SUPERIOR COURT OF CALIFORNIA

COUNTY OF ALAMEDA

BEFORE THE HONORABLE WINIFRED Y. SMITH, JUDGE PRESIDING

DEPARTMENT NUMBER 21

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COORDINATION PROCEEDING SPECIAL TITLE (RULE 3.550) ROUNDUP PRODUCTS CASE	**JCCP No. 4953**
THIS TRANSCRIPT RELATES TO: Pilliod, et al. vs. Monsanto Company, et al.	**Case No. RG17862702** **Pages 4318 - 4603** **Volume 27**

Reporter's Transcript of Proceedings

Monday, April 29, 2019

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(Multiple other counsel present as reflected in the minutes.)

I N D E X

Monday, April 29, 2019

Monday, April 29, 2019 8:55 a.m.

P R O C E E D I N G S

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(Proceedings commenced in open court out of the presence of the jury:)

THE COURT: Good morning, Counsel.

ALL: Good morning, Your Honor.

THE COURT: Everybody have a good weekend?

MR. MILLER: Yes, we did.

MR. WISNER: Your Honor, may I approach?

THE COURT: Yes.

MR. WISNER: I'm handing you a copy of Dr. Celeste Bello's expert report. She's the witness who's going to be testifying.

(Counsel confer off the record.)

MR. ISMAIL: Do you want to excuse her? Do you mind stepping out?

MR. WISNER: It's not a very long issue. But yesterday afternoon or morning -- yesterday we received an additional materials list for the witness, and it included a publication that was not on her original report. It's the NAPP study from -- NAPP presentation from 2016. And if you look at the report, the only time the NAPP is even remotely discussed, it would be on page 9.

And under her NHL epidemiology section, middle of the first paragraph, she says, "I performed a comprehensive review of the literature," and then it lists a bunch of studies. And then it says, "and data published or made available since IARC," and then there was a Pahwa 2015, Andreotti, Andreotti.

That Pahwa 2015 is a reference to the NAPP presentation from 2015. And they have very specific data on them about the relationship between glyphosate and NHL. And apparently they intend to have Dr. Bello testify about a 2016 presentation which was never on the original report. There's no discussion of the NAPP at all beyond that reference, that's it.

And so we object to them using it as an undisclosed opinion as we don't -- it's different data. That's why it's important.

MR. ISMAIL: So, Your Honor, the NAPP is fair game insofar as Dr. Bello clearly references that collective data in her report.

The 2016, all it does is -- and you recall this from the plaintiffs' witnesses -- it does a trend analysis based on the 2015 presentation. It doesn't add particularly new data, doesn't add relative risks, it doesn't add -- it doesn't change the picture. So we're not going to spend more than 30 seconds in referencing

that Dr. Bellow did see that, is aware of what it says. She'll be talking about the NAPP. I think there's an objection to the NAPP generally at least, insofar as the August 2015 presentation, so that's really all it is.

THE COURT: I don't recall -- I recall -- who testified regarding the two presentations? I can't recall now.

MR. WISNER: Dr. Weisenburger. He's the author of the NAPP which is why he testified about it.

THE COURT: And so, what, the 2016 is an extension of the 2015 in that it talks about the same data but differently or --

MR. WISNER: Exactly.

THE COURT: -- or is it completely different?

MR. WISNER: It was a presentation given to IARC actually a year after the presentation was given in 2015. The final NAPP print publication hasn't come out yet. Dr. Weisenburger testified a bit about that during his direct.

But the 2016 presentation, it's the one that has those weird lines on it, kind of diagonal lines.

THE COURT: You couldn't possibly be asking me to remember that specific. But I recall presentations. I don't remember when Dr. Weisenburger testified, was there some conversation about those two at the time?

Wasn't there -- didn't we have some sort of conversation about the two presentations and --

MR. WISNER: What we were talking about at that time was the abstracts for those presentations. And they showed the presentation from 2016.

THE COURT: Right.

MR. WISNER: We wanted to show the abstract from 2016 and there was a fight about the published abstract versus the presentation, there was a fight about that.

THE COURT: Right, and I think I said no.

MR. WISNER: You said no to the abstract.

THE COURT: To the abstract.

MR. WISNER: But you allowed testimony about the 2016 article.

My only objection is she hasn't -- she apparently didn't know about it until fairly recently. We only got the list yesterday. And there's been no discovery about her opinions on it and how it affects her opinions.

And so this is a definition of a newly disclosed opinion, and we object to its being used, at least in the context of direct.

THE COURT: Okay. Go ahead.

MR. ISMAIL: I was just going to say,

Your Honor, the 2016 presentation that Dr. Weisenburger testified -- so there was three presentations. The first one that he did on direct, he testified on cross he agreed that was old and superseded data. So we focused on the August 2015. Dr. Bello discusses that in her report.

The 2016 uses the August 2015 data, and all it does is run a P for trend test on it. And that's all.

THE COURT: Does she have an opinion about that, an additional opinion about it? Or it doesn't change her opinion? I mean, what is --

MR. ISMAIL: It does not change her opinion. So her opinion is that the NAPP does not show an association between glyphosate and NHL. And that's based on the relative risks reported in the August 2015 presentation. The 2016 presentation, all it does is confirm that there is not a dose response because the P for trend was negative. Which Dr. Weisenburger agreed.

MR. WISNER: To be clear, she doesn't offer any opinion about the NAPP in her report or in her deposition. So that's all news.

Literally she said she read the 2015, she doesn't specify which one, and that's it. She doesn't say anything about it at all. And I think this is really important because if you actually look at her

report --

THE COURT: Well, wait, wait. So are you talking about whether she's going to talk about the 2015 or talk about NAPP at all, or whether or not you're objecting to her being permitted to talk about the 2016? Because 2016, I may agree with you if she opines about that, that's a new opinion. But if she said she considered 2015 and you're arguing that she shouldn't be permitted to offer an opinion or testimony about the 2015, that's a different discussion than we were just having a minute ago.

MR. WISNER: Fair enough, the 2015, I was just responding to counsel's assertion that she's going to be giving an opinion about the NAPP. But she doesn't offer any opinion about the NAPP in her report at all. But I don't have any objection to her discussing the 2015 report because she does mention it in passing in one sentence. Okay. Fair enough. They can talk about it.

But the 2016 is just not there. And I think this is kind of an important point.

THE COURT: Right, well, I don't know if it's a highly important point, but I would agree with you that she can't comment on the 2016 but talk about 2015 whenever she talks about it.

MR. WISNER: Okay, and I just want to -- this

is something. We had a pending motion about Dr. Bello. It actually hasn't been ruled on, to my knowledge. It's fully briefed. I haven't seen a ruling.

THE COURT: You have it. Yeah, didn't we rule on Bello and *Sargon*. What was outstanding was -- you're mixing the two. You did have a fully developed motion which I just ruled on this morning. I mean, I have an order, but I think I orally said I was going to permit her to testify.

MR. WISNER: Sure, but --

THE COURT: I just committed that to writing just so that -- to keep the record clear. But Bello was part of the *Sargon* motion.

MR. WISNER: Fair enough. I'm mixing up.

But I just want to point out on page 15 and 16 of her report are her opinions. And I just want to keep those handy for the Court's attention because I'm worried that they're going to attempt to try to do a lot more with Dr. Bello beyond what her opinions are. And I just want to be wary that I'm going to be objecting. We'll obviously see what they try to do.

MR. ISMAIL: Her opinions are throughout the report and they can't be cabined into -- for example, on page 9 which Mr. Wisner directed you to, she discusses the epidemiology and says, "In my opinion, the totality

of the evidence does not support a conclusion that glyphosate or glyphosate-based formulations cause NHL or any subtype of NHL."

So specifically a comment about the epidemiology, which includes NAPP because that's referenced in the paragraph. So I guess we'll see if they object, but, you know, insofar of --

THE COURT: On page 15 and 16, it's opinions regarding the cause of Pilliod's NHL more specifically.

MR. ISMAIL: Correct.

THE COURT: Those aren't -- are you suggesting those should be her only opinions?

MR. WISNER: Well, I mean, that opinion he just said is in there, so about the epidemiology.

THE COURT: So why don't we just wait and see --

MR. WISNER: No, I'm just drawing your attention because they disclosed a bunch of new stuff yesterday, a lot of it -- we'll see if they go there, but I just want to have it handy --

THE COURT: I'm always ready.

MR. ISMAIL: Thank you, Your Honor.

MR. WISNER: Ready to go, Your Honor.

THE COURT: Let me see if the jurors are here.

COURT ATTENDANT: I'll check, Your Honor.

THE COURT: Thank you.

(Recess taken at 9:03 a.m.)

(Proceedings resumed in open court in the presence of the jury at 9:07 a.m.:)

THE COURT: Good morning, everybody. It's Monday. We're back at it.

And this morning we will begin the presentation of the defense case. And I think Mr. Ismail is going to call his first witness.

You may proceed.

MR. ISMAIL: Thank you, Your Honor. Good morning.

Good morning, everyone.

Your Honor, the defense calls Dr. Celeste Bello.

THE CLERK: Would you please raise your right hand.

CELESTE BELLO,

called as a witness for the defendant, having been duly sworn, testified as follows:

THE WITNESS: Yes.

THE CLERK: Thank you. Please be seated.

And would you please state and spell your name for the record.

THE WITNESS: Yeah. Celeste Bello,

C-E-L-E-S-T-E, B-E-L-L-O.

THE COURT: You may proceed.

MR. ISMAIL: Thank you, Your Honor.

Your Honor, we provided the Court a copy of the binder and have done so for Mr. Wisner as well.

May I approach the witness?

THE COURT: Yes, you may.

MR. ISMAIL: I'm providing the witness with the same binder.

DIRECT EXAMINATION

BY MR. ISMAIL:

Q. Hi, Dr. Bello.

A. Good morning.

Q. Can you please introduce yourself to the ladies and gentlemen of the jury, and tell everyone what you do for a living.

A. Yeah. My name is Celeste Bello, as I stated previously. And I'm a medical oncologist hematologist. I practice in the state of Florida at Moffitt Cancer Center. And I specialize in the field of malignant hematology, specifically lymphoma.

Q. And, Dr. Bello, did we ask you to review Mrs. Pilliod's medical records along with some information regarding glyphosate and Roundup to form opinions and tell the ladies and gentlemen of the jury

about her non-Hodgkin's lymphoma and what you determined to be the cause of those conditions?

A. Yes.

Q. And are you prepared today to share the results of your work and investigation with the ladies and gentlemen of the jury?

A. Yes.

Q. Okay. Just so folks know what we're planning to do today, is it your understanding, Dr. Bello, that another oncologist is going to testify later in the trial about Mr. Pilliod?

A. Yes.

Q. So for today we're going to focus on Mrs. Pilliod and some of the other information that you reviewed in this case. Okay?

A. Yes.

Q. Before I go any further, Dr. Bello, have you ever been in a courtroom before?

A. I know we had talked about this before. Actually, the last time I was in a courtroom was in high school for government class. So, no, this is a first.

Q. Okay. So you've never testified in a courtroom?

A. No.

Q. Okay. Now, Dr. Bello, before we get to the

substance of your opinions, I want to give everyone a better understanding of your background, your training and experience. And rather than walk through a CV, we thought we could summarize it with some slides and sort of summarize your professional experience. Okay?

A. Okay.

Q. So just can you tell the folks where your educational background, your early professional medical training, to get to where you are today as on the faculty at Moffitt Cancer Center.

A. I have a bachelor of science from Emory University. And then I went on to get a master's degree in epidemiology and biostatistics at University of South Florida.

Then I went to medical school and got my medical doctorate degree at University of South Florida. And this was followed by a residency in internal medicine also at University of South Florida. And then a fellowship in hematology/oncology at University of South Florida which also includes Moffitt Cancer Center where I work today. And have been on faculty ever since 2008 finishing fellowship at Moffitt Cancer Center.

Q. So you mentioned, Dr. Bello, that you have a master's of science in public health with a specialty in epidemiology and biostatistics?

A. Yes.

Q. Is that typical for practicing clinicians to have that additional higher training in epidemiology and statistics?

A. No, it's not.

Q. And are you board-certified?

A. Yes. In hematology and oncology.

Q. Now, you mentioned that you currently are on faculty at Moffitt Cancer Center; is that correct?

A. Yes.

Q. What is the Moffitt Cancer Center?

A. So Moffitt Cancer Center is a center that just deals with cancer and basically it's a center of excellence in cancer recognized by the National Conference of Cancer Networks and also the National Cancer Institute. And so only a few centers in the nation get that designation as a center of excellence for the NCCN and NCI, and we're one of them. And mainly has to deal with the treatment of cancer but also because we're a major research facility.

Q. And what area within the Moffitt Cancer Center do you currently have a position?

A. In the department of malignant hematology.

Q. And does that include conditions such as non-Hodgkin's lymphoma?

A. Yes.

Q. You also -- do you also have a faculty position at the University of South Florida?

A. I do. I have an associate professor title.

Q. So do you, in addition to your -- well, let me ask this first. You have teaching responsibilities. We've talked about you being on faculty at these institutions. Do you have any teaching responsibilities for residents and fellows as they're learning oncology?

A. Yeah, that's a main part of my job. I see patients, but I also teach residents, medical students, and fellows in oncology and hematology, and in my particular area, which is lymphomas.

Q. You indicated that you see patients; is that correct?

A. Yes.

Q. And have you, since your fellowship, maintained an active clinical practice in oncology?

A. Yes.

Q. How often -- well, let me ask it this way: What were you doing last week?

A. Seeing patients.

Q. What are you going to be doing tomorrow?

A. Seeing patients.

Q. And what is your specialty in clinical care?

A. Mainly it's in non-Hodgkin's lymphomas, particularly primary central nervous system lymphomas and Hodgkin's lymphomas too.

Q. Is central nervous system lymphoma the type of -- the subtype of NHL that Mrs. Pilliod had?

A. Yes.

Q. So within Moffitt, are there clinicians who specialize and take care of patients who have that type of lymphoma specifically?

A. Yeah, it's pretty much me. I see all of the primary central nervous system lymphomas, pretty much all of them at our facility.

We also have kind of a multidisciplinary team where we have a neurologist and a radiologist so we can all kind of focus because it is a very rare malignancy so it requires a team approach.

Q. Is it fair to say, Dr. Bello, that you see patients like Mrs. Pilliod on a weekly basis?

A. Yes, that is fair.

Q. Now, do you also have responsibilities for doing research?

A. Yes.

Q. Will you tell the folks on the jury what some of your research initiatives have been?

A. Yeah. I mean, I've had quite a few clinical

trials. I mainly research -- do research in clinical trials, which is drug development in humans. So I'm not a lab bench researcher.

Most of my studies are in Hodgkin's or in primary central nervous system lymphoma. I also have some in other non-Hodgkin's lymphomas.

The one now that we have that's kind of promising in primary central nervous lymphoma is a immunotherapy drug called nivolumab which we are using in people who have recurrent primary central nervous lymphoma. So that's people who have been treated, but now the lymphoma has come back, so we need newer therapies for that and this trial is looking at that.

Q. So are your research efforts involved in clinical trials to find new therapies to treat patients with primary central nervous system lymphoma?

A. Yes.

Q. Have you also published in the peer-review medical literature?

A. Yes.

Q. And in what areas have you published?

A. With non-Hodgkin's lymphoma, mainly some of them have been like review articles, like how to treat, those kind of things. But also clinical trials for non-Hodgkin's, in particular central nervous system

lymphomas, follicular lymphomas, diffuse large B-cell lymphomas. Is that what you're getting at?

