UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

COOPER, Petitioner, vs. VASQUEZ, Respondent.	Case No. 92CV0427-H San Diego, California Friday, April 2, 2004 9:00 a.m.
COOPER, Petitioner, vs. CALDERON, Respondent.	Case No. 98CV0818-H(LSP)

TRANSCRIPT OF MISCELLANEOUS HEARING
BEFORE THE HONORABLE MARILYN L. HUFF
UNITED STATES, DISTRICT JUDGE

APPEARANCES:

For the Petitioner: DAVID T. ALEXANDER, ESQ.

Proceedings recorded by electronic sound recording; transcript produced by transcription service.

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SAN DIEGO, CALIFORNIA FRIDAY, APRIL 2, 2004 9:00 A.M.

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(Call to order of the Court.)

THE CLERK: Number one on calendar, 92CV427, Cooper v. Vasquez for tutorial hearing, and number two on calendar; 98CV818, Cooper v. Calderon, for appealmandate hearing requisite to filing the certified copy of the judgment of the United States Court of Appeals authorizing Petitioner to file second or successive application for habeas corpus in the District Court and staying execution pending resolution of that application, and tutorial hearing.

THE COURT: Good morning. Would you state your names for the record?

MR. ALEXANDER: David Alexander on behalf of the Petitioner, Kevin Cooper. Good morning, your Honor.

THE COURT: Good morning.

MR. HILE: Good morning, your Honor. Norman Hile of Orick and Sutcliffe for Kevin Cooper, the Petitioner.

THE COURT: Good morning.

MR. KAZAMI: All Kazami for the Petitioner. Good morning, your Honor.

THE COURT: I think there's just two attorneys that the Court has recognized, but you're welcome to just -- well, you're welcome to appear as pro bono counsel

at Orick's expense.

MR. KAZAMI: Thank you, your Honor.

THE COURT: Thank you.

MS. WILKENS: Good morning, your Honor. Holly Wilkens, Deputy Attorney General for the Respondent.

MS. DENAULT: Good morning, your Honor. Deputy Attorney General Adrianne Denault on behalf of Respondent.

THE COURT: Good morning to you all. First of all, we'll spread the mandate. That will be ordered filed. And then, next, on the -- I'd like to just discuss scheduling. and was there somebody that we want to include by phone or not?

MR. HILE: Your Honor, we have one of the expertb who will be listening by phone later on because of scheduling.

THE COURT: I see. All right, thank you. All right. As far as scheduling, in the en banc order, the Ninth Circuit noted an issue concerning the Brady matter pertaining to the PF Flyers Pro Ked Dude tennis shoes, and so the Court will schedule an evidentiary hearing and would like testimony from the following individuals:

Midge Carroll, the warden at CIM Chino, where Cooper was incarcerate. James Taylor, the inmate at CIM Chino who has apparently changed his trial testimony. Dewey Newberry, if he can be located, the Stride Rite general

merchandise manager, if he's -- who testified at trial about the purchase contracts that CIM Chino had for Pro Ked Dudes. Donald Smith, the CIM Chino investigative lieutenant who testified as to the purchase contracts Chino had with Pro Ked.

And then, also, the Attorney General should select appropriate people from either the investigators or defense team or -- not the defense team, but the prosecution team, not the lawyers, but those who allegedly received information or didn't receive information from Midge Carroll. And I think that the information can be done -- the parties can present the information that we need rather than wait for the outcome of all of the briefing.

We're in an unusual posture where this is a successive petition and much has been done before. So, what I'd like to do is reserve some time now and then the parties can arrange for those witnesses to attend during that time frame. And so, I was looking at the Court's calendar, and I would like to do it on June 2, that's a Tuesday, if possible.

MS. WILKENS: Yes, your Honor. I did want to indicate that Mr. Newberry, he now works and lives in China, and therefore, we would be suggesting to present a declaration in lieu of testimony.

THE COURT: How about a deposition on written

interrogatories?

MS. WILKENS: If we have time. It's very difficult to get

THE COURT: Do you know what a deposition on written interrogatories is? It's an --

MS. WILKENS: Yeah, but we have to -- technologically, sending it to China, the back and forth is going to take a little while.

THE COURT: You send him the questions, but then, also, the Defense can send him the questions. If you just present an affidavit, then there's no opportunity for cross examination.

MS. WILKENS: I just want to make sure there's enough time for the interrogatories to arrive and be responded to and get back.

MR. HILE: Your Honor, this is something that we would like to try to work out so we actually could have a deposition, even if it has to be at --

THE COURT: No, we're not going to do a deposition in China.

MR. HILE: Well, and one of the possibilities would be that the witness could come here. It would be less expensive if he were to come here.

THE COURT: We can do a deposition on written interrogatories. It's very simple procedure. It costs just

to send in your questions and the party prepares the answer, and particularly since we have his trial testimony already done under oath, I think that that's a reasonable way to go. Why don't you take a look at that procedure.

MR. HILE: We will, your Honor. Maybe we can arrive at a stipulation with respect to it.

THE COURT: And then, in order to accomplish the testimony, I would think that I'll ask for the parties to later provide the Court a reasonable time estimate for these individuals and with the supplement as to any other individual that you think would be pertinent and the Court would evaluate it.

MR. HILE: Yes, your Honor. With respect to the scheduling, I have June 2nd as a Wednesday.

THE COURT: You have it as a Wednesday. I wonder why I put June 2.

MR. HILE: Is that correct?

THE COURT: Oh, that's because -- I see, thank you. Monday is Memorial Day, so Tuesday is our regular motion day, and so, thank you for bringing that up. June 2 would then be a Wednesday and we could do Wednesday, Thursday and Friday, if necessary, so we would have that block of time to take care of it. And we may be able to do it shorter or we would then at least reserve those three days.

MR. RILE: There is one procedural issue with respect to that date. As I calendared that date, June 2nd is the date that Petitioner's traverse would be due under the scheduling that the Court set at the telephone conference that we had a couple of weeks ago. And it might make sense to have that traverse filed and considered, and there may be issues raised by the answer and the motion that the Attorney has suggested, and I didn't know whether we were going to try to resolve those issues before we had the hearing.

THE COURT: We're going to go ahead with the hearing. If we need to supplement the hearing later, we can always consider that. But, given this unique procedural posture and the direction of the Ninth Circuit that did say it should be resolved quickly or could be resolved quickly, the parties are on notice of the issues, and so, I'd prefer to go ahead, get this -- based on the information that the Court's already reviewed from your side, that the Court would like to hear this information. And then, if we need to change or alter or supplement, we can do that at a later time. It would be the date that you have that. And so, perhaps the traverse could be filed the day before -- I mean, if that's possible.

MR. HILE: That should be possible if it's just an answer. The only problem that we'll have with respect

THE COURT: I'm sure there's going to be some motions, too.

MR. HILE: And until the motions are resolved, we may not be able to file a complete traverse. But, we will try to accommodate the Court --

THE COURT: We have the opportunity to do traditional traverse or supplemental briefing on any issues that we need as well. So, I think that this is a flexible schedule that promotes the expedition of the. case, because there are a number of issues and by being able to concentrate on certain issues at a select period of time, we can resolve those. If we need to do more, we can always consider that.

MR. HILE: Yes, your Honor, and just so the Court is aware, I think we mentioned this in the telephone conference a few weeks ago, we will be filing very quickly a motion for discovery and we'll obviously try to fit in and perhaps get a ruling on that and perhaps have .the discovery in time for this. But if we don't, we'll ask to then add to the record with respect to that.

THE COURT: I'll consider that partially. As I mentioned before, it's interesting, in the criminal trial, there is not traditional discovery. There are Brady rules. There are Brady obligations. But, there are no depositions before. And so, the habeas proceeding, while called civil,

is a hybrid in a sense, and, in this particular case, we also have the benefit of all that's preceded. And so, you may file your motion, the Government can respond, the Court can make an appropriate ruling and consider all to do, yes, everything's limited, or piecemeal what we need without prejudice to consideration of other information, if the Court believes that it's appropriate.

MR. HILE: Thank you, your Honor.

MS. WILKENS: Your Honor, I did want to clarify. We will in fact be filing an answer, and therefore, there will be no reason for delay with the traverse. None of our motions would implicate delaying the traverse. We are filing an answer for the express purpose of expediting these proceedings.

THE COURT: It is a significant proceeding, and obviously, the Court wants to give the attention that is required for this. At the same time, as I said, we have had numerous proceedings before and so we don't start with a blank slate. However, we do start with now a supplemental petition. And so, with that background, everybody is available for that week?

MR. HILE: From the Petitioner's side, yes, your Honor. We're available.

MS. WILKENS: Yes, your Honor, that's fine.

THE COURT: And then, you'll work on the

witnesses.

MS. WILKENS: We will.

THE COURT: Now, on time frame, what I realized after I scheduled it, and then somebody came yesterday, that I was -- in order to save some costs, I would think that if you could find out a flight down from San Francisco so you don't have to come the night before. I actually regret that we started this at 9:00 because I could have started it at 11:00 or 10:00 and then avoid the expense of you coming down the night before. And that is my oversight, or at least, I thought perhaps I've gone on the early flights up to Oakland and come over. So, that's my fault. But, I think if you could tell me a realistic time, then we could schedule it at that time, at least for the first day.

MR. ALEXANDER: That's very much appreciated, your Honor, and I think the cost saving is obviously an excellent idea. And there are flights that I think will accommodate so me don't have to start too --

THE COURT: So, at some time, you could --

MR. ALEXANDER: So, we'll check into that --

THE COURT: You could check and --

MR. ALEXANDER: -- and advise the Court.

THE COURT: Thank you. We'll also check into whether on any -- as I said, we have some limited pro bono funds. We'll also check to see whether there's a

possibility of trying to get Government rate. I don't know whether that's possible or not, but I will be consulting with the capital case committee chair, Judge Moskowitz, who resides in our. District, as to what things we can do to assist,

MR. ALEXANDER: Thank you very much, your Honor. We appreciate that accommodation. We're going.to file a request both under local rule for pro bono funds as well as under the statute 844(q), I think it is, that provides for expenses for cases like this, and we'll be filing that very soon.

THE COURT: And could you also in that address whether the 844(q), whether it makes a difference whether it's retained counsel or non-retained counsel in this sense that -- I'm sure you've done research in this respect, but the Court had appointed counsel who had previous death penalty experience, both at the trial level and then on Federal habeas before, and had invested significant resources. And then, there's always a learning curve, and what we don't want is just a duplication of effort of what has gone before. And I do know that, at least on the DNA side, that in the state court litigation, there were resources given to the Defense.

So, what we're trying to do is be responsive to what the Ninth Circuit said, be cognizant of the resource

limitations that we have, this year recognizing that the CJA funding is set to expire in June, but with the significance and importance of .a death penalty habeas case also before the Court to balance out all of those issues, and then provide the appropriate resources for the litigation pertaining to Mr. Cooper, at the same time not exceeding or being frivolous with those matters. So, you may file those and, as I said, preliminarily in the scheduling order, we'll come out with some protocols. But, if you think that some of that must be filed, you may file that and then the Court will review it and decide whether any or all of it is filed publicly.

MR. HILE: Your Honor, if I may address that very point. Thank you for bringing that up. What we would like to do with this motion, if the Court is willing to accommodate us, is to allow us to file it under seal. The Court can then decide whether or not it should be shown to the other side and whether there's anything that can be made public. But, we would appreciate an order that would allow us, from the clerk's perspective, to file either directly to chambers or under seal.

THE COURT: Why don't you file submissions directly to chambers. Obviously, under -- typically, attorneys funding requests are those that are appropriately filed under seal. If there are portions that the Court

believes should be public record, it's always been this Court's practice to try to recognize the importance of the public record as well. And so, I think, if you could submit it directly to chambers with the appropriate number of copies, then the Court will review it and then make a determination.

MR. HILE: Thank you very much, your Honor.

THE COURT: We may, on certain things -- and keep in mind that often there may be some things that can b filed publicly with some other parts redacted, or if you think -- traditionally, attorneys' fees requests in capital cases have been under seal, for obvious reasons. So, the Court will permit you to do that. And I think if you file it with chambers first, then, at least at the beginning, if we need to change that procedure, then, through a scheduling order, I'll let you know.

MR. HILE: Thank you, your Honor.

THE COURT: Okay. That takes care of the preliminary matters, with one other comment by the Court. Typically, I have not had expert witnesses under Federal Rule 704 that are court experts. As to the DNA issue, if the Court believes that the Court needs additional assistance, that may be one area where, depending upon the presentations of the parties, the Court may reserve some right, whether it's under Evidence Code 704 or related

matters, to see if the Court needs any additional assistance.

If-so, it would all be on the record. But, I'm just alerting you to if I feel that I need more background and independent analysis. And so, with that background, we'll turn it over to the Petitioner. If you could, confine your remarks to approximately an hour, hour and a half, if that's possible. If you want to open with about an hour and then reserve time for half an hour to respond, that might be one way to go. If it turns out that you truly need additional time, then the Court would consider that as well.

MR. ALEXANDER: Thank you very much. Good morning, your Honor. David Alexander on behalf of the Petitioner. I have been through these tutorials before. But, as your Honor pointed out in our conference call, typically in --

THE COURT: Is now when we need to conference in the expert or not yet? Okay, you'll let me know.

MR. ALEXANDER: Yes, your Honor. Typically, in the patent or intellectual property area, the way in which we would, with the Court's permission, intend to proceed is to start off with Doctor Terry Melton who will address the mitochondrial testing issue, and we would like to reserve some time, we had anticipated for the Court's benefit, we thought, to have Doctor Melton do her tutorial and then the

Attorney General's office has somebody here. And then, Doctor Melton, if it's appropriate, may want to respond or

THE COURT: On that issue, first, before we get to EDTA?

MR. ALEXANDER: Yes, so that there's less confusion. Otherwise, I'm afraid there's going to be a great deal of confusion.

MS. WILKENS: We were going to start with EDTA, but we can probably accommodate that request.

MR. ALEXANDER: Thank you. So, then we'll turn to Doctor Kevin Ballard, who is also in the courtroom, your Honor, and proceed in the same manner. And if necessary, get Doctor Deforest on the telephone. So, without further comment, Mr. Hile will be handling the tutorial with Doctor Melton.

THE COURT: Thank you. If Doctor Melton could come forward.

MR. HILE: Yes. Your Honor, would you like to proceed with the experts in the witness chair?

THE COURT: Yes.

MR. HILE: Fine.

THE COURT: We're on recording equipment, and so, even though we can hear, the recording equipment is preferable.

THE CLERK: Please state your name for the record.

THE WITNESS: Terry Melton.

THE COURT: And do you want the witnesses sworn?

MR. HILE: I don't think it's necessary, your Honor, but I'm certainly -- if it's suggested, that would be fine, but --

THE COURT: I think we could swear the witness.

MR. HILE: That would be fine your Honor.

TERRY MELTON, PETITIONER'S WITNESS, SWORN

MR. HILE: Your Honor, I have a curriculum vitae for Doctor Melton, if I can give that to the clerk. Would you like more than one copy for the Court?

THE COURT: Yes.

MR. HILE: And we apologize for the top part of this. It does reflect the CV for Doctor Melton. We took this from the internet color and it doesn't fax very well with color on it. But, I'll represent to the Court that it does reflect Doctor Melton's CV, which I'll hand to the witness with the Court's permission.

THE COURT: All right, thank you. We'll make this Petitioner's 1 for the tutorial.

DIRECT EXAMINATION.

BY MR. HILE:

Q Doctor Melton, can you please state your full name for the record.

A Terry Melton.
Q And do you have any advance degrees?
A Yes, I have a masters degree and a Ph.D. in genetics from Penn State University.
Q And your professional educational background, is that reflected in Petitioner's Exhibit 1?
A Yes, it is.
THE COURT: The Court will receive the Exhibit 1, and then we can go on.
MR. HILE: All right.
BY MR. HILE:
Q Would you just briefly for the Court's benefit describe what you do for a living?
A All right, thank you. Good morning, your Honor. I am president and CEO of a small company in Pennsylvania called Mitotyping Technologies. The exclusive focus of our work is mitochondrial DNA testing, which I'll be explaining a lot about to you this morning, and I hope that if at any point you have any questions, you'll interrupt me and ask me, because I do have a tendency to get excited about what I'm talking about. I do enjoy it a lot.
Mitotyping Technologies was started in 1998 to fulfill a need in the criminal justice community for a laboratory to perform very high quality mitochondrial DNA testing. And this is the kind of testing that is reserved for primarily

hairs and skeletal remains that are not suitable for nuclear DNA testing. So, I started the company -- at the time I started the company in 1998, the FBI was providing testing at the Federal level and for occasional state cases. But, there really were not a lot of other places to obtain this kind of testing.

My background is from Penn State University. I received a Ph.D. in genetics from an anthropology department. My thesis advisor was a very well-known person by the name of Mark Stunking (phonetic) who was one of the very first people to use mitochondrial DNA in a forensic context.

Now, it's also used in other areas, primarily to study human evolutionary history, and also to study some very interesting mitochondrial DNA diseases. So, since I started the company -- well, my Ph.D. at Penn State was the study of mitochondrial DNA as a forensic tool, specifically looking at the population genetics of this marker, that is, how variable is it in different populations around the world. And so, in my thesis, I looked at about 40 different populations from different continents.

Since 1998, we have done several hundred cases in our company. I am currently on the board of the Journal of Forensic Sciences. I give a lot of talks, both invited and submitted talks at meetings nationally and internationally.

THE COURT: Could we then just restrict it to what it is.

BY MR. HILE:

Q And Doctor Melton, before we talk about specifically the science, have you done work in the criminal forensic area for both the prosecution and defense?

A Yes, about two-thirds of our work is for prosecution and about a third is for defense.

Q Now, I know you brought with you some transparencies, and let me just get the first one started, and if you could use those as a backdrop for a very brief introduction to mitochondrial DNA technology and science.

A Yes. I would like to use an overhead or a laser pointer, if possible. Thank you. So, I'm going to cover the basic science of mitochondrial DNA testing. As we go along, I hope to eliminate the differences between mitochondria' DNA testing and nuclear DNA testing.

Now, we hear a lot about DNA on the TV and radio, specifically the human genon project, and sometimes the science can be a little intimidating. What I hope to do is make it interesting and not difficult. We typically hear about DNA having the structure of a double helix. If you take this double helical structure and you unravel it, you will get something that looks an awful lot like a ladder.

THE COURT: The Court's familiar with that.

THE WITNESS: All right, and the base appearing rules are A, T, C and G. A always appears with T, and C always appears with G. And it's the informational content along the length of the molecule that provides the information that we're interested in. It's kind of like a telephone number. And for nuclear DNA, with respect to your particular set of DNA bases, you are unique, except if you have an identical twin.

Now, for mitochondrial DNA, it's a little bit different. A child inherits the mitochondrial DNA type, and by that, I mean the exact order of these chemical bases in mitochondrial DNA from the mother faithfully. And so, maternally, it's inherited. It's inherited from the mother. And all siblings of that mother will have the same type. The mother will have the same type as her mother and her grandmother and so forth. So, the primary difference between nuclear and mitochondrial DNA, when it applies to forensics, is that it is not a unique identifier. That is --

THE COURT: It's a family identifier?

THE WITNESS: It is a maternal lineage identifier, and in fact, if you think about it, you could go back in your family tree and lose track of who your maternal relatives are. So, in theory, there could be someone out in the population with this type that you don't realize is your

maternal relative.

What we're getting at, though, in -- and I'll be discussing this more later -- is that there are many thousands of types, and the relative frequency of any one type is very low. So, the idea is, to test a particular idea or theory in a case, you will make a comparison between the mitochondrial DNA type of an evidentiary sample and compare it to a known individual. And in fact, the statistics can tell you that, by and large, the vast majority of people would not have this type and a very small pool of people could. So, it can be additional information, and for that reason, we like to refer to it as a piece of the puzzle when we're looking at a criminal case.

Let's go to the next overhead. Now, again, we're going to be interested in both kinds of DNA briefly. If you think of a cell almost like an egg, the yolk of that cell would be analogous to the nucleus and the white of the egg would be analogous to the cytoplasm. In the nucleus, we have the nuclear DNA, and this is the kind given to us by both our parents. It causes hair color and eye color, certain diseases that we may be prone to inherit, and it is found in the form of 40 to 46 chromosomes. Outside in the cytoplasm are these very small organelles. They have a peanut shape. They're called mitochondria, and they help provide energy for the cell. They're very important to the

cell, and it turns out that they have their own DNA molecules.

Now, whereas, the nuclear DNA has about three billion of those As, Ts, Cs and Gs in its compliment per cell, a mitochondrial DNA molecule only has about 16-1/2 thousand of those As, Ts, Cs and Gs. And there are hundreds to thousands of mitochondria in every cell, and there are one to ten mitochondrial DNAs in each mitochondrion. That's the single form of it. So, consequently, in any cell -- and we're talking about white blood cells and hair cells, skeletal material, any kind of tissue, there are hundreds of thousands of copies of mitochondrial DNA compared to the two copies of nuclear DNA. So, this is one reason why this tends to be a very, very good forensic tool, because you can recover mitochondrial DNA from things like shed hairs, which essentially have no nuclear DNA.

THE COURT: Whether or not you have .a root?

THE WITNESS: Whether or not you have a root. In fact, for mitochondrial DNA testing, you only need a piece of the hair shaft, and in fact, in our laboratory, we've successfully obtained mitochondrial DNA from fragments as small as two millimeters of hair. Now, the mitochondrial DNA molecule is circular. It still has that double helix shape, and it turns out there's one area, one end of this molecule that tends to be highly variable among individuals.

It's called the control region. And the interesting fact about it is it probably has some function in terms of the molecule's ability to reproduce itself, but in fact, it doesn't really have any other major functions. Therefore, it is free to mutate and this is why there are so many differences between people in the world, because over time, mutational changes have accumulated causing most people to be different from each other.

Now, in this region, a laboratory typically looks at two regions, HV1 and HV2. HV stands for hyper variable. And again, it's the As, Ts, Cs and Gs in this section that we look at. This is only a tiny piece. Most laboratories look at about 700 of those As, Ts, Cs and Gs in this region. And each piece is about 350 bases long, so for a total of 700. We are going to sequence or determine the order of those chemical bases in those two little regions.

THE COURT: What kind of technique do you use for sequencing?

THE WITNESS: Well, the process for doing that is what I'm going to talk about next. So, if we could go to the next overhead. The first two stages of a mitochondrial DNA analysis are exactly the same as an STR analysis. That is the nuclear DNA testing that's done in most laboratories. The first stage is extraction. This is simply nothing more than purifying the DNA in any cellular material away from

anything else in that sample. Secondly, we do something called amplification, and you've probably heard of the PCR process. This is a way to make billions of copies of the particular piece.of DNA that you're interested in, and in our case, it's HV1 and HV2 that we just talked about. And after you've made all of these millions of copies, then you proceed to the sequencing stage.

