical concentration, result in a much larger volume. And the way that it's administered in North Carolina is to have two executioners each with a syringe each injecting simultaneously into an IV so that the overall speed of completing the injection does not seem to be different by more than a few seconds at most between North Carolina and Missouri, as far as I can tell.

Q You were also asked in cross-examination whether you were -- and I think this is close to a quote -- certain that Dr. Henthorn's analysis was wrong.

A I think that his analysis --

Q Before you -- does that pretty adequately, accurately, summarize your testimony?
A I am certain that there is an assumption on which his analysis is based that is flawed.
MR. PRITCHETT: Judge, I know you sustained the objection to the discussion of what that assumption was in the direct portion of the testimony. I think the door has been open now and I would ask the opportunity to explore

that with the witness.
MS. ANDERS: I object, Your Honor. We have had absolutely no notice of what this might be. We haven't had a chance to ask our expert about it, and we haven't been able to depose Dr. Dershwitz on his views.
THE COURT: I don't see that the cross-examination put that in any better posture, so objection is overruled -- or sustained rather.
Q (By Mr. Pritchett) You were also asked towards the end of your cross-examination about Dr. Doe's testimony that thiopental is not an anesthetic, and you disagreed as a general matter with that conclusion.
A Yes.
Q Does that clinical either difference of opinion or mistake, however it should be described, does that have a clinical -- does that make a clinical difference in this case?
A Well, in my opinion as long as Dr. Doe succeeds in properly providing an adequate dose, which is, in my opinion, at least 1.5 to two grams of the thiopental,

properly delivered to the IV, it will have no meaningful effect on the conduct of a judicial execution. And so the fact that he made some pharmacological mistakes in his deposition does not contradict his statements about how much thiopental he says he gave, and the amount that he

said he gave was adequate to conduct a humane execution.

Q And then I think very nearly at the close of your cross-examination you were asked about how difficult it is to mix thiopental, and we understand that it is a fairly simple process. What's your understanding, if you have one, of why Dr. Doe was having difficulty with mixing the thiopental in the execution context?

A My understanding from his deposition is that when Missouri formerly used a five-gram single dose container of thiopental, he was able to dissolve that five grams of thiopental in an amount of diluent that would fit in a 60 millimeter syringe.

Subsequently, the State has procured the thiopental as 500 milligram injection kits, which is actually the standard preparation that we use at my hospital, and he then said that he was unable to put five grams in 60 milliliters of diluent. I think there's two possible explanations that make pharmacological sense about why this difference may have occurred. First of all, we know that thiopental is more soluable in water than it is in saline so one possibility is the preparation that was formerly used came with water as the diluent and the current preparation could have saline as the diluent

because depending on the manufacturer from which the thiopental is procured some use water and some use saline.

So that is a systematic change that may have occurred, although I can't say that for certain, but it is a possibility.

The other possibility is because the manufacturer intends that the medication be prepared as a 2.5 percent solution, there's no reason for them to make any manufacturing efforts to make it soluable at a higher concentration. And so it is possible that from one manufacturer to the other the crystalline structure of the medication itself is such that it was not soluable at the higher concentration as compared to the lower concentration.

For example, thiopental is not soluable at neutral pH. In order to get it into solution, the pH has to be elevated to approximately 11. Now, if one manufacturer had it at 10 and a half and the other manufacturer had it at 11 and a half as buffered in the solid state, there would be an enormous difference in maximum solubility. Yet, in both cases they meet FDA requirements for clinical use of 2.5 percent. So it's not the least bit surprising to me that there were differences in the behavior of batches from different manufacturers.

MR. PRITCHETT: Thank you, Doctor.

MS. ANDERS: Just a couple question, Your Honor.

RECROSS-EXAMINATION BY MS. ANDERS:
Q How much training did you undergo to become an anesthesiologist?
A Well, if one starts with college, I have a degree in chemistry which most medical students have a bachelor's degree before entering medical school. Then I did four years of medical school. And then an internship, two years of residency, and a two-year research fellowship. In addition, I also have a Ph.D in pharmacology which has been very useful to me as an anesthesiologist, which took an additional four and a half to five years.
Q So would you say that inducing anesthesia, general anesthesia, is a complex process?
A Inducing general anesthesia is actually pretty easy.
Q So it's really not necessary to have all that training?
A Well, it depends on the scenario. What's hard is to wake the patient up. But putting people to sleep, I'm not trying to be facetious, putting people to sleep is actually relatively easy. Keeping them stable and alive and waking them up again is the hard part.
Q Is monitoring the anesthetic depth of a paralyzed patient, is that complex?
A Clinically that could be very complex. That's one of the reasons why some of the new monitors have become very

helpful to some of us.
Q Are you aware of whether John Doe One uses the diluent

in the package that comes from the manufacturer?
A I'm assuming he does, because there's no description that he acquires a diluent from another source.
Q But you don't know for sure; is that correct?
A Well, again, he describes using what's in the kit and the kit in which the 500 milligram dose comes, he describes having two separate containers, one container with powder and one container with diluent and he's mixing them together, so I have to conclude that he's using the diluent that comes in the kit. And as I said, depending on which manufacturer supplies the medication, some manufacturers use water and some manufacturers use saline.
Q And you can't say for sure why the thiopental didn't dissolve; is that correct? I understand that you gave a couple of possibilities, but --
A I can't say for sure which of the two examples was more important. It's possible that both were operative, but I don't know for sure.
MS. ANDERS: Nothing further, Your Honor.
MR. PRITCHETT: No further questions from the defense, Your Honor.
THE COURT: Thank you, Doctor.
MR. PRITCHETT: Call Terry Moore to the stand,

please.
TERRY MOORE, called as a witness on behalf of the Defendant, being first duly sworn, testified:
DIRECT EXAMINATION BY MR. PRITCHETT:
Q Would you state your name for the record, please.

A Terry W. Moore.
Q What's your position, Mr. Moore?
A I'm the director of the Division of Adult Institutions with the Missouri Department of Corrections.
Q So the Division of Adult Institutions is a subagency of the Department of Corrections?
A Yes, sir, it is.
Q When did you become the director of the Division of Adult Institutions?
A August 1st, 2005.
Q Do you have a role in the execution process as used by the Department of Corrections in Missouri?
A Yes, sir, I do.
Q To your understanding, who is the person with the authority to set the method of execution in Missouri within the confines of state statute and case law?
A The director of the Department of Corrections.
Q Do you recall testifying in this case back in January?
A Yes, sir.
Q Did you state at that time that your understanding --

what your understanding was as to the dosages of the drugs that were administered in the lethal injection in Missouri?
A Yes, sir, I did.
Q And with respect and in particular to the sodium pentothal, at that time what was your understanding of the amount of sodium pentothal administered in executions in Missouri?
A Five grams.