Q. Yes, thank you.

A. Okay.

Q. How did you become interested in oncology as a specialty that you were going to focus on as a doctor?

A. Yeah. I think kind of a cheesy, I guess, answer is that I had -- I was interested in medicine and I always found it interesting, the science behind oncology that one cell can kind of take over a body. But from a personal aspect, I had some family members that were afflicted with different types of cancer. So when I started looking into medicine, I was kind of already geared towards oncology.

Q. And have you focused both your teaching, your research, and your clinical care in the areas of non-Hodgkin's lymphoma?

A. Yes.

Q. Since your fellowship that you described?

A. Yes.

Q. And have you developed a subspecialty and expertise in primary central nervous system lymphoma, the type of cancer that Mrs. Pilliod had?

A. Yes.

Q. Doctor, consistent with the other witnesses

who have testified, are you being compensated for your time?

A. Yes.

Q. What is your hourly rate?

A. $500 an hour.

Q. In terms of the materials that you reviewed to arrive at the opinions you're going to share with the jury today, can you give us a sense of, in Mrs. Pilliod in particular, what did you look at to form your opinions?

A. Yeah. I looked at her medical records. There were thousands of pages. I looked at all of those that I had available. I also looked at her MRI scans. Looked at some literature on glyphosate also.

But as far as her medical records, I pretty much looked at everything from -- that was provided to me from 2008 till now.

Q. Have you also reviewed the depositions of Mrs. Pilliod and Mr. Pilliod?

A. Yes.

Q. Did you review the depositions of Mrs. Pilliod's treating physicians?

A. Yes.

Q. Have you also reviewed the reports and depositions of the witnesses that the plaintiffs called?

A. Yes.

Q. And you also indicated you reviewed medical literature on the issue of non-Hodgkin's lymphoma and glyphosate?

A. Yes.

Q. Have you also -- are you also relying on your education, training, and experience to form the opinions that you're going to talk about today?

A. Oh, yes, definitely.

Q. Did you have an opportunity to speak with Mrs. Pilliod directly yourself?

A. No, I did not.

Q. Does that, in your mind, in any way hinder your ability to form opinions and testify about her clinical course?

A. No, I don't believe so.

Q. And can you tell us why?

A. Yeah. I mean, really I was asked to kind of review her clinical course, which has already happened in the past. I had thousands of pages to do that. So there was really no need for me to interview her now.

She also has several physicians which have already interviewed her and provided the physical exam findings.

So I don't think there's really any -- any --

there's no indication that I would find anything different than what her current physicians have reported. But the past information was what was most important in my decision-making.

Q. For all the opinions that you are going to offer today, will you do so to a reasonable degree of medical certainty?

A. Yes.

Q. Do you apply the same standards in reaching your opinions in this case as you would as a researcher at Moffitt or as a doctor caring for your own patients?

A. Yes.

Q. Doctor, what is evidence-based medicine?

A. So evidence-based medicine means you base your medical opinions on scientific evidence. So not guessing or assuming, but if we have data to support something, that's the evidence we need to make a medical decision.

Q. When you are teaching young doctors in oncology, do you teach them the principles of evidence-based medicine?

A. Yes. Very important, especially now we have so much information. It's like information overload, social media, the Internet. You know, being able to weed through what's important and what's not, there's

hundreds of articles that come out each month, it's really important now more than ever.

Q. When you are conducting research in therapies for cancer, do you follow principles of evidence-based medicine?

A. Yes.

Q. When you're deciding how to care and treat your own patients, do you follow the principles of evidence-based medicine?

A. Yes.

Q. When you were forming opinions in this case, were you -- do you follow the principles of evidence-based medicine?

A. Yes.

MR. ISMAIL: Your Honor, I tender Dr. Bello as an expert in lymphoma, its diagnosis, treatment, causes generally, and Mrs. Pilliod in particular.

THE COURT: Voir dire?

MR. WISNER: Yes, Your Honor.

VOIR DIRE EXAMINATION

BY MR. WISNER:

Q. Good morning, Doctor.

A. Good morning.

Q. My name is Brent Wisner. I'm going to be asking you a few questions, and then I'll turn it back

over to Mr. Ismail. Okay?

I appreciate you coming out here on this Monday morning.

I want to clear up a couple things. So your practice primarily focuses on treating patients with lymphoma; is that right?

A. That's correct.

Q. And your research is focusing on developing potential cures or treatments for lymphoma; is that right?

A. Yes.

Q. I'd like to talk to you a little bit about a different issue, and that is determining the causes of lymphoma. Have you ever published any scientific journal article addressing the causes of lymphoma?

A. No.

Q. Have you ever engaged in a systematic research project outside of the context here to look at the causes of lymphoma?

A. Yes.

Q. Okay. Now, I want to clear up a couple of things that I didn't fully understand. You said you published peer-review articles; is that right?

A. Yes.

Q. How many?

A. Oh, gosh, I'd have to look at my CV. There's got to be at least 20.

Q. Okay. Do you recall previously having a deposition in this case?

A. Yes.

Q. And do you recall Mr. Miller was there, he asked you some questions.

A. Yes.

Q. And you were under oath; right?

A. Yes.

Q. Same oath you're under today?

A. Yes.

Q. And when he asked you that question, you told him it was definitely more than 50, didn't you?

A. Uh-huh.

Q. That was false?

A. Was it?

Q. Well, you just said it was 20.

A. No, I said more than 20, at least 20.

Q. Okay. Let's look at your CV then.

MR. WISNER: May I approach, Your Honor?

THE COURT: Yes.

BY MR. WISNER:

Q. I'm handing you Exhibit 3146.

MR. WISNER: Your Honor, you already have a

copy of this.

Counsel, do you need a copy, or are you good?

Q. This is a copy of your expert report; right, Doctor?

A. Yes.

Q. And if we look starting on page 21, and I'm using the bottom right number; do you see that?

A. Yes.

Q. And this is a copy of your CV; right?

A. Yes.

Q. The CV that you provided for this case; right?

A. Yes.

Q. And if you turn to the section on peer-reviewed literature, do you see that? "Peer review publications."

A. Yes.

Q. All right. You numbered the number of peer-reviewed publications; right?

A. Uh-huh.

Q. All right. And if you turn to the end of peer-reviewed publications, it says 25; right?

A. Yes.

Q. 25 is definitely not more than 50; right?

A. That's true.

Q. And of these 25 publications that you've

done -- well, just to be clear then. So earlier when your deposition was taken and you said it was definitely more than 50, that was false?

A. Well, I meant more than 50 publications. There's still more than 50 publications if you put book chapters in here, posters. Those are publications.

Q. Let's do the math.

A. And then also, if I have to mention, this is probably not all-inclusive. To be honest with you, I'm not the best at updating my CV, but I try.

Q. Okay. So let's break that down. You said let's include everything. Let's do that.

A. Uh-huh.

Q. Book chapters, there's one; right? And then underneath that is oral presentations and posters, that's what you're referring to; right?

A. Uh-huh.

Q. And that's like 13?

A. Yeah.

Q. So we add 14 to 25, we're still in the 40 range, we haven't got to 50 yet; right?

Right?

A. Yeah, that's correct.

Q. Okay. So let's just be straight. When he previously asked you the question, you were mistaken,

you don't have more than 50 publications; right?

A. I may have misspoke on that because I don't have it in front of me and I didn't have it in front of me when he was asking me the question. So I was trying to just go off of memory. So 40, 50, but it's quite a few publications. And again it's not up-to-date, my CV is actually not all-inclusive.

Q. Oh, so there's other publications that are not on your CV?

A. There probably is.

Q. Like what?

A. There's probably some clinical trials, especially pharmaceutical-sponsored ones where I was just a poster abstract or something like that, and I probably would not have put that in here.

Most of the times the CV is used, I keep it updated for promotional status. So you have to do more high-yield articles on here. Usually if it's just a poster or if it's some presentation at a meeting, it doesn't carry any weight for promotion so it's not really included on most CVs.

Q. You included this as part of your expert report in this case; right?

A. Yes.

Q. And you knew that we would be relying on that

for your opinions?

A. That and my review of her records and the literature.

Q. Right. We were looking at your expert report. So it wasn't for promotional purposes here; right?

A. Right.

Q. Okay, it's we're relying on it.

A. But I was just asked to provide a CV so that's what I did.

Q. And in these peer-reviewed articles, Doctor, not a single one of them actually looks at the causes of lymphoma; right?

A. Let's see. I don't believe any of the peer-reviewed ones do.

Q. And in fact, you didn't write all of these ones, did you?

A. No, I contributed to all of the ones that my name is on.

Q. Let's look at that first one, the most recent one, that thing from the NCCN guidelines. Do you see that? Is your testimony to this jury that you authored or contributed to that?

A. Which one?

Q. Number 1.

A. Yes, definitely. Yeah, we all get a chance to

edit that material.

Q. Let's take a look at it then.

MR. WISNER: May I approach, Your Honor?

THE COURT: Yes.

BY MR. WISNER:

Q. I'm handing you Exhibit 3144. That's a copy of that article; right?

A. Yes.

MR. WISNER: Okay. Permission to publish?

THE COURT: Any objection?

MR. ISMAIL: No, Your Honor.

THE COURT: So granted.

(Exhibit published.)

BY MR. WISNER:

Q. Doctor, this is a copy of the article we were just referencing a second ago; right?

A. Yes.

Q. And you told this jury you contributed to it and authored it?

A. Yes. Yes.

Q. If you look right here -- well, turn to the next page, and there's a whole section here that says individuals who provided content development and/or authorship assistance. Do you see that?

A. Yes.

Q. Not on there, are you?

A. No, I'm not on that list.

Q. Because you didn't provide content or authorship assistance, did you?

A. No, that's not true. We actually sit around for weeks making these up, and then after it's all typed up, we get to look at it and edit it and send in our editorials. So that all goes into the authorship of this article.

Q. Well, how come you're not on this list?

A. I honestly don't know. I would ask them. I'm not quite sure if this is for the people who actually physically typed it. Because what happens is I can't physically type this, like I send them my recommendations, my critique.

Not only is it mine, but I have to send it to the other physicians that see lymphoma at our facility so there's a consensus about what we're agreeing to.

So I may not have physically typed this article so maybe that's why they're saying this is the authorship assistance. But I definitely contributed to this. I put in hours of work on this.

Q. Okay. So to be clear then, in this article that you're saying that you helped author, it says right here that you didn't; right?

A. I don't think that's what it says.

Q. Well, it says individuals who provided content development and/or authorship assistance. That's what it says. Your name is not there; right?

A. Right. But I don't think that means you didn't author it.

Q. If you look at the cover page, there's actually like a lot of different authors on this; do you see that?

A. Yes.

Q. And if you look -- I usually do this on my iPad, sorry.

Some of them have little like, for example, Dr. Hoppe, the first author has a little star. Do you see that?

A. Yes.

Q. Okay. And then if we actually look at the bottom, it says what that star is. Provided content development and/or authorship assistance. Do you see that?

A. Yes.

Q. And then if we look for your name in here, it's right there, Celeste Bello. Do you see that?

A. Yes.

Q. There's no star; right?

A. I think, you know, again, I think that kind of gives evidence to what I was referring to on the authorship thing. Dr. Hoppe and Dr. Advani, they typically type it up. They are actually -- they get an office at the NCCN to come up with this. That's like their job. We contributed to it, the rest of us here on -- we give a verbal communication, we also do e-mails, and we provide and help edit the content. But when it comes to the final draft, it's those two people that type it up.

Q. All right. So this is false?

A. No, that's completely true.

MR. ISMAIL: Objection, Your Honor.

BY MR. WISNER:

Q. Well, okay. Back to your CV, you said that -- okay, so you haven't published on non-Hodgkin's lymphoma -- sorry. Strike that.

You haven't published on the causes of non-Hodgkin's lymphoma; correct?

A. I guess that's not entirely correct. I've done review articles, like I have a review article on follicular lymphoma where we do go over some causes.

Q. You do?

A. Yeah.

Q. Are you sure?

A. I do.

Q. Want to look it up?

A. Yeah.

Q. Okay. Are you talking about the 2016 article?

A. I don't know what year it was.

Q. You know what, we won't spend time on it, that's fine. Really, we're getting into the weeds here.

Well, let's focus on the main point. You've never published on pesticides; right?

A. On which?

Q. Pesticides.

A. On pesticides, no.

Q. You've never published an article on chemicals; right?

A. No, I've never published a chemical article.

Q. You are not a toxicology; correct?

A. I'm not a toxicologist.

Q. You've never conducted an animal bioassay; right?

A. No, I have not.

Q. You've never conducted a long-term animal carcinogenicity study; right?

A. No.

Q. You are not a genotoxicologist; right?

A. I'm not a genotoxicologist, if that title

exists, no.

Q. You've never conducted a genotoxicological study on any chemical; right?

A. No, I have not.

Q. You are not a pathologist; right?

A. I review a lot of pathology. My title is not a pathologist, but I do review a lot of slides and I do review a lot of biopsy samples. But I'm not a pathologist per se.

Q. Your focus as a doctor is to treat people with cancer; right?

A. Yes.

Q. It's fair to say, though, that you're not really an expert on determining whether a chemical causes a cancer; right?

A. Well, probably as close to an expert as there would be on that topic because there's not a lot -- there's not a specific field called, you know, expert of chemicals causing cancers. It's usually oncologists that are trained in that and look for that.

My particular clinical focus is on treating patients, but we all take into account data and information that comes out looking for causes every day.

Q. Well, hold on, Dr. Bello. I mean, you've read the expert reports of Dr. Portier, Dr. Ritz,

Dr. Jameson, Dr. Weisenburger; right?

A. Yes.

Q. And they've spent their life researching the causes of cancer; correct?

A. Yes.

Q. There are people who spend their careers, experts, trying to determine if chemicals cause cancer; right?

A. There's people who -- who do research on that, yes.

Q. You're not one of them?

A. I would say I am as close to an expert as you'll get in that field. I may not do bench research or mice research like Dr. Portier or Dr. Ritz does, but I do see epidemiology stuff, I do see epidemiology articles, and I do conduct research that takes into account causes of lymphomas.

Q. So it's your testimony that you're as close as it comes to an expert on this area and you've never once published on it?

A. Well, I don't think that's entirely fair to say.

Q. Okay. Show me where on your CV you published the causes of lymphoma based on chemical exposure. I didn't see that in your CV.

A. Well, I wouldn't say specifically on chemical exposure, but we look at causes of lymphoma in almost every article.

Q. Well, that's my point and that's what I'm trying to get at. There are experts who study chemicals and how chemicals cause specific cancers, and we have met some of these experts, but you're not one of those experts. You're focusing on the treatment of lymphoma; right?

A. But I am an expert in lymphoma in humans and what causes lymphoma in humans. So that's where my expertise would lie.

Q. Okay. But again, just to get the point, we're talking about chemicals causing lymphoma. You've never published in that area?

A. No, I've never published on chemicals causing lymphomas.

Q. Because that's not your expertise; right?

A. Not my expertise.

MR. WISNER: At this time, Your Honor, we'd move to exclude her testimony about Roundup as she's not an expert in the area of chemicals causing cancer.

THE COURT: Overruled.

MR. ISMAIL: Thank you, Your Honor.

May I proceed?

THE COURT: Yes.

DIRECT EXAMINATION (resumed)

BY MR. ISMAIL:

Q. So, Dr. Bello, I want to pick up on this article that Mr. Wisner was asking you about. What is the NCCN?

A. It's the National Comprehensive Cancer Network.

Q. What is the National Comprehensive Cancer Network?

A. It's kind of the governing body that puts out all the guidelines on how to manage cancers, every cancer.

Q. And is the National Comprehensive Cancer Network, does that include what the jury has heard about these nationally recognized cancer centers of excellence that specialize in taking care of cancer specifically?