THE COURT: And there's no significant degradation in the PCR amplification? You have enough of a sample to then test for what you need to get?

THE WITNESS: Yes. Yes, you do. In fact, you can start with an extraction that contains as few as ten copies of DNA and obtain millions of copies from that.

BY MR. HILE:

Q Doctor Melton, can I interrupt just for a second. We've been talking mainly about hair, but can you get a sample for purposes of comparison from other types of samples, whether it be bone, saliva, other things?

A. Yes. All the tissues within an individual will be expected to have the same mitochondrial DNA profile. So, any tissue is suitable. Cheek cells, like a swab from the inside of the cheek, or a blood sample. So, continuing on now with sequencing, sequencing is the process that's been around for about 30 years now. It's used in the human genon project to decipher the human genetic code. And it's simply

nothing more than determining the order of those chemical bases in those two regions, HV1 and HV2. Now, again, this is just a tiny piece. We're going to look at 780 of those in our laboratory, and in fact, we get multiple looks at those regions by looking at overlapping PCR products, and by sequencing both sides of the double helix. So, even though we're looking at 780, we're actually producing about four times that much data and aligning it together to look at different places multiple times. So, we can go to the next overhead.

So, the idea of doing this test -- I mean, obviously, we've talked about all the nitty gritty here, but we want to know if two samples could have shared the same source. So, we look at a question sample, we determine the DNA sequence for HV1 and HV2 from that sample, and then we go to a sample from a known individual and make a comparison over those same regions. And if at every single one of those positions, the bases are the same, then the conclusion will be we cannot exclude person A and his or her maternal relatives as the source of sample B.

Now, if there are as many as two differences out of those 783 places that we look at in our laboratory, then, if there are two differences or more, then the conclusion will be this person could not have left this hair or this sample, this skeletal material, whatever it is. So, we're looking

at whether or not a person or his or her maternal relatives can be excluded. Then, when we get the situation where there is a match between the two sequences, remember, we're not saying this is from this person because it's not a unique identifier. We want to know what is the significance of this match that we've made. How many -- obviously, if everyone in a population has the same type, to make a match isn't very significant. So, we're interested in how common or rare a particular type is in the general population in order to understand the context or the meaningfulness of that match. So, let's go to the next overhead.

THE COURT: This is not useful -- it's not necessary to do this type of DNA testing to exclude Kevin Cooper from the hairs in the girl victim. You agree with that.

THE WITNESS: Well, I believe that, to date, the microscopic evaluation of those hairs has indicated that no hair similar to Mr. Cooper's were found. So, I think the idea here is to test an alternative hypothesis, which is, are there hairs there that are not from the family and could be from alternative individuals. So, the idea of the mitochondrial DNA testing is to move toward a testing of that idea rather than excluding Mr. Cooper, although the byproduct of testing him as well would be to determine that he is excluded.

THE COURT: But, we already know he's excluded.

THE WITNESS: Well, hair microscopy is not 100 percent accurate. Therefore, we have to be very certain that the hair microscopy has been done looking at all the characteristics that determine whether someone should be -- whether follow-up DNA testing should be done.

MR. RILE: Your Honor, if I could comment on that and ask a question of.Doctor Melton. Your Honor is correct. No one in the case has asserted that any of the hairs that are clutched in the hands of the three victims who are at issue here --

THE COURT: What we don't want to do is start going down and knocking down straw men.

MR. HILE: Right.

THE COURT: Let's focus on what --

MR. RILE: That's exactly right.

THE COURT: What we're really focusing more on is, is there some alternative perpetrator.

MR. RILE: That's correct, your Honor, and what we have that we are looking at testing is three of the victims had hairs clutched in their hands. And what we're hoping to do through this process that will lead to the end in the mitochondrial testing is to determine whether or not some of those hairs are from someone who is not a victim -- we already assume it's not from Kevin Cooper -- so we can place

a non-victim at the scene of the crime at the time whose hairs are in the hands of one of the victims.

THE COURT: In the hand. And beyond Jessica, there was who else?

MR. HILE: Doug Ryan.

THE COURT: Pardon me?

MR. HILE: Doug Ryan, the father, and Jessica and the mother, Peggy Ryan. All three had hairs clutched in their hands. And that process of determining whether there is a possibility that we can identify there was another person there at the time whose hair is clutched in the hands of the victims that is not one of the victims and not Kevin Cooper is what we're doing.

THE COURT: Now, I'll let you further develop this with your witness. As to that, if it turns out that -- do you need the known sample to make this meaningful?

MR. HILE: The known sample, what we'll need to do is to compare.

THE COURT: Here, the slide says that there is a sample compared to a known sample. If, for example, in a trial, if somebody has a Fifth Amendment or Fourth Amendment issue, even though you might just maybe ask that, you might not be able to get that. So, if it's a cost benefit analysis, if it turns out that there is no way to get a known sample and the only benefit is to get the comparison

between the known sample and the testing sample, then we'd want to know how much is this going to cost to test every -- meaning, theoretically, you could test every possible hair, or is there a representative sample, and is there a realistic way, absent constitutional issues, that the Court through this process can develop this theory.

MR. HILE: Yes, and let's try to -- there's a bunch of things that you've said there, and let me try to deal with them one at a time and get Doctor Melton to describe them. Let's first start with trying to exclude the victims themselves as the people whose hair is clasped in their hands.

THE COURT: Because I think that's valuable.

BY MR. HILE:

Q That is valuable, and that is one of the things, is that correct, Doctor Melton?

A Yes, of course.

Q And how will you go about doing that comparison to establish that?

A Well, a number of hairs -- questioned hairs are tested, or, alternatively, we can test or develop mitochondrial profiles on the family members and the victim, Chris Hughes. Now, Mrs. Ryan and her two children will have the same mitochondrial profile, so we only need to test one of those three individuals to develop their mitochondrial profile.

Mr. Ryan would have a different type, in theory. Chris Hughes would have a different type, in theory. So, we developed those profiles. Then, if we have other individuals we want to add to that pool of known individuals, such as Mr. Cooper, we can do that. Then, we test -- we develop those profiles and then we test the hairs by comparing those against the knowns.

THE COURT: So, we could find out are they victims' hairs or not.

MR. HILE: Correct, and that's the first step -- and as the Court said, we think that's a valuable part. And I want to get to that in a second. But, there is the second part, let me put to the side, but it's important for us to keep there, which is the possibility, given that there are some suspects that we've identified in the petition, who we think may be the perpetrators, there is a possibility that if we could get samples, mitochondrial samples from --

THE COURT: Voluntarily.

MR. HILE: Voluntarily, yes, or in other ways through existing samples, for instance, that might be, then we may. be able to do that. That, of course, is a second part, which we will be looking at and trying to determine. But, the first step is -- at least, the one that we're working at for purposes of what I want to discuss next,

which is the issue of microscopy.

THE COURT: All right.

MR. HILE: And let me just set that up for my question to Doctor Melton by this.

BY MR. HILE:

Q Doctor Melton, for purposes of doing the analysis that you do and the comparison, what types of activities have to be done with the hair to be tested?

A Well, we recommend -- in fact, we have it in our written memo that we ask our clients to sign, we recommend that all hairs undergo microscopic evaluation and photography, if necessary, because as scientists we feel this is simply more data collection that should be done prior to testing. So, microscopic evaluation and comparison of hairs to each other, of hairs to known individuals, and this would not be done in our laboratory.

THE COURT: What is the cost of that?

THE WITNESS: I don't know the cost of that.

THE COURT: And is that something that, if all you want to know is are these -- I mean, if you can get a realistic sample and say, here is this and this is not the victim, do you have to go through this other process?

THE WITNESS: Well, microscopic evaluation --

THE COURT: Especially if it's already had some other analysis done.

THE WITNESS: Microscopic evaluation is a screening tool that can often be useful in suggesting which hairs may fall outside the range of groups of hairs and suggest that those hairs may be candidates for testing. In other words, for example, if you have 50 hairs at a crime scene and you can cluster those hairs into groups of similar hairs, then you might not need to test all 50 hairs. You might be able to select candidate hairs from those groups for testing.

THE COURT: What we'd have to do is a cost benefit analysis to see whether there's a common sense way to do it, or whether this is a scientifically required way to do it.

MR. HILE: Yes, your Honor, and let me comment on that, if I may, because it relates to Doctor DeForest, who is the other person. When we talked to Doctor Melton about doing the mitochondrial testing, this issue of screening the hair came up. And there were two reasons to screen, obviously. One is because the cost of each test under the mitochondrial testing is significant.

THE COURT: Is it 3,000 a hair?

MR. HILE: Twenty-five hundred, I think it is.

THE WITNESS: Twenty-five hundred dollars, yes.

THE COURT: A hair. And how many hairs do we have?

MR. HILE: We have lots of hair, your Honor. And

that's the --

THE COURT: Maybe we could sequence is so that we could do a couple of hairs first and get those results before we do all.

MR. HILE: Absolutely, and we're not suggesting that all of them will be testing. But, let me just comment on that for a.. second. Doctor Melton told us that this process of examining the hairs prior to mitochondrial testing and deciding which ones to test, which would have the most likelihood of being useful and are properly presented so that they can be tested this way, is something that is called microscopy. And Doctor DeForest is, among other things, a microscopist. And he can accomplish two things for us. The first will be he can, through the process that he puts the hair through, narrow down the sample that we need to test. And second, he can try to find out which are the best and prepare those hairs in the best way so that Doctor Melton's lab can have the best chance of accomplishing a yes or a no or something significant for purposes of the case.

THE COURT: Just remember, we have context, and the context is a clump, and the theory is that it's a clump, that somebody is holding a clump of hair. Chances are -- common sense would tell you that, if it's somebody holding a clump of hair, they're not holding five different

people's hair, most likely.

MR. HILE: Exactly. But, since we have three victims with hair in their hands, what we're hoping to do is that, through Doctor DeForest's --

THE COURT: One per set?

MR. HILE: He may be able to, as Doctor Melton said, say not only are these hairs not -- don't look consistent with the victim or any of the victims, but they seem to be similar to ones that are in the other hands, so if the same person was the perpetrator, we might be able to do that.

THE COURT: That makes some sense.

MR. HILE: And that is the whole process that Doctor DeForest will do. And as I say, Doctor Melton suggested to us, when we talked to her, that he was, in her opinion, the person best qualified to do this type of microscopy to not only give us the best chance of a result, yea or nay, but also to keep the costs down, because he is considered one of the best microscopists, and therefore, his conclusions we expect are such things as whether the same hair is in the hands of more than one victim. It's something that he is the best person to discover.

BY MR. HILE:

And let me just say, Doctor Melton, I didn't mean to steal your thunder at all. Can you comment upon what it is

that you expect the microscopy to do?
A Well, first of all, microscopic evaluation includes the evaluation of a number of characteristics of each individual hair, color, diameter, size, different structures in the hair. And I'm not a hair microscopist, so I can address it in a very limited way. But, what that allows a microscopy expert to do is to suggest clusters or groups of similar hairs. So, that is the value of that. Then, proceeding onward to say this hair, for example, is in a group with four or five other hairs, but it is twice as long as those four or five other hairs, therefore it's divisible. So, we can cut it in half, take half for testing, and leave half for a second test, if someone wants it. So, a microscopist is also going to evaluate the suitability of the sample for divisibility and preservation.

THE COURT: All right, we can move on.

MR. HILE: Thank you, your Honor.

BY MR. HILE:
Q Now, Doctor Melton, could you please just discuss for a second where mitochondrial testing is available? I understand that it's available at Mytotyping, your laboratory. Is it available elsewhere?
A It is available at the FBI laboratory. They were the first laboratory to actually present mitochondrial DNA testing in a court in Tennessee. It is used at the Armed

Forces laboratory to identify the remains of missing individuals from military conflicts, and the Tomb of the Unknown Soldier is a good example of that having been done. There are -- there is the chief medical examiner in New York does their own testing. There are very few state and local labs. I believe the California Department of Justice is planning or is implementing a missing persons program to identify individuals whose skeletal remains have been recovered.. Then, there are a number of private laboratories, such as mine, about half a dozen of them. Now, my laboratory only does mitochondrial testing. We're somewhat specialists in that area, and we do specialize in working with difficult old samples, and we do a lot of cold cases. We do some post-conviction testing and that kind of thing.

Q Has law enforcement used your lab for the cold case or the old samples instead of themselves?

A Yes. We receive a lot of referrals for samples that are twenty years old and older. I believe the oldest hair we've ever tested is 37 years old. We did obtain results from that. We actually tested some skeletal remains that were a thousand years old and got results from those. So, we do specialize in difficult and old samples, cold cases.

Q With respect to -- we described the cost a minute ago. Can you describe for the Court how long it would take once

samples were identified and properly prepared, how long it would take for you to do your analysis?

A Well, we handle samples individually in our laboratory, but we have three technicians. So, we can have everyone working on a single case. It takes about two to three days to do a single hair. But, usually, the number of hairs in a case doesn't exceed ten or twelve at the most. So, usually, three to four weeks is all we need to do some of the largest cases we've ever received. I think the Green River case, we have done something like 57 samples, and that's by far the biggest case we've ever worked on. So, probably four times bigger than the biggest case we've ever worked on.

Q Has your office been contacted by the State in this case?

A Yes, Doctor Steinberger contacted my office while I was away. I've been away a lot lately. And talked to Doctor Nelson. He was our other Ph.D. analyst. And inquired as to the cost and as to the appropriate way to screen or diminish potentially the number of samples out of a pool of many samples. Doctor Nelson didn't realize this was the same case when Doctor Steinberger called. So, when I got back and she said we got a call from California and here's what we talked about, and she said, "I told Doctor Steinberger that Doctor DeForest would be the person we would recommend to do some microscopy." And that's really where that

conversation ended.

MR. HILE: Is there anything else that the Court would like to know about --

THE COURT: What are the limitations? What are the problems?

THE WITNESS: The limitations are certainly -- well, can I back up onto the statistics, because we really never talked about that. And I think that's a relevant issue. Most data bases that exist throughout the world for mitochondrial DNA show the same pattern, which is a phenomenally large number of different types with any single type being at a very low frequency. So, when you get a match, even though you can't say, well, we know this hair is from this person because it's not a unique identifier, we can say in a situation where it's a brand new type that we've never seen before, using the FBI's database, which is a way to estimate how common or rare a type is, when we have a brand new type, we can say, at the size of this current database, 99.94 percent of North Americans would not be expected to have this type. So, in other words, you can eliminate a huge proportion of the population as being someone who has that type.

THE COURT: Can you eliminate Hispanics?

THE WITNESS: Yes, you can eliminate anyone who doesn't have that type. So, the idea is, when you have a

match in a case, you can never say to the trier of fact, we know this hair is from Mr. So-and-so. You can say, if it doesn't match, we know this hair is not from Mr. So-and-so. But, when you have a match, you can never say we know it's his, because we know it's not a unique identifier. But, we can say we can eliminate 99 point something percent of the population in most cases.

THE COURT: Statistics are interesting, because let's say you have a Hispanic individual that has in the family tree multi-racial influence from the mother. Where is that going to get you?

THE WITNESS: Well, the idea is that it's inherited maternally. In the database, people do self-identify. In the database, there are currently 4,837 types in there -- or individuals in there. And each of those people has said --

THE COURT: Is this NCIS or what is this?

THE WITNESS: This is the mitochondrial DNA database that is managed and vetted by the FBI mitochondrial DNA unit. They have a unit that does just mitochondrial DNA.

THE COURT: And where does the database come from? Who are the subjects?

THE WITNESS: It is -- the subjects are volunteers who have given a sample so that their mitochondrial DNA

profile can be included, and the purpose of the database is only to estimate a frequency of a type. It's not used to search for someone. It's not used in a crime to see if someone's in there who might match. It's used to say, in this case we have a match, and this type, we want to know, is it a common type or is it a rare type? If it's a rare type, it could be very useful, because you've automatically eliminated many people who might have left that sample.

THE COURT: You have a high degree of certainty that we could identify whether these hairs are victims or non-victims.

THE WITNESS: Yes.

THE COURT: As to identifying whose they are, that's more speculative.

THE WITNESS: Well, let me put it this way, and if I could give a case example. We had a case in Traverse City, Michigan about four years ago where a young woman was brutally bludgeoned to death in a hotel office, and they had no suspects. They did identify a suspect eventually through other means. At the crime scene, they discovered a tire valve stem core in the pool of blood with a pubic hair wrapped around it. Okay.

THE COURT; So, you could take that and then match it to the database that gave a person?

THE WITNESS: No, the idea would be to look for

someone who is a candidate suspect based on other information. And they also then identified this particular suspect, his name was Kevin Holtzer (phonetic), and he was an employee of a tire manufacturing company,.and when they investigated, searched his apartment, they found another long hair that was microscopically similar to the victim's. So, it was a kind of double evidence case. They matched the hair from the tire valve stem core to him, we did. The hair from his apartment was the same as hers. Now, we couldn't say for sure that's his hair and that's her hair. But, we could say, you know, these types are so rare and we have this other evidence in the case, and you know, the investigators tied a lot of loose ends together, and the conclusion was, we can't say for sure it's his hair because potentially another person in the population might have this type, but in fact, he worked in the tire factory. It becomes another piece of the puzzle, another piece of evidence. The purpose of the database in that case was to say, have we ever seen this type before, and if so, how many times, and how often does that type occur in the population, given that we've seen it this many times in the database.

THE COURT: Do you believe in the validity of nuclear DNA?

THE WITNESS: Absolutely.

THE COURT: Do you think that nuclear DNA can be

more definitive?

THE WITNESS: It can be more definitive, but there are certain kinds of evidence -- it is more definitive, but there's certain kinds of evidence that it can't be used on, such as shed hairs or hairs with no roots. That's why mitochondrial DNA is the fallback technology for these kinds of samples.

MR. HILE: And your Honor, the way I understand this would work, and Doctor Melton will certainly correct if I'm wrong, is that for purposes of the first analysis that we talked about, that is, excluding the victims as being the people who gave the hair that is clasped in the hand, that can be done with certainty under mitochondrial DNA testing. Where you have less than absolute certainty but a very, very, very high probability is to include somebody else who we might be able to get a sample from.

THE COURT: The known sample.

MR. HILE: Right.

THE COURT: The known sample, Fourth Amendment, Fifth Amendment issues.

MR. HILE: Right. So, we will get --

THE COURT: Voluntary or if you find something else that was there that matches.

MR. HILE: We do have the possibility of certainty with respect to the exclusionary part of what we're trying

to do. But, we won't have complete certainty, although it will be virtual with respect to the second part of that, and the scientists will be able to tell us more about that.

THE COURT: And one more question. Animal hairs. Can you identify human versus animal?

MR. HILE: Our laboratory doesn't work with non-human hairs. But, there are specialists who do mitochondrial DNA on non-human hairs.

MR. HILE: I'll answer that one, your Honor, if I may. And that's just, again, Doctor DeForest.

THE COURT: Oh, okay. By his screening or what?

MR. HILE: Yes. One of the things that microscopists can do with great certainty is to eliminate animal hair and to identify what has to be human hair for purposes of an analysis. And they go far beyond that with respect to human hair. But, that's one of the things that they are capable of doing.

THE COURT: All right. Anything else?

MR. HILE: Not at this point, your Honor. Let me just say that -- let me tell you about our logistical issue with Doctor DeForest for the Court. The reason he could not be here today is because he was involved in a conference in Virginia. And he is available by phone if the Court wants to hear about the microscopy part of this. It isn't necessary if the Court doesn't feel that it is necessary

here today. But, he could tell the Court a little bit about what he would say needs to be done in order to present samples that Doctor Melton could then adequately test for the mitochondria) DNA that we've talked about. The other place, which you'll hear in a minute, that Doctor DeForest is someone who is an expert in -- as I said, he is not only a microscopist, but he is a criminalist generally. And he would be a person who, as you'll hear from Doctor Ballard, would be the set-up person for purposes of the EDTA, oxalic (phonetic) acid and citric acid.

THE COURT: Okay, so, why don't we defer him. And I recognize he's three hours different, but if we need to do him another time, we can always do that as well.

MR. HILE: Thank you, your Honor.

MR. ALEXANDER: Your Honor, if I might just take a moment to add one thing while Doctor Melton is still here.

THE COURT: Tag team?

MR. ALEXANDER: A little bit. I apologize, your Honor. And that is simply, because the mitochondria) DNA testing is maternally related, if you've got a sibling of the suspect -- and that obviously also has some constitutional issues and the like, but you may be able to get somebody more willing to provide that information than somebody --

THE COURT: Oh, I see what you mean.

MR. ALEXANDER: A sister or mother or brother. So, you have that opportunity. It's part of the fascination.

MR. HILE: Maternal relative, let's put it that way.

THE COURT: .Yes, all right, thank you. Do you want to cross or do you want to address your issues, or do you think that it's not as to this issue, we have enough background?

MS. WILKENS: Well, I'd love to ask a few questions. I didn't know if it was permissible.

THE COURT: Okay, you may.

CROSS EXAMINATION

BY MS. WILKENS:

Q Doctor Melton, I wasn't quite clear on the answer about eliminating Hispanics. Is the database such that, if someone were Hispanic, you would be able to look at certain results and determine that no Hispanic person would generate those particular results?

A I'm not sure what you're asking. The database is used as a whole and it is used to identify whether a particular type is in the database, yes or no, and the database is --

THE COURT: Let me try to interrupt. I think what we're trying to say is one of the suggestions in the petition and from one of the victims' earlier comments in

the hospital, there's been a question as to whether a Hispanic or more than one Hispanic was the perpetrator. And so, what we're trying to find out is, on race characteristics, for example, on nuclear DNA, it's quite specific that you can say this appears in the African American population and it does not appear in the white population. Is there a similar result that we can get where, by doing the mitochondrial DNA, we can then say this could not possibly have come from a Hispanic individual?

THE WITNESS: I see. I think I needed the context for the question in order to understand what you were asking me. In fact, there is a fairly good correlation between ethnicity and mitochondrial type. However, in North America especially, we must be very cautious about saying this sample has a recognizably African profile, therefore, the person who left it must be African American, because especially in North America, there's been a lot of add mixture, a lot of intermarriage and --

THE COURT:. But, let's -- African American, because I don't necessarily think that that's going to be our focus, at least from the petition. It's more on does that pertain to Hispanic or white individuals?

THE WITNESS: It applies to every -- the example was just an example. It applies to every group identically. And Hispanics --

THE COURT: Because we're a melting pot?

THE WITNESS: Because we're a melting pot, and any Hispanics, Hispanics, Native Americans and Asians can share a lot of similarities in their mitochondrial DNA. However, it is a useful investigational tool. If you find a profile that is recognizably similar to a well-characterized ethnic group, you can tell someone, you know, you might want to look at this group. But, we are so careful not to make these generalizations without those caveats, because we don't want a particular group that maybe isn't identified by that DNA testing to go unlooked at. So, what we want to do is say, investigationally, yes, this profile is recognizably Hispanic, recognizably Caucasian, recognizably African. But, it is used that way as an investigational tool. So, yes, I think that could be useful. It's just from a civil liberties standpoint. You want to be very careful how it's applied.