Q Have you since found out that less than five grams of sodium pentothal has actually been given at the last several executions?
A Yes, sir, I did.
Q How were you able -- how did you find that out?
A As a result of some of the discovery in this particular case, and I was advised by our attorney and I think it was May 18th that I was told.
Q Who is it that you understand made the decision to alter the dose of thiopental?
A The physician involved.
Q Or sodium pentothal. The physician. What's your understanding as to the amount of the drug that was administered in the last several executions?
A 2.5 grams.
Q As far as you know, did the doctor act on his own, at his own discretion, in reducing the dosage?

A Yes, sir, that is correct.
Q What's your understanding as to why the doctor thought he had the authority to alter the dose on his own?
A Well, he's been involved in the execution process with the state of Missouri for many years and it's my understanding that he thought that based upon his medical knowledge that he had the duty and responsibility to make a decision based upon the goals of the Department of Corrections to do an execution that is quick and as humane as possible.
Q Had the doctor been involved in the execution process

in the state of Missouri for some time?
A Yes, sir, he has been.
Q And had his recommendations, his thoughts as to how the process should work, have they been relied upon by the Department over the course of time, as you understand it?
A Yes, they have been.
Q Now that we have learned that, in the last several executions, there was a 2.5 gram dose as opposed to a five gram dose of sodium pentothal used, what's your view as to that situation?
A Well, it should never have occurred and I hate that it did, but I can understand why the doctor made the decisions that he made, once again, based upon his medical knowledge, his involvement in the process, and also him wanting to

make sure that the Department of Corrections completed their goal. And I think that the 2.5 was adequate in being administered and to keep the offender sedated and unconscious during the process and that the ones that I have been involved with, they have gone very smooth.
Q Are you aware of any changes that are planned by the Department of Corrections to firm up the procedure and to ensure that proposed modifications in the procedure are referred to the director, for the director's decision?
A Yes, sir, I am.
Q As general matter, what is planned by the Department of Corrections in this regard to firm up the process?
A To come out with a more detailed, more direct policy and procedures dealing with the execution process that will

delineate the amount of dosage that are supposed to be used, the sequence in which they are to be given, and that any changes that are to be made are to be in the sequenced amount and so forth and will be approved by the Department of Corrections before they're done.

Q Does that document, directive, policy, whatever you want to call it, has that been drafted as of this time?

A No, sir, it has not.

Q Have certain determinations been made as to what the contents of that directive will contain?

A Some of them have, yes, sir.

Q And --

THE COURT: Why is all of this relevant to this procedure, Mr. Pritchett?

MR. PRITCHETT: Judge, I think it's relevant to show the court that we understand that there was a deviation, an aberration from the process as described before, and actions are being taken so that it doesn't happen again, so that the Department of Corrections can be confident that the process will be as described.

THE COURT: Okay. I still don't think it's relevant, because it's in court now, that issue is going to be ultimately decided by this court and this court is probably going to fashion something, if it deems it appropriate, that may or may not be consistent with the Department of Corrections, and at some point in time if that occurs the court will have to look at what the Department does. But in terms of what it's doing now,

other than what you have just stated, is not relevant to me. But proceed.

MR. PRITCHETT: Thank you, Judge.

THE COURT: You have your time.

MR. PRITCHETT: And I really do not intend to belabor the point. I just wanted to get the expectations out into the record and in front of you, and in the spirit of not belaboring it I think we'll talk about the details

of the process with the director in his testimony.

Q (By Mr. Pritchett) Are there also plans under way, though, to attempt to ensure that the requirements of any policy that is developed will actually be carried out?

A Yes, sir, there is.

Q And what are those?

A Each one of the individuals that's involved in the process will have consultation, go through the policy, and once the policy is over with, we'll have a -- kind of like a debriefing, auditing team, and then we'll go back through to make sure everything was done the way it was supposed to be done, that procedures were followed.

Q And will emphasis be placed on what decisions are matters that have to be referred to the director and what decisions are matters of discretion to certain individuals?

A Yes, sir.

Q Do you have knowledge as to the lighting as it exists in the execution support room, the room where the persons, the doctor, the nurse and John Doe stand?

A Yes, sir.

Q Before the execution is actually under way, what is your understanding as to the lighting in that room?
A All of the lights are on and it's very bright.
Q Are the drugs prepared while the lights are on and sufficiently bright to be able to see?

A Yes, sir, they are. About one hour before the execution is scheduled.
Q Okay. Are the drugs then -- the syringes laid out in any particular manner?
A Yes, sir, they are.
Q And what manner is that?
A They are laid out in the sequence in which they will be administered.
Q When it's time to begin administration of the drugs, is there a change in the lighting in the execution support room?
A Yes, sir, there is. It is decreased.
Q Do you know why that is?
A It is to ensure that the reflective window operates properly.
Q Is there -- is it dark? Is it too dark to be able to see the medications, the drugs that have been laid out at that time?
A It is dark, but they can still read the names on the syringes, the names that have been printed on the syringes.
Q Is it sufficient to do the work of the persons that are administering the drugs?
A Yes, sir, it is.

THE COURT: Are you back there when this is happening, Mr. Moore?

THE WITNESS: No, sir, I'm not.

Q (By Mr. Pritchett) There's also been some reference to the experience level of particularly John Doe Three and John Doe Five. Are John Doe Three and John Doe Five particular individuals, or is this a designation for some class of duty within the prison?

A They are particular individuals.

Q Does John Doe Three have experience in the administration of the lethal drugs?

A Yes, sir.

Q Can you tell us what that experience is?

A I don't know the exact number but many, many, many executions, for several years.

Q So he's been involved in the process as a participant for some time?

A That is correct.

Q And are you aware of John Doe Five's level of experience?

A John Doe Five has been involved in at least the last five.

Q And has he taken part in the process with John Doe Three?

A That is correct, yes, sir.

Q And is John Doe One, the doctor, also present at the time?

A Yes, sir.
Q And is it your understanding that before John Doe Five actually took part in an execution there was some practice in the process?
A Yes, sir.
MR. PRITCHETT: Thank you. That's all I have, Mr. Moore.
CROSS-EXAMINATION BY MR. BERGER:
Q Good afternoon, Mr. Moore.
A Good morning.
Q You said in prior testimony in this case that Missouri injected five grams of thiopental, right?
A That is correct, yes, sir.
Q And you believed this to be true at the time you said it, didn't you?
A Yes, sir, I did.
Q But that's not what happened, is it?
A From the records and from what I have been told, no, that did not occur. Not in the last four I think it is.
Q But you don't mix the thiopental, do you?
A No, sir, I do not.
Q So at the time you testified in January you couldn't have known that five grams weren't going to be used, could you have?
A No, but I think if you look at my testimony I think I

said to the best of my knowledge, because I think Mr. Simon even asked me the question about what do you mean by the

best of your knowledge, and I had to explain where my knowledge came from.

Q But so based on your level of knowledge, it wasn't your fault that the wrong amount was stated.

A No, sir, it was not.

Q You mentioned a moment ago the goals of the execution procedure. What are those goals?