A. Yes.

Q. And this particular document is indicated a guidelines document; is that right?

A. Yes.

Q. What is a guidelines document?

A. Guidelines are kind of rules or points to help guide your treatment. So it's kind of a presentation of facts, information, to put it all in a condensed version

to help people make an informed decision when they're treating certain malignancies.

Q. Did you spend your own professional time working with this group of experts with the National Comprehensive Cancer Network to come up with these guidelines?

A. Yes.

Q. Did you contribute meaningfully in the development of these guidelines to guide other doctors taking care of patients with cancer?

A. Yes.

Q. Were you invited to participate in this effort?

A. Yes. We have meetings in varied cities where we meet for several hours and even a couple days at a time.

Q. Do you consider it an honor to participate in coming up with the guidelines to help doctors treat their own patients with cancer?

A. It is a great honor, yes.

Q. And are you listed as an author in -- first of all, what journal is this published in?

A. This is in the *Journal of the National Comprehensive Cancer Network*, I think is the full title.

Q. Is that a well-known and respected journal in

cancer research and cancer care?

A. Yes, it is.

Q. And are you listed by the journal as an author of this guideline document that Mr. Wisner showed you?

A. Yes.

Q. Are you an author of this document?

A. Yes, I am.

Q. Did you contribute meaningfully to this document?

A. Yes.

Q. Is there any way the *Journal* could list you as an author if you weren't a participant in it?

MR. WISNER: Objection. Speculation.

THE WITNESS: No.

THE COURT: Overruled.

BY MR. ISMAIL:

Q. All these other people who don't have little asterisks next to their name because they're not the people who helped format and gather the document, did they also contribute meaningfully to this guidelines to guide physicians caring for their patients?

A. Yes, they did.

Q. Okay. Dr. Bello, let's continue our discussion about your work and your opinions in this case. Okay?

A. Okay.

Q. Now we're going to get into this in much greater detail. But just to give folks an overview of what we're going to cover today, did you examine Mrs. Pilliod's medical records to determine whether she had risk factors for the development of non-Hodgkin's lymphoma?

A. Yes.

Q. And we're going to talk about what those were this morning. But can you confirm whether or not Mrs. Pilliod indeed had risk factors for NHL?

A. She does have risk factors, yes.

Q. Did you review her medical records and the deposition testimony to determine whether the cause of her primary central nervous system lymphoma can be determined?

A. Yes, I did.

Q. And what did you conclude based on your training, experience, and review in this case?

A. Yeah, I mean, based on her records, the cause of her primary central nervous system lymphoma is really unknown.

Q. And is that unusual in any way in the area of primary central nervous system lymphoma?

A. No, it's not. Unfortunately most of the

cases, probably about 80 to 90 percent, are unknown, the causing incident is unknown.

Q. Okay. And we'll talk about that in more detail.

Have you also, based on your review here, been able to form an opinion as to whether or not Roundup was a substantial contributing factor in Mrs. Pilliod's non-Hodgkin's lymphoma?

A. Yes, I have.

Q. And what did you conclude?

A. It was not a contributing factor to her primary central nervous system lymphoma.

Q. And have you also reviewed the epidemiology data regarding formulated glyphosate and non-Hodgkin's lymphoma to form an opinion as to whether there's an association based on that data?

A. Yes.

Q. And briefly what did you conclude on that issue?

A. So the human epidemiology, the totality of that data does not support a link between formulated Roundup and non-Hodgkin's lymphoma.

Q. Okay. So let's talk how you formed those opinions and the support you have for what you just shared with the jury.

It's been a few days since we've all been together. To sort of reorient everyone, when we talk about lymphoma, can you just give us sort of a working definition of lymphoma and how you talk about it with your patients.

A. Yeah. The short answer is it's a cancer of lymphocytes. Lymphocytes are the cells in your body that fight infection. There's a few different types of lymphocytes, but once one of those becomes a cancer, that's what a lymphoma is.

Q. And what body system are lymphocytes part of?

A. The lymphatic system. So it's mainly considered a blood cancer blood, a blood and lymphatic cancer.

Q. Some of the other witnesses have talked about non-Hodgkin's lymphoma being a cancer of the immune system; is that a fair characterization?

A. I think it's fair. The lymphocytes are an integral part of the immune system.

Q. Okay. So we've heard some description of B and T lymphocytes, or B-cells and T-cells. Can you remind us what those are and how they relate to the development of non-Hodgkin's lymphoma?

A. Yeah. So a B -- a B-cell and a T-cell are just different types of lymphocytes. So a B- or a

T-cell can become a lymphoma. So there's also different steps in development of the cell that if the lymphoma occurs at that step, then it can become a different type of lymphoma. So because of that -- you already have two different cell types to start with, B-cells and T-cells. But then at the different stages of development, if the mutation occurs, they can become a lymphoma. Because of that, there's over 60 different types of lymphomas so it's not just one entity.

Q. So when we talk about primary central nervous system lymphoma, is that a specific clinically distinct subtype of non-Hodgkin's lymphoma?

A. It is.

Q. And might that have important differences when we talk about the care and treatment and diagnosis of those patients?

A. It does.

Q. Let me ask a more sort of basic question. How does cancer develop on a cellular level?

A. Yeah. There's a lot of steps that go into the development of a cancer, some known, some not known. But the basic generic step is that you have to have damage in the DNA. And then that damage has to be something that the cell is able to live with and propagate to daughter cells. So when it divides, it has

to be able to pass that on.

Most of the time, DNA damage is repaired before it even gets to that step, or the cell has like a suicide or a shutoff valve where it kills itself. So usually the body is pretty amazing that it could kind of take care of itself.

But let's say you do get an event like a break in a DNA strand and it is a survivable one and it passes it on to its daughter cells, that's what we call a mutation.

Well, most mutations are what we call silent mutations or nonsense mutations which means they don't even affect the cell. They're there, but they really have no cause, they don't make the cell do anything different than what it was going to normally do.

And so those most -- majority of those mutations don't even matter. So that's good.

And then if you happen to get a mutation that does matter, your body has a way of surveillance system where if it sees that now this mutation is making this cell have some type of survival advantage -- which is what a cancer is, it's a cell that is able to either avoid dying or is able to live a long time -- your body has a surveillance system, the immune system. Part of the immune system's job is to fight infections. The

other part is tumor surveillance.

So if it sees these little cells that are starting to grow, it's supposed to come over there and get rid of them. So a lot of steps have to happen before DNA damage can actually lead to a cancer.

Q. So when we talk about primary central nervous system lymphoma as its own distinct subtype, does that affect the clinical care and management of patients with that particular subtype?

A. Yeah, they're managed differently.

Q. And have you helped us put together a slide that distinguishes the clinical presentation of primary central nervous system lymphoma with diffuse large B-cell lymphoma --

A. Yes.

Q. -- systemically?

Now can you just give us an overview of what those distinctions are from a clinical perspective as someone who takes care of these patients?

A. Yeah. I think when you're looking at this slide here, "DLBCL" stands for diffuse large B-cell lymphoma. If we're talking about systemic, what we mean by systemic is anywhere in the body but not the brain. When we're talking about primary, that means the primary CNS, which means central nervous system, excuse me, that

includes the eyes, the brain, and the spinal cord. That's considered your central nervous system.

So primary central nervous lymphoma, by definition, is only in those areas. So that's kind of easy, it's in the title.

But what also is different is that primary central nervous system lymphoma is more rare than the systemic diffuse large B-cell lymphoma and the treatments varies. So we have a standard treatment for systemic diffuse large B-cell lymphoma. We use a regimen called R-CHOP. That's not really important, but just to know there is a standard regimen that's used in almost every case.

In primary central nervous system, the regimens -- there's not really a standard gold standard. It's known that methotrexate should be used. But more than that is not really defined because it is pretty rare.

Q. And has some of your own clinical research focused on finding these new therapies for CNS lymphoma?

A. Yes.

Q. Now, you've told us that CNS lymphoma is clinically distinct from systemic diffuse large B-cell lymphoma; is that correct?

A. Yes.

Q. Are there also differences on the genetic level?

A. There are.

Q. And has that been researched and published in the peer-reviewed literature?

A. Yes.

Q. Doctor, you have a binder in front of you and I'd ask that you turn to Exhibit 6800.

A. Do you mind if I get my glasses? I actually left them in my purse.

Q. I'll grab them for you.

MR. WISNER: You're going to go through her purse?

MR. ISMAIL: No. Somebody else is.

(Laughter.)

THE WITNESS: It's okay. It's just a travel purse. It doesn't have a lot in there.

BY MR. ISMAIL:

Q. There you go.

A. Thank you.

Which one were you asking for?

Q. 6800.

A. 6800, thank you.

Okay.

Q. Is this an article you reviewed and relied

upon for your opinions in this case?

A. Yes.

MR. ISMAIL: Permission to publish?

MR. WISNER: No objection.

THE COURT: Granted.

BY MR. ISMAIL:

Q. So, Dr. Bello, just to orient everyone, this is an article by a Dr. Tun, it looks like from Mayo Clinic.

And can you tell us generally what this paper did and we're going to show the jury some of the data they represented here.

A. Okay. So basically what this paper did was Dr. Tun and his colleagues took tissue samples from primary central nervous system lymphoma and then tried to compare the genetic material or the expression of certain genes compared to lymphoma in lymph nodes and lymphoma in other parts of the body, to see if there was any difference between expression of genes in the brain lymphoma, or the genes expressed on lymphoma in a lymph node, basically to try to see if they're different entities.

Q. And is that research important to understanding the differences between why a lymphoma cancer develops only in the central nervous system as

opposed to never going to the central nervous system?

A. Yes, it is.

Q. Okay. So if you could turn, Doctor, to page 3 of the article. There's this very confusing looking presentation. And can you help us make sense of what we're seeing here.

So let's take these three large columns here.

A. Yeah. So this is a very busy slide so I was going to just try to walk through it kind of slowly here. But -- can I stand up?

MR. ISMAIL: Your Honor, may she?

THE COURT: Yes.

THE WITNESS: So this column here is looking at lymphoma samples from brain lymphoma, CNS, primary CNS lymphoma. And each row, which is really microscopic, is reporting expression of a gene.

So if you count all these rows, which is like impossible because this is so zoomed in, it was over 10,000 different genes that they looked at.

So then they compared it to genes from extranodal lymphoma which means lymphoma in the bone marrow, in the spleen, the liver, and then ones in a lymph node. So these two categories we would consider systemic. This is brain. This is systemic.

And what they found was there were over

50 different genes that were expressed differently between systemic and brain.

And so what these color plots here are looking at is they took out like one of the genes and they magnified it so you can read, actually, you can't really read that. And so like for instance this one here, this column is the brain, diffuse large B-cell lymphoma samples. These two columns are the systemic diffuse large B-cell lymphoma samples.

The orange-red color means that there was overexpression of this gene. The green color means there was less expression of this gene. So this right here is showing you that these two clearly -- the systemic clearly had different expression of this gene compared to the primary central nervous system samples.

And then they did it for several others. And these are just examples of the same where it's just different genes that they showed a different expression.

And I know it's kind of like, okay, great, but it's important because we don't know why some of these genes -- some of these lymphomas only go to the central nervous system and why others want to be in a lymph node.

And what these researchers noted was that the genes that are kind of misexpressed or expressed

differently actually encode for like signals that make the cells want to latch onto certain areas, and also code for signals for different like chemicals that the cells make, proteins, to communicate with each other, which might actually give us some idea that that's why this cell wants to go to the brain and that's why these cells want to go to a lymph node.

BY MR. ISMAIL:

Q. So based on this sort of emerging research and the gene expression of the different types of cancers, can primary central nervous system lymphoma, does it look and behave differently on a genetic level than systemic DLBCL?

A. Yes, it does.

Q. Now, Doctor, I want to turn to the question of the cause of primary central nervous system lymphoma. Okay?

A. Okay.

Q. Now, I think you told us that you see nearly every one of the central nervous system lymphomas that come in one of the biggest cancer centers in the country at Moffitt; is that correct?

A. That's correct.

Q. And you have been teaching and studying in this area your entire time that you've been an

oncologist?

A. Yes.

Q. Do you have a view as to whether there's a view in the medical community, oncology community, as to what are the known causes of central nervous system lymphoma?

A. Yeah. There's really only two known causes. It's having HIV or having a suppressed immune system either from being on immunosuppressive medications or having a congenital immune problem.

Q. And is that just Dr. Bello talking, or is this something that you have seen in your work as a cancer researcher clinician?

MR. WISNER: Objection. Calls for hearsay. Speculation.

THE COURT: Overruled. She can answer.

THE WITNESS: Yeah, no, it's not just me. This is published data that have shown this by numerous researchers that have spent a lot of time looking into this issue.

BY MR. ISMAIL:

Q. Doctor, are you familiar with the World Health Organization's classification of tumors of hematopoietic lymphoid tissues?

A. Yeah, I am.

Q. And is this a resource that is reviewed and relied upon by cancer researchers?

A. Yeah, that's basically the lymphoma leukemia bible.

Q. Okay. And do they have a section here on discussing central nervous system lymphoma?

A. They do.

Q. If you turn to Exhibit 6184, I have an excerpt of just that section rather than copying the whole book, and I'd ask you to identify that, please.

A. Okay. Yes. This is the WHO classification of hematopoietic and lymphoid tissue tumors.

MR. ISMAIL: And Your Honor, this has been published previously.

(Exhibit published.)

BY MR. ISMAIL:

Q. So this is the section in this World health Organization text on primary diffuse large B-cell lymphoma of the CNS; is that correct?

A. Yes, that's correct.

Q. And CNS is central nervous system?

A. Yes.

Q. Does this describe Mrs. Pilliod's cancer?

A. Yes, that's what she has.

Q. Now if you go down here to the section

entitled "Etiology" -- remind us what the word "etiology" means?

A. It means cause.

Q. So it begins: In immunocompetent individuals. What's an immunocompetent individual?

A. That's a person with a normal immune system.

Q. What would be things that would make someone an immune-system-compromised individual?

A. Having HIV is one of the major ways that people have a compromised immune system. But also medications can do it. So, for instance, organ transplant, people that have been on an organ transplant or had an organ transplant are usually on medications to suppress their immune system.

Q. And what does the WHO say with respect to the known -- for people who have a competent immune system, how does the WHO describe what you can say about the causes of their cancer?

A. It's unknown.

Q. Is this a principle that you agree with?

A. Yes.

Q. Is this what you teach your residents and fellows who are learning about primary central nervous system lymphoma?

A. Yes.

Q. When you care and treat for patients every week who have this type of cancer, is this something that you talk about with your patients?

A. Yes.

Q. Let's apply these principles to Mrs. Pilliod. Is she, from your view of the records, an immunocompetent individual?

A. Yes, she is.

Q. Now when we say someone is immunocompetent, does that mean that there isn't some degradation of their immune system for whatever reason?

A. No. It just means that they're not -- they don't have a known dysfunction of their immune system.

Q. Okay. So you determined that Mrs. Pilliod doesn't have HIV, doesn't have -- didn't have an organ transplant to dramatically suppress her immune system?

A. Yes.

Q. So if we apply these principles to her, what -- how do you characterize her cancer from an etiology or cause perspective?