BY MS. WILKENS:

Q Now, how do you determine whether or not hairs are clutched as opposed to merely adhering to blood?

A. That is a question for a criminalist or a hair microscopist. I can't answer that question.

Q Okay, and with respect to the microscopic examination of the hairs, if that in fact had been done, is that something that would be useful to you to review what had

been done previously in terms of microscopic examination of the hairs?

A I assumed that it would be. However, I don't know what kind of evaluation was done. I think there are different kinds. One is just a general looking at under a stereo microscope. Then, there's one where you look at the hairs under higher power microscopes and you write down different characteristics such as size, diameter, color, and those all have different categories, structure of the nebula (phonetic), structure of the cortex and so forth. There are in-depth kinds of investigations that can be done on hairs.

THE COURT: Does this go to the issue of Doctor Blake's notes?

MS. WILKENS: And Doctor Thornton.

THE COURT: And Doctor Thornton. Can we get those turned over?

MR. HILE: Yes, your Honor. I think that, for sure, we are going to -- we will -- I think Doctor Thornton's notes everybody agrees do not exist anymore. But, we're trying to find them.

THE COURT: The only notes that we have, uh-huh.

MR. HILE: What I would suggest, given the answer to the question, is that both sides give each other all of the testing, notes, lab notes, bench book, whatever there is, so we have all of the data that has been gathered before

over the last twenty years, that both sides have that so that the testing at least can be done with that. I know, in talking to Doctor DeForest, he said to me that was one of the things that he wanted to look at was what type of analysis has been done and what were the results of that earlier on, so he can see whether or not that is significant to what he's looking at. So, absolutely, we are happy to --

THE COURT: This kind of goes back to the preliminary comments that I made that I know a lot has been done already and then a new team comes on. You're the third team. You're the third team. And the Court has had significant resources given out already, and so I'm trying to avoid a re-invention of the wheel.

MR. HILE: Absolutely, your Honor.

THE COURT: So, you can meet and confer outside on that. But, at least with respect to the agreement that was reached for the DNA testing, Doctor Blake's notes should be turned over.

MS. WILKENS: We're in full compliance with respect to the agreement, and we know that Doctor Blake took notes because our scientist was present when he did so. And we've made repeated requests. And with respect to Doctor Thornton, there was a representation made to Judge Kennedy that his files were lost. But, we have understood that

Doctor Thornton has used those notes in the last few years for teaching purposes. So, there may be other sources, because he teaches a class where they use notes from Cooper and O.J. Simpson and other cases. So, it may be possible to obtain those notes from sources other than his missing file.

THE COURT: All right, thank you,

MR. HILE: And we think that -- we are working hard to get that, because we think it's for everybody's best interest, and we'd just ask that the state do the same, give us anything that they have that relates to that examination. I think that would be fair.

MS. WILKENS: We've already turned it over.

THE COURT: So, you wouldn't object to the Court authorizing the issuance of a subpoena for Doctor Blake's notes and Doctor Thornton's notes.

MS. WILKENS: No, that would be very helpful.

MR. HILE: No, your Honor.

THE COURT: All right, who wants to prepare the subpoena?

MR. HILE: We will, your Honor.

THE COURT: All right. If they prepare and serve it, it's your expense.

MR. HILE: I thought that -- well, we are trying to make sure that we get as much information from both sides, and so, if Ms. Wilkens prefers, that's fine.

MS. WILKENS: I don't prefer to incur any costs that I don't have to.

THE COURT_ I'd prefer it beCause:that's not out of a pro bono fund budget that we have. So, why don't you do -- you want Doctor Blake and Doctor Thornton. You do that. And then, if there's any other ones that you think they haven't turned over, identify that and then you can subpoena those.

MR. HILE: Thank you, your Honor.

THE COURT: All right.

BY MS. WILKENS:

Q Doctor Melton, just one more point. Do you have any --

THE COURT: As to those, direct it through counsel.

MR. HILE: Yes, your Honor.

THE COURT: As to Doctor Blake and Doctor Thornton, I think it should go directly to Doctor Blake and Doctor Thornton.• Don't you think?

MR. HILE: Copy to us, yes, your Honor.

THE COURT: Oh, yes.

MS. WILKENS: Thank you, your Honor.

BY MS. WILKENS:

Q Doctor Melton, just one more quick point. Do you have any sense of how long it takes to do the microscopic

examination? I realize it's not your area of expertise, but do you have any sense of that?

A I do not. I'm sorry.

THE COURT: All right, thank you. You may step down. We'll keep you in reserve in case we have other questions that are developed along the way.

MS. WILKENS: Your Honor, we have a presentation by Doctor Steinberger, and if I could have her sworn in as a witness, then with the 'Court's indulgence, she'.d like to stand at her computer.

THE COURT: If she stands at her computer, we'll give her a hand-held mike, or a walking -- maybe the walking mike might be best. And I think as far as our time, it's kind of going a little longer than we thought. So, we do have time available.

EVA STEINBERGER - RESPONDENT'S WITNESS - SWORN

THE CLERK: Please state your name for the record.

THE WITNESS: Eva Steinberger.

THE CLERK: Please spell your last name for the record.

THE WITNESS: S-T-E-I-N-B-E-R-G-E-R.

THE CLERK: Thank you.

THE WITNESS: May I?

THE. COURT: Yes, you may.

MS. WILKENS: Thank you, your Honor. We've

provided in advance a copy of Doctor Steinberger's curriculum vitae, and we will just leave it at that. It's appendix 1.

THE COURT: All right, we'll mark that as the Defense EXhibit 1.

MS: WILKENS: A.

THE COURT: Defense Exhibit A for purposes of this tutorial, and it's received. Both are received. Could I see it?

MR. ALEXANDER: Your Honor, I can provide a copy, if you wish.

THE COURT: Oh, it's in the submission?

MS. WILKENS: It is in the paperwork.

THE COURT: It's in the paperwork. I've got it here, then. Actually, it was already submitted as Exhibit A.

MS. WILKENS: Thank you,, your Honor.

THE COURT: The Court receives that.

DIRECT EXAMINATION

BY MS. WILKENS:

Q Doctor Steinberger, if you want to just go ahead with your presentation, and if we have any questions, we'll jump in.

A The research for this tutorial today was put together by a team of scientists at the Department of Justice.

Myself, I am the Assistant Chief for the new programs at the California Department of Justice. Steven Meyers, who worked with Doctor Blake under the jpint DNA testing agreement for pott-conviction testing. .Gary Simms, who is the laboratory director of case work and Steven Meyers' tuperidr. And Mark Timkin. (phonetic) from our methods development section.

My presentation was originally structured so that I would have it in two parts. One would be with EDTA. The second part would be the mitochondrial DNA analysis part. And both presentations will be structured in the following way. A description of the methods, which will in this case be a repetition of what Doctor Melton already told us.

THE COURT: So, we could move on beyond that?

THE WITNESS: It's very -- I can skip -- I mean, I can move quickly. But, most importantly, the second two bullets up there are the issues include science pertaining to the methods and the validity or relevance of the results, because as forensic scientists, we not only test anything that comes our way, we also integrate the results. This is what we do.

So, now, I have to close this and go to the second part. If you'll give me two minutes.

THE COURT: Why don't you just go ahead with your EDTA and then we'll have it backwards that way. Why don't you go ahead with your first part on the EDTA.

THE WITNESS: Okay. So, part one -- EDTA. EDTA is not a naturally occurring molecule. It is a synthetic chemical and it was patented in 1935.' It readily Soluble in water, which is a very important point that we have to remember, and it strongly binds metal ion (phonetic). This is why it has such widespread use in our daily lives, because EDTA bound metal ions are less reactive than free metal ions. And that makes EDTA useful as an additive in commercial products for processes for removing metal ions. And some examples of products that contain EDTA are bathroom and kitchen tile cleaning agents to remove iron stains, to soften the water, and improve the cleansing. Some personal care products, cosmetics, hand lotions, hair care products, deodorants, and so forth, soaps and mascaras. Some fertilizers to add in the delivery of minerals. Some fruits to promote -- retention, and inhibit rancidity. And of course, in the purple top blood collection tubes -- that's why we are here today -- to bind calcium ions to inhibit the clotting of the stored blood. Today, there are no public reports to indicate that EDTA is present at quantifiable levels in non-EDTA --

Another important fact is that the concentration of EDTA in blood that has been collected into these purple top or EDTA tubes is expected to be 1.3 milligram per milliliter, or about .13 percent. I just included --

THE COURT: And does that remain over time?

THE WITNESS: Probably, yes: There is one note that 'I didn't make, that now that you 'ask the question, this concentration is express -- well, that's not important. In actual samples, there is some uncertainty of the concentration because we're assuming that the nurse who took the blood took exactly the amount of milliliters that are supposed to be in the tube. Sometimes, it's a little less. Sometimes, it's a little more. But, yes, the amount should be --

This is just a slide to put milliliters and microliters and nanoliters into some perspective. A milliliter is a thousandth of a meter, and two liters are one large soda bottle. A microliter is a millionth of a liter, and one drop out of a dropper bottle is about 50 microliters. That's a ballpark figure. And one nanoliter is a billionth of a liter. The same with weight. A milligram is a thousandth of a gram and a gram is about the weight of a paperclip. A microgram, the same, is a millionth of a gram and a nanogram is a billionth of a gram. So, I try not to go into this too much because it becomes quite confusing, but it would be important to relate the sensitivity of the methods to what we actually need to detect.

Now, we did an extensive literature search of EDTA

passing in blood, in particular with blood stains, and we found five publications. These publications represent three groups that do this kind of testing. The first, one is the FBI The second two publications are from a group at Carmel University, and this group doesn't exist anymore. They were dissolved when the main investigator, Dbetor Hamlin, Professor Hamlin retired in the fall. And then, Doctor Ballard's group down here.

Now, I haVe a couple of slides that just very superficially explain how EDTA testing is done. And I am not going to go into depth, just the principle behind it. There are three major steps in this procedure, and the first that I am going to talk about is called chromatography with selective ion -- and masspectrometry (phonetic) detection. So, first, you have to prepare the sample, which is explained down here. You cut a portion of the blood stain or substance control in our case. You extract the soluble DNA by soaking the cotton in water, and you convert all forms of extracted DNA into a chemical identical form of EDTA or into some derivative. That's a technicality that is only important so that you can make good fractions that contain all the EDTA in this step. So, let's go to the next step.

The next step is a chromatographical approach, and this can be a chromatography or also an electrophoretic

method, and if you were to relate this to something you're more familiar with, electrophoresis is we're also doing in DNA work. It separates molecules from each other. In this case, this method separates the EDTA from other substances that co-extract into the water when you make the water extract in the very beginning. And as I say, there can be several methods that I used and all of them are adequate.

The next step is the masspectrometer (phonetic) and in this part, you send the separated DNA from after the chromatography into a masspectrometer where the substance is ionized and this causes some fragmentation of the molecules of the smaller ions. And the masspectrometer acts as a mass filter to separate the fragment ions, and that method is very sensitive and is specific for this molecule. In this particular method, although it's very sensitive and already a very good method, there are some interference peeks that can make it more complicated. So, there is an improved method, and if you'd permit me to skip the next three slides because everything in the front is the same.

Where you can see, there are two sets of masspectrometry and we call this tandem (phonetic) MS, or MSMF. After fragmentations, you filter the fragment that you want to investigate further to produce a new fragment, and the result becomes very clean. No interference anymore, and very good sensitivity.

, the conclusion from what we know, first of all, these are the results that these -- groups present in their publications, and-Shephard and Henyon (phonetic), the. Cornell group that worked with blood plasma, which doesn't exactly represent the blood stain, but it's a very good study, they are sensitive down to one to three nanoliters of preserved blood and one to three nanograms of EDTA.

The FBI group is much less sensitive, it seems, from this result. Remember, one microgram is a thousand times more than a nanogram. But, this is only because their interpretation in this publication is more conservative. They can detect down to a certain level, but they are. more Conservative in their interpretation. And Doctor Ballard's group has approximately the same detection level as Doctor Henyon's group.

But, what¯ all means is that it's very sensitive and certainly sensitive enough to detect EDTA preserved blood. So, the method is adequate. At least, it is adequate for a pristine blood stain of known volumes. Okay.

And in this context, I define a pristine blood stain as defined to be one that is laid onto a clean substrate where no EDTA was before.

But, now comes a very important point. It is actually the EDTA concentration that is the critical value

in differentiating EDTA preserved blood stain and a non preserved stain. So, in other words, you need to know the volume of blood that you're testing. If you don't know that, the EDTA result is not very --

So, if EDTA is detected at a concentration that is consistent with one point -- milligrams EDTA per milliliter -- that's the number that we saw in the very beginning, then the pristine blood stain was very likely formed from preserved blood.

Now, I'm going into the issues that have to be considered when you do this type of testing. Issue number one. Can the volume of blood on the t-shirt be accurately quantified? The volume of blood that originally made the stain is unknown and difficult to estimate. And the raying (phonetic) method that is published by Doctor Ballard is not suitable in this case because there is an unfavorable ratio of substrate to blood, and if I may, I will illustrate this in my next slide.

MR. ALEXANDER: Excuse me, your Honor. I very reluctantly interrupt. But, I think we are now into an area that goes beyond a tutorial, your Honor. But, we are now into some argument and I thought this might be appropriate, but not at this particular time.

THE COURT: Your objection is noted. It's overruled. It's not really argument. I mean, if we want to

test A41 -- first of all, the test tube blood Obviously is going to have EDTA. I think that's a given, I would think.

MS. WILKENS: Yes, your Honor.

lvIR. ALEXANDER: Or another preservative

THE COURT: So, to test the test tube to find out if it has EDTA, we would expect that it. does. Then, there's two other samples, the A41 and the t-shirt. The t-shirt was never in the custody of the San Bernardino Sheriffs. IT's been in continuous custody of the San Diego Superior Court. And the chain of custody -- so, I think we need a chain of custody hearing as to that. As to A41, there are other issues as to whether that sample is big enough, or whether in doing this, we actually ruin the sample. So, it's context, and it's context that's helpful. To just learn about EDTA in general is helpful. But, it is still case-related. So, this is helpful for the Court's understanding, and then you can point out the issues on your side as well.

MR. ALEXANDER: Sure, fair enough. If I might just point out, your Honor, and because it is an important context, we believe there was actually access after the -- it was an exhibit. But, more importantly, based on the information we have to date, our contention is, in the instance of the t-shirt, that the tampering that we suspect or believe occurred was before trial. So that we are not talking about -- and this has been a confusion or whatever,

and perhaps it's our fault. But, our contention relates to the handling of the t-shirt before the trial when it was in fact in the possession of the Sheriff's Department.

THE-COURT: Well, we can go into that. The question is as to whether somebody would think at that time that to contaminate something for later use on a method that wasn't really recognized at that time.

MR. ALEXANDER: Well, we're now clearly into an area beyond the tutorial and

MS. WILKENS: Your Honor, if I could interject --

MR. ALEXANDER: Excuse me, Ms. Wilkens.

THE COURT: All right, your objection is noted and overruled at this time.

MS. WILKENS Thank you, your Honor, and we've carefully distinguished between scientific relevancy and relevancy in the general sense of the case, and we are quite confident that we are not getting into the areas that would be legal relevance.

THE WITNESS: This is the t-shirt that was investigated during post conviction testing, and Doctor Abe Blake (phonetic) and Steven Meyers did the sampling and the DNA testing on this shirt. You can see where they sampled. These are the yellow arrows. And I want to emphasize that not all sampling on this t-shirt was done for blood. For instance, up here, it was attempted to determine the

habitual wearer of the t-shirt by looking for perspiration and cells that would contain DNA: But, if you look into this area, thiS is the area where they test for blood. And on first try, there was very little blood visible, and I want to do a magnification here so that you can see a little bit better.

THE COURT: Can you tell me, what trial exhibit was this, the t-shirt? Somebody can look that up as we go.

MS. WILKENS: I'll look it up, your Honor.

THE COURT:' You can look it up and you can continue on.

THE WITNESS: Shall I continue?

THE COURT: Uh-huh.

THE WITNESS: The only thing that you can see on this slide is that not all of the DNA types that were obtained from blood are from.a single source. They are different. For instance, 6F contains a mixture of two individuals and possibly somebody else that couldn't conclusively be determined. 6G is not a mixture. It's just one person and so forth. 61, 6J are mixtures again. The mixtures are not all the same. So, therefore, it is entirely clear that the area where there is blood, and these are blood smears that we are mostly interested in for DNA testing, is more homogenous. Now --

MS. WILKENS: Your Honor, if I could interject,

the trial exhibit number is 169 and you can see it on the slide, DOLT6/169.

THE COURT: Okay, thank yoU.

THE WITNESS: Okay, now, magnified, the same area that we looked at before, you can see that these areas were sampled here and here. You have a centimeter ruler on top of it so that you know how big these samples are. And Mr. Meyers says that this area here appears to be the most significant remaining stain that would likely contain blood consistent with Cooper. So, what I want to pbint out here is that this smear is very thin. The published method is to cut out a piece that contains blood and cut out a piece without the blood of the same size and weigh the two pieces, and based on the difference he wrote, you can estimate how much blood is there.

Now, we did a little experiment in the laboratory where we tried to put one microliter of blood on the substrate and weighed it, and then we took some from a cotton t-shirt -- took the average of about one centimeter and weighed it and it had approximately the same weight as this one microliter of blood. So, weighing it would not give you accurate determination of how much blood was there.

In addition, the blood may also be a mixture, and I'd like to point this out. The reason why I'm saying this is because there was a mixture between here and here. This

is something that we have to keep in mind. And the blood stain that was originally determined to contain a DNA type that matched Mr. Cooper, is almost pristine, there was a tiny little bit a little to the left. So, we can see how little --

THE COURT:- So, wouldn't the question be, could you take that -- since we already have this test definitive, can you take that little remaining area and is that enough to test that area --

THE WITNESS: I don't know if it would be enough.

THE COURT: That area compared to another area of the shirt, where we've got plenty of other areas of the shirt, and compare it and see if we get that magic 1.3 percentage ratio of preserve, whatever it is, the preserved blood. If you have it in that one little area and don't have it on the other part of the shirt, if it comes out so perfectly, then, that's what the Petitioner would want to know.

THE WITNESS: Well, given that it's been determined how much blood this was, because if you just test this blood for EDTA, you may get some value.

THE COURT: But, see, you may get some value and the question would be , if you get the same value in an area closely in proximity to that area, then -- and if the two EDTA differences are dramatically different, logic, common

sense -- I'm not an expert -- would say that that would be interesting and worth further exploration.

THE WITNESS: Well, this is actually exactly the point that I need to get to subsequently, because it's complicated. Now, let me just finish the quantitation report. So, the weighing doesn't work on the other options for quantitating the blood. One possible approach would be quantitation of hemoglobin in the blood. Hemoglobin is the protein in the red blood cells that carries oxygen from the lungs to the body's tissues, and returns carbon dioxide from the tissue to the lungs. Hemoglobin is easy to measure in liquid, but with the chemical method combined with -- this is routinely done in the medical setting when -- hemoglobin checked. In the forensic area, there are -- methods that detect conformity of hemoglobin in blood stains,' but they are only semi-quantitative. So, the goal for these studies was really to identify blood in multi-quantitative. The concern is, if you would like to try this for quantitation, if the original amount of hemoglobin were underestimated due to degradation, the stain is 20 years old, or lack of some -- that's even a greater concern, because the molecule could change and it would be not -- from the substrate as efficiently as when it is fresh. This would lead to an over-estimation of the EDTA concentration. There would be --

. THE COURT: Are you saying that, in a test tube, the test tube sample is preserved, and so the ratio should . continue on, but because this shirt is 20 years old, who knows what evaporation or other things it's done to it?

THE WITNESS: There are no studies.

THE COURT: There's no studies?

THE WITNESS: No. So, that's one possibility, and then, there are also antibodies against human hemoglobin that could potentially be used. But, the issue of degradation of the natural molecule you're looking for is still the same.

Can we use DNA to determine the amount of -blood present, because the approximate amount of DNA in fresh blood is known. It's a known value. But, we already know that DNA degrades when exposed to the environment, that the amount of DNA recovered cannot be translated in blood. So, this is not a good method to use.

THE COURT: And you cannot then use DNA with PCR amplification and then get the sarrie kind of EDTA. There are two different testings?

THE WITNESS: It's exactly something I will get to to address that point.

THE COURT: Okay.

THE WITNESS: Issue number two. The exposure to EDTA from other sources. Since we already know that EDTA is

distributed widely everywhere we. go. So, EDTA is present in many products used in daily life, and some of these products contain EDTA in high concentrations, which are then shown in the next slide. And the history of the t-shirt with respect to its exposure to EDTA I just put a few„examples, soaps, lotions or foods -- is unknown. And here are some consumer items that contain EDTA and what I would like to draw your attention to is some of these were obtained at very high percentage of EDTA -- and so on, but more so the tile cleaners and toilet bowl cleaners. This is much higher than the concentration in the EDTA result blood tube. It's .13 percent and here we're talking about one .to ten and one to five percent.

As I said, the history of the shirt is not known. If it had been used as a rag, we would have -- we could account for a high concentration in certain areas.

THE COURT: But, couldn't you test adjacent samples, one with the blood, one without? And then, theoretically, those adjacent samples should probably have the same -- one would think maybe the experts could say that the EDTA would be consistent in the two areas. Theoretically, maybe one area of the shirt was splattered, but if they are adjacent, probably you would expect a uniform concentration.

THE WITNESS: I will get to that.

THE COURT: Okay.

THE WITNESS: So, again, to repeat, the history is not known, and there is a possibility that the t-shirt itself contains a certain level of EDTA in the background. Now, EDTA is highly water soluble. We know that. So, if you dilute the blood from the stain to test for EDTA, you would of course remove the background as well, and --

THE COURT: Tell me -- I didn't get that. Explain that to me.,,

THE WITNESS: Well, in the previous slides where we talked about how you test for EDTA, you make a water extract first, and then you rinse the stain in water so that all the EDTA gets solubilized in water. So, if there's already EDTA on the background, that EDTA will dilute with it. But, that leads to --

BY MS. WILKENS:

Q So, if I can clarify, Doctor Steinberger, if you are removing the blood, the method that you're using is also going to extract any EDTA that is in the garment itself under the smear of blood.

A If there was some.

MS. WILKENS: There's no way to pull from the smear of blood without also pulling from the t-shirt that's under the smear, which could contain EDTA itself.

THE COURT: Okay, and then maybe the

Petitioner -- but, can you - let's say you have one area on one side and one area on the other, and you pull it from both, and then can you say that the known concentration from the t-shirt is X, and you subtract that X from the area of the t-shirt, the base, plus the blood, to get the level of the blood, if there are any studies in that regard.