A It's basically to ensure that a humane and quick execution occurs once the order has been issued by the Missouri Supreme Court.

Q And how do you prioritize those goals?

A I don't know that it's necessarily prioritized as quick or humane either way.

Q If there were to be a difference between carrying out a quick execution and an humane execution, would you assign different levels of priority to those competing goals in the event that they were to diverge?

A Humane.

Q Are these goals recorded anywhere?

A Not that I'm aware of.

Q Have you discussed these goals with John Doe One?

A I personally have not, no, sir.

Q Your position is the director of Adult Institutions;

is that correct?

A Yes, sir.

Q And part of your responsibility is to oversee the execution procedures, right?

A It is in one of the institutions in which I'm the

director of the superintendent of that particular institution. It's actually the responsibility of the director of the Department of Corrections.

Q I see. Where is your office?

A In Jefferson City.

Q But the execution facility is in Bonne Terre, right?

A That is correct, yes, sir.

Q How many miles away is that, about?

A 140.

Q Now, do you travel that distance and attend every execution?

A Since I have been the director of the Division of Adult Institutions, yes, sir.

Q And do you intend to continue to attend each execution as long as you remain in that position?

A Yes, sir.

Q So what are your responsibilities when you're at an execution on execution night?

A I have a checklist of things that I do and such things as to verify that the drugs have been mixed, that they're

ready to go, that the stretcher is in place and then the -- I end up actually leading the state's witnesses to the state witness viewing room, stay there with them and then announce to them as the procedure occurs, and then lead them back out once the procedure is completed.

Q I see. So you spend -- is it correct that you spend some time in the execution support room and some time in the witness rooms?

A No, that is incorrect.
Q I'm sorry. Where are you when the actual execution is taking place?
A In the state witness viewing room.
Q Okay.
A I am not in the support room, the actual execution support room.
Q Are you ever in the support room prior to the commencement of the execution?
A No.
Q Are you trained in anesthesia?
A No, sir, I am not.
Q Are you trained in pharmacology?
A No, sir, I am not.
Q Are you trained in pharmacokinetics?
A No, sir.
Q Are you trained in femoral line insertions?

A No, sir.
Q Do you have any medical training?
A Other than the normal CPR, first-aid, that type stuff, no.
Q So for the executions you have attended, do you stand anywhere near John Doe One when he mixes the chemicals?
A No, sir, I do not.
Q Do you stand near him when he inserts the femoral catheter?
A No, sir.
Q And am I right you don't stand behind John Doe Three

and Five when they inject chemicals?
A That's correct.
Q And do you watch John Doe Two and Five fill in the chemical logs?
A No, sir, I do not.
Q And even if you were with John Doe One when he were mixing the chemicals, would you understand what you were seeing?
A Not unless I was trained, no, sir.
Q And if John Doe One were to recommend or implement particular injection times, would you know whether that creates a significant risk of pain?
A No, sir.
THE COURT: Mr. Berger, I think you're over-

emphasizing an answer -- or questions, the answers which we know already. Let's go on to something pertinent and different, please.
MR. BERGER: Okay. Thank you, Your Honor.
Q (By Mr. Berger) Isn't it true, Mr. Moore, that you need to rely on John Doe One to mix the chemicals properly?
A John Doe One and then also the nurse.
Q Can the nurse tell John Doe One what to do?
A The nurse can offer an opinion, make suggestions.
Q Is your understanding -- based on your understanding, who is in charge of the mixing process?
A The doctor.
Q And based on your understanding, who has made the decisions about dosage, particularly on the evenings when

there has been some difficulty mixing the thiopental?
A The doctor.
Q And you rely on John Doe One for all the other medical decisions that need to be made with the timing of the executions and the placement of the femoral line and so on; is that correct?
A Once again, John Doe One and the nurse.
Q And you have testified that you rely on John Doe One's representation as to whether the EKG machine is set, right?
A Yes, sir.
Q Do you accept the proposition that the safety of a

given medical procedure depends on the manner in which it is undertaken?
A Yes, sir.
Q Do you accept the proposition that the safety of a given medical procedure depends on the qualifications and judgments of the person or persons administering it?
A Education and training, yes, sir.
Q Did John Doe One ever tell you, prior to your testimony, that he was giving less than five grams?
A No, sir, he did not.
Q Did he ever tell you he was having trouble mixing the thiopental?
A No, sir, he did not.
Q Did he ever tell you that he was dyslexic and had difficulty with numbers?
A No, sir, he did not.
Q Did he ever give you an opinion on the relative

advantages of femoral access as compared with peripheral access?
A We did have an overall broad discussion about that topic.
Q What did he say?
A The emphasis was that the flow of the drugs would go better through the femoral vein catheter than if it was a peripheral.

Q Did you talk about how much pain each of the two procedures would have relative to each other?
A No, sir, we did not.
Q Did you talk about the possible medical complications that could arise with each procedure?
A No, sir.
Q Did you talk about anything else other than the flow of drugs?
A Not that I recall, no, sir.
Q On --
THE COURT: Mr. Berger -- when did you have this discussion, Mr. Moore, with John Doe One?
THE WITNESS: It was at one of the executions. Probably October 2005.
THE COURT: Excuse me.
MR. BERGER: Thank you, Your Honor.
Q (By Mr. Berger) On page 89 of his deposition transcript John Doe One says medical errors are committed by someone performing a procedure for the first time. Does this sound right to you?

A I would say there is a possibility of that, yes, sir.
Q So to the extent -- John Doe One also says that any doctor who has performed any procedure more than ten times will never make in a error. Does this seem right to you?
A Will never make an error?

Q Yes, Mr. Moore.
A No, sir, that does not seem correct.
Q In your judgment, do you feel comfortable employing or contracting with someone to take part in medicalized procedures who believes this to be the case?
A I have confidence in his capabilities.
Q Would it change your mind to find out that his view on that and many other significant issues connected with this procedure were widely rejected by many or most doctors?
A I would say that it's something that we definitely need to have a detailed, thorough discussion about.
Q Would a statement like the one I just quoted to you raise questions in your mind about John Doe One's judgment?
A No, sir.
Q Have you spoken with John Doe One over the past few weeks during this litigation about his continued participation in executions in Missouri?
A No, sir, I have not.
Q At page 62 of his deposition transcript, John Doe One discussed his authority vis-a-vis the director of prisons. He said, "He's relying on me to keep him looking good." Do you think the inconsistencies in dosage reflect well on Missouri's Department of Corrections?

A I don't know what he's referring to when he says to keep him looking good. If I knew what the context of his

statement was, then --
Q If he were to mean that part of the doctor's role in this process is to help things go smoothly so that the Department looks good and it looks like they're carrying these things out in a systematic manner and in a way to ensure a painless, humane death, do you think that the inconsistencies reflect well on the Department of Corrections?
A It does not reflect well, and once again, you know, I'm sorry that it happened, but we need to ensure that it doesn't happen again, and that's the reason we're in the process of formulating additional new policies.
Q As you formulate those additional policies, will you be in touch with John Doe One?
A Yes, we will.
Q Based on what's happened already and what has been said in this litigation, do you have confidence in John Doe One's competence to carry out executions in Missouri?
A Yes, I do.
Q So you intend to continue to allow John Doe One to keep his position in the execution procedure; is that correct?
A I won't be the final authority to make that decision.
Q What factors -- will you play a role in that decision?
A Yes, sir, I will.