A. Then it would have to be unknown or idiopathic.

Q. Now when we say a cancer is idiopathic or unknown, is that the same thing as saying, well, nothing caused it?

A. No. No. Something caused it, it didn't just happen by magic. But the problem is we don't know what caused it.

Q. And so based on your review of the records, would you consider Mrs. Pilliod's cancer idiopathic?

A. Yes, I would.

Q. Now, there's been a lot of discussion in the trial about risk factors. Are risk factors the same things as causes?

A. They are not.

Q. Now, I want to show you, Dr. Bello, the presentation from the two witnesses the plaintiffs called. Conveniently they used the same board in how they assessed Mrs. Pilliod's cause of her cancer. Okay?

A. Okay.

Q. First of all, when you are caring for patients, do you -- have you ever gone through this exercise where you list a bunch of risk factors and cross out some and circle one?

A. No.

Q. When you are working with your colleagues at Moffitt, caring for patients, is this an exercise that you and your fellow faculty and oncologists go through?

A. No.

Q. Are these things on the far left column all

known causes of primary central nervous system lymphoma?

A. No, they're not. Most of them are risk factors but not actual causes.

Q. Would -- is it, in your view, a legitimate exercise to cross out things and circle one as a cause of primary central nervous system lymphoma in Mrs. Pilliod's case?

A. No. I think really for cause, the only one would be immunodeficiency. So you could kind of rule that out because we know she doesn't have HIV and we know she's not on any immunosuppressant medications.

I guess viral infections, that would include HIV, but there's other viral infections. And then the other ones listed here are mainly risk factors for the development.

Q. Is this exercise that Dr. Nabhan and Dr. Weisenburger went through consistent with what we just looked at with the World Health Organization guideline for lymphomas in the cause of PCNSL?

A. No, it does not have these listed as a cause, besides the immunodeficiency.

Q. Okay. Well, let's talk about risk factors then for Mrs. Pilliod. Does Mrs. Pilliod have risk factors for the development, if we look at it from a non-Hodgkin's lymphoma perspective, does she have risk

factors for that disease?

A. She does.

Q. And would that put her at an increased risk of getting non-Hodgkin's lymphoma by virtue of her various risk factors?

A. Yes, it would.

Q. Could you just give us a snapshot of Mrs. Pilliod's medical history -- well, first of all, when was she diagnosed with non-Hodgkin's lymphoma?

A. She was diagnosed March-April, 2015.

Q. Okay. So looking at that point and backwards, can you give us a sense of her medical history, and then we'll talk about which of those factors you considered risk factors in her case.

A. Okay. Yeah, she has a history of diabetes. She also has a history of an autoimmune disorder called Hashimoto's thyroiditis, which is immune thyroid condition. She has a history of bladder cancer which was treated and then recurred. And then she was treated again with immunotherapy treatment.

So she does have some other issues in her medical history that put her at risk.

In addition, she does have a body mass index that was greater than 30, which is considered unfortunately obese. And that's a risk factor for

lymphomas too. She also has a history of smoking.

I think that was it.

Q. How old was Mrs. Pilliod at the time she was diagnosed?

A. At the time of diagnosis she was 70. So age does put you at an increased risk for non-Hodgkin's lymphoma.

Q. Okay, let's start there. So if you'd turn to page 6127 in your binder and tell us what that is and whether that's an article you read in light of this case.

A. Okay. This is an article by Villano and colleagues, and it was looking to see if age and gender and race played a role in the development of primary central nervous system lymphoma.

MR. ISMAIL: Permission to publish, Your Honor?

THE COURT: Any objection?

MR. WISNER: One second, Your Honor.

No objection.

THE COURT: Granted.

(Exhibit published.)

BY MR. ISMAIL:

Q. Okay. Doctor, if you turn to the second page, there's a Table 2 here.

A. Okay.

Q. Now, first of all, is this data specific to primary CNS lymphoma?

A. Yes, it is.

Q. Is that shown up here at the --

A. At the top.

Q. Okay. So just generally speaking, does this review talk about the incidence rate of developing CNS lymphoma as people age?

A. Yes, it does.

Q. So if we go down here and look by age group, race, and gender, for example, if we take a Caucasian female under the age of 50 and compare it to a Caucasian female over the rate of -- age of 50 -- first of all, this column is labeled "Incidence Rates"?

A. Uh-huh.

Q. What's an incidence rate?

A. The number of cases that occur in a population.

Q. Is that the same thing -- that's different than an odds ratio?

A. It is different than odds ratio.

Q. The jury is used to seeing some of these numbers reported as a ratio.

A. Right.

Q. This is sort of the rate of developing this cancer in a given population.

A. Yes.

Q. Okay. So the rate for the younger group is .09 and the rate for the older group is 1.2.

A. Yes.

Q. And so that's a factor of about --

A. Over 10.

Q. Okay. And Mrs. Pilliod obviously falls into the older age group here.

A. Yes.

Q. Okay. And is this data consistent with what you've seen in your own practice in terms of the types of patients who present with primary central nervous system lymphoma?

A. Yes. The majority of patients with a normal immune system are in the age of over 60.

Q. And is it consistent with what you've seen in other articles and your own training and experience that age is a risk factor for CNS lymphoma?

A. Yes.

Q. Is it just the turning of the calendar that puts someone at an increased risk?

A. No. It's not so much that, you know, just having a birthday puts you at risk for non-Hodgkin's

lymphoma. It's what that signifies. When you age, different things happen in your body. One of the things that happens is your immune system starts to not be as effective.

So, I mean, we know that people who are older require -- that's why it's recommended older people get pneumonia vaccines after the age of 60, because the immune system starts to wane a little bit.

Also, as you age, you do come across more genetic mutations so you have more time to get a mutation that might actually become carcinogenic.

Q. Thank you.

One of the other things you mentioned was that Mrs. Pilliod is diagnosed with something called Hashimoto's disease?

A. Yes.

Q. And you told us that that is an autoimmune condition.

A. It's an autoimmune condition.

Q. Just in a few sentences, what does it mean clinically?

A. An autoimmune condition is when your own immune system decides to attack something in your body that it shouldn't. It usually signifies that somebody's immune system is not normal, there's something not quite

right about it.

Q. Have you looked at Mrs. Pilliod's medical records for indication that she reported herself that she had this condition of Hashimoto's?

A. Yes.

Q. If you turn to Exhibit 6576 in your binder, please.

Is this a medical record you reviewed and relied upon for your opinions in this case?

A. Yes.

MR. ISMAIL: Permission to publish?

MR. WISNER: No objection.

THE COURT: Granted.

(Exhibit published.)

BY MR. ISMAIL:

Q. Let's look at the top part first.

So this is a new patient questionnaire that Mrs. Pilliod filled out; is that correct?

A. Yes, that's correct.

Q. And if you look here where she's describing herself what she's been diagnosed with, what does she say with respect to this question of Hashimoto's?

A. She wrote in that she had been diagnosed with Hashimoto's 15 years prior to this questionnaire.

Q. Does Mrs. Pilliod further in -- by the way,

the date of this down here at the bottom, is it 2001?

A. Yes.

Q. Okay. Does Mrs. Pilliod, in this medical record, go on to describe some of what her own clinical course was with respect to her thyroid treatment?

A. She does.

Q. So is that down here?

A. Uh-huh.

Q. The question was asked: Any serious illnesses or injury in the past not referred to above? And can you tell us what Mrs. Pilliod wrote in here with respect to the issue that we've been discussing.

A. Yeah. She wrote that she had a serious reaction to one of the medications she was getting for treatment of her hyperthyroidism that destroyed her immune system. She mentions white -- white platelets, but I think she probably was referring to white cells because the medicine that she was on to treat this does have a side effect where it can cause a massive destruction of some of your white cells, leading to a compromised immune system.

Q. And what, if anything, do you make of this description by Mrs. Pilliod herself that her treatment "pretty much destroyed my immune system for a time"?

A. I think it kind of gives evidence that she

probably did have a hyperthyroid condition, that it wasn't just her misunderstanding that because that medicine is really only used for hyperthyroid.

Q. Now, is there -- are there studies and peer-reviewed literature that describe whether or not Hashimoto's itself is a risk factor for the development of non-Hodgkin's lymphoma?

A. Yes, there are.

Q. Can you turn to Exhibit 6613 in your binder, please.

Is Exhibit 6613 an article that you reviewed and relied upon for your opinions in this case?

A. Yes.

MR. ISMAIL: Permission to publish?

MR. WISNER: No objection, Your Honor.

THE COURT: Granted.

(Exhibit published.)

BY MR. ISMAIL:

Q. So just generally, what did this article look to? And we'll just look at the specific data with respect to Hashimoto's.

A. Basically it just took a group of people with non-Hodgkin's lymphoma and looked to see what different autoimmune conditions they had and then tried to determine if they had a higher risk of developing or of

having the non-Hodgkin's lymphoma based on their autoimmune condition.

Q. And are these researchers from the National Cancer Institute?

A. Yes.

Q. If we turn to Table 2, Dr. Bello.

A. Yes.

Q. Do they -- do these researchers break out whether there was an observed increased risk with various forms of autoimmune conditions?

A. Yes, they do.

Q. And so here is the first column, disease, that would be the autoimmune disease?

A. Yes.

Q. And they looked at different forms of cancer; is that correct?

A. Yes.

Q. Was non-Hodgkin's lymphoma one of them?

A. Yes.

Q. Right here, I know it's hard to read, so can you tell us, for Hashimoto's thyroiditis, the condition that Mrs. Pilliod had, what do these researchers report as to whether there's an increased risk?

A. They showed a statistically significant increased risk in people developing non-Hodgkin's

lymphoma if they had Hashimoto's.

Q. And is -- what's the degree of risk that's reported here?

A. Three. An odds ratio of three.

Q. And you indicated it was statistically significant?

A. Yeah.

Q. In addition to this review, have you seen other peer-reviewed publications that describe Hashimoto's as a risk factor for non-Hodgkin's generally?

A. Yes.

Q. Does that mean Hashimoto's causes non-Hodgkin's lymphoma in patients?

A. No, it's a risk factor. It's not a cause.

Q. Does the autoimmune disease itself, how does that -- what is your understanding as to why autoimmune diseases, whether they're a marker for something or why so many autoimmune diseases like Hashimoto's are associated with an increased risk of NHL?

A. Yeah, I think it is -- it's not so much that the autoimmune condition is causing the lymphoma. It's more of a flag or a marker that this person's immune system, which is necessary for getting rid of cancers, is not behaving properly. It's not the norm.

So, again, it's not that these people are getting lymphoma because -- directly because of their autoimmune condition. It's because the autoimmune condition is a reflection of a compromised -- I shouldn't say compromised but an altered immune system.

Q. Is this risk of non-Hodgkin's lymphoma -- or lymphoma -- sorry -- limited to just lymphomas of the thyroid gland?

A. No, it is not.

Q. And why do you say that?

A. Because it's an immune-wide, bodywide problem. We don't see -- it's not necessary that you're going to see an increase in lymphoma in the thyroid gland. It's that your immune system is not working so lymphoma can pop up anywhere.

Same thing with like rheumatoid arthritis. We don't see people -- we see a higher risk of rheumatoid arthritis leading -- or non-Hodgkin's lymphoma in people with rheumatoid arthritis, but we don't see lymphoma in the joint. It's that they have an altered immune system which is predisposing them to getting lymphoma.

Q. You indicated that Mrs. Pilliod had, prior to her non-Hodgkin's lymphoma, two bouts of bladder cancer; is that correct?

A. That's correct.

Q. Are there data that show that a personal history of cancer puts you at an increased risk of non-Hodgkin's lymphoma?

A. Yes, there are.

Q. And in terms of -- does that mean that those prior cancers turn into lymphoma or cause lymphoma directly?

A. No. Again, it's kind of a marker for something's not quite right in the body. With regards to another malignancy putting you at higher risk for lymphoma, it's probably more of a reflection that there's a problem with the person's DNA repair, and that's why they're more likely to get another cancer.

Q. Did Mrs. Pilliod have a family history of cancer?

A. She did.

Q. Is that reported even by her in her medical history?

A. It is.

Q. And you indicated that body mass or body weight is associated with an increased risk of non-Hodgkin's lymphoma?

A. It is.

Q. And I think the jury has seen some of that discussion. Was Mrs. Pilliod in the category for that

factor that placed her at an increased risk?

A. Yes, she was.

Q. Now, so we talked about the various risk factors that Mrs. Pilliod had. Does that change in any way your view that her cancer is properly characterized as idiopathic or unknown?

A. No, it does not.

Q. Why not?

A. Because we're talking about risk factors again. And none of those are known causes of primary central nervous system lymphoma. They're risk factors for non-Hodgkin's lymphoma. The only known causes of primary central nervous system lymphoma are HIV and a compromised immune system which she didn't have. So all the other things are risk factors, but they don't cause it.

Q. And that assessment that you have talked about with the jury today, drawing that distinction between causes and risk factors, is that how you practice medicine at Moffitt?

A. Yes.

Q. Is it consistent with how you were taught yourself and how you teach the next generation of oncologists?

A. Yes.

Q. Is that consistent with how your colleagues at Moffitt approach this question about PCNSL?

A. Yes.

MR. WISNER: Objection. Speculation.

THE COURT: Overruled.

THE WITNESS: Yes, it is.

BY MR. ISMAIL:

Q. If you were going to go through the -- I know you told us that the exercise that Dr. Nabhan and Dr. Weisenburger went through with the board and the crossing and the circling is not how actual oncologists go about treating their patients. But if you were going to go through that exercise, is there any basis upon which you could just cross out her other risk factors like age and Hashimoto's and body weight and prior cancers?

A. No.

Q. Okay. Dr. Bello, I want to continue the discussion about Mrs. Pilliod and her clinical course.

Now, you indicated she was diagnosed in April of 2015. The jury has heard from her and from her treating physicians about her course thereafter. But have you reviewed those medical records as well?

A. Yes.

Q. And do -- did she receive good care? Do you

concur with the care and treatment that she received from her doctors?

A. Yes.

Q. Can you just give us an overview -- I don't want to get into too much detail, folks have already heard it -- but from what you saw from the medical records of her care?

A. Yeah. She received a methotrexate-based regimen for several cycles, which is pretty -- pretty standard for the treatment of primary CNS lymphoma.

She appears to have tolerated for the most part well, but did have some complications related to that with some of the treatment.

She did get a complete remission at one point, but then unfortunately her lymphoma recurred and then she had to be treated again. And then got a little bit more additional therapy with a consolidation, which is kind of like a treatment to try to kill off any microscopic disease that might still be left behind. It's like one for good measure kind of treatment. And then she was placed on maintenance treatment which she is currently on to this day, I believe.

So it seems very appropriate. She's been in remission now since January 2017. So for over two years, which is great. So her treatment seems pretty

standard.

Q. Is there anything in -- when we talk about the cause of non-Hodgkin's lymphoma, and you said for PCNSL in particular, central nervous system lymphoma, you identified two known causes; is that correct?

A. Yes.

Q. What percentage of the total group of central nervous system lymphomas does that make up?

A. It's a small percentage, like 10 to 20 percent.

Q. So based on the -- your discussion with the jury thus far, how many -- what's the percentage of central nervous system lymphomas that are properly characterized as unknown or idiopathic?

A. It would be 80 to 90 percent.

Q. And is that description of 80 to 90 percent idiopathic for central nervous system lymphoma consistent with the discussion of this issue at conferences and in medical schools that you've been a part of?

A. Yes.

Q. And so when you characterize Mrs. Pilliod's cancer as being idiopathic, does she fall in that 80 to 90 percent of unknown causes that you see clinically every week?

A. Yes, I would say so.

Q. Is there anything that you saw in the medical records about Mrs. Pilliod's clinical presentation that would be different than the type of patients you see every week?

A. No. She presented pretty typically to what I see most the times with primary central nervous system lymphoma patients.