THE WITNESS: Right, that's exactly what it says here. It points to the significance of the subsequent reports. That's what it's called, the neighboring

THE COURT: Okay.

BY MS. WILKENS:

Q And Doctor Steinberger, would the EDTA in the garment be consistent throughout the garment? Would it be possible to --

A That is the big question and I won't get into that.

Q Okay.

A But, anyway, to your question, when a fabric is exposed to water, the salt with EDTA could conceivably be displaced on the substrate by the combined effects of -- action and chromatography. Such movement could effectively concentrate EDTA at locations that correspond to the dried out solvent -- and to give you an example, a perspiration stain would be the perfect example of something like this, where some component'S move until the liquid dries up and then get -- so, that's why the weighing method is not a good

method for. this particular situation, because there could be a concentration in this area on the background it's not mixed with, and it would make the results not reliable.

THE COURT: But, wouldn't that be lessened if you do it -- your control area is near where the smear area is, the GF, GI, GJ, those areas?

THE WITNESS: But, the control area -- the areas of the smear that you're referring to is -- so, there could be some higher concentration within that smear that would increase the EDTA concentration, but it doesn't come from the blood.

On a surface like this, where we assume homogeneity in the background, this approach is the right approach to take. But, on a non-homogenous situation like this one, it's questionable.

Now, I'm talking about the homogeneity within the sample itself. We're not talking about background on this slide. And I showed you that most of the blood smears on the t-shirt are known to contain mixtures. And'the mixtures are not all the same. And the EDTA measured could be from a mixture, because we can only -- we cannot tell. We can only extract DNA from the blood, whether it's blood from one individual or more than one. And therefore, we have to determine STR types that are present in the sample that is EDTA tested to determine if a blood matching Mr. Cooper

would actually be in that sample. If I may --

THE COURT: Don't we already know that?

THE WITNESS: No, because we cannot sample exactly the same area.

THE COURT: Oh..

THE WITNESS: Oh, from that little -- it's again --

THE COURT: From that little area.

THE WITNESS: We haven't sampled that area. It's adjacent, yes, but we don't really know. And I don't know if I'm permitted to refer to this situation where that became exactly the issue, where a bloodstain was halved and then an EDTA result was obtained from one-half and the genetic type was obtained from the other half, and then the argument -- the question was, well, we really don't know if this type is already the type -- is also the type that's in the half that was EDTA tested.

So, you brought it up before that you should really test -- do these tests on the same area. You should do EDTA. You should quantitate the amount of blood, and you should do the DNA testing from the same area.

THE COURT: And isn't this destructive testing, then?

THE WITNESS: Well, after EDTA testing, you cannot do DNA testing anymore. So, there's currently no published

methods where all three critical tests could be performed on the same extract.

BY MS. WILKENS:.

Q So, Doctor Steinberger, what you're saying is, in order to make sure that the EDTA result is coming from the blood result of a particular individual in this instance, it would be Mr. Cooper -- you would need to do both the very specific DNA testing that was done in the post-conviction testing. You would also need to test for EDTA and you would also need to quantify the amount of blood, and it's not possible to do all three from a sample. Is that what you're saying?

A The method doesn't exist. That's all I can say. Now we go back to a non-homogenous background that they talked about before.

THE COURT: Oh, you mean, this is the mud issue? Was it the ditch? This is the ditch issue?

MS. WILKENS: Well, the t-shirt is stained and --

THE COURT: Wasn't it found in a ditch?

MR. ALEXANDER: Yes, it was, your Honor, near the Canyon Coral. Bar.

THE WITNESS: So, when Doctor Blake and Steve Meyers looked at the t-shirt during post-conviction testing, water stained areas with varying intensity of fluorescence were observed._ And this strongly indicates a non-homogenous

background. And choosing the appropriate substrate controls will be highly problematic. That addresses the discussion that we had earlier, which substrate controls to choose.

And now, I come to the last slide, which addresses the validity. Known methods are unsuitable for the marginal situation that the same blood smear on a 20-year-old garment presents and EDTA testing results would be unreliable. So, that concludes my EDTA presentation. Would you like to --

MR. ALEXANDER: Yes, please, your Honor.

THE COURT: For this portion, why don't you go to the witness stand.

MR. ALEXANDER: If I may ask the Court's permission for Doctor Steinberger -- is it Doctor Steinberger? I'm sorry. To call up a slide so I can ask a question about it, but for most of what I want to ask, I think that's fine.

THE COURT: Okay. Don't turn it off.

THE WITNESS: No, I won't. But, now, I need to go back. That's going to take me a minute.

MR. ALEXANDER: While we're waiting, your Honor, to move things along, the article, the reference to the Cornell University people is the attachment to our submission, just to remind the Court, involving Jack Henyon and Mr. Shephard. So, you have their work that was done in 1997 attached to our submission. And in addition, just to

put Doctor DeForest in further context, one of the matters he will address is a matter that Doctor Steinberger -- Doctor Steinberger it is? Yes. Doctor Steinberger raised, which is which are the suitable stains that should be subject to the preservative testing. Thank you.

THE COURT: Thank you.

THE WITNESS: Do you want --

MR. ALEXANDER: I think it's the Court's preference that you be on the witness stand until I have a couple of questions about some slides.

THE COURT: Is anybody okay with -- well, we'll go till noon and then take a break. Okay.

CROSS EXAMINATION

BY MR. ALEXANDER:

Q I just want to understand, Doctor Steinberger, a few things relating to the preparation of the presentation. It's my understanding that the laboratory for which you are employed does not do EDTA testing or preservative testing, is that correct?

A That's right.

Q And you, yourself, have not ever done any.

A No.

Q Okay, what I said is correct.

A I have not done EDTA testing.

Q Okay, and is it also true that the other gentleman listed, the three gentlemen listed there also have not done, to the best of your knowledge, preservative'testing? -
A To my knowledge, they have not done EDTA testing.
Q And is it -- based on information you have, is it more likely than not that preservative testing is going to be done by a defendant because it will typically arise in an issue of tampering as opposed to the prosecution, if you know?
A At this point, yes.
Q Okay. But, are you aware that, in fact, in the O.J. Simpson case, it was the prosecution that first introduced the preservative testing, correct?
A That's true.
Q And that was done by a Doctor Marks (phonetic).
A From the FBI.
Q At the time, yes.
A That's right.
Q Do you know if Doctor Marks is still with the lab of the FBI or if he's in some other position?
A He's not with the FBI anymore. I don't know in which position he is now.
Q Okay. Now, you mentioned -- in mentioning the FBI, with Doctor Marks no longer there, do you know who it is at the FBI lab -- and is that the one in Quantico, Virginia?

Do you know?
A I am not sure.
Q All right, fair enough. But, when you said Washington, I 'believe that's the one you're referring to, that FBI lab in Washington?
A I did not mention Washington, I don't believe.
Q I apologize. Maybe it was Ms. Wilkens. In any event, so, you're not sure where the FBI lab is.
A They are all in Washington. One is downtown and one is in Quantico.
Q Okay, thanks. Now, do you know who does do the preserVative testing at the FBI lab today, if anyone?
A At the moment, it's not done.
Q Okay, and I think youmentioned that, at Cornell University, that facility that Mr. Henyon and Mr. Shephard who wrote the piece you refer to, they're no longer there.
A That's true.
Q And the FBI doesn't do it anymore, correct?
A At the moment.
Q Okay, fair enough. At the moment.
A Yes.
Q And so, is it your understanding that the only laboratory that does do preservative testing at the current time is Doctor Ballard?
A Yes.

Q Okay. Thank you for that. Now, let me ask you this. In the course of this preparation, did you actually see the t-shirt itself?
A I did not
Q Did any of the other gentlemen who assisted you see it?
A Yes.
Q Which of these gentlemen saw the t-shirt?
A Mr. Steve Meyers who did the testing himself, and Mr. Gary Simms, who is the laboratory director who has also seen the t-shirt.
Q I see, and when did they see that t-shirt?
A During the post-conviction testing, which was the period from -- 1999? Is that correct?
A Okay, not recently.
THE COURT: 2001. Wasn't it 2001?
THE WITNESS: During post-conviction testing. I cannot specify the date.
BY MR. ALEXANDER:
Q I was confused. Not in connection with your tutorial preparation. They didn't see the t-shirt more recently within the last month or so.
A .I don't believe we looked at the original evidence, no.
Q When is the last time you recall that you people were given access to the t-shirt?
A As I said, during post-conviction testing.

Q I just wanted to make sure I was clear on that. Thank you. Now, I don't know if you'll need to go to a slide for this, but I believe that there was a slide up there that you described a separation method in dealing with the bloodstains.

A Chromatography.

Q Okay. Do you know whether in the DNA -- I'm sorry -- yes, in the DNA testing that was done in this case in 2001, whether there was soaking of the bloodstain that was tested and then subject to a centrifuge to separate out the DNA from the remaining portions of the stain?

A Well, there was certainly a soaking of the bloodstain involved, because that's how we remove the cells from the substrate.

Q And after the cells are subject to the soaking, is the compound or whatever comes from that then subject to a centrifuge so that you get a separation?

A Well, it's not accurate the way you put it, but there are some centrifugation steps involved.

Q Okay, and does that result in a separation of the DNA from a liquid that would contain the preservative in it? Let me ask it more simply. I shouldn't try and show any expertise in this area, because that would be an exaggeration. But, when you do the centrifuge, is there a separation that occurs?

A Well, again, separation is not the right word. It's not possible to separate the EDTA from the DNA with the method we are applying.

Q I'm sorry. When you say "the methods we're applying," to what methods are you referring?

A The DNA methods, the DNA extraction method.

THE COURT: The extraction PCR amplification?

BY MR. ALEXANDER:

Q Is there a soaking liquid that, as a result of the extraction, that is separated out? I use the word "separated," you know, in quote.

A Yes.

Q Okay, and now, do you know whether or not that has been maintained by the Attorney General's office?

A Well, your question isn't addressing the relevant step, because this is a bloodstain and we apply a re-agent that bursts the cells so the DNA is solubilized in that liquid. So, that's part of the method. There is nothing to keep behind.

THE COURT: It all becomes soluble?

THE WITNESS: Yeah, the DNA is solubilized in the liquid.

MR. ALEXANDER: May I have a moment, your Honor? Maybe I can bring this --

(Pause.)

BY MR. ALEXANDER:
Q - Do you know whether or not there was an initial soak done of the stains back in 2001 when the DNA testing was done?
A I do not know.
Q Now, if you could approach the --
MR. ALEXANDER: I'm almost done, your Honor.
BY MR. ALEXANDER:
Q If you could approach your power point and-call up the picture of the t-shirt itself, I would appreciate that.
THE COURT: Could we also have her print out a copy of her power point slides and giVe a copy to the Court?
MS. WILKENS: Yes, we'll have that available after the noon recess.
THE COURT: All right, thank you. And to Defense counsel.
(Pause.)
THE COURT: You've highlighted the top portion. You need to unclick that, probably.
THE WITNESS: Do you mind if I leave it like this, because apparently, when I go to the presentation, it goes back to the first one.
THE COURT: But, I thought that was because you highlighted the first slide. Do we have any power point gurus here?

MR. ALEXANDER: I have to empathize with Doctor Steinberger.

THE COURT: Why don't we -- why don't we take our --

MR. ALEXANDER: I think I can work with the smaller one, your Honor.

THE COURT: With this one?

MR. ALEXANDER: I think so.

THE COURT: Okay.

MR. ALEXANDER: All right, I'm not going to be very long.

THE WITNESS: Sorry.

MR. ALEXANDER: That's all right. I know they say it's down. I use the word "broken." But, that's fine. I think I can --

THE COURT: Just stay with that one?

MR. ALEXANDER: I'm fine with that, your Honor.

THE COURT: All right, and this is the t-shirt, Exhibit 169.

BY MR. ALEXANDER:

Q Okay, it's fine. Oh, absolutely. I just want to make sure I -- as I understand it, if you look at the t-shirt here, with the exception of 6G, CC1 at the top, that doesn't have any smear according to the exhibit of Mr. Cooper's blood, correct?

Right.

Okay, and then, we can't tell --

THE REPORTER: You need to be:at a microphone.

BY MR. ALEXANDER:

Q S CC1 is simply blood from Doug Ryan, the dad, the father.

A Correct.

Q And then, we can't tell on the next one down, 6A, whose blood that is, correct?

A Could riot be determined. There was not enough --

Q And apparently, there is same conclusion on 6B, D and E. We don't .know whose blood that might be. It says "habitual wearer." Do you know what that means?

A Yes, it means it's these samplings here where it was attempted to determine the habitual wearer of the t-shirt by looking at cells in the perspiration.

Q But, no indication as to who that's identified with.

A No.

Q Okay.

A Correct.

Q All right, then, the next one, 6F, is a mixture. So, we have apparently Peggy Ryan and Mr. Codper and perhaps somebody else, or it's not certain?

A Well, he was not able to make a conclusion, but there are other peaks, as we call them.

Q Okay, now, I'm going to skip the smear and come back to that in a minute. The next one, 6H, there is -- we don't know who -- there's no DNA there and there is no ability to identify. I guess that's a water stain of some sort, fluorescent stain?

A It's fluorescent, but I am not -- I cannot tell you what the history is.

Q Okay. All right, so, we don't know, at least with the exhibit, who that might belong to, or come from, that stain, or where.

A There was no DNA recovered.

Q Then, the next one, we have Doug Ryan and Mr. Cooper again, correct?

A Correct.

Q All right, and then, we have Doug Ryan again and Mr. Cooper, correct?

A Correct.

Q And then, on the last one, 6K, we have another mixture, Doug Ryan and Mr. Cooper.

A Right.

Q So, is it your understanding that this t-shirt was -- this was the t-shirt that the State contends was worn by Mr. Cooper in the commission of the crimes and the blood got on there from the commission of the crimes. Is that your understanding?

A I am not --

MS. WILKENS: I'm going to object, your Honor. She is not privy to what --

THE COURT: Well, if she knows.

MR. ALEXANDER: If she knows.

THE COURT: If you know.

THE WITNESS: I do not know.

BY MR. ALEXANDER:

Q Okay, fair enough. But, at least, with the exception of 6G, in every instance on that t-shirt where blood was apparently spattered, and I'll ask you to assume it was done during the commission of a crime, Mr. Cooper's blood is right mixed in with Mr. Ryan's, correct?

A But, spatter is an incorrect description.

Q Forget about the word "spattered." Every time that they identified Mr. Cooper's blood, with the one exception of 6G, it's mixed in with Mr. Ryan's blood.

A That's correct.

Q Okay, now, let me just ask you a question about the smear, and that is, do you, Doctor Steinberger, or any of the people who assisted you in doing this, have the expertise to know whether or not that smear could be tested for a preservative? Is that something you would be able to do?

A They only looked at the intensity of the smear and

determined where the intensity is the highest. It's the best chance to get an EDTA result. That's all.

Q Okay, but -- I guess it might be appropriate to return, if you might return to the witness stand.

THE COURT: And when you say "that smear," which

MR. ALEXANDER: I'm sorry, your Honor. 6G, where it says "smear," which appears to be on there --

THE COURT: Cooper.

MR. ALEXANDER: Just Cooper.

BY MR. ALEXANDER:

Q And I guess my question was a little bit different, Doctor Steinberger, and that is, do you have the expertise to determine whether or not that smear could be tested for a preservative?

A Myself?

Q Yes.

A I am certainly qualified to determine which of these smears seems to be the most intense.

Q I understand that. But, my specific question is, with regard to that smear, whether the most intense or the least intense, whether or not you have the expertise to determine whether the intensity it has, whatever that may be, could be tested for the presence of a preservative?

A I would not consider myself an expert.

Q Okay, and just finally, do you know whether any of the other gentlemen who assisted you have that expertise?

A No, they don't.

MR. ALEXANDER: I believe that's all I have. Thank you very much, Doctor Steinberger.

MS. WILKENS: Your Honor, could I just clarify something on the t-shirt?

THE COURT: Yes.

REDIRECT EXAMINATION

BY MS. WILKENS:

Q Doctor, drawing your attention to the t-shirt, first of all, with respect to stains 6B, 6C, 6D, 6E, to clarify, those are not bloodstains, is that correct, those are the habitual wearer portions?

A These are the ones -- I can't see from here. These are the ones from --

Q They're the ones around the collar, and it says "habitual wearer."

A These are not bloodstains, no.

Q I wanted to clarify that those are not bloodstains. And then, additionally, counsel asked you if every time, with the exception of the one stain where it was solely Mr. Cooper's blood, he asked you if every other time where Mr. Cooper's blood appeared with someone else, was it Doug Ryan. And I wanted to clarify that stain 6F mentions Cooper

and Peggy Ryan. So, it would be incorrect to say that all of the combinations are with Doug Ryan, is that correct?

A That's true. I missed that.

MS. WILKENS: Thank you.

THE COURT: Why don't we take a short recess. What's your scheduling?

MR. HILE: Your Honor, may I ask, Doctor Melton has a flight that leaves at 1:15. I'm wondering if she could be excused.

THE COURT: Yes, you may. Thank you for coming.

MR. HILE: Thank you.

MR. ALEXANDER: What we would propose to do next, I believe, subject -- and Mr. Hile is more familiar with Doctor DeForest's situation, but I think, since we're on to this area, I would propose to have Doctor Ballard and --

THE COURT: And you're all right on your flight schedules as well?

MR. ALEXANDER: Oh, yeah, we're up in the Bay area.

THE COURT: Yeah, okay, so then, why don't we take a recess. Let me ask my staff. How about till 1:15, is that okay? Oh, it's 11:14, okay, all right. We can keep going.

MR. ALEXANDER: Oh, we can, very well.

THE COURT: Does anybody need a short break?

MR. ALEXANDER: If the Court would indulge, I could use a short break.

THE COURT: All right, we'll take a -- why don't we take a fiveLminute recess break.

(Proceedings recessed briefly.)

THE COURT: You may proceed.

MR. ALEXANDER: Your Honor, at this time, we would propose to have Doctor Ballard give his presentation on the tutorial with regard to preservative testing. We don't need, for whatever purpose, that information, and to assist both the Court and counsel -- and these got pulled out -- I would request the Court's permission to hand out both Doctor Ballard's CV and the copies of the power points he will use, because as I understand it, he's going to refer to excerpts of those, not necessarily the whole power point.

THE COURT: You may.

MR. ALEXANDER: Thank you, your Honor. These actually are now punched.to go in the notebook.

THE COURT: And we'll mark this as Petitioner's 2 and it's received for purposes of the tutorial.

MR. ALEXANDER: Thank you, your Honor.

THE COURT: Oh, I see, so this is the CV and then that's -- all right, this will be 2 and then the power point will be Petitioner's 3.

MR. ALEXANDER: Thank you, your Honor. Just

finally, before Doctor Ballard takes over, I really just intend to allow Doctor Ballard, in the interest of time and the like,' to proceed right into his presentation, and I don't intend to do it question and answer, as was done somewhat with Doctor Melton, unless there's some point or so that I just want to bring up.

THE COURT: All right.

MR. ALEXANDER: Thank you very much, your Honor. Doctor Ballard.

KEVIN BALLARD - PETITIONER'S WITNESS - SWORN

THE CLERK: Please state your name and spell your last name for the record.

THE WITNESS: My name is Kevin Ballard. That's K-E-V-I-N, B-A-L-L-A-R-D.

DIRECT EXAMINATION

BY MR. ALEXANDER:

Q Doctor Ballard, I think your CV is self-explanatory. Just let me ask you, if I might, it also has some words on it that I cannot pronounce, let alone understand. So, I won't take you through all of that. But, if I could ask you to briefly describe for the Court what your occupation is.

A I'm the director of analytical toxicology with a company named National Medical Services in Willow Grove in Pennsylvania. I'm also the director of research and development with National Medical Services.

THE COURT: And can you -- this is not in the CV, so can you tell me a little bit more about what he does?

MR. ALEXANDER: Yes, I was going to follow-up. That's one reason I asked this.

BY MR. ALEXANDER:

Q As her Honor just indicated; could you describe or explain to the Court with regard to your own particular practice in that lab -- first of all, how many employees at the lab, approximately?

A It's a medium sized company. It's approximately 200 employees.

Q Two hundred employees. Okay, now, for the Court's benefit --

THE COURT: From '93 forward, I believe.

MR. ALEXANDER: Yes.

BY MR. ALEXANDER:

Q Is that correct?

THE COURT: What have you done since 1993?

BY MR. ALEXANDER:

Q Ninety-three. When did you start at the laboratory?

A I started in 1998.

Q 1998.

THE COURT: And what did you do from 1993 to 1998?

THE WITNESS: I worked as a research assistant professor at Baylor College of Medicine in Houston, Texas.

THE COURT: Oh, I see. It says that here. Thank you.

MR. ALEXANDER: Yes, I was going to move from 1998. to the present, your Honor.

THE COURT: Okay, I got confused. On page 2, it said '98, and then I just flipped to the last one and it was through '93. So, I missed your '98 issue. So, you've been with the same company since '98.

THE WITNESS: Since 1998.

THE COURT: All right, thank you.

BY MR. ALEXANDER:

Q And if you could describe with greater particularity with regard to your own responsibilities, the areas in which you practice and concentrate on.

A I focus, as director of analytical toxicology, our laboratory does a lot of toxilogical testing, both in forensic settings and in clinical settings. My focus is o the analytical side of the toxicology; in other words, if a question comes up, can we measure such and such compound in this particular type of tissue, I'll be asked that question. Whereas, what doe$ cyanide do to a human being, our classical toxicologist will be asked that question. My focus is on the analytical side of toxicological and clinical drug issues.

Q What do you mean by "the analytical side?" Could you

elaborate?

A Yes. Developing methods to permit us to analyze compounds, answering the two fundamental questions, is the compound there, and if so, how much. That's the analytical side of a toxicological issue. The more pharmacologic/toxicologic question would be, well, what does that do to the heart, or what does that do to the liver. That's not my focus. My focus is on the analysis itself.

Q So, for example, what the compound consists of is analytical toxicology.

A Yes. How much morphine is in the blood, that's analytical toxicology. What would the effect of this amount of morphine be on a human being, that's classical toxicology.

Q Okay, thank you. Now, in connection with your work, would you describe for the Court your experience in analytical toxicology with regard to preservative testing?

A I first became involved with testing for anti-coagulants, also known as preservatives, during the O.J. Simpson case.. I was asked by the, Defense in the Simpson case whether it would be possible to determine, to detect EDTA in the forensic blood stain. And I did some research, and to the best that I could tell, that had never been done before. So, I began developing methods to permit doing that. Along the way, questions relating to other types of

anticoagulants have come up.