Q What are the factors that you would weigh in that decision?
A Advice from other medical experts, what direction we get from the courts.
Q Have you been in touch with other medical experts?
A Other than reading some of the information that has come across to me as a result of this particular case, no, I have not.
Q Do you intend to get in touch with other medical experts about John Doe One's competence and professional judgment?
A We will have an over-all staff team meeting of those people who are currently involved in the process, the top managers of the Department of Corrections, and we will lay out a strategy as to what we are going to do from this point forward.
Q Would John Doe One be at that meeting?
A John Doe One could be at some of the meetings.
Q But you don't imagine he would be at all of them?
A Depends on what the discussion is about.
Q Would you have any other doctors at that meeting?
A There could be.
Q But there would not definitely be other doctors at that meeting?
A We haven't laid out what our strategy is going to be.

Q How could you assess John Doe One's competence in that meeting -- what would you rely -- strike that. What would

you rely on during that meeting to assess John Doe One's competence were there not other doctors in the room at the time?

A I guess a lot of it just depends on the context of the meeting itself, what that particular meeting is about and what concerns that are raised about his competency, and at that point we would decide then whether to continue to have this particular physician or a particular discussion related to what needs to change.

Q So that would be based --

THE COURT: Mr. Berger, how much more time are you going to take with this examination?

MR. BERGER: Not much, Your Honor. Perhaps five more minutes.

THE COURT: You have three.

MR. BERGER: Thank you, Your Honor.

Q (By Mr. Berger) So am I correct that would then be based certainly on the information that's come to light during the course of this litigation and possibly input from other doctors?

A Yes, sir, that would be part of it.

Q Was it frustrating to find out after the fact that you had misrepresented the dose to this court?

A It was frustrating. It was disappointing. But here again, based upon the information that I had at the time I did not misrepresent myself to the court.

Q And didn't you just testify that this should never have occurred?

A This should never have occurred, being the doctor should not have reduced the amount of dosage without getting the authority to do that by the director of the Department of Corrections.
Q But it's correct that -- isn't it true that John Doe One assisted with the writing of the interrogatories on which you base your view somewhat? Let me rephrase that. It's correct that if you did continue to use John Doe One in executions, you would still be putting your trust in him; is that right?
A That's correct.
Q Would you feel comfortable that you could 100 percent guarantee that the procedure would be followed as you instruct?
A Once we lay out the additional policies, have discussions with him, yes, sir.
Q Wouldn't you have some lingering reservations about using him based on his misrepresentations?
A No. Once we lay out the policy and have a discussion with him.

Q Mr. Crawford is the director of the Department of Corrections; is that correct?
A That's correct.
Q And you say he's working on a directive ordering that five grams be administered and other things; is that correct?
A That's correct.
Q And you fully intend to comply with that directive to

inject five grams; is that correct?
A Yes, sir.
Q So you wouldn't have any objection to this court entering an order requiring the state to, for instance, inject five grams, would you?
MR. PRITCHETT: Objection, Your Honor. I think it's in a way seeking a legal conclusion, and also infringing upon what the court chooses to do.
THE COURT: Objection sustained.
You have one minute to wrap it up.
Thirty seconds.
Q (By Mr. Berger) Are still relying on the same people you did in January when you said that the amount of thiopental is now five grams?
A That is correct, with the addition of Dr. Dershwitz.
MR. BERGER: No further questions.
Thank you, Your Honor.

Thank you, Mr. Moore.
MR. PRITCHETT: Defense has no additional questions, Your Honor.
THE COURT: Thank you.
THE WITNESS: Thank you, sir.
THE COURT: How many more witnesses do you have?
MR. PRITCHETT: One.
THE COURT: Mr. Crawford.
MR. PRITCHETT: Yes.
THE COURT: Why don't we take a short lunch break and then finish up with Mr. Crawford.

MR. PRITCHETT: I don't think he'll take much longer than Mr. Moore. You have told me it's pretty much irrelevant to you what the plan is, but I'd like to get it in the record.

THE COURT: I understand that, but I'm saying this is kind of after the fact now. It's interesting to know that they're going to do something, but all the details of it doesn't do anything for me at this point.

MR. PRITCHETT: Okay.

THE COURT: Do you think he's going to be about 15 minutes or so; is that what you're saying?

MR. PRITCHETT: 15, 20.

THE COURT: Let's still take a break until 12:20 and then we'll resume.

MR. PRITCHETT: Very good.

MR. BERGER: Thank you, Judge.

(Lunch Recess)

MR. PRITCHETT: I call Larry Crawford to the stand, please.

LARRY CRAWFORD, called as a witness on behalf of the Defendant, being first duly sworn, testified:

DIRECT EXAMINATION BY MR. PRITCHETT:

Q With you state your name, please.

A First name Larry, last name Crawford.

Q Mr. Crawford, what's your position?

A I'm director of the Missouri Department of Corrections.

Q When did you become the director of the Missouri

Department of Corrections?
A Early January 2005.
Q What's your role in the execution process?
A Overall I have responsibility for the execution process, important policy, and the carrying out of the execution process.
Q Are you the person who has the authority to set the method of execution within the dictates of Missouri statute and case law?
A Yes.
Q Do you make decisions with regard to execution methods

all by yourself?
A No.
Q Can you describe for us a bit, please, the process you go through in order to make decisions with regard to the lethal injection process in particular?
A When I came to the Department in early 2005, of course the lethal injection process was one of the things that I looked into, that I was given information about after I asked. And I met with my executive-level staff as well as experienced folks that had been working in that execution process, and even went to the -- after we had met and talked about and I looked over some of the protocols, that we even traveled to Potosi at that time, is where we have a correctional institution and I took a walk-through, a tour of the process at Potosi.
Q Did you take into consideration advice that you received from your executive staff in reaching decisions

with regard to the lethal injection process?
A I do -- I do with that as well as most other decision-making. It's a large Department. We have over 10,000 employees, and there's a lot of expertise within the Department and there's a lot of specialized mission that we must carry out, so I depend on my legal counsel and my executive staff and others for advice, and then in my decision-making.