Q. Any reason from your review of how she presented that you would look for a reason to take her out of the 80 to 90 percent of central nervous system lymphomas that are -- have an unknown cause?

A. No.

Q. In terms of her clinical course, how she was treated, did you see anything there to suggest anything different or special going on in her case that would take her out of the 80 to 90 percent of unknown causes that you see every week?

A. No.

Q. Now, you have seen in the depositions and in the information provided by Mr. and Mrs. Pilliod that they reported that they used Roundup at --

THE COURT: So, counsel, if you're sort of shifting into something slightly different.

MR. ISMAIL: This is a good time to stop.

THE COURT: This is a good time for a break.

MR. ISMAIL: Yes.

THE COURT: So we're going to have a 15-minute break. We're going to resume at 10:35.

So if you would just wait one second, Dr. Bello, and let the jurors get up.

THE WITNESS: Okay.

(Recess taken at 10:21 a.m.)

(Proceedings resumed in open court in the presence of the jury at 10:38 a.m.)

THE COURT: You may proceed, Mr. Ismail.

MR. ISMAIL: Thank you, Your Honor.

Q. Dr. Bello, I would like to continue our discussion that we were having about how you assessed Mrs. Pilliod's case.

A. Okay.

Q. We talked about with the jury how that it's accepted that there are two causes of central nervous system lymphoma, and you described that for the jury.

A. Yes.

Q. And that the vast majority of CNS lymphomas, the causes of them. Okay. But then you talked about how there are several risk factors that are associated with the development of non-Hodgkin's lymphoma.

Can you help us understand what's the

difference when we talk about risk factors for developing a disease versus what you know about the causes of the disease.

A. Okay, yeah, sure. A cause is something that directly results in the condition. A risk factor is something that just puts you at a higher risk for getting that condition. So it doesn't necessarily cause it. It's just something about that factor makes you more likely to develop the condition.

So, for instance, with having an autoimmune condition, your immune system is a little bit off so that might make you higher risk for getting lymphoma.

So those are risk factors. But we know that the autoimmune condition itself does not cause the condition.

Q. So, for example, age, is it generally accepted beyond dispute that older individuals are at an increased risk of non-Hodgkin's lymphoma?

A. Yes.

Q. Do cancer researchers understand all the reasons why -- what about getting older makes individuals develop cancer more frequently than younger individuals?

A. We don't know all the reasons why, but some of the thoughts are about the immune system becoming less

active as you age, that's one theory. It is known that people as they age, their immune system becomes less effective, which would be less effective in tumor surveillance also.

Also, there's another theory that -- which is accepted, that people, as they age, have more exposures to things that can cause mutations or just have mutations in general. Because you're having millions, billions of mutations occur in your body every day, it's just part of life. As you age, it could start to add up.

Q. So understanding -- well, let me ask this. When we talk about pesticides as a term, is that specific to talking about a particular chemical when we say the word "pesticide"?

A. No, there are over a thousand different types of pesticides so it's a pretty generic, broad term.

Q. Is -- have there been certain pesticides that have been associated with an increased risk of developing non-Hodgkin's lymphoma?

A. Yes, there are. Like DDT, malathion are known risk factors for the development of non-Hodgkin's lymphoma.

Q. Your hospital, the Moffitt Cancer Center, does the Moffitt Cancer Center have a website that describes

some of the -- in patient-friendly terms, what some of the risk factors might be for developing NHL?

A. Yes, it does.

Q. Is there a description of certain pesticides being one of those on the website?

A. Yes, it's listed there.

Q. Does that mean every single pesticide increases the risk of non-Hodgkin's lymphoma?

A. No, absolutely not.

Q. Do you have to still investigate and look at the data for the particular pesticide to see in which group it falls?

A. Yes, each one.

Q. And have you considered the question of whether Roundup is a pesticide that is associated with an increased risk of non-Hodgkin's lymphoma?

A. Yes, I've looked at that data.

Q. And what did you conclude?

A. The total data, human data, did not support a link between the development of non-Hodgkin's lymphoma and Roundup.

Q. So do you consider Roundup a risk factor for Mrs. Pilliod?

A. I do not.

Q. Now, continuing this discussion, Dr. Bello,

are you aware that Mr. Pilliod, in 2011, also was diagnosed with systemic non-Hodgkin's lymphoma?

A. Yes, I'm aware.

Q. And you've talked about with the jury about how that was different clinically and genetically from the cancer that Mrs. Pilliod had.

A. Yes.

Q. Mrs. Pilliod, if you look at the cells under the microscope, are they diffuse large B-cells?

A. Yes, there are.

Q. But are there still important distinctions between the two types of cancer?

A. Yeah. Some of the things we can't see under the microscope, protein expression genes, and there are differences.

Q. So, for example, that complicated looking graph that we showed earlier, that type of gene expression, genome mapping, does that occur clinically when you are treating patients?

A. Clinically, no. That was a research topic that was mainly educational to try to say, hey, look, there's something different going on, maybe we need to look at these differently. But those are not tests that are available like in a hospital or in a clinical practice. That was a research.

Q. Did you consider the fact that Mr. Pilliod -- another person in Mrs. Pilliod's household developed a subtype of non-Hodgkin's lymphoma when investigating her case?

A. Yes, I did.

Q. In your opinion, Doctor, does the fact that Mr. Pilliod was diagnosed with systemic DLBCL support a conclusion that it must be Roundup that caused Mrs. Pilliod's cancer?

A. No.

Q. Given the prevalence of non-Hodgkin's lymphoma in the United States, would you expect occasionally to see two individuals who are in the same household or the same environment develop non-Hodgkin's lymphoma?

A. You would just by numbers alone, that would happen.

Q. Have you seen that in your clinical practice?

A. I actually have. I've seen it in my practice with married couples. I've seen it with inlaws. I've seen it with neighbors and people who work together too.

Q. There was a witness here last week who told the jury that it's got to be common sense that it must be Roundup because both Mr. Pilliod and Mrs. Pilliod developed non-Hodgkin's lymphoma.

Is that a valid medical or scientific way to

approach these questions?

A. No. No.

MR. WISNER: Objection. Misstates the record. And leading.

THE COURT: Well, sustained to the extent that it may not accurately reflect exactly what -- I think it was Dr. Nabhan actually said.

MR. ISMAIL: I'll be happy to rephrase.

Q. Dr. Bello, in your view, is it important to consider the actual scientific data on whether having a spouse with non-Hodgkin's lymphoma is associated with the other spouse developing cancer?

A. Yes, it is.

Q. Can you just simply say it must be common sense and end your inquiry?

A. No, you have to use some science behind it to see what is this link, not just jump to that conclusion.

Q. Is there medical literature and studies that look at this question -- let me back up.

The phrase "spousal concordance," what does that mean for cancer research?

A. It means when a spouse, a husband-wife get the same cancer. So that's a concordant condition.

Q. And had there been studies looking at the question of whether non-Hodgkin's lymphoma is one of the

cancers for which there is this spousal concordance?

A. Yes. There are a few studies looking at that.

Q. One of the studies the jury saw last week or at least was referenced last week was the Friedman publication at Exhibit 6456 in your binder.

Have you read and relied on this paper?

A. Yes.

Q. How many couples were assessed on this question of non-Hodgkin's lymphoma concordance?

A. They actually had four couples that both had non-Hodgkin's lymphoma.

Q. And do they report an association in that paper?

A. They do a report on association.

Q. Are there larger, more recent -- are there larger data that look at this question of concordance?

A. Yes, there are.

Q. And by the way, in terms of when the intake or the enrollment in this study --

A. Right.

Q. -- if that is what the right word is -- did that occur before Roundup was on the market?

A. It did. It did.

Q. And so are there examples in the literature about couples developing non-Hodgkin's lymphoma even

before Roundup became available?

A. Yes.

Q. Now, with respect to the larger studies that you're referring to, if you turn to 6463 and tell us whether that's one of the studies.

A. Hemminki, yes, this was one of them.

MR. ISMAIL: Permission to publish?

MR. WISNER: No objection, Your Honor.

THE COURT: Granted.

(Exhibit published.)

BY MR. ISMAIL:

Q. So this is the Hemminki paper. And when we look here in the abstract to sort of orient what we're looking at, the estimated risk for concordant and discordant cancer in spouses in order to quantify cancer risks from the shared environment. Is that this issue we've been talking about with Mr. Pilliod and Mrs. Pilliod?

A. Yes.

Q. And how many different cancer sites or types of cancers did these researchers consider on this issue of concordance?

A. They looked at 18 different cancer sites.

Q. And did they report here which of the cancers in fact do have an association between husband and wife?

A. They did. They reported, which is right there in the abstract too, that they noted three sites, stomach, lung, and bladder had increased -- significantly increased concordance between spouses.

Q. Did these researchers report what they found with respect to the other cancers that they investigated?

A. Yes, they do.

Q. And if you turn, Doctor, to Table 2. So in the far left column, spouse cancer site, these are the 18 different cancers that they looked at. And then they have it broken down by concordant cancer in husband by wife's cancer. What does that mean?

A. So it means if the wife had the cancer listed in the left, the incidence of the husband developing the cancer is listed here.

Q. And then is the opposite --

A. The opposite for that chart. If the husband had the cancer, then it was the incidence of the wife developing that cancer.

Q. And then is non-Hodgkin's lymphoma one of the cancers investigated?

A. Yes.

Q. How many couples were included in this analysis?

A. So 56 couples.

Q. Is that significant when you're assessing -- is more data more meaningful than smaller studies?

A. It does. It gives you more valid results usually.

Q. Now, SIR, is that like an odds ratio in cancer research?

A. Yeah, it is.

Q. And what did they report for the first question about whether there's a concordance for non-Hodgkin's lymphoma in husbands if the wife has cancer?

A. They found no association that was statistically significant to increase the risk.

Q. And in terms of looking at it going the other direction, the wife's risk of having cancer if the husband had non-Hodgkin's lymphoma?

A. Right. Again, they found an SIR of zero, 1.07 there. And that was not statistically significant.

Q. And so in terms of this question about whether or not -- looking at this data, how would you apply it to the question of Mrs. Pilliod's -- the cause of her cancer knowing that Mr. Pilliod had systemic DLBCL four years earlier?

A. I would say there's more -- there's more to it

than just them living together and being husband and wife.

Q. Have there been additional data published on this very issue?

A. Yes, there is.

Q. And if you turn to 6501.

Is this the paper you reviewed?

A. Yes.

MR. ISMAIL: Permission to publish?

MR. WISNER: No objection.

THE COURT: Granted.

(Exhibit published.)

BY MR. ISMAIL:

Q. And this is a collection of researchers including at least one from Stanford that had looked at this question of spousal concordance?

A. Yes.

Q. And if you look at the conclusion in the abstract, do the researchers say only strong environmental risk factors such as smoking seem to influence cancer in adulthood?

A. Yes, that's what they concluded.

Q. And right above that, what do these researchers say about this question about shared environment?

A. That it probably contributes only a minor role.

Q. And did they look at again the question of non-Hodgkin's lymphoma and the husband and the wife each having had cancer?

A. Yes, they did.

Q. And if you turn to page 4, are these all the different cancer sites that they considered?

A. Yes.

Q. So this table is, okay, if the wife has a certain cancer, what are the -- what's the risk that the husband has the same cancer?

A. Yes.

Q. Is non-Hodgkin's lymphoma listed here?

A. It is.

Q. And is there a statistically significant increased risk of the husband having cancer if the wife has -- if the husband having non-Hodgkin's lymphoma if the wife has NHL?

A. No, there's not.

Q. And in the next table, did they look at the question going the other direction?

A. They did in the discordant ones, yes.

Q. So let's look, if you turn to Table 3 on the next page, cancer in husband, so if the husband has

non-Hodgkin's lymphoma, what is the risk of the wife having the same cancer?

A. Yes, they did.

Q. And in terms of this study, Doctor, how many couples were examined?

A. 92.

Q. And --

A. 92 for -- that had non-Hodgkin's lymphoma.

Q. Thank you.

When you look at this larger study in the 92 couples, was there any statistically significant increased risk of the wife developing non-Hodgkin's lymphoma from the husband -- because the husband had the same cancer?

A. No.

Q. And applying the teaching from these studies to the question that you are investigating in this case, does the fact that Mr. Pilliod have a systemic DLBCL prove that Mrs. Pilliod's central nervous system lymphoma was caused by Roundup?

A. No, it doesn't.

Q. Last week with Dr. Nabhan, Mr. Miller and the witness went through an exercise of putting up numbers on a flip chart. I want to ask you about your view as to the legitimacy of that process. Okay?

A. Okay.

Q. And what they did was they said, well, the odds of both of them getting a DLBCL was 1 in 120. And then they multiplied them by one another to say what are the odds that two in the same household get that condition.

As I've described that process to you, as a cancer researcher and oncologist, is that a legitimate way to investigate this question?

A. No, it's not. There's more that go into it. We know that Mrs. Pilliod had some risk factors. So her odds of developing a condition would not be the same as the general population. So sometimes you really can't just use general population statistics and apply it to everyone.

Q. And so would the same be true for Mr. Pilliod?

A. Yes.

Q. So that answers the question about whether they were even using the right numbers. But how about the question about answering the issue of concordance generally. For example, in the papers that we just looked at, did the researchers simply just multiply the ratios by one another or did they actually investigate the cause?

A. No, they actually investigated. They looked

through -- in the last paper, the Weires paper, they looked through over a million couples, they looked for this.

Q. And when you actually do the study and you actually gather the data, what does it show about non-Hodgkin's lymphoma and this risk of spousal concordance?

A. It doesn't show that one exists.

Q. And is that -- is that consistent or does that make sense to you as a cancer researcher when we're talking about NHL in particular?

A. I think it does because with non-Hodgkin's lymphoma, it's different than like lung cancer. You're not really worried so much about environmental exposures. It seems to be something else that's going on, whether it is more of a genetic or immune dysfunction.

So I would say it kind of does gel with what common knowledge is for non-Hodgkin's lymphoma.

Q. You've told us that Mrs. Pilliod has Hashimoto's disease.

A. Uh-huh, yes.

Q. And just generally, what's the prevalence of Hashimoto's disease?

A. It's like 1 in 50, 1 in 20. It's not rare.

You can see it.

Q. So, and you know Mr. Pilliod has ulcerative colitis?

A. Yes, I saw that.

Q. And have you seen data that the prevalence of ulcerative colitis is like 1 in 400?

A. I have.

Q. So if you wanted to do the same exercise Mr. Miller did last week, what are the odds that a husband and wife, one would have Hashimoto's and one would have ulcerative colitis?

A. Right. It's pretty rare too.

Q. One in 20,000?

A. Yeah.

Q. Yet they both have those autoimmune conditions; correct?

A. Yeah, those numbers alone --

MR. WISNER: Objection, Your Honor. I'm going to move to strike this witness's testimony about Mr. Pilliod. That is an undisclosed opinion and she said she's not here to talk about him.

THE COURT: I don't think she's expressing an opinion. So it's overruled.

MR. WISNER: Well, she said that he had ulcerative colitis, and I don't know how she could

possibly know that.

THE COURT: I think it's because Mr. Ismail just suggested that he did.

BY MR. ISMAIL:

Q. I ask you to assume that Mr. Pilliod has ulcerative colitis.

A. It was in the deposition.

Q. That's right --

(Simultaneous colloquy.)

THE WITNESS: The Pilliod.

MR. WISNER: Well, the foundation wasn't laid, Your Honor. That's my objection.

MR. ISMAIL: I'm happy to.

THE COURT: So why don't you go back and recreate.

MR. ISMAIL: Thank you.