I brought along an exhibit that basically is just a bunch of blood collection tubes. Both for forensic and for clinical purposes, blood is collected into-different kinds of blood collection vials, depending upon the purpose. In a hospital setting, for instance, if a complete blood count needs to be done, everybody knows that the purple top is the correct type of tube to use for that test. Similarly, if glucose level is being done, there's a special tube for glucose. For many drug tests, a gray topped tube is the correct one to use. There are a myriad of these things. And they allcontain different things. The red topped tube actually is the simplest. It contains absolutely nothing. It's just a tube, an evacuative tube. The purple top tube is anti-coagulated with EDTA. The gray top is anti-coagulated with dofoxalic (phonetic) acid and flouride. I don't have one here, but a yellow top is anti-coagulated with citric acid. This green top is anti-coagulated with heparin, and this blue top is another variation on the purple top. It has EDTA in it. Out of all these, the only things I can test for are the purple top, the gray top and the yellow top. I can't test for heparin. The red top, there's nothing in it to test for.

Q Now, just finally, by way of some background information, Doctor Ballard, in the course of your work

since 1998 and even before, have you done work for both enforcement agencies as well as the defense?

A Not on the EDTA issue, but on toxicological issues, yes. The fact of the matter is the vast majority of my work is on behalf of law enforcement.

Q Does that also include the FBI?

A I haVe worked in conjunction with the FBI. I have done some testing specifically for the FBI.

Q And I take it -- or let me ask you. Have you testified as an expert in cases where you were retained by the FBI?

A I was not retained by the FBI in the cases that I think you're referring to.

Q The Veteran's Administration.

A Yes. The Veteran's Administration, and also the State of Florida. There were two or three cases, actually, where both the FBI laboratory and our laboratory did testing basically to verify each other's findings.

Q And is it also true today that the vast majority of your toxicological work is for enforcement agencies?

A The vast majority of it is, yes.

MR. ALEXANDER: Very well. With that, your Honor, I would allow Doctor Ballard to take us through his tutorial with regard to preservative testing. Thank you, Doctor.

THE WITNESS: Fortunately, Doctor Steinberger did more than half of my work for me. So, I may be able to

shorten this somewhat as compared to what I had originally intended. I want to start with EDTA and its structures. Is that laser pointer available?

This is the structure of EDTA, which is ethylene diamine tetracidic acid (phonetic).. The long name comes from the structure. This what I'm trying to circle here is ethylene diamine. Then, it has four acidic acid -- attached to the nitrogens of the ethylene.

This is, as far as I know, a purely synthetic compound. It was synthesized back in the 30's. It is a tetracarboxilic acid. COOH here is the carboxilic acid part. Acids donate hydrogen, or also called protons, to the solvent that they're in. By its very nature, just as a compound dissolved in water, depending on its PH, it can exist in five different forms. This is what's known as the fully proteinated form. If we form a monosodium salt, replace one of these hydrogens with a sodium atom, that would be a triproteinated form. And then you take off another one,'that would be a biproteinated form, all the way down to the form that has lost four protons.

What I'm trying to show, your Honor, is the complexity of-the chemistry of EDTA, because it's not like other molecules. It exists in many different forms. Here, these diagrams, by the way, are from an analytical chemistry text that I had in college, Coogan West (phonetic). This

shows the equilibrium that exists between these five forms of EDTA even in simple aqueous solution. As a function of PH, each one appears and disappears as you alter the PH, such that, at a PH of 12, it's almost all the tetra anionic form. Whereas, the low PH, it's almost all the fully proteinated form. And these are all in equilibrium with each other. But, the picture is much more complicated.

EDTA's role in this world derives from the fact that it forms complexes known as kelates (phonetic) with metals. This is a list of various cationic metals that form complexes with EDTA. One of those is calcium. It forms a kelate of intermediate stability. It has a formation constant in the realm of a -- range. The reason EDTA is used as an anticoagulant in blood is because it ties up the calcium that's present in blood. Calcium is required as a co-factor for the formation of a clot. By binding up all the calcium -- and this is a cartoon diagram of what that kelate might look like with the calcium right here in the middle of this cage. By tying up all the calcium, the blood doesn't clot.

If you think in terms of a forensic blood stain, just in EDTA preserved blood, if the tube is filled properly to the intended level, approximately half of the EDTA in that blood exists as the calcium kelate. The rest of it will exist, some as magnesium kelates. There's a little bit

of magnesium in blood, a little bit of copper, various other trace metals, and the free forms, the five free forms that we've already looked at. So, if you're doing an EDTA analysis, you have to consider all these different forms, the possibility that perhaps it's on a rusty knife that would be full of iron, which forms an extremely stable complex. How can you test for it and reliably find it if it exists in all these different forms?

Well, the answer is to drive all these different forms to one final common product. That's the approach that I took to it. That's also the approach that Jack Henyon and his co-workers took.. A slightly different approach. What they did, what Jack Henyon did was used nickel, which also forms an extremely stable complex, and using heat and time, drive all the forms of EDTA to a nickel complex, and then analyze for the nickel complex using actually electrospray in tandem with masspectrometry. The approach that I used is a derivitization (phonetic) approach where all these different forms and the previous five are all driven to a tetramethylester (phonetic) derivative. I used a very powerful agent for that, and all those kelates, including the extremely stable iron kelate, are driven to the final common product, and that's analyzed by tandem masspectrometry.

For the sake of completeness, I also wanted to

show the structures of citric acid. This is out of the Merck indek. It's also a polycarboxilic acid, but it also has an alcohol group. You use a slightly different approach to analyzing for citric acid, a different derivitization strategy, and also, oxalic acid; which is the other analite for which I test in terms of anticoagulants. Oxalic --

THE COURT: But, the citric acid is really a non-issue.

MR. ALEXANDER: No, your Honor. We understand -- in fact, I think we were able to document that, at present, the two preservatives that we're aware of from lab reports are EDTA and citric acid. I don't know whether any others were used. That's something we need to find out so that we don't go looking for one and in fact it was another. But, we do have indications now that there was a yellow top test tube. And in fact, in our -- well, those are the two we're now aware of, and certainly, the State will know whether there are those or any others. One could test, presumably, for EDTA, and it's not there, for example, because they didn't use EDTA, in fact they used it was a tube with citric acid as the preservative.

THE COURT: And how do you know that? I mean, you represented to the Appellate Court that it was EDTA.

MR. ALEXANDER: No, we actually, in our petition, requested -- and I have a copy of our prayer for

relief -- testing of any of preservatives that could have been used, and yes, it is correct, EDTA became the focus, and as I think I mentioned before, sort of the shorthand. We are aware for sure that there is EDTA and I believe that's also true of citric acid. I don't know.

THE COURT: But, there's nothing in the literature -- or correct me if I'm wrong -- that would say that citric acid has such a recognizable level, so that if we find it, that we would be able to say it's always in this level and so, therefore, it should be in this concentration. Perhaps you could get to that when we get there.

MR. ALEXANDER: Yes, that's what I'm going to ask Doctor Ballard to address.

THE COURT: Go ahead.

MR. ALEXANDER: Thank you.

THE WITNESS: Would you like me to go ahead and address that?

THE COURT: Well, you can address it at an appropriate time.

THE WITNESS: Just for the sake of completeness, I've also included oxalic acid, which is in the gray topped tube. The testing that I do, I test for EDTA currently using liquid chromatography tandem masspectrometry. The original test that I developed involved gas chromatography, tandem masspectrometry. The original test that I developed

involved gas chromatography tandem masspectrometry. Therefore, technical reasons, not the least of which is that we now have a much more powerful instrument, I moved the EDTA testing to LCMSMS.

What I've diagramed here is a generic LCMSMS system, which consists of one or more HPLC pumps. This is liquid chromatography. An injector, a column. This is where separation occurs. An ion source. This is the electrospray ion source that allows liquid systems to be interfaced into a masspectrometer. And then, the tandem masspectrometry at the end, which consists of an initial masspectrometer, MS1,. a collision cell, and a final masspectrometer, which is MS2. Derivatized EDTA has a molecular mass of 349. So, for an EDTA analysis, what we would do is set MS1 to transmit only 349 and throw everything else away. This is a first stage molecular specificity.

We then introduce 349 ions into the collision cell at a predefined collision energy, and basically force the ions to break, to break into pieces. And then, we use MS2 to scan those pieces. Now, what you get, depending upon how you do the analysis, you can either get a full spectrum or you can do selected reaction monitoring.

In the instrument that we're using, you get full spectrum.

THE COURT: Is it true that since this is with water, with some sort of solvent, that once you do this test, then you can no longer do DNA testing on the sample?

THE WITNESS: Actually, that's not true, your Honor. I do the testing in such a way that the DNA is preserved. As Doctor Steinberger pointed out, that was, in fact, an issue that came up-in New Jersey v. Pompei. The way the testing shook out, there, strictly speaking, was not overlapping EDTA and DNA information.

I basically do the reverse of what many DNA laboratories do. Many DNA laboratories perform what is known as an initial soak, where they soak the evidence in water or perhaps phosphate buffered saline, let it soak for a while, spin it down on a centrifuge and remove the supernate (phonetic), and they typically keep that. The DNA is at the bottom of the tube or still stuck to the cloth or whatever they're testing. That's exactly what I do.

The point about initial soaks at the DOJ during the testing of the Cooper specimens, if they did an initial soak, it's perfect for EDTA testing and we already know the DNA on it, if they did it.

THE COURT: And so, what would be the specific inquiry?

THE WITNESS: The specific inquiry would be -- these cuttings that came up mostly as mixtures,

including Kevin Cooper, one apparently is with Cooper possibly as a single source. Were those specimens loaded with EDTA? We can find out by testing the initial soak. You already know where Cooper is and where Cooper isn't. You also would presumably have soaks from the control cuttings. That would be the idea. In addition to fresh cuttings from the t-shirt.

The instrument that I'm using for this is called a quadropole (phonetic) time of flight instrument, also known as a QTOF. Here, we get full masspectral information. I'm going to have to show this to you in bits and pieces here. The upper spectrum -- the upper spectrum is EDTA itself. The lower spectrum is the internal standard that I use for this, which is isotopically labeled EDTA, where four of the carbons in the EDTA have been replaced with carbon 13 rather than the naturally present carbon 12, so that this molecule, which is in fact EDTA, can be differentiated from ordinary EDTA by the maaspectrometer. In looking---

THE COURT: What does that do for you?

THE WITNESS: It does many things. It's an ideal qualitative control for an assay to have an isotopically labeled internal standard. If you don't have one and you run an assay and you see absolutely nothing, you're kind of left wondering, well, is that nothing because there really is nothing, or is that nothing because my analysis didn't

work? With an internal standard, you know immediately whether or not your analysis works. And if you see nothing, then you know it's a true negative.

The other useful thing about an isotopically labeled internal standard is that it forms an excellent basis for quantitative determinations, You can run standard curves against it. You can even do the assay without a standard curve at all. If you know how much of the internal standard you put in there, the ratio of the intensities between the analite and the internal standard gives you an immediate measure of how much is in there. And this is actually a pretty good example. This is actually from a one-to-one mixture of unlabeled and labeled EDTA.

THE COURT: And what do you use as your label?

THE WITNESS: The label is carbon 13. It's analogous to like radio immunoassay where they use carbon 14 as -- or sometimes tredium (phonetic). It's very similar, except instead of being radioactive, carbon 13 is stable. So, you don't have to worry about radiation, and it hangs around and the masspectrometer can tell the difference. But, this number up here is the intensity of the base peak in the spectrum. This is 1.15 times ten to the fourth, and this 1.08 times ten to the fourth. These are theoretically a one-to-one mixture. Well, it is a one-to-one mixture because I made it that way. There is a slight isotope

effect, but it's pretty much one-to-one. Actually, 1.1 to one.

THE COURT: And did you say what reagent you use or not?

THE WITNESS: I'm sorry?

THE COURT: Did you say what reagent you use?

THE WITNESS: For the derivatization?

THE COURT: Uh-huh.

THE WITNESS: Thremolar (phonetic), hydrochloric acid and methanol.

THE COURT: And is that standard?

THE WITNESS: Oh, very standard, yes. It's an excellent way to derivatize carboxilic acids. I used it throughout my dissertation work and one of the reasons I like it is because it has never failed me. It works every time.

This is another way to represent the data. This is in the form of a chromatogram. What I've done here is just plotted one ion for the internal standard and one ion for the analite as a function of time during the chromatographic process. The EDTA, the derivatized EDTA, will come out at a characteristic time in the system. So, what you see is a chromatographic peak. And these actually are high resolution data. The specter that I just showed you incorporate, because they're high resolution, they

incorporate exact mass information, which can tell you the elemental composition, which is another piece of the molecular specificity of the assay. You can tell how many carbons, hydrogens, oxygens, nitrogens are present in each individual piece, and everything has to be exactly right or the assay is simply negative.

Now, what I've also included in this notebook are copies of some presentations that I gave, have given over the years at various masspectrometry meetings, the American Society for Masspectrometry. This one -- I believe I presented this in 1996, the determination of EDTA in forensic samples by capillary GCMS and GCMSMS. As I told you earlier, I originally developed the testing using gas chromatography as a separation means. I've since moved it to liquid chromatography. The basic principles, the basic science, they're all essentially the same, and the derivative is exactly the same, still using the tetramethylester derivative.

One of the things we showed during that presentation was a combination of what, in essence, was blind proficiency testing and simulated evidence tampering. What we did here was one of my co-authors, Mark Taylor, stuck himself with a pin and went outside and bled on the sidewalk up in Ventura. Then, he let-the sidewalk, stains dry, went out and swabbed them up. And he treated them in

one of three ways. He either allowed those swabs to dry in a hood, or he allowed them to incubate at room temperature, I believe, for 24 hours, or he allowed them to be incubated in a hood -- yeah, incubated at 37 degrees under moist conditions. What that does is it allows bacteria to grow and degrade the DNA. He then either did or did not add purple top blood to the swabs. He either added nothing or one microliter or two microliters of blood from either individual M or individual G, and I have no idea who those people were. He then sent the specimens to me. And what I've expressed here -- and what I measure is mass of EDTA. But, what I'm showing here is the equivalent in terms of microliters of EDTA -- in terms of microliters of purple top blood, of EDTA that was actually found by both GCMS and GC tandem MS. We were looking at both approaches. And you can see there's a very good agreement all across the board. If he didn't add anything, we didn't find anything. If he added one microliter, we found about a microliter in terms of EDTA.

THE COURT: If we wanted to replicate that and give you samples and you didn't know where they came from, it should come out the same.

THE WITNESS: Yes, this was done in a blind manner. I did not know what the specimens were. Now, I've done similar testing in conjunction with Peter DeForest.

I'll show you that as well. Now, one thing -- as we discussed a few minutes ago, we can do DNA testing and EDTA testing on the same specimen.

THE COURT: Have you done that before? You say --

THE WITNESS: I've done it several times.

THE COURT: You have done it.

THE WITNESS: Yes, I've done it several times. And this.was from 1996. This was the first time we did it. Now, let me just show you this.

THE COURT: What kind of DNA testing are you doing?

THE WITNESS: This was PCR. I have not done it in conjunction with STR actually, I may have. I think I did one case.

THE COURT: So, all you're just doing is PCR replication?

THE WITNESS: That's what this testing was. This testing was PCR. This was in 1996, and STR really wasn't around then.

THE COURT: Do you hold yourself out as a DNA expert?

THE WITNESS: No. I do know a fair bit about the subject. My ex-wife is a DNA expert. But, I personally am not. These are examples of where we did do overlapping EDTA

and DNA testing using the polymarker system.

THE COURT: What's the polymarker system?

THE WITNESS: The original PCR system was DQ alpha and polymarker, and this was the polymarker variant of that. It's the predecessor to SDRs. Both use the PCR technique. What we have is the sidewalk stain by itself dragging a hood and genetic typing on that. What we have on the bottom is ten microliters of individual G's purple top blood, and we have typing on that, and you can see there's some clear differences. G has a type C at the GC locus (phonetic) whereas the sidewalk stain, which is marked Taylor, has an A at that locus. And there are some other differences as well. In GYPA, it's A versus B. When he mixed the sidewalk stain and ten microliters of G's purple top blood, dried it properly in a hood and did the DNA testing, and this is testing on the material that I had extracted for EDTA. You get the obvious mixture. Here, you get an AC, here you get an AB.

When he first incubated the sidewalk stain under moist conditions, allowing the native DNA originally in the sidewalk stain to degrade, and then added G's purple top blood to it, he, quite expectedly, gets G's type. So, the original stain had this type. The simulated tamper stain has this type. And there's no evidence of a mixture. I thought that was fascinating.

But, this is one of the specimens where we did both DNA and EDTA EDTA and DNA testing. This is specimen BB.

THE COURT: Part of the scientific method is replication and sufficient numbers of issues. So, you have one test, but you need to have it replicated in order to have some scientific validity. Do you have that?

THE WITNESS: In terms of the DNA testing, no. All I can tell you is --

THE COURT: What we're dealing with realistically here is a very small sample. That's all that's pretty much available to us.

THE WITNESS: But, I would again emphasize the point that if these initial soaks exist, the DNA testing's already been done. This is -- here's BB, the same specimen, sidewalk stain, with ten microliters of G's blood on it, and we're able to find that. The thing that I personally find frightening is that, if somebody did that using a buckle (phonetic) swab, there's nothing to find. I also wanted to show you this. This is the extended abstract that was published as part of the proceedings of the meeting from the poster that I just showed you. The poster that's in that book isn't complete in that I couldn't find the figures. All I had was the text part. But, this does include a couple of the figures and I just wanted to show the nice

cleanliness of the traces. This is due to the use of tandem MS and the linearity of the standard curves. The dotted lines above and below each line represent 95 percent confidence limits forx those standard curves.

THE COURT: I would assume that there's lots of analytical toxicologists in the nation. Who would be your equivalent contemporary that you would respect?

THE WITNESS: Well, I respect Mark LaBeau with the FBI. He's an analytical toxicologist. Yes, there are. fact, there's the Journal of Analytical Toxicology.

THE COURT: There's a journal?

THE WITNESS: Yeah, there are plenty of analytical toxicologists.

THE COURT: Are there any that do EDTA testing?

THE WITNESS: No. No, but it's not a question of whether they're capable of doing the testing. Plenty of people, plenty of laboratories in this country could do EDTA testing. It's more a question of willingness. This is from a talk I gave at another ASMS meeting, and this concerns a slightly different approach to the extraction derivitization strategy, and looking at quantity of EDTA found vis-a-vis the amount of dried blood stain analyzed. I did this work largely in conjunction with Doctor Peter DeForest.

What Doctor DeForest did was he sent me specimens of dried blood on three different kinds of cloth. The blood

either was or was not purple top blood. It was up to me to find out, and it was again done in a blind fashion. And the three different types of cloth basically had two fundamentally different characteristics. Two of them, the nature of the cloth was such that you could easily scrape blood plates off of the clOth and just weigh it.

THE COURT: We don't have that -- we don't have that here.

THE WITNESS: We don't have that here, no, we don't. The other type --

THE COURT: Do you agree that the weighting method just wouldn't work here?

THE WITNESS: I absolutely agree with that. The weighing method's not going to work. But, what will work and basically what I understood you to be getting at is comparing similar surface areas of t-shirt where a stain is about that big and the unstained area is about that big, and if you find similar levels of EDTA, that's a meaningless finding, and if it's gigantic in the stain and not so gigantic in the other one, I think that's meaningful.

THE COURT: What about the issue of the blood is wet and may have dripped or, through capillary action, distorted the surrounding areas?

THE WITNESS: I think that's theoretically possible if -- you expect, if such a thing had actually

happened, first of all, there'd probably be some visual evidence of it. What you wouldn't expect is the average area density of EDTA on the cloth to change; in other words, on average, it's going to be the same. If you happen to have a spot or a solvent front edge that goes through the middle of a cutting, it still represents the portion of the cloth that had been washed, if you understand what I'm saying. That EDTA is still going to be the same amount per square centimeter or per square inch. Whether it's been concentrated through solvent front action or not.

THE COURT: All right. Why don't we take a break at this time, and then is 1:00 okay? We'll come back at 1:00.

(Proceedings recessed for lunch.)

AFTERNOON SESSION

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'THE COURT: Welcome back. We're back in session. We can continue. Doctor Ballard.

MR. ALEXANDER: Good afternoon, your Honor.

THE WITNESS: Getting back to EDTA with respect to bloodstain mass, related to the original -- as Doctor Steinberger pointed out, the theoretical value for purple top one is about 1,300 nanograms per microliter. A microliter, remember, is about one-fiftieth of an ordinary drop from an eyedrop. This is actually a tremendous amount, very high concentration, from an analytical perspective. Dried blood weighs about 18 percent of what the original wet blood weighs. And if you do that calculation, a dried purple top blood would give you 7,200 nanograms of EDTA per milligram of bloodstain, and that's true for pristine purple top blood. But, what if it's in a mixture? What if it's a mixture of equal parts purple top blood and non-purple top blood? Well, that number is going to be cut in half.

THE COURT: Isn't that speculation?

THE WITNESS: I'm sorry?

THE COURT: Isn't that speculation?

THE WITNESS: No. If you dilute EDTA blood with non-EDTA blood, you're by definition reducing the concentration of the EDTA.

THE COURT: Where's the foundation for that, though?

THE WITNESS: This is standard chemistry principles, your Honor. Let me give you an analogy.

THE COURT: I mean, dilution -- obviously, dilution. But, let's say I dilute it with -- how do I know you can't take any possible value of dilution and then just say, well, this is what's going to happen?

THE WITNESS: This is easily predictable. If we start with a milliliter of purple top blood, it has this concentration, 1,300 nanograms per microliter. If we add a milliliter of unpreserved blood to that to concentrate the volume double, you still have 1,300 nanograms, but now we have twice as many microliters. So, the volume doubles. The concentration is cut in half.

THE COURT: Now, you no longer have a constant that you're looking for. So, you're.

THE WITNESS: It's not a constant, and that's the point. In mixtures, the concentration of EDTA per mass of stain is necessarily going to be reduce as compared to pure dried purple top blood. Just as an analogy, if you take Coca-Cola and a glass of water and you mix them together, you've now got yucky brown looking Coca-Cola. If you take a tenth of a glass of Coca-Cola and mix it with a whole glass of water, you've got very faintly stained Coke stained

water. The more you dilute it, the lower the concentration is going to be.

THE COURT: Right, but at the front end, you're saying that we can tell definitively whether this blood was tainted or not. And now, what you're saying is, no, we can't tell definitively whether this blood is tainted or not because there could have been any number of dilution samples. So, no matter what value you get at the end, you could justify it by saying it was either present on the t-shirt with some soap or detergent, or it was diluted to this concentration, so you no longer have a yes/no -- by analogy, a pregnancy test, if you find HGA, whatever it is, it's definitive. So, we're now not sure that we're going to get any definitive results, even if you do your test.

THE WITNESS: I'm really trying to point out that it's not as simple as a number of 1,300 nanograms per microliter or 7,200 nanograms per milligram. There are practical considerations. At some point, say, one to ten or so, you're not going to get a DNA result out of it anyway. At some point, the minor components -- show.