Q With regard to executions, do you rely on medical advice from anyone?
A Oh, yes.
Q Who is that, how we have been describing this individual in this proceeding?
A I have spoken with the experienced members of our team that have been involved, directly involved in the executions, and I have asked questions, been given information about the process, about how it works, about the human factor. And I want to make clear that there's a lot more to this execution process than what we have been talking about in court for two days, the actual injection process. There's a lot of security, a lot of other employees and planning involved, movements that night and preparation before, so I mean as a whole, I have had a lot of discussion about that.
Q Do you also consult with the individual identified in this proceeding as Dr. John Doe One?
A Yes, I have.
Q Once you get advice from the folks that you need

advice from, that you want advice from, who makes the final decision with regard to executions?
A I do, within what's legal in the law.
Q Absolutely. Did you find out recently that less sodium pentothal had been given in recent executions than

you originally expected?
A Yes.
Q What had been your expectation as to the amount of sodium pentothal that had been given?
A Five grams. It's my understanding that five grams of sodium pentothal had been given in all the executions during my tenure, and at least some time before that.
Q And recently, what different amount of sodium pentothal have you found out has been given in recent executions?
A I found out it had been reduced, and I believe two and a half grams had been given in some of the prior executions.
Q Who do you understand made the decision to reduce the dose?
A The doctor, John Doe One.
Q Is that a matter that you should have been informed about before Dr. Doe made the decision to reduce the dose?
A Yes. When I first became aware of that, I was extremely concerned and disappointed, particularly that we had provided wrong information in a court proceeding, was particularly disappointed that I wasn't made aware of a change being made by the doctor.

As more information came to light and I have learned more about this process, and I'm still concerned,

but I have discovered some reasons why now that the doctor may have made the decisions he made, but I should have been notified.

Q What's your understanding as to the reasons the doctor acted on?

A The difference in the packaging of the drugs didn't allow him to use the amount that had been used, and possibly -- possibly his understanding that a lesser amount had been ordered in some other states, that it may have been more appropriate, and putting those two factors together allowed him to make the decision of what he thought was best at that execution.

Q What's your understanding as to how Dr. Doe came to the conclusion that he would be able to alter the dose on his own?

A He has had a lot of history with the state of Missouri and maybe -- and in the execution process. He was consulted when -- back when there was little knowledge -- less knowledge, I think, about lethal injection, and there isn't a lot of experts in this field, it's not a medical field, a medical procedure, and so he had put a lot of effort in working this. And other directors have depended on him heavily I think to provide a constitutional, humane execution, and I think he's taken that very seriously and feels that he has successfully been able to deliver, as

does the Department and the people that I have talked to in the Department, on the executions before I became director, feel like he has done a very good job and successfully completed that mission.

Q Other than the aspect of the question you should have been informed of the decision to reduce the level, what's your view as to the reduction -- what's your understanding as to the reduction of the dosage from five grams to 2.5 grams?

A Well, in my first understanding of any drugs or the combination of drugs that we gave going back to my first month or two, my first months with the Department of Corrections, the way it was described to me is that the sodium pentothal was given in a dosage that was twelve times the amount normally given in an operating room, a surgical-type setting when sodium pentothal was used daily as a drug. And that, in my mind, because I had to get a feel for this whole process, the first, the beginning was the drug that rendered you unconscious and that number twelve stuck in my mind, five grams, and so that came -- when I learned of the two and a half grams I immediately -- half of five is two and a half, I went to six times the amount. And it was my understanding, and I think in my prior deposition, you know, I believed that both rendered you in such a full state of unconsciousness to still

complete the mission. But that didn't excuse the fact that it changed and without the records and without my

knowledge.
Q Are you planning to make any changes now with regard to the execution process to firm up the way that it's done?
A Yes, I do.
Q Is there a directive or an order already issued?
A No. We normally have, I think always have 30 days' notice by the court when to set an execution. There are -- time has been taken up some with the court proceedings and a myriad of other things that are going on in the Department. I have begun discussions with legal counsel, other folks within the Department on how we should issue this directive, and I have said very firmly and quickly that we were going to put together a team and come forward with a defined -- a fairly defined protocol so that this didn't happen again and to set out the procedure definitely what discretion there would be, the areas of discretion. And also on the recordkeeping end. So we're just going to make this process better and there will be a directive forthcoming on that.
Q Have you already made some determinations as to what you expect this forthcoming directive to look like?
A Only in general terms, that we will pull together the people that are involved as well as John Doe One and

come -- and there will be a clear understanding of the process, notifications, and we will reach an agreement that that's what we will follow, absent any order of the court before then.
Q What's your expectation as to the amount of sodium

pentothal that is going to be provided under the proposed directive?
A Five grams, I guess mixed in a 60 cc solution would be my full intentions of what will happen in the directive.
Q Given the packaging issues that the doctor needs to know, is there going to be some leeway with regard to whether or not the five grams of pentothal are going to be administered in one 60 cc syringe?
A Yes. If it's not able to be delivered in a single syringe, which may be preferable, but if it's not it could be administered in more than one syringe but it will be, absent any further -- a different order, five grams in a 60 cc solution in one or more syringes followed with a flush.
Q Okay. Is there going to be any amount of flush mandated?
A No. I have thought that through and talked to some folks because I believe there is some discretion that should be allowed for the best practices that would be the amount of flush necessary to clear the lines and clear the

drug. I expect that will probably be about 30 cc's, approximately. But there would be discretion on the staff on that, 30 cc's or half of a 60 cc syringe that's currently being used.
Q After the flush that follows the sodium pentothal, what's the expectation as to the next drug?
A The next drug would be pancuronium bromide. It would be 60 milligrams mixed in a 60 cc solution, also followed

by a flush with discretion, but very similar to the first drug, about the other half, approximately, of that 60 cc syringe.

Q And then with regard -- after the second flush, the flush following the pancuronium what's expected to follow that?

A The third drug would be the potassium chloride, 240 milliequivalents in 120 cc solution followed by a flush that will be more than enough to clear the lines and more likely to be the 60 cc syringe, the full amount.

Q Under the directive as you're conceiving it, will the dose -- will the drugs themselves, the order of the drugs and the doses be items that can be changed at any one else's discretion besides yours?

A No.

Q What's the expectation as to the means of administering the drugs into the inmate's body as you're

expecting the directive to be?

A I expect that while the first choice would be the femoral vein, would not limit it to that because there could be circumstances where that might not be available or appropriate, but that would be a preference. But there would be discretion on the doctor.

Q Is that something that would require preapproval to change the access from femoral access to some other access if the doctor believed it appropriate?