Q. Thank you, Dr. Bello. Did you review Mr. Pilliod's deposition?

A. I did.

Q. Did he describe his medical history there?

A. He did.

Q. And however he describes it there, for the purposes of this question can you assume that Mr. Pilliod has ulcerative colitis?

A. Yes.

Q. Again, so as to this question about what are the odds that a husband and wife each would have autoimmune diseases?

A. Yeah, it's rare, but it happens.

Q. Thank you.

Dr. Bello, I want to switch gears now and talk about your review of some of the human data regarding Roundup. Okay?

A. Okay.

Q. The jury has heard about different kinds of data, mechanism data, animal data, and human epidemiology data.

In your view, do you weigh those all equally when answering the question about whether Roundup is associated with non-Hodgkin's lymphoma?

A. No, they're not all equal.

Q. And why is that?

A. Well, if you're looking at animal data or cell line data, let's start with the cells or testing in a Petri dish, that's very informative, it's very helpful, but it's not the same as being in a human. It's an artificial environment. There's a lot more that go into it.

So cell studies, animal studies, they're helpful in getting like a hypothesis, but it's still not

the same as seeing it in a human. A lot goes on in the human body.

So I would not make those two different categories equal, their evidence equal to the human data. The human data is what it is, that's in humans.

Q. And in terms of to the extent somebody was showing a picture of three equal pillars, animal data, mechanism data, and epidemiology data, do you think those are -- should be given equal weight in cancer research?

A. No, not for humans.

Q. And have you focused your inquiry on human epidemiology data?

A. Yes.

Q. Did you consider that there's other types of information that have been generated on this question?

A. Yes.

Q. Have you reviewed the various scientific reviews of the genotoxicity or cell data and the animal data, for example, the regulatory reviews?

A. Yes, I have looked at that.

Q. And so you're aware of what's been generated and the assessment of others on those questions?

A. Yes.

Q. Do you think you should just disregard those

data, or should they be part of the discussion?

A. No, it's important.

Q. And in terms of the hierarchy of what you believe to be the most important, where do you put your focus as a clinician in cancer research?

A. I mean, the human data would be all the way up here. The mice, cell lines would be down here. So they're not unimportant, they're helpful because you're trying to come up with an idea, you're trying to get mechanistic information. But then once you move and you're like ready to get it to the human stuff, the human data, there's no substitute for humans.

Q. Okay. Is that consistent with how you were taught in epidemiology, as an epidemiologist, as a clinician, and how you teach others?

A. Yes.

Q. Dr. Bello, there's been some discussion about genotoxicity as a concept. Is genotoxicity the same thing as saying something causes cancer?

A. No.

Q. And have you helped us put together a description of why that is true?

A. Yes.

MR. WISNER: I'm going to object to this. Undisclosed opinions. There's no mention of

genotoxicity --

THE COURT: Sidebar.

(Sidebar held but not reported.)

BY MR. ISMAIL:

Q. Dr. Bello, let's pick up where we were.

Have you helped us put together a slide to sort of explain this concept of the difference between genotoxicity and something causing cancer?

A. Yes.

Q. So when you talk about genotoxicity, what does that mean in sort of the where that is in the process?

A. It's a long -- these are kind of the definitions. Genotoxicity would be an event that causes damage to a DNA. It doesn't mean that that event is going to be around to survive to daughter cells. A lot of DNA damage is repaired by the cell.

So the body again -- I know we kind of alluded to this earlier -- is really amazing in what it can do. And it will correct a lot of these damaged areas in the DNA if it happens. And so if it doesn't, then a lot of cells will have a switch that tells them to die. So it's kind of like a self-destruct.

If for some reason the DNA damage is allowed to survive and the cell is able to spread that to its dividing progeny daughter cells, that's the definition

of a mutagen. It's something that is survivable of the mutation.

So most mutations, they are passed on to -- when the cell is dividing, it will pass it on to its daughter cells, but the majority of mutations are what we call nonsense or just silent mutations, which means they have no function on the cell whatsoever.

So even if you're a mutagen, it does not mean you're going to be a carcinogen. The majority of mutations are not carcinogens.

And then let's say by just some, you know, unfortunate incident, it's able now to become a tumor and it's growing, it's starting to proliferate in the body. The body has a defense mechanism -- that would be considered a carcinogen if it's that gives the cell a survival advantage, it's able to live longer than it should. The body has an immune system that's supposed to kill this.

So there's a lot of steps that go into the development of a cancer. So being genotoxic does not necessarily mean you're a mutagenic compound. Being mutagenic does not mean you're a carcinogen. And having a carcinogen does not necessarily equate to an actual cancer in a person. So there's a lot of steps that go into it.

Q. So in terms of DNA damage, is that something that happens in all of us on a daily basis?

A. Every day.

Q. And this process that you described here, is this well accepted within the field of cancer research?

A. Yes, this is.

Q. I want to talk about a couple of studies that the jury has heard about thus far in this trial. And it's generally under the umbrella of the aerial spraying studies in around the border of Ecuador. Are you familiar with those papers?

A. I am.

Q. And in terms of this question -- well, if you turn to Exhibit 5691 in your binder.

And before I turn from this, Dr. Bello, to the extent someone suggests that a compound causes genotoxicity up here in the process, does that establish that that compound necessarily causes mutagenicity or progresses to a carcinogen?

MR. WISNER: Objection. Well beyond the scope.

MR. ISMAIL: It was a generic question.

THE COURT: If she knows.

MR. WISNER: I mean, it's not in her report, Your Honor. The word "genotoxicity" doesn't appear.

THE COURT: Okay. Step to the side.

(Sidebar held but not reported.)

MR. ISMAIL: May I proceed, Your Honor?

THE COURT: Yes.

BY MR. ISMAIL:

Q. Dr. Bello, picking up where we were, I'll restate the question.

So even if a compound has shown to lead to genotoxicity and DNA damage, does that necessarily mean that compound proceeds to all the pathways to the point of it being a carcinogen as well?

A. No.

Q. Now, I think you have in front of you Exhibit 5691; is that the Paz-y-Mino study?

A. Yes.

Q. Did you review and consider this opinion and -- this article in your review of this case?

A. Yes, I did.

Q. Briefly remind the jury what this paper looks at and we'll talk about your interpretation of it.

A. They were looking at people who had potential exposure to glyphosate due to where they lived in Ecuador compared to controls. And they collected blood samples to see if there was any evidence of DNA damage in those two groups.

Q. And this is described as one of the aerial spraying studies where the government was trying to eradicate some illegal crops?

A. Yes.

Q. Now, in terms of what these researchers found, are there, in your view, limitations in interpreting this data based on how they went about doing this study?

A. Yes, I believe so. I mean, they did not really actually assess the direct exposure to glyphosate of these people. They just said, oh, you're considered exposed because you live in this 3-kilometer radius where spraying occurred. They didn't actually ask these people were you exposed to glyphosate. So I feel that there's a little misclassification on exposure versus unexposed.

And then in addition to that, with the patients that they -- or the people they used here, they did not control for other substances. So they didn't see if maybe some people in group A were exposed to different infections, different medical history than people in the control. So there were a few limitations to this study.

Q. Did these researchers publish a follow-up study?

A. They did.

Q. And if you turn to 5689, is that the follow-on study that was published by the same group of researchers?

A. Yes.

Q. And what did they do in this follow-on study?

A. Well, this one they tried to go back and actually assess exposure in these people.

Q. And what did they find?

A. They found that -- well, they found a couple of things. I guess to say they found that there was no increase in DNA damage in the people who were highly exposed to the glyphosate verse the people who were considered not exposed.

But then they also found that this alleged damage in these people now were not -- it was not present years later because they followed these people and they repeated blood samples and they did not see DNA damage in these people reportedly a couple years after the spraying had stopped.

Q. Is that reported by these authors in the abstract?

A. Yes.

Q. So in terms of that sort of pathway we were just discussing with the jury, did the Bolognesi researchers find that this aerial spraying progressed

those people down the path of developing either mutagens or carcinogens?

A. No.

Q. There was another paper the jury has heard about, the Bolognesi paper, 4285.

Is this another paper you read and considered?

A. Yes.

Q. Is this another aerial spraying study?

A. It is.

Q. And in terms of what these researchers did, can you give us an overview of how their study differed at all from the one we just looked at?

A. Yeah, this one was a little bit more intricate. They actually had multiple different regions where they knew aerial spraying had occurred. And then they compared it to areas where they used glyphosate pesticides for eradication in their crops in addition to the -- or separate from the aerial spraying.

And then they also had areas where no pesticides were used. So they tried to compare it to these different areas to see if they saw any difference in DNA damage in these groups.

Q. So let's look to see how the authors described their findings. If you turn to page 994 of the paper.

Are you there? The bottom right column.

A. Okay. 994?

Q. Yes. So the paragraph that begins "Overall."

A. Yes, okay.

Q. So first of all, what is the MN test?

A. It's a micronuclei test looking for -- it's kind of a surrogate for DNA damage.

Q. How did these researchers describe their own data?

A. They said overall these results suggest that genotoxic damage associated with glyphosate spraying evidenced by the MN test is small and appears to be transient.

Q. If you turn to the next page, in the carryover paragraph. Did these researchers comment as to whether they thought their -- further comment about the importance of their data? Down in the middle. Let me just highlight it for you.

A. Okay. I was kind of reading the whole...

(Exhibit published.)

BY MR. ISMAIL:

Q. Do these researchers write, "Evidence indicates that the genotoxic risk potential associated with exposure to glyphosate in the areas where the herbicide is applied for eradication of coca and poppy is of low biological relevance"?

A. Yes, that is what they concluded.

Q. And do you agree with that interpretation of this data?

A. I do.

Q. Now, you indicated one of the problems with the first study, the Paz-y-Mino study, is that they didn't assess whether the people in the study actually were exposed to glyphosate?

A. Yes.

Q. Did this group of researchers address that potential limitation?

A. They did. They did.

Q. And so is that data reported in the paper?

A. It is.

Q. Is that on page -- I guess Table 4?

A. Yes, it's Table 4.

Q. And I don't want to get super into the details of this because it's complicated, but did the -- does this table report how the folks who actually reported exposure to glyphosate compared to the controls?

A. It does. It does. It even lists it out on the side under the little n, the number of people exposed, no exposure, sprayed in air, sprayed on the skin, entered spraying field. So they did break it down.

Q. Okay. And are these the three different communities that were assessed up here at the top?

A. Yes.

Q. And these are the various ways they assessed exposure?

A. Yes.

Q. And can you tell us, Dr. Bello, whether any of these, when you consider actual exposure, was there any statistically significant difference between exposed and unexposed in this study?

A. There was not.

Q. Now turning to -- I want to turn now to the discussion with the epidemiology. Okay? So switch gears again.

A. Okay.

Q. So when we talk about epidemiology, first of all, are we talking about formulated glyphosate itself?

A. Yes.

Q. And have you considered the different types of epidemiological studies that have been conducted on formulated glyphosate?

A. Yes.

Q. The jury has heard about something called case-control data. Have you considered those studies?

A. Yes.

Q. The jury has heard about cohort studies, and we'll talk about the differences in a minute, but did you consider those as well?

A. Yes.

Q. Did you do your best to consider the totality of the epidemiology data that has been generated on this question?

A. Yes.

Q. And did you form an opinion as to whether that, when you consider it in total, whether that evidences an association between glyphosate products and non-Hodgkin's lymphoma?

A. Yes. When you consider it in total, there's no evidence to support a link between glyphosate and non-Hodgkin's lymphoma.

Q. Okay. So let's talk about the different types of data.

The case-control data, remind us real quick what the case-control study wants to do.

A. So case-control study is kind of looking back in time. They take people with a known problem or diagnosis and they look back and kind of survey these people and try to see if there was exposures or something in their history that caused that condition. Then they try to get a group of controls which are

trying to be similar but without the actual condition.

So in our case-control studies that we've been -- or you guys have been discussing here, it's been non-Hodgkin's lymphoma is what we're looking at. So they're taking people with non-Hodgkin's lymphoma and trying to assess things that happened before they developed the disease.

But they already know who has the disease, and they're comparing it to a control group without non-Hodgkin's lymphoma and looking back and seeing if there was anything in their history that's concerning.

Q. Are there known limitations of using that kind of study to assess the scientific question?

A. Yes, there are.

Q. Can you give us some examples?

A. Yeah. There's -- one of the biggest differences in case-control, one of the biggest drawbacks is what's called recall bias. People -- it's hard to remember something that happens back in time. You know, it's hard to remember what you had for breakfast yesterday, much less what kind of compound were you exposed to, you know, five to ten years ago.

People who have an actual medical diagnosis will tend to remember things a little bit differently than somebody who is healthy. This is -- it's just

human nature. When you have a problem like lymphoma, you're going to wonder -- most patients wonder, you know: How did this happen? Why did I get this? So they microanalyze everything that happened. And it's just human nature. They're trying to see: What could I have done differently?

When you're healthy, people don't tend to dwell on that. And so there is a little difference in what is remembered in one group, not intentionally, it's just human nature.

Q. And this phenomenon, recall bias, is this a recognized limitation of case-control studies?

A. Yes.

Q. There's also been discussion of this term "confounding." Is confounding a concept that's important in epidemiology to consider and control for when you can?

A. Yes, it is.

Q. And when we're talking about glyphosate and non-Hodgkin's lymphoma, is there particular variables that should be controlled for?

A. Yes. We know that there are risk factors for non-Hodgkin's lymphoma. So if you're doing a study looking at something that you suspect might be a risk factor, a new risk factor, you'd want to control for

already known risk factors like age, prior history of cancers, those kind of things would be considered a confounder, and you would want to control for that in your research.

Q. Are there additional confounding concerns when you're talking about exposure to other pesticides?

A. Definitely, yeah.

Q. So you told us a little bit earlier today that certain pesticides have been associated with an increased risk of NHL?

A. Yes.

Q. And has that been borne out by some of the studies you reviewed here?

A. Yes.

Q. And so if you don't control for those exposures, how might that impact the reliability of the data you see in glyphosate products like Roundup?

A. Well, you won't know if your actual outcome is due to the glyphosate product or to the confounder.

So if you don't control for a known pesticide like DDT and you get a result that shows there's some association, you're not going to know if that association was due to the glyphosate or due to the DDT unless you control for that.

Q. And so when you're looking at the data set

that's been generated here on products like Roundup, do you believe -- which do you believe would be the more reliable important data to look at, the adjusted data or the unadjusted?

A. The adjusted data.

Q. And in terms of the effect of confounding, is that just a theoretical concern? Or have you seen actual evidence that confounding matters when answering the questions that you investigated in this case?

A. Yeah, there's evidence that it matters, and this is a pretty well-known phenomenon in statistics.

Q. So let's take an example. The jury has heard about a paper called McDuffie many, many, times. Are you familiar with that paper?

A. Yes.

Q. Is that a case-control study?

A. It is.

Q. Now, in one of the analyses in McDuffie, there was a reported statistically significant increased risk. Are you aware of that?

A. Yes.

Q. Was the McDuffie case-control study adjusted for other pesticide exposure?

A. It was not.

Q. Has the data set that was used in the McDuffie

paper been used in other analyses that might tell us whether or not the failure to control for confounding matters?

A. Yes, it has.

Q. And if you'd turn to Exhibit 5152.

Is that the Hohenadel paper?

A. Yes.

Q. Is this a paper you reviewed and considered for your opinions in this case?

A. Yes.

MR. ISMAIL: So any objection?

MR. WISNER: I'm not sure yet. Give me a second.

THE COURT: Has this been published before?

MR. ISMAIL: It has.

MR. WISNER: It hasn't.

(Pause in the proceedings.)