THE COURT: What do you mean?

THE WITNESS: When they take cuttings, they're taking a finite mass for DNA. If it's equal parts of two people, the testing can certainly be taken as to people. If a person is in the so-called minor component, they can still

detect that first. But, at some point, if a person is so minor in the mixture, the DNA testing won't detect it. And similarly, at that point, they wouldn't be finding EDTA anyway.

THE COURT: You can proceed.

THE WITNESS: Now, these are actual data from samples that Doctor DeForest prepared and sent: me. haven't included all the negative samples, but he sent me a bunch of negatives as well, and there were no false positives. What I'm showing here are the results in terms of nanograms of EDTA per milligram of stain, bearing in mind the -- value of 7,200 and also bearing in mind that these specimens were literally straight blood plates off.of the cloth and weighed.

Now, you notice that most of these fall in the four to five thousand, maybe three thousand nanograms of EDTA per milligram range.

THE COURT: With one glaring exception.

THE WITNESS: Well, there are a couple of exceptions. This is an exception. That's pretty low, considering this theoretical data. That's extremely low considering this theoretical data. And I actually remember going back and repeating this one, because I was afraid I'd done something wrong and I replicated the finding. These were mixtures. Peter DeForest I thought he was either

sending me purple top blood or not purple top blood. Well, he threw in a couple of specimens where he mixed this up together. And I actually directly called him and I told him I think that one's a mixture and I think that one's a mixture. And he said that's exactly what they were.

There were similar results on the cloth where we had to use the weight and subtracting method. Here, the numbers are a little bit higher in the four to eight thousand nanograms of EDTA per milligram range. But, again, with a clear notable exception. This one shows up at 242. And I again called that one a mixture. I think I called that one a mixture, too, and they both were. You can see that, when it gets mixed together, in terms of mass of EDTA per milligram or microliter, if you want to use the volume metric measure, it necessarily has to go down.

This really brings us to the importance of comparing stained and unstained areas on a piece of evidence. This is another presentation that the previous two were 96 and 97. This one was -- thousand one. This is a case where there were two bloodstains on a pair of coveralls. The coveralls were the suspect's coveralls, or at least they were attributed to the suspect. One of those bloodstains came back both serologically and ultimately through DNA testing as consistent with the victim's blood, thus tying the suspect to the crime.

This was a situation where the Defense, who called me into the case, did not know whether it was a purple top or yellow top or gray top, or just what the heck was involved. So, I recommended that we test for everything. tested for EDTA first and found nothing. This was an instance where it was possible to use the weighing method, the weighing cloth method and basically subtracting out the mass of unstained cloth where we could determine how much was present, how much dried blood was present.

We had two stains and it was very dark cloth and it was very difficult to see the stain, but it's pretty heavy. And one substrate control, and that was from a neighboring part of the coveralls. As I said, I tested for EDTA first and found nothing. We also had a sample of the victim's reference sample. I tested then for citric acid and oxalic acid, and much to my surprise, the coveralls -- one of the coverall stains was loaded with citric acid. The other stain had nothing and the substrate control had nothing. This is the coverall stain. This is the victim's reference sample -- this is the citric acid stain. Again, we go to the --

Now, unlike EDTA, which as Doctor Steinberger indicated, is not normally present in human blood, and that was established through -- chromatokinetics (phonetic) studied back in the 50's. Normal human blood does contain

citric acid, and it's at a tightly regulated level. This is a comparison of the coverall stain with normal human blood. This is-an obvious difference. And this number is entirely consistent with what you would expect to find from any citric acid preserved or any coagulated bloodstain.

You can get -- if you think about this normal blood, rather than being normal blood, but a value for substrate control, you can get entirely comparable comparisons. And substrate control might have values that are running in the low numbers, and most things have values in low numbers and then all of a sudden up pops the high value. I think that comparison can be very meaningful.

As I've indicated, I do the EDTA testing by lipochromatography tandem masspectrometry. Oxalic acid and citric acid testing uses gas chromatography masspectrometry. But, it doesn't add much to the overall process. The evidence gets soaked. I take one aloquot (phonetic), process it for EDTA testing, and in parallel, process another aloquot or portion of the liquid for citric acid testing. So, it basically can,be done in parallel. I believe that's pretty much what I had for my presentation, your Honor.

THE COURT: Counsel, anything further? Did you want to clarify?

MR. ALEXANDER: I just wanted to ask Doctor

Ballard one or two things that may not have arisen.

KEVIN BALLARD - PETITIONER'S WITNESS - PREVIOUSLY SWORN

DIRECT EXAMINATION (Resumed)

BY MR. ALEXANDER:

Q You described or made reference to the O.J. Simpson case.

A Yes.

Q And you did not testify in that case, though, correct?

A I did not testify.

Q Okay, but you did have a role in that case, correct?

A I consulted in that case, yes.

Q Okay, now, and you consulted for the Defense, is that correct?

A Yes.

Q Now, with regard to Doctor Marks who was the prosecution's expert on the EDTA, did you have an opportunity to review the findings that he made?

A Yes, I did.

Q Okay, and what were his initial findings?

A He initially recorded no EDTA detection.

Q Okay, and did you then review that finding?

A - Yes, I did.

Q Okay, and what did you conclude?

A I concluded that there was in fact EDTA had been detected on two key evidence items, a sock and the -- stain.

Q And in the course of making that determination, you made reference earlier to there being different so-called forms, I believe you said, of EDTA.

A Yes..

Q Were you able to learn the error that Doctor Marks had made?

A Well, I disagreed with the approach that he and the FBI in general had taken in analyzing EDTA, because I felt like it did not adequately take into account all the different forms of EDTA. It basically --

Q Go back to your slide that might demonstrate that.

A It basically tested for the least abundant form. The testing that the FBI did in the Simpson case tested for this form of EDTA. And the PH's that are involved in a soak stain and especially in the OC -- which would be along here, this is one of the least abundant forms of EDTA. So -- and Doctor Steinberger pointed this out. The FBI testing method was about 1,000 times less sensitive than the methods that I use and that Professor Hinton used. That sock stain was extremely clean, very clean. Nevertheless, there were signals present. Let me put it in the present, and this is liquid chromatography tandem masspectrometry. There was no doubt in my mind that he had detected it, and ultimately, he admitted that he had.

Q Now, final question. We're going to hear from Doctor

DeForest shortly, and would you just describe for the Court the role that Doctor DeForest would play in connection with the analysis that you would do in this case?

A Yes, I would like Doctor DeForest to do cuttings in this case. I'd like for him to examine the evidence, because he really is a superb expert in looking at bloodstains, choosing which ones are appropriate for analysis, choosing appropriate substrate control areas. I would like for him to do cuttings.

MR. ALEXANDER: Thank you very much, Doctor Ballard. I have nothing more.

THE COURT: Was there a previous criminologist for the Defense?

MR. ALEXANDER: I'm told by Mr. Coches the answer is yes. But, I don't, standing here right now, know the scope of what he did. But, we'll certainly find that out and report it to the Court. Thank you.

THE COURT: Would you like him here or here?

MS. WILKENS: Would you be more comfortable over there, Doctor?

THE COURT: You're not going to need the slides, so --

MS. WILKENS: Yeah, I don't think I need the slides. So, that makes sense.

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CROSS EXAMINATION

BY MS. WILKENS:

Q Now, Doctor Ballard, is it necessary in order to determine the level of EDTA, is it necessary to quantify the amount of blood that you're working with?

A It's always helpful to quantify the amount of blood. When you're dealing with extremely faint stains like we're looking at on this t-shirt, though it's difficult, you can get an eyeball estimate, but it's difficult to get a precise quantity when they're that faint.

Q So, it's helpful, but not necessary.

A I think it should be done whenever possible, but not absolutely necessary when you're dealing with faint stains.

Q How do you insure the accuracy of the quantity of EDTA being measured if you're not able to quantify the amount of blood that you're testing?

A The accuracy of the EDTA determination really isn't affected by whether or not you know how much blood it is. So, you're talking about two different measurements. You're talking about a numerator and a denominator. The numerator being the nanograms of EDTA, the denominator being per milligram of blood. The accuracy of the EDTA measurement itself is unaffected by whether or not you know the denominator. And with faint stains, what you're doing is comparing stained and unstained controls with the working

hypothesis that any EDTA found is due to background in the shirt.

Q How do you know that the two different materials you're working with are precisely the same with the exception of the blood?

A No two cuttings are exactly the same. They're necessarily different cuttings, but they're from different areas of the same evidence item.

Q Well, if they're not necessarily the same, how do you discern any scientific import to any differences in EDTA levels between the two different samples if you don't know that they're exactly the same?

A It's directly analogous to substrate controls in DNA testing. You do DNA testing on a stained area and you get a result. You do DNA testing on an unstained area, if you get the same result, you know that your finding is meaningless. If on the other hand you get a very different result, i.e., no DNA on the unstained area and DNA on the stained area, then you know you've got a meaningful finding.

Q Well, if you're getting DNA in the stained area, when you take that DNA, you're looking at information that allows you to figure out whose DNA it is. You prepare a profile. Is that correct?

A That's correct.

Q Do you have anything that's similar in terms of EDTA?

I mean, you get a level of EDTA. You don't get a profile. Is that correct?
A That's right. You get a level.
Q Okay, and how do you establish any scientific significance to a particular level of EDTA when you are not working with samples that are precisely the same size?
A Well, they're not going to be precisely the same size. they're certainly going to be approximately the same size, and you can always make the measurement of what the surface area is. You can even simply weigh the cloth itself, which is a good way to do it. Basically, what you would be doing is measuring EDTA per square centimeter of cloth, or EDTA per milligram of cloth, when you're dealing with a faint stain now I'm talking about, and looking to see if there's a significant difference. And ideally, you'll do multiple controls to get a good sampling of the shirt, and this shirt I think is suitable for that because it doesn't have any stains on it. And --
Q I'm sorry, the shirt does not have any stains on it?
A It doesn't have -- it's not a blood-soaked shirt so you can get good substrate controls is what I'm saying. There are unstained areas there to sample.
Q Okay, and when you're mentioning stains, you're referring to blood smears, bloodstains?
A Yes.

Q You're not referring to other possible stains?

A I'm referring specifically to the bloodstains. Other stains can certainly be tested as well, if they're simply dirt or something like that.

Q If you have a smear of blood on a t-shirt, is it going to be equally distributed across the surface of the t-shirt?

A It should. It's not necessarily going to be, but it should be. There is EDTA in laundry detergent, for example. When a garment is carried through awash cycle, the last thing that happens to it is it gets rinsed. Well, it depends on how effective that rinse is as to what, if any, residual EDTA will be there. But, on the assumption that there is, it will be uniformly distributed across that shirt. Now, if that shirt has had -- now, there's EDTA in food, in beverages. If some of those things have been splashed on it, then that would result in a non-uniform distribution of EDTA on that shirt. But, such things are typically rather low in EDTA concentration.

Q So, if something were on the shirt, it's not necessarily going to be equally distributed.

A Not necessarily, that's true.

Q I was curious earlier, because I don't know how much laundry you do, but I didn't really understand the notion --

A Since I'm divorced, I do a lot more than I used to.

I'm sorry.
Q Well, I didn't really understand the notion that all the products that you would use in laundering a garment would be equally distributed and rinsed away, because you might, for example, pour the detergent on a stain or you might apply stain remover, and also, there's all those variables in terms of the quality of your washing machine, in terms of the rinse cycle.
A That's true. What you have to remember, though, is that EDTA, the forms that we use in daily life, everything except the H4Y form is extremely soluble in water, and it distributes throughout the water with a minimum amount of agitation. It's just evenly distributed in a very short period of time.
Q But, that presumes the t-shirt's been laundered.
A Yes, that's correct.
Q What if the person who wore the t-shirt had deodorant? Would that be applied to the garment, potentially?
A That's possible, yes.
Q And it wouldn't be equally distributed across the garment.
A No, it would be in a contact pattern, yes.
Q Now, you mentioned that you have done experiments where you have tested for both DNA and EDTA in the same sample, is that correct?

A Yes, it is.
Q And have you ever published your work in that area?
A Other than the one. poster` presentation that I showed you, no. And I'm not sure if that was included in the extended abstract for that poster or not. I can't remember.
Q Are you aware of any other published -- not any other. Are you aware of any published works where anyone has done the type of experiment that you undertook to do, resulting in testing for both DNA and EDTA levels in the same sample?
A Not, I'm not aware of any such studies.
• Have you ever subjected your experiments to peer review?
A In the form of meeting presentations only.
Q And how many meeting presentations?
A Three so far.
Q And when and where were those?
A Those were in 1996, 1997 and 2001 at the American Society for Masspectrometry meetings.
Q And you have never tested the same sample for DNA and EDTA for purposes of a forensic case. Is that correct?
A Bear in mind, I don't do the DNA testing. But, that's not correct. I've worked several cases where both EDTA and DNA testing were done on the same specimens.
Q What cases?
A I'm actually -- I think I'm not at liberty to say

because they were always negative specimens and there was no report and it falls under attorney/client privilege.

Q So, you've never testified in a court of law to the results of testing one sample and achieving DNA and EDTA results.

A On the same sample, no. You're right. I have not.

Q Now, with respect to the simulated tampering chart that you showed earlier, what was the concentration of the blood that you used for the stains when you were simulating tampering? How much blood did you use?

A In terms of the purple top blood? Is that what you're asking me? How much purple top blood did --

Q Sure, how much purple top blood?

A Well, that's included in the chart. It was either one microliter or ten microliters or none at all.

Q Okay. So, considerably more than a smear of blood.

A Yes. Well, one microliter is pretty close, actually. A smear, like what we were looking at earlier, that 6G item, that's going to be in the ballpark of a microliter, in my opinion, between a half a microliter and a microliter.

Q But, you've never undertaken your tampering analysis with respect to smears. You've used a larger quantity of blood, is that correct?

A I've tested deliberately as little as a tenth of a microliter of blood. Now, whether it was smeared, it wasn't

smeared. It was applied directly out of a syringe onto a piece of cloth. But, it would be equivalent to an extremely faint smear.

Q Is there a minimum amount of blood that's required before you can obtain an EDTA reading?

A Yes.

Q What would that be?

A The way I routinely set the test up, it would be approximately one nanoliter of blood, which is one one-thousandth of a microliter of blood.

Q And how does that compare to the size of the blood smear on the t-shirt?

A Well, if I'm correct that that looks like about a microliter, then that would be one one-thousandth part of that.

Q Okay, and when you perform your EDTA testing, can the results of your tests be reproduced?

A I can certainly reproduce them, and others should be able to as well, if they use the same method that I used.

Q So, you don't consume the sample in your testing?

A Perhaps I misunderstood your question. I will certainly -- yes, others can reproduce it, because I never fully consumed the liquid soak that I generate. I'll use like 20 to 30 percent of it, and the remainder would be available for somebody else to test, yes.

Q And it doesn't matter how small of an amount of blood you're working with. As long as you don't need all the soak, someone else could reproduce the exact same results that you obtained.

A They should be able to.

Q Has that ever been done?

A No.

Q Would you agree that EDTA is very ubiquitous, very freely found in the environment?

A Absolutely.

Q How do you rule out to a scientific certainty that there's other possible explanations for the presence of EDTA other than tampering?

A Well, there's -- technically, the testing cannot tell you whether it was done accidentally or deliberately. All that testing can tell you or potentially tell you is that a specimen was contaminated. If you look at seven specimens, though, and they're all contaminated, you begin to start to rule out accident in your own mind.

Q Now, when you say they're contaminated, are you saying they're contaminated with purple top blood or just contaminated from the environment?

A What I'm talking about is, where you've got clear evidence of bloodstain associated EDTA, that where there's a bloodstain, there's EDTA, and when there's no bloodstain,

there's no EDTA, when there's clear evidence, then that blood could not have come from a normal human being. Now, that means it came from a purple top blood. Well, was that an accident or was that deliberate? Well, then, it becomes a judgment call.

Q Well, isn't it possible that there's contamination from another source of EDTA other than blood in a purple stopper?

A It's always possible, yes. It's always possible.

Q How do you rule that out scientifically?

A Again, that's a judgment call.

Q Well, how do you make that judgment call?

A By testing as many stains and as many controls as you possibly can.

Q So, you basically test an entire t-shirt?

A Test a reasonable sample in the vicinity of the stains in question.

Q What's a reasonable sample, one, two?

A I think three is.

Q Okay, how do you arrive at three?

A It would be a good triangulation around a stain. It's a good representative sample of what the background on that cloth is going to look like.

Q And the background is going to be consistent throughout that area.

A It should be.

Q Why?
A Because of the high water solubility of EDTA.
Q Well, if there's a high water solubility for EDTA, that doesn't mean that it's going to be confined consistently across the garment, is that correct? It would mean the opposite.
A No. EDTA, from things like laundry and the like, which is the most likely source of EDTA on a t-shirt, is going to be uniformly distributed across that thing because of the high water solubility of EDTA. If EDTA were not highly water soluble, then you would expect an unevenness.
Q Well, don't you need to know the history of the t-shirt?
A It would be nice, but what we're doing is using the controls to find out about the history of the t-shirt. The controls tell us something about the history of the t-shirt.
Q Well, how many controls are necessary to give you the history of a t-shirt?
A Do you really want me to answer that question? There's no way you're going to gain the entire history of a t-shirt from controls. But, you gain some information about the background level of EDTA to be expected near the stain from the controls.
Q Well, wouldn't it be the same over the entire t-shirt?
A It should be, but as we've discussed, it isn't

necessarily so.

Q Now, do you keep re-agents that have EDTA, do you keep those in your laboratory?

A We have a number of re-agents in the laboratory that have EDTA in them, yes.

Q Okay. What form are those? Are they powder, liquid?

A We have the powder in the laboratory. We have particularly mobile phases in our HBOC department that have EDTA contained within a liquid medium at a predefined concentration.

Q But, how do you store these re-agents that contain EDTA? How do you store those in your laboratory?

A The powder is simply contained in a bottle inside a cabinet with a sliding glass door. The re-agents that are being used out in LCMS are literally bottles on top of the instruments. They're there all the time.

Q What do you use these re-agents for, generally?

A The biggest use my laboratory has for EDTA is as a mobile phase or as a component in mobile phases for HPLC instruments that use electric chemical detection. That's the single biggest use we have for it. And because we have to make those re-agents -- they get consumed, we have to make the again -- we keep the powder on hand to make that re-agent.

Q What do you do to prevent these re-agents containing

EDTA from coming in contact with your test samples?
A First of all, I don't work anywhere near them. Second of all, I always do what's known as a re-agent blank that controls for every re-agent that -- every re-agent, and for that matter, test tube piece of apparatus that the samples are exposed to during this testing process.
Q Now, earlier, you were explaining that it's easily predictable if you take blood that does not contain EDTA and you add it to blood that does contain EDTA, because you're going to know the exact volume, and therefore, you're able to determine with precision.
A You'll know exactly what the concentration is in that mixture, yes.
Q Is it as easily predictable when you don't know the exact quantity of the blood you're working with?
A Absolutely not.
Q Okay, and you have not means of knowing the exact quantity of the blood from a blood smear.
A No, but you can tell looking at it that it's certainly no more than such and such, and certainly no less than such and such. I mean, you can get a pretty good estimate just looking at it, if you've got enough experience as to how much blood that originally represented.
Q Well, to look at it, you need to know how much it originally was, or you can just look at it and know.

A You can get a good idea looking at it. You don't know exactly, but like for example, I don't think there's anybody here that's seen that photograph that would argue that that was a full drop of blood. We all know it wasn't. It's very much less than that. And based on the work that I've done with bloodstains, it looks like it's in the vicinity of a microliter of blood to me.

Q Well, is a good idea of the quantity of blood enough to know the significance' of an. EDTA level?

A I don't need to know the quantity of blood at all in a situation like that, because I'm thinking in terms of the background. Is it blood or not, first of all, and I think we're all in agreement that it's blood. You check neighboring unstained areas, you check that area, you expect them to be the same. If they're different and that blood is straight from a purple top tube, they will be very different, because one microliter is a 1,300 nanograms of EDTA, and that will be a gigantic difference from what you would expect from a typical shirt, which is going to be somewhere like 10 to 20 nanograms per centimeter area, something like that.

Q So, you're saying --

THE COURT: Just a second. The typical shirt, you would expect to have what?

THE WITNESS: Somewhere in the five to twenty-five

nanogrms of EDTA per square centimeter, in that ballpark.

THE COURT: And the purple top blood?

THE WITNESS: One microliter will contain 1,300 nanograms.

BY MS. WILKENS:

Q Doctor, are there published studies that indicate the amount of EDTA that would be expected to be found on a t-shirt per centimeter?

A - Published studies, no, not that I'm aware of.

Q Where are you getting the figure that you just provided the Court?

A Purely from experience. I've tested a lot .of evidence, and it's purely from experience. You usually find a little bit of EDTA on most evidence items that I've had an opportunity to test. You find a little bit. It's not perfectly clean. But, it's not enough to write home about, either.

Q So, you generally do not find any appreciable levels of EDTA on a garment.

A I've tested somewhere between 12 and 15 forensic cases for EDTA, and the vast majority of the time, I find absolutely nothing.

Q I'm sorry, 12 to 15?

A Yes, all over this country.

Q Now, you indicated that if you're unable to detect DNA,

then it's axiomatic that you would not be able to detect EDTA, is that correct?

A I don't think I understand the question.

Q I thought I understood you to say that, if there wasn't a sufficient amount of blood for you to get a result of DNA, then you wouldn't have a sufficient amount to get EDTA. Did you say that?

A I did say that with the underlying assumption that the DNA that you couldn't detect came from a purple top tube.

Q I missed that assumption. Okay.

THE COURT: Say that again?

THE WITNESS: When.I was making the analogy of extreme dilution where you dilute purple top blood out with non-purple top blood'to the point where DNA testing doesn't work anymore, you no longer find a minor component, well, simultaneously, EDTA is not going to find anything, either.

BY MS. WILKENS:

Q Are you aware of any scientific studies that compare particular EDTA levels to tampering? And by "tampering," I mean the use of blood in a purple topped tube.

A Other than the one that I showed you that my colleagues and I did, that's the only one I'm aware of.

Q Okay, and was that published?

A Only in the form of presentation at a meeting and the corresponding media abstract.

Q Now, you mentioned that you had worked on a case with a pair of coveralls.

A Yes.

Q What state was that?

A That was Texas. That was Texas v. Odelle Barnes (phonetic).

Q And did you testify in that matter?

A I did not testify in that matter.

Q You provided declarations?

A I provided a report.

Q Okay, so, you never provided a sworn declaration in that case.

A I never had the opportunity t

Q Now, you had mentioned that you've worked in conjunction with the FBI, is that correct?

A Yes.

Q And you've mentioned that you've worked for the State of Florida, is that correct?