A No, he could make that judgment on that execution. I would have discussions and expect if this was going to be

an ongoing change, that we should have that discussion, or it became a priority rather than an option.
Q Is it your intent that this proposed directive will be unalterable in the future?
A No. I couldn't, in any good judgment, set something this important and cast something in stone. My mind would always have to think there could -- things could happen. Drugs could no longer be on the market. There could be new information. Of course there could be court orders. There could just be a myriad of things that could happen. But probably in the next -- in the near future I wouldn't expect any of those things to change. They would be the same, because Missouri does have good experience. In talking -- in my talking with the state witnesses, with my

own employees that have been active in those, I believe the process has worked and it's worked well. So I would anticipate continuing with the process that I just mentioned unless there was some reason that really was necessary or a good reason to deviate or change.
Q And if there were a reason to change, who would decide whether there was a good reason to make that change or not?
A Ultimately it would be me, and again I would not make those kind of changes on just my own -- on my own without consultation with more than one person.
Q What plans are expected to be made to ensure that once this directive is prepared, to see that it's carried out?
A I plan to invoke an auditing process, change the recordkeeping that we presently have, and have a quick

auditing process the day following. Actually I guess it would be the same day because the execution normally happens shortly after midnight, but considering a normal workday starts at 7:30 a.m. inside an institution, that we would have an auditing process. For some time at least in the future I would have that information sent directly to me so that I could look over it and feel comfortable with not only the execution that happened and the recordkeeping, but also the process of auditing -- the auditing process, and it will probably come through the director of Adult Institutions to me also until I was confident with it that

I could delegate that as it should be.

Q Are there any plans as to how you would expect to let the persons that are involved in the execution process know that this directive is coming out and what's imposed, what's discretionary?

A Yes, it will be in writing, but we will have a meeting face-to-face with my staff and medical staff, John Doe One.

Q And will it be emphasized what is discretionary and what is nondiscretionary, what requires your preapproval to change?

A Yes. As I set out, and John Doe One, he or she, the doctor will need to agree to that, and I have every reason to believe that they will.

MR. PRITCHETT: One moment, please, Judge.

Thank you, Mr. Crawford. That's all that I have.

CROSS-EXAMINATION BY MR. HELLMAN:

Q Good afternoon, Mr. Crawford.
A Good afternoon.
Q So it's correct that you have ultimate authority for all aspects of the execution procedure in Missouri?
A Under the constitution and law, I believe so, yes.
Q You spoke about the review process when you came on board as director of corrections. You said you met with your executive staff to learn about the procedure. Did

that staff include any doctors?
A No.
Q Did you consult any doctors in learning about the medical aspects of the execution procedure?
A No. I don't have -- I mean, I actually have a doctor on my executive staff, but I didn't -- I don't think I can say that I consulted with him directly about the injection process and the things that you are interested in. I did consult with him about other parts of the execution process.
Q Thank you. So then you didn't consult with John Doe One as a doctor regarding the medical aspects of the execution procedure?
A No, I did not.
Q In your deposition which took place on May 23rd, you said you had no plans to review Missouri's execution procedure unless new information came forward. Is the directive that you've been talking about today the product of new information?
A Yes, I think so.

Q And what is that information specifically that's motivated you to issue this directive, or plan to issue this directive?
A Well, it's the continuing information that I have learned about the packaging of the -- the change in the

packaging in the material and some of those challenges. The recordkeeping, and just the new information that has actually become available through some of the court proceedings and some of the discovery. I know you mentioned May 26th, but I believe during those interrogatories I told you I would look at -- I would continue to look at this, I would process that information and make an appropriate decision. And that's what I'm continuing to do, since on May 26th I had very little time to -- I had a short period of time to understand any of these things, and I had not talked with John Doe One.
Q Have you talked to John Doe One since the deposition that took place?
A Yes, I have.
Q And could you describe that conversation?
A He called me actually. This was I think after his deposition, and probably wanted to reassure me that he had a constitutional -- the Department's best interest in mind, that he had always been focused on a humane execution, and gave me information about I guess sort of his level, some of his level of experience, which was great, in this process, and that he was willing to continue to do the good job he'd been doing and work with me as needed.

Q Did you find him credible in this conversation?
A Yes. And I have spoken to him in other conversations

377

and a lot of times they were more of a waiting and more of a casual conversation, not about the medical side of this. So I have sort of gotten to know him over a period of time so I can judge him from that more than just this one conversation. I have known him to be very bright, professional, articulate, and quick, very quick.
Q You mentioned a directive in your testimony, and I understand that the court has made a statement about that so I'll be very brief in my questions regarding it. Have you formally adopted this directive?
A No, I have not.
Q What day will the directive be adopted?
A I couldn't answer that question because I don't know as of today, but it will be before we have an execution set.
Q So then you wouldn't execute Mr. Taylor before issuing this directive?
A Oh, no.
Q And why not?
A Because I want -- I want to assure that the process is better and I want to assure that we know distinctly the amount of drugs that are going to be administered and in good order and have that recordkeeping process in place.
Q Do you think Missouri is ready to undertake executions today not having this directive in place?

378

A We couldn't undertake it today. I believe there is always 30 days, we have 30 days' notice. In fact, my schedule is normally checked by the Supreme Court. They will check our schedule before they set the date, or give us some tentative dates, so I don't know that that's pertinent. I will say I have faith that we have done constitutional and humane executions, the ones that I have had experience with.

Q Let me try to ask my question a different way. If there were a hypothetical prisoner for whom the 30-day period had lapsed or passed such that he could be executed today by law, do you believe Missouri would be ready to conduct that execution today not having the directive in place that you have talked about?

A If -- if you -- if we were going to do that today, and I suppose you mean 12:01 midnight tonight, I would quickly put together that protocol that I mentioned earlier, the procedure and the protocol, would have a meeting with my team, but we are getting hypotheticals here that we could find everybody and get them there by midnight tonight and there weren't going to be all the other barriers, legal barriers to an execution. But, yes, I think with what we have in place we could do the same good job, maybe even better, because -- because I could put that together that quickly. Now, I'd rather have more time to do something of

this magnitude, and I think I will have that time.

Q I'll just try to make my point clear so I'm coming

across. Let's assume that the directive wasn't able to be put in place and the execution was going forward today, would you -- do you believe Missouri would be ready to handle an execution, go forward with that execution absent the directive?

A We are charged under law to do the execution so if you're telling me I was ordered to have an execution tonight, I would proceed with the execution. Had I had the proper safeguards in my mind and the ability to do a constitutional -- fulfill my constitutional duty, yes, I could do it tonight.

Q I don't mean to belabor the point --

THE COURT: But you are belaboring the point. Move on to another question if you can't phrase that question any better than you have. Okay?

MR. HELLMAN: Thank you, Your Honor.

Q (By Mr. Hellman) Do you reserve the right to change this directive in the future after Mr. Taylor has been executed?

A Not in the -- not in the near future. I just only reserve the right to change it if need be, but I have no -- I -- no, I have no reason to just change it for the sake of any reason other than out of some type of necessity or as I

mentioned before, new information, court orders.

Q Would this directive require anesthetic monitoring?

A No.

Q Would it provide for improved visibility of the inmate during the execution?

A I'm sorry?
Q Would it provide for improved visibility of the inmate during the execution?
A Visibility to the inmate?
Q Visibility of the inmate by, say, the medical personnel.
A It would have the same -- this directive would have the same visibility that -- it would be the same as it has been in the past. There's a large window there and I have certainly had discussions with my staff about what they see, and it's different than what I saw in one picture.
Q So it wouldn't allow for a full view of the IV tube?
A No.
Q Would it impose any timing safeguards to ensure that the thiopental had taken full effect to achieve burst suppression before other drugs are administered?
A The procedure as far as the syringes and the timing that has been set forth successfully by the doctor, and there is some timing issues that I believe are important in this, would remain -- remain as they have been.