BY MR. ISMAIL:

Q. We can circle back to this, Dr. Bello. Let's keep pushing forward.

The question of confounding, have certain researchers undertaken an effort to control their data for exposure to other pesticides?

A. Yes.

Q. Now, you've read the IARC monograph.

A. Yes.

Q. And that came out in 2015.

A. Yes.

Q. And does the working group there list what epidemiology studies that they considered in their analysis?

A. They do.

Q. And the jury has seen the studies several times. But let's just list them this way so we don't have to go through each paper one at a time.

So have you read each of these studies?

A. I have.

Q. And are these the six that -- as of 2015?

A. Yes.

Q. Now, there was an earlier Hardell paper that's been referred to, this 2002 paper.

Does that include all the data from the earlier Hardell paper?

A. The 2002 one does, yes.

Q. Why is the De Roos 2005 in yellow?

A. The De Roos is the only one that's a cohort study.

Q. Now, the first column here says number of formulated product cases. What is that?

A. The number of non-Hodgkin's lymphoma cases

that were actually exposed to the formulated glyphosate.

Q. Okay. And do you -- is there a concern when you have smaller cases in terms of the reliability of those studies for reaching final conclusions?

A. Yeah. Smaller -- smaller numbers will not give you as valid a result.

Q. And then the second column is adjusted for other pesticides?

A. Yes.

Q. And then obviously the Xs and the checks mean yes or no. And then odds ratio are what some of the studies -- what those studies show for the odds ratio; is that correct?

A. Yes, that's correct.

Q. Now, for some of these we have Xs in this presentation of the data. But do, in fact, the researchers control for other pesticides for certain of the studies that are listed here?

A. Yes.

Q. So, for example, the Eriksson paper, did those researchers do additional analyses that controlled for other pesticides?

A. They do.

Q. And so which set of data do you think are more important to look at, the adjusted or the unadjusted?

A. The adjusted is more important.

Q. And so when you do that, when you look at the adjusted data, what does that do to whether there is a statistically significant increased risk with products like Roundup?

A. It shows that the risk does not exist.

Q. There was one paper here, the De Roos paper in 2003, that's different than the 2005 paper; correct?

A. Yes.

Q. So this 2003 is a case-control study?

A. Yes.

Q. You report an odds ratio of 1.6 here that's not statistically significant.

A. Yes.

Q. Are there -- why did you select that odds ratio from the De Roos paper?

A. Well, this, according to the authors, was the most accurate measurement of odds, the odds ratio. So that's why I selected this one.

Q. Now, in terms of then when we look here across the various epidemiological studies as of 2015, does this show you that there's an association with products like Roundup?

A. It does not.

Q. Had there been additional epidemiology studies

that have been done and published since 2015?

A. Yes.

Q. And which direction do those studies point when you consider them in total?

A. Yeah. The studies are larger and larger, and they showed no association between the formulated glyphosate and non-Hodgkin's lymphoma.

Q. Okay. So let's talk about some of those studies. Are you familiar with the North American Pooled Project?

A. Yes.

Q. So remind the jury what that research effort was.

A. So the North American Pooled Project took data from four different case-control studies and pulled it together to get a larger sample size to try to evaluate the effects of different pesticides on lymphomas.

Q. And what's the research effort -- why did the researchers pool those data together when analyzing this question?

A. Well, they were trying to get a larger sample size to get better, more reliable data.

Q. Now, have some of the studies that we've been looking at been included as part of the North American Pooled Project?

A. Yes.

Q. And so the jury has seen this a couple times already.

Is the McDuffie study part of the North American Pooled Project?

A. It is.

Q. And the De Roos study, is that a subset of the NAPP as well?

A. Yes.

Q. And when you're considering the -- whether there's a relationship between products like Roundup and NHL, would there be any reason, for example, to just pull out the De Roos study and focus on that rather than the larger data study?

A. No. I mean, if you have more information, it would be usually best to use that.

Q. And have you considered each of these -- have you considered De Roos individually, McDuffie individually, but also as part of a whole with NAPP?

A. Yes.

Q. Okay. So let's turn --

MR. ISMAIL: Your Honor, do you have a particular stop time for lunch today?

THE COURT: Noon.

MR. ISMAIL: Noon. Okay.

Q. If you turn to Exhibit 5671 in your binder, is this -- first of all, has the NAPP been published in a peer-review journal?

A. It has not.

Q. And so how is it that you have access to it or aware of the data?

A. These are presentations that were presented at conferences.

Q. And have you reviewed and considered the data in this presentation?

A. Yes.

Q. And I ask, Doctor, if you'd turn to page 26.

A. Okay.

Q. Okay. So we're going to go through this table here.

So first column is glyphosate use, and we'll explain that in a minute.

But over here, I want to remind folks what these two columns mean. What are proxy responders and self-responders?

A. So self-responders are people who filled out the information themselves. So that's kind of self-explanatory. Proxy is somebody that you get to answer for you. So if they were not able to answer it, they would have had a spouse or a son or daughter answer

in their place.

Q. Okay. So, and these researchers show what the results are if you just consider self-responders as opposed to proxy and self together?

A. Yes.

Q. Okay. So the first look at the data is what some have described as the never/ever analysis. Are you familiar with that?

A. Yes.

Q. And so how do you -- so what does the NAPP, so the combination of the various case-control studies in North America, show as to whether there's an increased risk with products like Roundup and non-Hodgkin's lymphoma overall?

A. Overall if you look at the never/ever category which would take into account everyone who ever said yes, they were exposed, in the study, it shows no statistically significant increased risk.

Q. Okay. Now, the next three looks at the data are getting at whether different exposure levels are associated with an increased risk; is that correct?

A. That's correct.

Q. And so the first is the number of years; is that right?

A. Yes.

Q. And knowing what -- if you accept at face value how Mrs. Pilliod described her use of Roundup, where would she fall in this table?

A. She would be in the greater than three and a half years.

Q. Now, if you look at the way this data is presented here, you have people who are reported to have used Roundup less than -- more than zero, so they've been exposed, but less than three and a half years, that's the first look at the data.

A. Yes.

Q. And then more than three and a half years.

A. Yes.

Q. What happened to the relative risk number the longer the people used the glyphosate product like Roundup?

A. Well, it went down.

Q. Okay. Does that mean it's protective?

A. No.

Q. Why is that?

A. Well, the confidence interval, which is the numbers in parentheses to the side, includes 1. So regardless if it's above -- if your result shows a potential protective or a potential increase, the confidence interval includes 1, you cannot rule out

chance as being the reason you're seeing these results.

Q. If it indeed were the case that exposure to products like Roundup increased your risk of NHL, would you expect to see, the longer you used it, your risk going down?

A. No, you would expect to see it go up.

Q. Now, here in frequency, number of days per year, the researchers put "2 or below" and "more than 2"; right?

A. Yes.

Q. And so if we accept at face value how Mrs. Pilliod described her use, would she fall in this greater than 2 days per year?

A. Yes.

Q. Now in terms of understanding whether the results are statistically significant, does it matter if you look at self-responders only or proxy and self-responders?

A. It does, it matters.

Q. And tell us why?

A. Well, self-responders will be more accurate. It's hard to have a proxy, somebody speak up for you to say what you've used in the past.

Q. And so -- and if you include proxies, is there a statistically significant finding?

A. If you include proxies, there is.

Q. If you just look at the people who are actually exposed, is there a statistically significant finding?

A. No.

Q. Now, if we continue in this discussion, the next one is lifetime days; is that correct?

A. Yes.

Q. Where would Mrs. Pilliod fall accepting her description of how often she used it?

A. The greater than 7.

Q. Is that essentially a null finding here?

A. Right. It showed no association.

Q. Now, when you look at this data in total, what does it show you in terms of whether there's an increased risk with non-Hodgkin's lymphoma in exposure to products like Roundup?

A. Yeah, I think the total data does not support an increased risk or increased association with use of glyphosate in development of non-Hodgkin's lymphoma.

Q. Do you believe, Doctor, it's scientifically legitimate to just pick one of these numbers here to the exclusion of the other eight numbers that we've highlighted and say that's got to be the answer?

A. No. I think you have to look at everything.

Q. And when you look at everything, ever/never, number of years, lifetime days, and days per year, what does the entire picture show you?

A. The entire picture shows no increased risk with glyphosate use.

Q. Now, we've talked about case-control data so far. There's another type of study called cohort study. And remind us what the difference is between that and the case-control.

A. So a cohort study is a study where you actually enroll people before they get the diagnosis or the condition. So, again, since we're talking about non-Hodgkin's lymphoma, it would be people enrolled before they developed non-Hodgkin's lymphoma, and then you would take information from them and then follow them through time to see who develops non-Hodgkin's lymphoma and who doesn't.

Q. And have there been case-control -- sorry -- cohort studies that have looked at whether products like Roundup are associated with an increased risk of NHL?

A. Yes, there are.

Q. And was one of them known as the Agricultural Health Study?

A. Yes.

Q. Okay. So have there been more than one

publication from the Agricultural Health Study?

A. Yes.

Q. Specific to this question about glyphosate exposure, has there been more than one?

A. Yes.

Q. We saw an earlier slide, the De Roos 2005 study. Is that the first publication from the AHS?

A. The De Roos 2005, yes.

Q. And what is the -- has there been a subsequent update including more data from Agricultural Health Study?

A. Yes, there has been.

Q. And what's that study?

A. The Andreotti in 2018 gave an update to the Agricultural Health Study.

Q. So if you would, Doctor, please turn to Exhibit 4106.

And is this the 2018 publication updating the Agricultural Health Study?

A. Yes.

Q. Now, is this a cohort study?

A. It is.

Q. Just to orient folks here, who funded this study?

A. So the NIH, National Institutes of Health,

funded this study.

Q. And in terms of the author affiliations here, if we look down to this description, we don't have to go through every one, but in terms of where these scientists and researchers come from, where they publish this research, can you give us a quick overview of that?

A. Yeah. A lot of them work for either the NIH or the National Cancer Institute.

Q. Does it also include university academic researchers as well?

A. It does. University of Iowa. And I thought there was -- well, Drexel. I thought Nebraska was on here, but I think I have my studies confused.

Q. And in addition, we talked about this peer-review publication with all these scientists on it. What journal was this published in?

A. So this was published in the *Journal of the National Cancer Institute*.

Q. Is that a well respected journal?

A. It is.

Q. Okay. Now just remind us, Dr. Bello, just what the overview of the Agricultural Health Study was or is? Is it still ongoing?

A. It's still ongoing, yes.

Q. Tell us about sort of just the general design

of that study.

A. Well, they took like over 50,000 licensed pesticide users in the state of Iowa and North Carolina, and they gave them a questionnaire to kind of assess what they use, what they've been exposed to, different factors in their life.

And then they followed them over time with subsequent questionnaires. And then also looked through cancer registries to see if any of them developed lymphoma.

Q. So the use of cancer registries, is that a -- how significant is that in your review of this study as to how reliable it is?

A. They're pretty reliable. Cancer registries are usually government-run registries that record people who get certain cancer diagnoses.

Q. Is it well accepted in cancer research to rely on those registries?

A. It is.

Q. Now, at the time that the individuals were enrolled in the study, is that the first time that they were exposed to any sort of pesticide?

A. No, it was not.

Q. And how do we know that?

A. They had questionnaires that mentioned how

long they used it.

Q. And so at the -- when the study began, had there been, for the participants, years of pesticide exposure even before that?

A. Yeah. I don't remember the exact number, but it was several years before they had filled out that questionnaire.

Q. Okay. On this question of confounding that we've been talking about, did these researchers from the National Cancer Institute and others design their study to control for confounders?

A. They did.

Q. What kind of confounders did they control for?

A. They controlled for a bunch of stuff, age, past medical history, pesticide exposure, as well as industrial exposures. I know there was some, like, fuels they adjusted for, radiation exposure they adjusted for. So there was quite a few work-related and environmental-related.

Q. Given the rigor that these scientists used to control for confounders, how does that impact your interpretation of how reliable the data is?

A. It makes the data a lot more reliable taking all of that into account.

Q. Okay. We've talked about AHS having the

De Roos '05 publication and the Andreotti 2018. Have there been other papers published out of the Agricultural Health Study?

A. There have been.

Q. And is it a database that has been used to examine lots of questions about cancer and the participants in the study?

A. Yes.

Q. Now I want to turn now to what -- overall what did these researchers find in the Agricultural Health Study?

A. Overall they found no association between glyphosate and non-Hodgkin's lymphoma.

Q. Okay. So let's look at the data. So Table 2 is on page 4. The data that's specific to NHL is on the next page. I'm just orienting that we're looking at the table that shows cancer incidence in relation to intensity-weighted lifetime days of glyphosate use in Agricultural Health Study. Okay?

A. Okay.

Q. And if you turn to the next page, page 5, you see non-Hodgkin's lymphoma listed here.

A. Yes.

Q. Now, the way these researchers broke it up, they have these Q1, Q2, Q3, and Q4. Remind us what

those different looks at the data are getting at.

A. So those were different quartiles of exposure. What they were trying to account for was different levels of exposure that some people may have been exposed to more of the glyphosate verse others. They were trying to account for that.

Also, because they called it intensity-weighted, they used a formula to determine the intensity like how much of the exposure, so not to just say how frequently they used it, but to what extent.

So if somebody was just kind of spraying just a little bit, that would get like a lower intensity verse somebody who was like having just mixing batches of it, that would get a higher intensity. So they called this an intensity-weighted exposure.

Q. Now, are these the relative risks and the confidence intervals reported for those four looks at the data?

A. Yes.

Q. Is there any statistically significant increased risk in the matter of how often the patients -- individuals were exposed?

A. No, none of the -- none of the quartiles of exposure showed an increase of risk.

Q. Now, the point estimates are below 1. Does

that mean in this study products like Roundup was protective?

A. No, it doesn't. Because again the confidence intervals, it's very important to look at that because if it includes 1, that's means your findings can be explained by chance alone. So it's not statistically significant. But you can't say that it's protective. You can just say there was no association.

Q. Okay. And is there any evidence of a dose response when you look at this data?

A. No.

Q. Did these researchers also look at diffuse large B-cell lymphoma in particular?

A. Yes, they did.

Q. And similarly some of the numbers are below, some of the numbers are above. Are any of them statistically significant?

A. No, they're not.

Q. And how do you interpret this data in total?

A. Again, it shows that there was no statistically significant association between glyphosate and diffuse large B-cell lymphoma.

Q. Now, you indicated, Dr. Bello, that in the conduct of this study, the researchers gave a second questionnaire.

A. Yes.

Q. And the jury has heard that between the first and the second questionnaire -- let me say that differently -- that a certain percentage of the people didn't fill out the second questionnaire; is that correct?

A. That's correct.

Q. Is that at all unusual when you're looking at these studies that go on for two decades or more?

A. No. In large studies, it's quite common that you'll get some people who will not fill out subsequent surveys.

Q. And so how did the researchers here address this question about the individuals who didn't fill out the second questionnaire?

A. They used an imputation or mathematical model to try to fill in some of the blanks.

Q. And what is imputation?

A. It's when -- it's kind of like a -- I don't know whether you'd call it like an educated guess, but you're taking information that you know to be true and you're using it with some of the other background factors about that person to try to assume what their answer would have been if they filled out the questions.

Q. Is imputation a recognized and accepted method

of doing epidemiological research?

A. It is.

Q. Has imputation been used in other well-known and highly regarded studies?

A. Yes, it has.

Q. And did these researchers validate their imputation model for glyphosate?

A. Yes, they did.

Q. And we talk about validation, what does that mean?

A. It means assessing how true their outcomes were.

Q. And did they publish their results?

A. They did.

Q. In a peer-reviewed publication?

A. They did.

Q. Now, did these researchers also look to see how their results would change, if at all, if you only looked at people who filled out both the first and second questionnaire?