A Yes.

Q And you mentioned an analytical toxicologist that you hold in high regard would be Mark LeBeau, is that correct?

A That's correct.

Q Did you work with Mr. LeBeau in the case of the State of Florida v. William Cybers (phonetic)?

A We both worked on that case, not together. We did

independent testing on that. case.
Q Was Mr. LeBeau able to duplicate the results of your testing in that case?
A Yes, he was.
Q All of your results?
A Not all of them, no. He didn't have the sensitivity to duplicate some of the lower levels, but the higher ones, he did.
Q And you testified in court in that case, is that correct?
A Yes, I did.
Q And was that case reversed?
A That case was reversed, yes, it was.
Q Were there other cases where you had to contact law enforcement or the prosecution and advise them not to rely on your results?
A I had to advise them that the interpretation of results had changed because of a new scientific discovery, and as a consequence, they had to basically put the case on hold.
Q How many cases did you have to make a notification of that nature?
A Just the one. No, that's not quite right. There was one criminal case and one civil case.
Q And what was the new scientific discovery that caused you to notify them not to rely on your opinion?

A The discovery that a compound called sucsenalmonocholine (phonetiC) is present at apparently low but detectable levels in liver and kidneys from recent decedents.

Q And who made that new scientific discovery?

A The FBI and National'Medical Services concurrently or working together made that discovery.

Q Okay, and that knowledge- was not available to you when you did your testing?

A That's correct.

Q And there's no other cases where you've had to notify them to disregard your test results?

A Not that I can recall.

MS. WILKENS: Thank you, your Honor.

MR. ALEXANDER: May I ask one question of Doctor Ballard?

THE COURT: Sure.

REDIRECT EXAMINATION

BY MR. ALEXANDER:

Q Doctor Ballard, we've gone into a lot of detail and the like, but I think one question that hasn't been asked or explained by you -- and if it has, I missed it and I apologize -- and that is with regard to human blood just inside our bodies, okay, are there detectable levels of EDTA?

A There are not detectable levels of EDTA in normal human blood. This was established by an elegant pharamacokinetic study done back in the 50's where what they did was they administered a pretty high dose of very radioactive EDTA. Radioactive testing allows very high sensitivity, even higher than what masspectrometry can do. And they were unable to detect EDTA in blood after administering a very large oral dose. Some EDTA, however, is absorbed, because what they did observe was that, over time, radioactivity appeared in the urine. What they concluded was that approximately five percent of orally administered EDTA is absorbed over approximately an 18-hour period. It doesn't accumulate to any extent in the blood because it's actively -- very actively excreted in the urine by the kidneys. So, in the absence of something like renal failure, it will not accumulate in human blood from people just eating EDTA, which we all do. We eat EDTA everyday.

MR. ALEXANDER: Thank you very much, Doctor Ballard. Nothing further from me, your Honor.

THE COURT: Thank you, anything else?

MS. WILKENS: No, your Honor, thank you.

THE COURT: You may step down. Now, is it time to call our --

MR. HILE: Yes, your Honor, that would be great if we could do that.

THE COURT: Okay. Now, it's really important, when we have somebody by phone, that you be close to a microphone so that he can hear.

(Pause.)

THE CLERK: Mr. DeForest?

THE WITNESS: Yes.

THE CLERK: Raise your right hand, please.

PETER R. DEFOREST - PETITIONER'S WITNESS- SWORN

THE CLERK: Please state your name and spell your last name for the record.

THE WITNESS: Peter R. DeForest. D-E, capital F-O-R-E-S-T.

THE CLERK: Thank you.

THE COURT: You may proceed.

MR. HILE: Thank you, your Honor.

DIRECT EXAMINATION

BY MR. HILE:

Q Good afternoon, Doctor DeForest.

A Good afternoon.

Q This is Norman Hile speaking.

MR. HILE: I'm going to, at this point, ask the Court to receive a CV for Doctor DeForest, which we would ask the Court to mark next and I think that would be 4.

THE COURT: I think it's 4. This is Petitioner's 4 which is received for purposes of this proceeding.

BY MR. RILE:

Q Doctor DeForest, we have heard so far from two scientists today, one, Terry Melton, who mentioned that she would like to have you be the person who performed microscopy with respect to hair samples before they are tested under her laboratory for mitochondrial DNA, and also from Doctor Kevin Ballard, who has testified that he would like you to be the person to establish the samples for testing for anticoagulants or preservatives. Can you tell the Court very briefly your background with respect to those two areas?

A Okay. To make it clear here, I'm having a hard time hearing you. I'm wondering about having you closer to the microphone or something. But, I think I got the gist of what you're asking. You had asked about my background. think the CV is there, but in terms of the things that are germane to what we're discussing today, the major things would be that, you know, I have expertise in terms of bloodstain patterns, which would be important here in determining whether or not a particular stain fits with the event that is alleged to have taken place and whether or not that stain shows any signs of any post-event modification, that kind of thing, and in addition, in the area of the hairs, the ability to be able to look at hairs and help evaluate whether they would be contemporaneous with the

event, whether they might be something that we call trash hairs, hairs that have lain in the environment for a long time, or whether they're hairs that could be contemporaneous with the event under investigation.

Q Now, have you performed microscopy in advance of mitochondrial DNA testing in the past?

A Oh, yes.

Q Can you tell us about how many times?

A Oh, I don't know, probably a couple of dozen, I would guess.

Q What types of information do you need to do that?

A The type of information that are derived from doing that is what you're asking or --

Q Yes, what do you need to look at and to have in order to make an accurate assessment in microscopy for determining which hairs should be tested for mitochondrial DNA?

A Well, it's really both the condition of the hair as to whether or not it is a hair that appears to be contemporaneous with the event, whether it shows any signs of environmental exposure that might preclude a mitochondrial result and things involving the size as well. I had a recent one where the particular hair sample was apparently a limb hair, or a hair from an arm or a leg of .a child that was just way too small to be likely to yield testable quantities of mitochondrial DNA.

Q Do you also prepare the samples, then, prior to them actually going to the lab for the mitochondrial DNA testing?

A Yes. Some people prefer it. Some of the microbiologists that do the analysis, particularly Doctor Melton, prefer that I be the one that prepares the hair and secures it in an epindorf (phonetic) tube before it is sent for analysis.

Q Let me turn now to analysis of bloodstains or smears. We've just been looking at a blow-up photograph of the t-shirt that is one of the subjects for testing in this case with respect to anticoagulants. Have you seen some pictures of the t-shirt?

A I have. Nothing that I would regard as being a very good picture.

Q For purposes of doing the cutting of the samples to take, can you describe for the Court briefly what you would be looking for?

A Well, I'd want to see the actual t-shirt and I wouldn't have to do the actual cutting myself if I saw the t-shirt. But, what I'd want to do is assess the nature of the stain and the surrounding area, so that it would be possible to obtain a sample that would clearly represent a source of blood and perhaps assess whether or not it's a single source or perhaps a mixed source. And then, choose areas around that that would be a good control sample for further

analysis.
Q All right, we've also talked earlier, you and I, about the issue of testing what has been called A41, a bloodstain from the wall in the Ryan home. What will you need to do to assist in analyzing that stain?
A I think the first thing would be I'd want to see a quality photograph of that stain as it was before it was sampled. The -- I have at this point is that a portion of the wall was actually taken out in the process of collecting that stain. So, the photographs that were taken prior t the sample of the wall being taken would be very important.
Q Now, Doctor DeForest, can you describe briefly the difference between a blood spatter and a blood smear for the Court?
A The term "spatter" is normally used to refer to an overall pattern which consists of stains made by airborne droplets, droplets of blood that have been either dropped or projected, have been allowed to coalesce and form little spheres that then travel from spade and then contact something leaving stains. Whereas, a smear would be a contact transfer where the blood is on one surface and is transferred to another, or in the alternative, the blood rests on one surface in liquid form and then is spread out onto that surface by the action of another surface coming into contact with it.

Q I'd like to now ask you somewhat of a hypothetical question. If you have a bloodstain that has tested positive for two persons' DNA, is it possible that one of those persons' DNA is on the bloodstain not as a result of a dilution of blood, but from another source?

A Okay, I didn't hear the question clearly, but I think I understand the gist of it. Let me give an answer here, and if that's not appropriate, you can re-ask the question. But, the issue I see here is that it's the difficulty of knowing whether or not a DNA result is from blood or from some other source of DNA. We need to remind ourselves that blood contains DNA only in the leukocytes, in the white cells that are in the blood. And the white cells are present in the blood at about one one-thousandth of the population of the red cells. So, blood is not a rich source of DNA. We need to have nucleated cells for DNA, and the only nucleated cells in blood are the leukocytes. And again, these are about one-tenth of one percent of the total cells in the blood. It's conceivably very easy to have more DNA from other sources such as epithelial DNA being shed from the skin. We all are shedding hundreds of thousands of skin cells a day, and these are nucleated cells and therefore contain DNA. So, there needs to be a clear understanding and more research done to really look at a number of potential situations where mixed sources of DNA

could lead to results that are difficult to interpret, where we have, say, blood being deposited on a surface, say an article of clothing is one example where the habitual wearer of the clothing has shed faxivial (phonetic) cells onto that, and -- you know, certainly, if we have a situation where we have a fresh bloodstain appearing on a fairly clean surface and the quantity of blood is fairly large, we can probably be assured that the result we're getting from the DNA application is from the blood itself. But, there are situations that arise where that may not be so clear, where the blood may be -- a small amount may be diluted, it may be old, a number of things that could result in the contribution of the nuclear material from the blood being a minor portion of what the total DNA contribution is, and therefore, it might be that things from skin cells, epithelial DNA, could be what is being amplified. We also should remind ourselves that using the modern techniques that are utilized for DNA analysis, the amplification of a very small amount of DNA is what we're looking at. We're actually testing amplified DNA. We're looking at replicated DNA, DNA that has been amplified two to the 32nd power, something on the order of a billion times, or you know, ten to the ninth amplification. So, we're starting with a very small amount of DNA and amplifying it a billion-fold.

Q Thank you. That did answer my question and I

appreciate that. That's all the --

A Kind of a rambling answer, but --

MR. HILE: I appreciate that. That's all the questions that I have. Thank you very much, Doctor DeForest.

THE WITNESS: Are we concluded now, do .you think?

THE COURT: No, we're not. Now we have cross examination.

THE WITNESS: Okay.

CROSS EXAMINATION

BY MS. WILKENS:

Q Good afternoon, Doctor DeForest. I just --

THE COURT: Do you want to pull the microphone closer?

MS. WILKENS: Yeah.

BY MS. WILKENS:

Q I just have a few brief questions for you. Have you ever done EDTA testing yourself?

A I have not.

Q And are you a chemist?

A Say again?

Q Are you a chemist?

A Yes, uh-huh.

Q By training.

A I missed the last part there.

Q Can you give me an estimate of the cost for you to microscopically examine 100 hairs?

A Oh, boy. It really would depend on what the end purpose was, whether it was to look at the hairs to see whether or not they might be hairs that were shed around the time of the event or whether these might be hairs that were what are sort of commonly called trash hairs, hairs that have been damaged mechanically or from microbial activity, fungal activity, that kind of thing, that would occur for hairs that are left in the environment for a period of time.

THE COURT: The pUrpose would be to determine whether they're appropriate for a mitochondrial DNA testing.

THE WITNESS: I think we could probably assume that, in terms of assessing the suitability for mitochondrial DNA testing, simply looking at the amount of the hair, you know, the total mass of the hair and its gross condition would be adequate to do that, and that would probably not require mounting of the hairs, but simply a stereoscopic microscopic examination. And that might be done in a matter of a few hours.

BY MS. WILKENS:

Q Now, when you say a microscopic examination, what level of microscope are you going to use to look at 100 hairs in a couple of hours?

A Okay, well, if we're talking about that situation where

we're looking at gross features and trying to make a gross assessment of whether or not the condition of the hairs is such that they represent good candidates for the mitochondrial DNA analysis and the assessing the quantity or the mass of hair present, that would utilize a stereoscopic microscope and there will be no need for mounting the hairs and using things like a polarized microscope or a comparison microscope. So, you know, in terms of trying to economize here, I'm suggesting that approach might be adequate for making that kind of an assessment.

THE COURT: So, you're saying about two hours?

THE WITNESS: Two to four, I would think might be fair for that.

THE COURT: What's your hourly rate?

THE WITNESS: Mine is $350 and hour.

THE COURT: What's the difference between just taking a random number and running them through a test versus --

THE WITNESS: Repeat that again?

THE COURT: Why couldn't you, as an alternative, just out of the 100 hairs take a random number and run tests?

THE WITNESS: We'd have to have some kind of a agreed-upon protocol that would be able to assure us that a random sample -- you know, that it was actually in fact

random, and that the work then would represent the variation in the total sample. If we had an agreed-upon way of doing that, a lesser number might be adequate. But, there's always a possibility that there's some outwires there and that kind of thing that wouldn't be covered by that.

BY MS. WILKENS:

Q If the hairs had already been examined using the same kind of microscope by other criminalists, and they took notes, would you work from the notes, or would you have to repeat their efforts?

A I think it would depend on how clear the notes are and who it was that had done the examination, and you know, what purpose that they were -- what was the goal of their examination.

Q If you were to examine 100 hairs and the goal were for you to select a number of those hairs, let's say ten, that would be the best hairs to perform mitochondrial testing on, both in terms of their suitability and both in terms of the evidence in the case, is that done in two to three hours, or do you put them on slides or do anything differently?

A I think that, from what you've described there, that the idea of a hair being examined with a stereomicroscope would be adequate. There are some kinds of damage that might not be detected by that,. but I think that most things would be detected using the stereomicroscope.

Okay, and what would your estimate be for 1,000,hairS?
A Maybe ten times that, I guess. You know --
Q Well, you don't get depressed and slow down for the second half of a thousand hairs. So, same estimate.
A Yeah.
THE COURT: Same estimate, meaning ten times more or two to four hours?
THE WITNESS: If I understand what you're saying, increasing the number of samples by a factor of ten would increase the amount of time involved by a factor of ten.
BY MS. WILKENS:
Q Now, with respect to the,mounting of the hairs, what is involved, because that's what you would do for mytotyping is you would mount the hairs to be tested on a slide, is that correct?
A If we're talking about the kind of examination that has been discussed up to this point here, you know, when you and I first started this discourse here, I haven't envisioned mounting those. In other words, I would envision this being done unmounted with a low power stereoscopic microscope and just assessing the gross features of those, whether or not -- what the size is, whether there's any gross appearance of damage and that kind of thing. If we're talking about looking at hairs in terms of looking to see whether or not they -- if we could either eliminate certain

possible donors or whether they're consistent with a certain donor, that kind of thing, that would require a much more detailed examination that would require mounting.

Q So, you have the ability to examine the hairs and see if they have similar characteristics by color or texture, is that correct?

A Yes.

Q And what would be the purpose in making that kind of an examination? Would that help you select hairs that you would want to test over other hairs, potentially?

A Yes, in other words, there are sort of two major factors here. One is to eliminate hairs that are severely damaged from being in the environment for a long time, either mechanical damage or chemical damage, microbial damage that would indicate that they were not contemporaneous with the event, assuming there's been no change since the collection. Normally, when hairs are collected and put into a proper storage environment, we wouldn't expect to see those kinds of changes to continue. And then, the other would be whether or not the hairs can be assessed as to whether they have a likelihood of coming from a given individual. And the second problem is a much more involved one than the first.

Q Now, in terms of performing the second prong, what kind of time frame would be required to do the second prong on

one hair?
A On one hair.
Q Well, you'd have to compare it to a reference or another hair. But, I'm just trying to figure out how much more time.
A I'd want to make sure that I had an adequate known sample of each individual that I was comparing that one hair to. But, you know, it could involve something on the order of a few hours, I guess, is enough time to really assess that properly.
THE COURT: Why would it take so long?
THE WITNESS: Say 'again?
THE COURT: Why would it possibly take so many hours to examine one hair versus a known sample?
THE WITNESS: Let me make sure I heard the entire thing. There's an echo and --
THE COURT: Why would it take so long?
THE WITNESS: It's a pretty involved process. We're talking about -- you know, as I understand, this case, there are at least four individuals that would represent the known samples, and we would then need to look at that hair, compare it with the range of variations seen in those four knowns; in other words, we -- each individual can have a fairly wide range of variation in hairs within the same scalp, and that complicates the comparison process. So, in

order to properly evaluate the likelihood of given hair coming from a particular source, we would need to compare that to the range seen in each of those sources.

THE COURT: Isn't that what we're going to do in the mitochondrial DNA, so we're doing it twice?

THE WITNESS: Say. again?

THE COURT: That wasn't for you, that was for counsel.

THE WITNESS: Okay.

MR. HILE: Yes, your Honor. May I propose to Doctor DeForest what we talked about conceptually as the first part that Doctor Melton talked about this morning, so he's aware of that?

THE COURT: Not right now. Why don't we let her go forward and then you can do follow-up.

BY MS. WILKENS:

Q Now, Doctor DeForest, is the value in comparing hair characteristics, is there value in that in trying to determine which hairs should be subject to mitochondrial testing when you're dealing with 100 or 1,000 hairs?

A Well, you know, there's going to be a question of economy, I guess. Clearly, the idea of looking at the hairs and seeing whether or not they're suitable is a simpler problem than deciding whether or not the hair is likely to have come from a certain person and the mitochondrial DNA be

used as a confirmatbry thing. So, depending on what the mitochondrial DNA is going to cost per hair versus what the more detailed microscopical evaluation is going to entail, it might be -- well, it's just hard to articulate this. But, you know, I can see situations where it would be fairly straightforward to go through a fairly large number of hairs and just ascertain whether they would lend themselves to mitochondrial analysis and getting a meaningful result from that, versus an analysis that would try to narrow down the proximation of hairs to those that would appear to be relevant to the case. That makes sense? Am I --

Q Yes, would you use this'process identify hairs that are from the same.source so that you're not testing twenty hairs that appear to be from the same source?

A Sure, right. Part of the thing would be to attempt to group them, and assuming we have an adequate known source to do that, that should be possible. It should be possible to find hairs that do appear to have similarities to a given source and group them that way.

MS. WILKENS: I have nothing further, your Honor.

THE COURT: All right. Now you may clarify.

REDIRECT EXAMINATION

BY MR. HILE:

Q Doctor DeForest, it's Norm Hile again. Let me just try to set up what we were talking about earlier as to what

we're calling the first step here. Doctor Melton testified that one of the things that might be found through the process of analyzing and then doing mitochondrial DNA testing on the hairs that were clutched in the hands of three of the victims was to eliminate those victims as the source of one or more hairs that were clutched in the three victims' hands. And so, that's the first area that we are looking at, and I didn't set that up well enough when I was asking you questions earlier. So, I just want you to be aware of that, that that's what we're looking at as the first test, that is, to determine through your analysis and then through ,mitochondrial DNA testing, if we find hairs clutched in the hands of any of the three victims or more than one of the three victims that might have come from someone other than those victims. And so, that's what we're setting up with respect to this first part. So, in responding to this question, then, give that as your basis. Would you be able, in looking at those hairs that are clutched in those three victims' hands through microscopy and what you do, to determine what you feel would be the most suitable ones to determine if there were some that would not come from the victims that could then be tested for that?

A Okay, in other words, to try to group the unknown hairs in a way that they could be assigned as a likely source to

the individuals involved, and then from that, identify hairs that fall outside that range that would perhaps be useful ones to do the mitochondrial DNA analysis on. Is that --

Q That's correct.

A Okay, yeah, and that is something that I think is worth doing. It's something that should be done before the mitochondrial DNA is done, you know. In a context like this, it would make sense to do that.

Q And just so we can respond to the Court's concern here, can you give us some idea of how many hours it would take and how long it would take to identify the best hairs from those groups of three clutched victims' hands of hair that it would take for you to determine which would be the best ones or twos or threes-or how many you think that would be good for testing against the sample of those victims' mitochondrial DNA?

A Okay. I guess I haven't made myself clear on this. But, to me, it would appear there'd be two stages here. I mean, I haven't seen the thing yet. I haven't examined anything at all. But, from what I know of the situation, I would assume that there are a large number of hairs that would be irrelevant to the investigation hairs, that would have lain in the environment for a period of time and would have suffered mechanical damage or microbial damage, chemical damage, that kind of thing in the environment that

could be eliminated from consideration with a fairly cursory process. And then, following that, for those that appear to have the possibility of being shed contemporaneously, to then try to associate those with individuals that are principals in the case, and then from that, identify hairs that would fall outside those ranges that would be good ones for mitochondrial analysis to evaluate whether or not they could be from someone other than those that are principals in the case.

THE COURT: Before you answer, because - this is Judge Huff. If you could, between now and when I ask for a further submission, give a realistic view as to .what would be a practical way to develop a reasonable test, what we're trying to focus on are victim hairs, animal hairs and other perpetrators. And then, if your testing is so expensive that it would just be cheaper to just do the mitochondrial DNA on everything, then we wouldn't need you. Obviously, it's about $2,500 per hair for the mitochondrial testing, so we're trying to get a reasonable sample that would give us the results that we need in the best way. So, you can talk further with counsel and recognizing that we do not have unlimited budgets here, but you can talk further with counsel and then come up with a proposal that you think would be of assistance.

MR. HILE: That would be fine, your Honor. We'll

do that.

THE COURT: Okay.

MR. HILE: Thank you. Thank you, Doctor DeForest.

THE COURT: Anything else?

MS. WILKENS: No, your Honor.

THE COURT: All right. Anything else from either side on the tutorial? Thank you, Doctor Forester. We'll be in touch with you through counsel later.

THE WITNESS: Okay, very gobd. Thank you very much. Bye-bye.

MS. WILKENS: Yes, your Honor, we haven't finished with Doctor Steinberger's hair presentation.

THE COURT: All right, then, we'll resume with that.

MR. ALEXANDER: Can I indulge the Court for a quick three-minute break?

THE COURT: Yes.

(Proceedings recessed briefly.)

THE COURT: We need the mike. We're back in session. You may continue.

THE WITNESS: The first part of my presentation is very similar to the material that Doctor Melton presented. So, if you want, I can skip it, which would save some time. There's just one slide among the slides that is a schematic of a hair, and I would like to explain a little bit how a

hair grows. And. you heard the terms "shed hair" and "pulled hair" and things like that, and just clarify this quickly. So, this is the schematic representation of a hair follicle.

THE COURT: This is -- the slides have been marked as Respondent's Exhibit B.

MS. WILKENS: Yes, your Honor.

THE COURT: And received.

MS. WILKENS: 'They've arrived.