Q Have you consulted with any medical personnel in deciding to make or not make any of the modifications you have just discussed and the other modifications you have talked about in your testimony today?
A Did you say consulted with medical personnel?
Q Yes.
A No, I have not. With any new medical personnel?
Q With any medical personnel, new or old.

A No, I -- no, I have not contacted anyone. I have given -- I have done some reading. Of course, we have had expert witnesses here yesterday and today that I have listened to what they have to say. And I am firmly convinced that while we use components of a medical procedure, this is not a medical procedure. The execution is not a medical procedure, and that would make -- makes it quite difficult in consulting with medical doctors that are charged with saving lives when we are ordered and under a duty to take a life under the law. And that is a difference.

And as director I have to -- I have to consider that if this was a medical procedure that required somebody to undergo anesthesia or to be rendered unconscious, in the first place, we don't do those procedures inside our correctional institution. We have contracts with hospitals and medical folks that do those in medical settings. So

when I keep hearing the doctors, there's a very narrow -- a very narrow group of people that have any expertise, I believe, with a lethal injection and actually have experience in doing that successfully. I haven't heard any of those people actually in the courtroom here today or yesterday that have had those -- that have actually successfully carried out an execution under the law.

Q But would it be consistent with your understanding of what Missouri's goals are to have a prisoner who woke up when the second of those drugs was being administered I take it?

A If I had somebody to testify to that, that would certainly -- I think that would be very legitimate testimony.
Q Would it be consistent with Missouri's goals for executions to use a procedure that posed a significant risk of severe bleeding, say with femoral catheterization?
A Certainly not. That's why we use a medical -- a medical doctor to do that, to make the insertion, which is more -- I told you there are some components of a medical procedure, and the insertion of a catheter would be a component of a medical procedure.
Q But you're saying that the testimony you have heard today and yesterday about, say, the risks of insufficient anesthesia or the risks of significant bleeding aren't

relevant because the persons giving that testimony have not conducted executions themselves?
A I don't believe I said that was not relevant.
Q In what way is it relevant then?
A As bleeding has to do with part of a humane execution, I think that could be -- that is relevant. And because we do use a drug that is used in a surgical procedure, that -- some of those parts are relevant. I said there are components of the medical procedure. When you're talking about causing death, I think then there are parts that are very different. Maybe I -- I'm sorry if I didn't make my point very clear.
Q How does the detail in the directive you described compare to the substance of the detail in the execution

procedure, such as security? For example, you said that you prescribed the dosages and the drugs and a guide on femoral access. If that's the substance of the directive, is that more or less detailed than the directives that concern the security aspects of the execution procedure?
A In some cases, about the same I would say. We have detailed security as to -- as to who has what job, as to as far as weapons go, if we make -- we try to make a comparison about what type of weapons our security will be armed with as specified. That would be sort of like specifying I guess which drug and what amount.

And I think, as I mentioned earlier, there will be some flexibility need to be given and some discretion in that execution room for things that might come up and -- and come up so quickly and need to be dealt with that a decision would have to be made there without going through me. And those are also in the protocols, of course, for the security. So I think it's a fair comparison to say that they would be very similar.
Q How many pages is the security aspects of the protocol for an execution procedure?
A I don't know that I could guess the pages, but I can probably give you a thickness.
Q How thick then?
A Okay. Three-quarter's, a half, three-quarter's of an inch thick probably.
Q Is it fair to say that the directive you're talking about today could fit on a single page?

A I don't believe they'd fit on a single page. You could, I guess, depending on how small you made the type. I think they would be more than a page, but I don't think they would be a hundred pages either. I hadn't really considered that.
Q Thank you. How many -- you have already said that five grams of thiopental have not been used in recent executions in Missouri. What was the basis for your

statement that five grams had been used when you made that statement previously in interrogatories?
A That was my belief, and I think there are multiple components to how that happened. One, I think we based -- this isn't the first case where those types of questions have been asked, and I think one of the things was we probably relied on the misunderstanding and mistake that nothing had changed. We had gotten those figures from the doc from an execution that may have happened late 2005 and assumed that those drugs were still given, and actually it may have been before that time. And then there was some oversights, and I just am not happy with that, but it just happened.
Q Did Doe One ever tell you personally that he'd been giving five grams of thiopental, say, before the start of this year?
A Not that I can recall.
Q Did Doe One ever tell you he was having trouble mixing thiopental?
A No, he did not.

Q Or that he was dyslexic and had difficulty with numbers?
A No, he did not.
Q Did you and he ever discuss the relative advantages of femoral access?

A My early understanding, and which I still understand, but the early description of that was that it is a large and a strong vein so it doesn't have some of the strength issues that people have in a weakened health condition or people that have abused their body in their lifetime, so it's a strong, large vein. And it also provides quick access to the heart so it will provide a quick and humane execution, so that it's very preferable. Can be preferable, anyway.
Q And Doe One is the source of your information that you just described?
A Actually, I got most of that information from my staff that talks directly with John Doe One and I do have staff -- as director I mentioned we have 11,400 employees that are responsible for around 100,000 convicted felons and there's quite a bit of work that goes on in our daily duties that fall outside the execution process, so I have got most of this information through legal counsel, through people that are directly working with the execution team that have talked directly with that.
Most of my discussions with John Doe One have been at the institution on the night of, and that's something that we don't usually talk about, any issues that

wouldn't just come up immediately. We talk about -- more of a social time because, as you can imagine, it's not

something that we're -- it's something that we're charged with doing, but it's not something that we're just focusing on the details of I guess.

Q And just to sum up, you rely on your staff and your staff rely on John Doe One for the discussion of the relative merits of femoral access?

A Yes, I'd say that would be fair.

Q Are you going to continue -- excuse me, strike that. Will you continue to allow John Doe One to take part in Missouri's executions?

A Yes.

Q Have you had any conversation with that individual about his continued employment with the state?

A No, I have not. I have not indicated that, but I have not indicated otherwise. I did just talk to him the one time that I mentioned. But that is my plan, if you ask, that he will.

Q So you have confidence in Doe One's competence and training to carry out executions?

A Yes, and I base that heavily on his success and the demeanor and the efficiency and all the information I have gathered from my staff and from state witnesses on the executions that I have been involved with and those before that he has been involved with, and he has been involved with all those I'm talking about.

Q You may recall yesterday we talked a little bit with various witnesses about Doe One's statements that it would be impossible for him to cause significant bleeding using the femoral vein technique, and I also believe that he said that anyone who had done the procedure more than ten times would never have a complication.

I'd like to show you briefly --

THE COURT: Mr. Hellman, how much more time?

MR. HELLMAN: Ten minutes.

THE COURT: Five minutes.

MR. HELLMAN: If I can approach the witness then.