THE WITNESS: And in this slide, you can see the hair coming down here into the skin. These layers here around here are skin layers. And down here is where the hair begins to grow.. And that is the root of the hair. Now, once the cells start to divide, the hair grows and the shaft is pushed out of the skin. When the hair is growing, the cells that were originally soft and nucleated become hard and what we call keratinized. That's a substance that makes the cells hard. And the nuclei die. The only thing that is remaining with respect to nucleic acids is the mitochondrial. So, a growing hair, a hair that's still growing is, first of all, formally seated in that follicle, doesn't fall out easily, and the root down here still contains nucleated cells in a growing hair. So, since the growing hair doesn't fall out by itself, when it's pulled out forcibly or plucked, as 'we call it, it would take a little bit of the cellular material that's around the hair

that's called the sheath with it. And that's why a pulled hair is very suitable to DNA typing because it has living cellular material with it.

EVA STEINBERGER - RESPONDENT'S WITNESS - PREVIOUSLY SWORN

DIRECT EXAMINATION (Resumed)

BY MS, WILKENS:

Q Excuse me, Doctor Steinberger, when you say suitable for DNA typing, you're referring to the more --

THE COURT: Nuclear.

MS. WILKENS: Specific nuclear?

THE WITNESS: Mitochondrial or nuclear, but as soon as the cell has a nucleus, normal nuclear typing will work. Now, when a hair stops growing, it tends to come out easily and eventually it will fall out because a new hair will start growing at the bottom and push the old one out. A non-growing hair -- well, first of all, when it comes out of the skull or anywhere on the body for that matter, it will not have this cellular material on the side because there is no more embedding into the skin. And secondly, the root cells also don't contain any nuclear DNA anymore. The root also hardens under these circumstances. So, this is what I believe would clarify a shed hair versus a pulled hair, and the hair that need mitochondrial DNA analysis versus nuclear DNA analysis.

So, I skip the rest of the mitochondrial related

slides. And I just want to give you a feW facts about human hair that pertain somewhat to this case. A human being loses approximately 100 hairs per day from the head. Shed hairs consist mainly of dead cells without a nucleus, and intact mitochondria are still present, and that pertains to the root and to the shaft of the hair. The average growth cycle of the hair is two to six years. And a human being has between 90,000 and 150,000 hairs on the head. And we have approximately two million follicles on the whole body.

So, I skipped all the mitochondrial talk and I jump immediately into the forensic science part. One of the fundamental principles in forensic science is that, when two objects come in contact with each other, some exchange of trace matter will likely take place. This is called Lockard (phonetic) principle, and it's, as I said, a fundamental basis of our work. So, generally speaking, the presence of hairs falling to the victims could be of significance. But, now, I'm coming to the issues.

The first issue is the condition of the carpet in the house where the incident occurred, and this slide may be a little bit difficult to interpret. It's a bird's-eye view of a plastic bag with vacuum sweepings from the carpet, and you can see that there is a huge amount of hairs embedded in that dust. Some of them are animal. It's hard to tell from the slide, but they look like animal hairs. But, there are

uncountable hairs in this sample.

BY MS. WILKENS:

Q And Doctor Steinberger, to clarify, this is just from the master bedroom of the home, is that correct?

A Yes. The second issue is the choice of hair for mitochondrial DNA analysis that was just discussed in depth by Professor DeForest, and I just put up this slide to show you how many hairs were submitted to the DNA laboratory when Doctor Ed Blake and Steven Meyers tested the hairs under the post-conviction agreement. And you can see there must be hundreds of hairs that could potentially be tested. There were more hairs that are not on this slide from Chris Hughes' left hand, where I don't have a photo. And in the next slide, just for completeness, we included also all the hairs that were previously examined and arrived at the lab already on a slide. It's hard to see, but there's usually one hair on each of these slides.

Now, one question that is coming up is the question of color, hair color. And this is the Ryan family and Chris Hughes. All of them have blonde to light brown hair, so it would be a range of colors, but still light brown to blonde. And let me go to Jessica's hair, which you can see here is clearly very light brown in comparison to the hair samples that were submitted to the laboratory from the right hand and the left hand and they all look pretty consistent in

color. There may be some darker spots here and here, but this hair has contained some blood, so that's where the darker spots come from. Now, this is just to illustrate where this bunch of loose hairs comes from. It was collected from the right hand of Jessica Ryan, and these are clearly loose hairs. It doesn't look as if it were a clump.

Another issue, resources, you've already talked about this, so go over it very quickly. We contacted the private laboratory. The cost per hair is more than 2,000. It's actually 2,500, but a discount could be worked out if we submit a large number. With respect to the time frame, I already knew that there are a lot of hairs involved, SO just asked them, how long will it take. And she said, in the last five years, we have typed about 700 hairs. So, it takes a long time. And these, of course, are individual cases, so it could be a little bit faster, but not much. And from this slide that I showed you, we estimate that several hundred hairs were submitted to DOJ during the post-conviction testing. So, this is then the scope we are talking about.

Issue number four, references samples. Reference samples should be available for all individuals because, as you know now, there are so many hairs in that house that will be different from the victims just by visitors bringing it into the house and clients. And so, it would be good to

have all reference samples, but it is not necessary to type the reference samples first, in our opinion.

Now, to the relevance of the results. The carpet sweepings, as we've seen, contain untold numbers of hairs from the Ryan household. These hairs would have mainly originated from the family members, pets, but also from other individuals visiting this house. And finding hairs in the sweepings that are foreign to the victims is expected and will be of no probative value.

Now, back to the hairs in the hands of the victims. Even if you shed foreign hairs in the mass of hairs in the victims' hands may be significant, and the reason is that the crime scene photos show that at least three of the victims were found on the floor, and there was a lot of blood on the hands of the victims, so when they fall down, they are likely to pick up some hairs from the floor. And the presence of animal hairs on the bodies which were found indicate that these hairs were transferred from the floor because the animals were not involved in that struggle.

But, a clump of pulled hairs that are foreign to the victim would be significant. And if pulled, these hairs would be expected to have the morphology that is characteristic of a plucked hair, as I explained in the beginning with my schematic picture. And this is what a plucked hair would look like. There's the lower hair here.

You can see the root here. This is the hair shaft, and these structures on the sides are the cells that were pulled out of the skull when the hair was pulled. So, this is what we would expect to see in a clump of pulled hair. There could be some hairs in that sample that don't have these cells or very few. But, some of them certainly would have to look like this.

However, Doctor Ed Blake and Steve Meyers, during the post-conviction testing, looked at all hairs, all samples that I showed you up on the screen, under a stereo microscope, and the vast majority of hairs found were these types where you can see there are no cells on the side and the root looks very characteristic of a shed hair, and these types, which is a cut hair. Out of all the hairs that they looked at only three hairs were felt suitable for post-conviction STR tests, but none gave a result. And that's all I have.

THE COURT: Okay, thank you.

BY MS. WILKENS:

Q Doctor Steinberger, just to clarify with respect to the examination that Doctor Blake and Steve Meyers conducted, the hairs that are in Jessica's hand, the long hairs that are in the photo, are those cut hairs?

A He said these were hairs.

Q And what is the significance that they're cut?

A There was obviously a struggle and the murder weapon was a hatchet. So, in that fight, hairs would be cut off like when you go to the hairdresser and somebody cuts your hair. There are -- you know, you'd find cut hairs.

Q And the Defense keeps talking about clutching hairs. Do you know whether or not it's commonplace to have rigormortis cause the hands to close inward?

A This is not my expertise. I cannot speak to that. But, what I can say is that this was not a clump of hair. These are loose hairs, as you saw in the picture.

Q Thank you.

THE COURT: Any cross?

CROSS EXAMINATION

BY MR. HILE:

Q Doctor Steinberger, I'm happy to have you stand there, if you'd like, or whatever your choice is. It may be easier for the Court to hear you. I just have a few questions. Doctor Steinberger, have you ever performed mitochondrial DNA testing?

A

Q Have any of the gentlemen on the list that you had there who were part of your slide, first slide, have they ever done it?

A No.

Q Have you ever worked in a lab that has done

mitochondria' DNA testing of hair?
A Yes. I'm currently working in a lab that is almost -- well, we're almost ready to go online with mitochondrial testing, so I have a lot of contact with data and validation and proficiency tests, yes.
Q When you say "almost ready to go online," do I understand by that that they haven't yet actually done testing in the regular course of their business?
A They have not begun case work yet.
Q Have you or any of the gentlemen that were on that list ever testified as an expert on mitochondrial DNA testing?
A No.
Q Have you ever testified as an expert in hair microscopy?
THE COURT: Did you want to amend your previous answer?
THE WITNESS: Yes, I probably should, because I believe that Steven Meyers was asked a lot of questions about mitochondrial testing in the post-conviction case, so he has testified on mitochondria' testing as an expert.
BY MR. HILE:
Q Okay. How about, have you ever testified as a hair microscopist?
A Myself?
Q Yes.

A No.
Q Was Doctor Melton correct that you called Mytotyping Lab within the last week or two to inquire about services?
A I did.
Q What was the reason that you did that?
A I wanted to get an impression of what the cost and the length of time would be.
Q For a private lab such as that to do the --
A Yes.
Q And is the reason that you wanted to find out about having a private lab do it from a cost standpoint because you had found no other public or Government lab that could do it?
A No, I just wanted to be prepared for this presentation in case someone wants to know how much it would cost.
Q Now, I wanted to ask you about the hairs in the slides that we just saw. My understanding is that the rug sweepings were not hairs that were found grasped in the hands of any of the victims, is that correct?
A Can you repeat that question, please?
Q Yes, is it correct that what you were referring to as the hair sweepings were not hairs that were found in the clutches of the victims? Those are different hairs, correct?
A Yes, the evidence that I showed on the screen is

evidence that was collected after the incident occurred, so it's not the same hairs, yes.

Q Okay, so, as you understand it, no one has asked to test all the sweepings, correct?

A I'm not sure what you're asking.

Q Well, you talked about how there were hair sweepings that were brought together from the house.

A Yes.

Q Those are different hair samples than the ones that were in the victims' hands, are they not?

A Yes.

Q No one is asking to test those sweepings, are they?

A No, I only showed it in the context of the fact that the victims were found on the floor. So, even if you find single hairs in these hands that do not match the victims and they were not pulled, it is not significant because the victims were on the floor and they must have picked up some hairs from that floor and the sweepings are a representation of that floor.

Q And you yourself have not done microscopy on the hairs that were in the grasp of the victims' hands.

A The hairs in this case, no.

MR. HILE: Thank you. I have no more questions, your Honor.

MS. WILKENS: Nothing further, your Honor.

THE COURT: Thank you. You may step down.

MR. ALEXANDER: Your Honor, I have one matter I just wanted to clarify for your Honor and we're done, without any witness.

THE COURT: Sure.

MR. ALEXANDER:. And I may be presuming something that the Court did not have in mind. By some questions that your Honor had asked of Doctor Melton, I got the impression that you thought that the other possible subjects were of Hispanic origin.

THE COURT: From your petition.

MR. ALEXANDER: I'm sorry?

THE COURT: From your petition.

MR. ALEXANDER: Well, that may be mentioned in the petition. I don't recall offhand. But, let me clarify --

THE COURT: The prison gang. The prison gang.

MR. ALEXANDER: Yes. Well, I don't know if it's a prison gang or not, but I guess --

THE COURT: The prison gang and the testimony of the son in the hospital.

MR. ALEXANDER: Okay.

THE COURT: It's mentioned by you it's the Hispanic prison gang.

MR. ALEXANDER: That's correct. There is reference to that, okay, and that is a possibility.

Obviously, it's not our burden to show who did do it, just to show that there's reasonable doubt as to whether Mr. Cooper did it. But, to be clear as we proceed, because I think this is important, our belief or the best information we have is that the other perpetrators, whose names we are aware of, are white.

THE COURT: Thurow (phonetic) and Coone (phonetic)?

MR. ALEXANDER: Coone and Darnell.

THE COURT: Coone, of course, retracted.

MR. ALEXANDER: Yes, perhaps.

THE COURT: Anybody else?

MR. ALEXANDER: No, I just wanted to make sure --

THE COURT: Coone and the prison gang?

MR. ALEXANDER: -- and there's a Mr. Darnell, all three who were in prison. I just want to make sure that your Honor was aware that those are the principal people that we think, and that ties into the coveralls and a lot of the other evidence. Thank you.

THE COURT: All right, thank you. I did want to go over a couple of other things. I think it's been very helpful to lay out some of the issues and get going on the matter, and it's been at least very helpful to me. What I would like is for the Petitioner to prepare a case budget, submit it to the Court in 30 days for any expenses, and we

may have to then evaluate pros and cons of various approaches. The subject of the mitochondrial DNA testing, we may end up sequencing certain matters where we do some things first and then hold off on others, or I may decide to go forward on several prongs at once.

As to the mitochondrial DNA testing, I don't have any questions about the scientific validity of the testing. There is an issue, if given what happened with the en banc panel, that if there is no EDTA found and if that meets Dalbert, which is a separate issue, then if Mr. Cooper's blood is there and there's no contamination, then that may end the story, absent a Brady issue. I know you may have a different view of that. But, remember, this is a gateway claim of actual innocence, and then you have a logical sequence that flows from that. So, will end up evaluating whether we do many prongs at once, or whether we focus on one and then move on to the next, depending on how the case progresses.

As to the EDTA, I think, given the submissions in the information, there is at least an issue as to scientific reliability on the Dalbert standards. And so, what I would like is briefing by both sides on the Dalbert and you're free to attach declarations of other people challenging the scientific reliability of that in this context. Do you -- what I was planning to do is have you probably do

simultaneous briefings and then, unless you think that -- probably given what we have today, it would be simultaneous briefings, and then each party respond and then have that covered by the Court by June 2. So, if you could -- if we get out a calendar, if you file that in 30 days, that would be May 2. I don't know what day of the week that is. I'll look. That's a Sunday. So, the Friday would be -- what's the Friday right before that?

THE CLERK: April 30th.

THE COURT: How about by April 30? Is that enough time?

MR. HILE: Is that the opening briefs, your Honor, on Dalbert?

THE COURT: Opening briefs on Dalbert.

MR. HILE: Yes, your Honor.

THE COURT: And then, the reply briefs -- by May 14, that's two weeks later.

MR. ALEXANDER: Excuse me, your Honor, before you continue on this, I just realized, April 30th, May 1 and -- May 1, I'm to be at the Northern District Conference.

THE COURT: This is just submissions.

MR. ALEXANDER: Okay.

THE COURT: Just filings.

MR. HILE: Your Honor --

THE COURT: Filings of briefs.

MR. HILE: Understood. Could I ask a question just because I don't know. It will be very helpful, I think, probably to both sides to have a transcript that may be part of what our submissions would be with respect to the Dalbert issue of what happened today. And I'm just wondering, how long does it take to get such a transcript?

THE COURT: You can have a free tape immediately.

MR. HILE: Okay, that would be great. That would be terrific.

THE COURT: You can have a free tape, free today.

MR. HILE: That would be wonderfully helpful.

THE COURT: And then --

MR. HILE: It's free and it's quick. That's wonderful.

THE COURT: I think we can make it today, can't we? Today or -- well, today you're here. They can take it with them.

THE REPORTER: Sure, that's fine.

THE COURT: Okay. And then, I really hate to do expedited briefing on that. I mean, if yo have the tape, then you could -- wouldn't that give you enough information?

MR. HILE: Yes, your Honor. I mean, we'll create a transcript from it that we can then submit, to the extent we need it. But, also that will help us to prepare.

THE COURT: We'll then also order a transcript,

but we do normal course and that's 30 days. And then, the opposition would be due May 14. And then, I'll be seeing you on June 2. And then, your case budgeting -- the opposition is due Friday, May 14. Your case budgeting -- can you also file by April 30?

MR. HILE: Can we have till the 3rd of May, your Honor?

MR. ALEXANDER: That's the Monday following.

THE COURT: You may. You get the weekend, then. You may. And that would be to chambers under seal, and I wouldn't be giving access to the other side unless I think that I need more information from them. And then, I would -- let me just give you some preliminary thoughts, that I have some questions about the Dalbert issue as to the EDTA and what we will get out of it. I have -- as I said, if we can come up with a simple way of doing it, then -- and if I'm satisfied that what we get out at the end is reliable, then, obviously, the Court would be more persuaded to invest their resources in doing it.

Then, additionally, as to the hair analysis, it seems that from -- remember, in state court -- I know Mr. Port is here and observing and he had assisted the Defense, and is a recognized expert on DNA, and we had -- Defense had Doctor Blake and there was a lot of work done, and so, we've got some samples that are already mounted to the -- rather

than duplicating with Doctor Forester (sic), maybe we can take just a few of these and proceed on a couple of them already, especially the ones from Jessica's -- the loose hairs from Jessica's hand. Maybe we could go forward with those through the first witness.

MR. HILE: Yes, your Honor. What we would anticipate with respect to that -- and we're gathering these things -- is that we could use these photographs, immediately talk to Doctor DeForest about what he needs to do in order to make his determination as to which hairs are most appropriate for sampling based upon these photographs and other things, and that he needs to see them, and we'll give that to your Honor as part of the estimate of what the budget would be.

THE COURT: What I'm concerned about with Doctor Forester is that it seemed to be a whole lot of things, so if you could segregate each item, I'm not sure I'm as persuaded about the A41 analysis that he was talking about. We have to evaluate whether the EDTA is worthwhile. That's more worthwhile to me on the --

MR. HILE: T-shirt?

THE COURT: Well, at least, on the t-shirt, if you have one area, then maybe you could find three, although the A41 -- if your theory was that the t-shirt was contaminated originally, and so you're not proceeding on the San Diego

clerk somehow permitting access of some unknown person when the t-shirt was in their care and custody. You're not proceeding on that theory.

MR. HILE: No, your Honor.

THE COURT: So, you're saying that the contamination occurred early on back in '93 -- '83/84 vintage?

MR. ALEXANDER: Before trial. Before it was admitted as an exhibit on behalf of -- the Defense introduced it.

THE COURT: So, what I'd like is just try to be as realistic as you can and to have a practical way of doing this, and see if there are some alternatives that we can do instead of evaluating every possible hair. There's thousands of hairs. And just in looking at these photos, it seems to me that some of these could be very helpful, and they're already mounted and we can get going on those. So, those are just some of my preliminary thoughts, and then I am toying with the idea of, if we can't come up with a good protocol on the EDTA or the mitochondrial DNA analysis, then, we'll have to evaluate it again and I may ask Doctor Meyers and Doctor Blake to testify if I think that maybe we should use what's already been done and then springboard from there to conserve resources rather than to go a different route. But, these are just preliminary thoughts,

and then I would like the briefing of the parties.

MR. ALEXANDER: Speaking of practical, which we're not really going to get to after we've had the science today, and this was with the greatest of respect for Doctor Blake, but we have Doctor Blake who was involved with the Defense in the case who is„. currently of the personal view that he will not participate unless he is paid, and more than that, paid in advance_ That's why we so welcomed your Honor's suggestion of a subpoena to Doctor Blake. And I don't want to make any more of that. But, our ability --

THE COURT: The subpoena -- what we were talking about was records.

MR. ALEXANDER: Right, I understand.

THE COURT: But, then, if we wanted Doctor Blake, we would figure out what is a reasonable hourly rate, and then we would have to accommodate that request.

MR. ALEXANDER: We don't have the "control" over Doctor Blake as one might ordinarily have in getting the cooperation of others, and.I don't mean to cast any -- but that is the reality.

One of the other items, though, I would raise, and we've used this EDTA, is it would be extremely helpful because we do not -- simply do not know, all of the samples of blood, including any blood stained cards, I guess I'd refer to, that were taken of Mr. Cooper, including any that

were obtained by the prosecution from Pittsburgh, because this issue of what preservatives may have been used -- if it's only EDTA, we have no problem with, you know, confining the testing. But, I think, as Dodtor Ballard explained, the methodology is really not essentially different with citric, which we understand was also used. But, I think it would be important to get that pinned down because we can do efficiencies in doing this at one time, as opposed to going back again.

THE COURT: And what I'll ask, the Government to check into that.

MS. WILKENS: Yes, your Honor.

THE COURT: And to then report to the Court as to if you can trace back, was it purple top, was it other -- were other blood samples taken.

MR. ALEXANDER: It would also be helpful -- and we'll try and ask Doctor Blake, as Mr. Coches here suggested to me, if we can find out whether or not doing the EDTA test or the DNA testing that was done in 2001, whether or not they in fact still have the fluid that remains that your Honor mentioned, and that would certainly, as I think Doctor Ballard can say, that would be a very efficient way of dealing with the --

THE COURT: And why don't we get him to say in his terminology what it is. It's the extraction of fluid, but

what would you call it?

DOCTOR BALLARD: The term that I've heard, your Honor, is an initial soak.

THE COURT: 'Whether the initial soaks are.still available or not available for further testing.

DOCTOR BALLARD: Well,'first of all, not all labs do, but many do. Were they done, and if they were done, do they still have them.

MS. WILKENS: Yes, your Honor.

MR. ALEXANDER: Thank you, your Honor.

MS. WILKENS: Your Honor, with respect to not reinventing things that have already been done, you mentioned Doctor Meyers and Doctor Blake. I would also invite the Court's attention to Doctor Thornton. In Judge Kennedy's courtroom, he was never presented. We have a chain of custody problem as to the hair because he examined it. He may very well have done everything that was being discussed with Doctor DeForest. We have no way of knowing, because he's been conspicuously absent from all court proceedings. So, he is someone the Court would very much like to hear from, I'm sure.

THE COURT: Where is he?

MS. WILKENS: I believe he's Berkeley area.

THE COURT: All right.

MR. ALEXANDER: We'll find out or attempt to find

out.

THE.COURM Okay.

MS. WILKENS: He's in the Bay area.

MR. ALEXANDER: We'll check.

THE COURT: Do you think, on timing, if we had three days, that we could do the warden, the person who gave out the PF Flyers but didn't give out the PF Flyers?

MR. ALEXANDER: Mr. Taylor, James Taylor.

THE COURT: Mr. Taylor. James Taylor. The ones that identified earlier. Do you think we could dO those in two days and then reserve Blake, Meyers and Thornton for Friday?

MR. ALEXANDER: There might be -- there might be -- and I need to go back and check, but there may be other witnesses not identified who also would be relevant to that Brady issue.

THE COURT: If so, then, put it in the brief and then -- but, why don't we plan on two days for the shoe people and then one day on Friday. Then, you could line them up already and we would pay Doctor Blake's reasonable hourly rate. Hopefully, it's reasonable. And that would be June 4, Friday, June 4 for them. If they're not available on the 4th, we could always switch the order around so we've got the 2nd, 3rd and 4th blocked out. All right, well, I want to compliment the parties. It's been a wonderful

presentation, most enlightening to the Court. I think we have a good start. And it's a very important and significant matter, and it blends scientific evidence with criminal work as well, and I think that both sides have been extremely professional and responsive to the suggestions of the Court and I want to compliment you. Thank you.

COUNSEL: Thank- you, your Honor.

(Proceedings concluded.)

I certify that the foregoing is a correct transcript from the electronic sound recording of the proceedings in the above-entitled matter.

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Transcriber Date

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