THE COURT: Yes.

MR. PRITCHETT: May I ask what you handed to the witness.

MR. HELLMAN: I have handed the witness what is labeled I believe Plaintiff's Exhibit 27. These are the photos from the Collective Exhibit 18 which is the Timothy Johnston execution that was discussed yesterday.

Q (By Mr. Hellman) Do you believe John Doe One is correct when he says that it would be impossible for him to cause significant bleeding through the femoral catheterization technique?

A I -- I would have to qualify any of my answers on that with my relationship and what I have seen in talking with John Doe One, and I will say this, in talking to him more

on a conversational level than on just a professional level, but he has a tendency to communicate sometimes by

overstatements, and I don't mean being untruthful in any way, or not professional, but he has kind of a quick way of overstating things to make a point. And so when I read that in his deposition I thought, well, you know, that's sort of like a story, if you were going to say how many mushrooms you found or how many fish you caught or how big your fish were, you might say, and he'd say something is impossible.

THE COURT: What was the question?

MR. HELLMAN: The question was -- well, the court reporter can read it back, but my understanding of the question was John Doe One has said it's impossible for him to cause bleeding, significant bleeding, through the femoral vein technique. I asked if the witness had confidence in John Doe One, given that statement and those photos.

A My judgment would be that it would not be impossible, that there's very few things that are impossible. So I would take issue with it being impossible in my judgment, not medical judgment.

Q (By Mr. Hellman) During an execution, you're not in either the execution support room or the execution room itself?

A I am not.

Q Under Missouri's procedures, does John Doe One have the authority to deal with any unforeseen complication as it arises without consulting you?

A Could you -- does he have any --

Q Must John Doe One consult you before dealing with an unforeseen complication that occurs during an execution?
A No. I think -- I think if it were unforeseen, that he could -- would need to, in many cases, obviously respond to that immediately. I don't believe he would ask me if he needed to apply pressure to stop the bleeding, for instance. That would be something that you'd respond to. Similar to, I would guess, that he would -- he would have similar to those kind of responsibilities assigned to him in an operating room when he couldn't refer to the hospital administrator or the consenting family member.
Q And if he were to consult with you on a medical question, would you defer to him?
A I would give heavy weight -- I would give some weight because of his expertise in the execution procedure. I would certainly give some credibility. And he would have a part in my decision-making process, but I certainly don't -- wouldn't give him full credibility in that decision-making by any means.
Q What are you basing your view that John Doe One had, I

believe you used the word success, in carrying out execution procedures? How would you know if he were not successful?
A I would think that if we had a -- well, it could be a myriad of reasons. One thing, we prepare the patient. My staff tells me that they're cordial, the doctor is cordial, that there is no pain. They are very responsive to

discomfort. Staff and doctor are in communication with the condemned. In fact, some of them, there are various stages, we offer a sedative. Some of them don't accept those. Some of them do. Some of them are joking and talking and telling stories. Some of them are quiet. So, I mean, I even got a letter on just one of the recent executions from an inmate condemned that did not leave a prepared last statement, but he thanked the superintendent of the prison on how he was treated. So I believe that -- I believe that we are humanely and properly preparing them for execution.

My staff tells me that after the first drug is pushed, the sodium pentothal, that they can see -- sometimes I mentioned there is a sedative given. We have even had to awake a condemned for the execution so that they can see their family or whatever. And they tell me that after they push the plunger it's just a very short period of time that they can see their head drop and them

go to sleep, that they can just see them relax. And then a very short period of time after that the doctor, using some kind of electronic machine that flat lines, pronounces them dead. So to me a quick, a humane execution is one where I don't believe there is -- there is much pain, and then it's carried -- it's not a lingering death.

And we have had no reports of excessive blood or all these other scenarios that can be thrown out. Or somebody sitting up I think was mentioned before. So I think we're successful in doing that.

Q Are you aware of the effect that pancuronium bromide has on a prisoner, the paralysis effect?
A Yes, I am.
Q Does Missouri do any toxicology reports to ascertain how much of the drug, the drugs, were delivered to the body, after death?
A No, we don't.
Q Is the pancuronium necessary, in your mind, to accomplish an efficient and humane death?
THE COURT: I don't think he has given any testimony that he has any medical background, Mr. Hellman.
MR. HELLMAN: I ask more because it's his ultimate decision to decide whether or not to include it.
THE COURT: You may answer.
A I think that all three drugs need to be used in

concert to constitutionally and humanely complete this procedure. If we did not use pancuronium bromide we might need to use something else or totally different drugs to complete the procedure. I think any time you change or take out one would make me revisit the whole process.
THE COURT: Your time is up, Mr. Hellman.
MR. HELLMAN: Thank you, Your Honor.
REDIRECT EXAMINATION BY MR. PRITCHETT:
Q Did you have the opportunity to listen to the testimony of Dr. Dershwitz this morning?
A Yes, I did.
Q And did you listen to the testimony?
A Yes.

Q Is it your understanding from Dr. Dershwitz' testimony that there is any need for the Department of Corrections to make a change with regard to the visibility of the inmate from the execution support room through the window into the execution room?
A No, I did not hear anything.
Q Is it your understanding from the testimony of Dr. Dershwitz that there is any need for the Department of Corrections to slow down the process so that the sodium pentothal could take effect?
A There was no evidence given.
Q Is it your understanding from the testimony of

Dr. Dershwitz this morning that there is any need for the Department of Corrections to modify its current practice with regard to having a view of the full length of the IV tubing from the execution support room through the wall and then into the inmate?
A Contrary. I believe he said it was reliable once it was hooked up properly.
Q And finally, is it your understanding from the testimony of Dr. Dershwitz this morning that there is any need -- excuse me, that it's a -- is it your understanding from his testimony that femoral access as a means to administer these drugs is an appropriate practice?
A It -- yes, and in some cases preferable.
MR. PRITCHETT: Thank you.
MR. HELLMAN: Nothing further, Your Honor.
THE COURT: Thank you.

MR. PRITCHETT: That concludes the case of the defense, Your Honor.

MS. ANDERS: That concludes our case as well.

THE COURT: Okay. Very good.

Well, I will take the matter under advisement and issue an order within the time frame given me by the 8th Circuit. I'm not requesting any findings of facts or conclusions of law or any of that stuff. We have been over this enough. I don't need that, okay?

MR. HELLMAN: Just to be clear then, Your Honor, no post-trial brief is desired by the court?

THE COURT: No.

Thank you.

MR. PRITCHETT: Thank you, Judge.

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REPORTER'S CERTIFICATE

I, Donna M. Turner, Registered Merit Reporter, hereby certify that I am a duly appointed, qualified, and acting official court reporter for the Western District of Missouri; that the foregoing pages contain a true and correct transcript of the proceedings had in the within-entitled cause on the dates stated herein, and that said transcript is a true transcription of my shorthand

notes taken therein.

_____RMR
Registered Merit Reporter

DATE: _____