A. They did.

Q. So without imputation, what does the data show?

A. They found no statistical link between the glyphosate and non-Hodgkin's lymphoma.

Q. And is that reported here in the paper?

A. It is.

Q. I think it's on --

A. What page was it in?

Q. -- the fourth page.

A. On the fourth page?

Q. To the left of Table 2.

A. Oh, yeah, right up here.

Q. So they have this description.

> To evaluate the impact of using imputed exposure data for participants who did not complete the follow-up questionnaire, we limited the analysis to the 34,698 participants who completed both.

Is that correct?

A. Yes.

Q. So did these -- was this study still large even if you looked at people who only filled out both questionnaires?

A. Yes, it was.

Q. And did they report, when it comes to non-Hodgkin's lymphoma, whether there was any increased risk?

A. They did not show an increased risk.

Q. And is that how the National Cancer Institute scientists reported in the peer-reviewed journal?

A. Yes, that is.

MR. ISMAIL: Your Honor, perhaps this is a good time to stop.

THE COURT: Yes, it is.

All right. So, ladies and gentlemen, we're going to break for lunch and come back at 1:30.

Have a good lunch. Don't talk about anything you heard in the courtroom this morning. And we will resume 1:30.

(Jury excused for lunch recess.)

(Proceedings continued in open court out of the presence of the jury:)

MR. WISNER: Your Honor, just to quickly put on the record our sidebar.

I objected to Dr. Bello providing any expert testimony or opinions regarding the genotoxicity of glyphosate in Roundup as I do not believe it was properly disclosed in her expert report, and I was overruled.

THE COURT: Okay.

MR. ISMAIL: Just for the benefit of the record, all the papers that Dr. Bello discussed were disclosed in her report. Indeed Mr. Miller even asked

her about the Bolognesi paper at her deposition, in addition to some of these other concepts of the mechanisms of cancer. So it was disclosed.

THE COURT: I did rule that in fact that the papers were mentioned in her reliance materials and as a result she could talk about them.

So have a good lunch.

MR. EVANS: Your Honor, just handing up the bench brief with a witness -- with a witness, Dr. Mucci on Wednesday, just so you can have a copy.

MR. MILLER: Do you have a copy for me, counsel? Thank you.

THE COURT: I did want to just mention in relation to our conversation about the jury instructions. I don't know if you're talking about or discussed an instruction regarding the difference between the time Mr. Pilliod -- Mrs. Pilliod stopped using Roundup and -- Mr. Pilliod stopped using Roundup and consideration of a conduct between those times and how the jury ought to consider that.

So that was just on my mind to mention to you that we want to flesh that out and talk about what that should look like.

MR. MILLER: Sure.

MR. EVANS: Thank you, Your Honor.

(Luncheon recess was taken at 12:01 p.m.)

AFTERNOON SESSION 1:38 p.m.

(The following proceedings were heard in the presence of the jury:)

THE COURT: Mr. Ismail, you may continue.

MR. ISMAIL: Thank you, Your Honor.

BY MR. ISMAIL:

Q. Let's finish up our discussion here. When we took the lunch break, we were talking about the Agricultural Health Study, and you were talking about how the researchers there dealt with the situation of certain participants not filling out the second questionnaire, how they addressed that and published that in the literature?

A. Yes.

Q. Have there been other criticisms levied at the Agricultural Health Study? Without going into great detail, just in general.

A. Yes.

Q. Have the researchers and authors published their response and how they dealt with some of the comments about the methodology of that paper?

A. Yes, they have.

Q. And do they -- "they" being the researchers at the National Cancer Institute and others -- stand behind

their results and findings of the Agricultural Health Study?

A. Yes, they did.

Q. Did you consider their comments about the methodology of that paper and the response of the authors in deciding for yourself how much significance to place on that study?

A. Yes.

Q. When you consider the totality of that information, do you consider AHS to be a reliable study?

A. Yes, I do.

Q. Does it inform your assessment about whether there's any association between glyphosate and non-Hodgkin's lymphoma?

A. Yes, I think it's very helpful.

Q. So in our discussion, we were talking about some of the epidemiological data that has come out since IARC. We talked about the map which hasn't been published, but has been presented. We talked about AHS.

Has there been other cohort data published?

A. Yes.

Q. What is that paper called?

A. It's by Leon and colleagues. I think they called it the AGRICHOH study.

Q. If you turn to Exhibit 6762, can you tell us

if that's a publication of the study you just referenced.

A. Yes, this is the one.

Q. Have you reviewed this paper?

A. Yes, I have.

Q. And this came out fairly recently, has it not?

A. Yes.

Q. I think a month or so ago?

A. I think it was February. No, March -- February 2019.

Q. Very good.

Is this a collection of cohort data?

A. It is.

Q. Let's go ahead and look at the results that are reported here.

If you go to Table 2 on page 8.

A. Okay.

Q. Tell me when you're there.

A. Yeah, I'm there.

Q. Okay. Awfully small, but let's see if you can walk us through it.

Do we have up on the screen the information from the paper with respect to glyphosate?

A. Yes.

Q. Okay. And when we talk about the size of

studies, you indicated that the more cases that you can consider, the more reliable the data?

A. Yes.

Q. Or at least the more weight you can give it?

A. Yes.

Q. And how many -- what's the N here, the number of cases?

A. Here, they have 1,131 cases noted.

Q. They report whether there's an overall risk of non-Hodgkin's lymphoma in this study.

What did they report here as the hazard ratio?

A. 0.95.

Q. And was that statistically significant?

A. It was not.

Q. Is this the largest collection of cohort data that has yet been published on glyphosate and NHL?

A. Yes, as far as I know.

Q. Is there any increased risk reported with this data that came out a month ago?

A. No.

Q. Similar to what I've asked you before, is the fact that the point estimate is below 1, does that mean it's protective?

How would you understand this finding?

A. Again, the confidence interval crosses 1,

which means these findings are just as likely to happen by chance alone.

Q. Do they also report information on DLBCL?

A. They do.

Q. Is that a smaller number of cases, by definition, since it's a subset?

A. It is.

Q. What did they report here for their results?

A. They showed a hazard ratio of 1.36, and again, it was not statistically significant.

Q. Is that because the lower amount includes 1?

A. Yes.

Q. So based on the three studies that we've looked at since IARC has come out -- the NAPP, the Agricultural Health Study, and the Leon -- what does that tell you, when you look at the totality of the epidemiology data, as to whether glyphosate is associated with NHL?

A. The totality of the data does not support an association between glyphosate and NHL.

Q. There's been some discussion of a paper that came out earlier this year, called Zhang.

Have you read that paper?

A. Yes.

Q. Without going into great detail, what does the

Zhang publication do?

A. Zhang was trying to pool different studies together to also look at an association between glyphosate and non-Hodgkin's lymphoma.

It didn't just use cohort data, it also used some case-control studies and cohorts, and mixed it together to form a meta-analysis, meta results.

Q. Did the Zhang paper report any new instances of NHL?

A. It didn't.

Q. It was just an analysis of existing studies?

A. Yes.

Q. Did it mix unadjusted data and adjusted data together?

A. It did.

Q. I forgot to ask you: With respect to the NAPP data we looked at, the AHS, and the Leon, were those adjusted results?

A. They were.

Q. But as you said, Zhang mixed together adjusted and unadjusted?

A. Yes.

Q. Did Zhang include all the results from the Agricultural Health Study?

A. It didn't.

Q. And I guess, by definition, it didn't have Leon to include either?

A. No, it didn't.

Q. Did Zhang include all the case-control data from North America that we've looked at?

A. It did not.

Q. Does the Zhang meta-analysis, in your view, suggest that glyphosate -- formulated glyphosate like Roundup is associated with NHL?

A. No, it does not.

Q. Okay. So just in terms of the summary of where we're at on the -- this is what we were looking at as of 2015. And then we added some additional data that we just went over with the jury.

So with respect to what we're showing here, why did you gray out the De Roos and McDuffie paper on this analysis?

A. De Roos 2003 and McDuffie are included in the North American Pooled Project, so to not double count the numbers.

Q. And then the 2005 De Roos paper, why is that grayed out?

A. That's included in the Andreotti 2018 data.

Q. And I'm not sure you can see it too well on the screen, but why is Andreotti and Leon in the yellow

box?

A. Those are cohort studies.

Q. So when you look at this information and take care not to double count your studies, overall, what does this show you about whether there's an increased risk between products like Roundup and non-Hodgkin's lymphoma?

A. It does not support an association between non-Hodgkin's lymphoma and Roundup.

Q. And with respect to whether there's a dose response, these are some of the papers that have looked at the question of dose response with original data.

Did the McDuffie and Eriksson papers report a dose response in their analysis?

A. They did.

Q. Did De Roos and NAPP and Andreotti find a dose response?

A. No.

Q. When you consider the question of adjusting for other pesticide exposure, did McDuffie and Eriksson adjust for other pesticide exposure in the dose response data?

A. No, they did not.

Q. And did the three studies that we just looked at here adjust for other pesticide exposure?

A. Yes, they did.

Q. Does that -- how do you interpret that data when assessing whether or not there's a dose response with glyphosate products like Roundup?

A. I think it's important to use the adjusted data, because that's the more accurate data. And they did not show a dose response.

So when you're looking for associations, especially with a chemical, you would expect a dose response. At higher doses, you would expect a higher likelihood of the disease you're looking for. These studies did not support that.

Q. Let's take it back to Mrs. Pilliod. Based on the human data, where you put most of your focus, even if you accept the usage of Roundup that Mrs. Pilliod reported, did her use of Roundup, in your view, put her at an increased use of developing non-Hodgkin's lymphoma?

A. No, I don't believe so.

Q. Doctor, we summarized the opinions you talked about with the jury so far today.

In terms of how Mrs. Pilliod presented, her clinical course, all her medical records that you reviewed, did you see anything there that would distinguish Mrs. Pilliod from the patients with CNS

lymphoma that you see in clinic every week?

A. No --

MR. WISNER: I would object, Your Honor, this is leading.

THE COURT: Overruled.

Keep in mind this is direct.

MR. ISMAIL: Yes, Your Honor.

THE WITNESS: No, her course was pretty common to what I see in most of my primary CNS lymphoma patients.

BY MR. ISMAIL:

Q. Did you form an opinion as to whether Roundup contributed to Mrs. Pilliod's primary central nervous system lymphoma?

A. I don't believe it contributed to her primary central nervous system lymphoma.

Q. And after all the information we've talked about with the jury this far, how do you assess the question of causation in her case?

A. There's only two known causes for primary central nervous system lymphoma; it's HIV and having an immunodeficiency secondary to medication or a congenital problem. She did not have either one of those.

So the totality of the data does not support Roundup as a cause or even a risk factor. So I would

say, in my opinion, her case is still idiopathic. Or an unknown cause of her case.

Q. Does that put Mrs. Pilliod in the majority or the minority of individuals who develop PCNS lymphoma?

A. The majority.

Q. Overall, do you believe that the totality of the human epidemiology shows an association or not between Roundup and NHL?

A. It does not show an association.

Q. Do you have an opinion as to whether Roundup causes NHL at human-relevant doses?

A. The data does not support that.

Q. Dr. Bello, thank you for your time.

MR. ISMAIL: Pass the witness, Your Honor.

THE COURT: Cross-examination?

MR. WISNER: Yes, Your Honor. Just a few minutes to get set up.

THE COURT: That's fine.

CROSS-EXAMINATION

BY MR. WISNER:

Q. Hi, Doctor. How are you doing?

A. Good.

Q. We'll be sure to get you out of here today. I know you need to get back to work.

Before you got involved in this case, had you

heard of IARC?

A. I had not.

Q. Okay. I'm confused.

6184. This was shown to the jury.

Do you recall that?

A. Yes.

Q. You called it "the bible," right?

A. Yes.

Q. Okay. Well, if we could go to the second page, it says right here, "The International Agency for Research on Cancer."

A. Okay.

Q. So you have heard of IARC?

A. I've never read that line before.

Q. They wrote the bible, didn't they?

A. No, the WHO did. And I know the authors that have written it, but I've never heard of International Agency -- I've never seen that line on there before.

Q. Second page?

A. I don't usually look at the second page.

Q. Shocking.

So you agree, then, that IARC -- I mean, they wrote the bible for what you cited to in your direct.

A. They're -- I believe they are a subdivision of the WHO.

Q. They wrote this document.

A. I don't know if they literally wrote this document, but they are a portion of the WHO.

Q. It says "WHO Classification of Tumors of Hematopoietic and Lymphoid Tissue"; talks about who it was edited by; and says "International Agency for Research on Cancer."

Do you see that?

A. Yeah. It's just that some of those authors -- I know who Elaine Jaffe is. I know Swerdlow. I don't know if they're part of IARC. So it's kind of interesting; maybe they are, maybe they're not. But I do know them, and I've never heard them bring up IARC. But I know they wrote this book.

Q. IARC, they actually invite experts from around the world to participate, don't they?

A. Yes.

Q. So your colleague, Dr. Jaffe, she might have been invited by IARC to participate in this document?

A. It's possible. I know she definitely participated in this one.

Q. Have you ever been invited to IARC?

A. No, I have not.

Q. IARC, that's a pretty prestigious organization, would you agree?

A. I mean, I think they have a good reputation, for the most part. I don't have any reason to doubt it.

Q. And the IARC Monograph, they actually did a fairly exhaustive analysis of the carcinogenicity data for glyphosate, didn't they?

A. I'm not sure I would agree with that.

Q. Were you there?

A. I was not there.

Q. Your review of the carcinogenicity data in this case largely consisted of reading IARC, right?

A. Not really.

Q. You didn't read the Monograph?

A. I did read the Monograph.

Q. And you know they discuss hundreds of genotoxicity studies, right?

A. Yes.

Q. You didn't look at them?

A. I looked at some of them, yes.

Q. You looked at two, right?

A. I looked at some of them. I can't say exactly if it was two, but I definitely looked at some of them.

Q. Do you have your report up there from before?

A. Yeah.

Q. I would like you to point out to me where, in your report, you discuss genotoxicity at all.

A. I don't discuss it in my report.

Q. If you go to your "Materials Reviewed" list, I reviewed it, and I saw a discussion of Bolognesi and Paz-y-Mino.

That's it, right?

A. Yes, I looked at theirs.

Q. So we have these reputable scientists at IARC looking at hundreds of studies. You've looked at three, and you think you're qualified to disagree?

A. No, I've looked at more than just three.

Q. Where? Show me. I'm looking at your report, Doctor. I can't find more than three.

Tell me what I'm missing.

A. If you look at the EPA, their monologue or draft and summary of this, they have a whole table -- about three or four pages long -- about all of the animal data they used to look at it. And that's what I relied on, the animal data. They had more data than was even published.

Q. You looked at the EPA report; that's what you relied on?

A. Yes.

Q. Have you assessed whether or not the animal data cited by the EPA involved citation to fraudulent data?

A. No. I have no reason to question their statements.

Q. I'll tell you, the jury and I have looked at it closely. And the very first study the EPA cites was a study done by IBT.

Did you know that?

A. I didn't know that. I don't know what IBT is.

Q. Because you would probably defer to people who are experts in the field about the history of animal studies, right?

A. I don't know about that.

Q. All right. Well, let's go back to your opinions. I want to talk specifically about differential.

Do you recall talking about that?

A. Differential diagnosis?

Q. Yeah. Or differential ideology.

Are you familiar with the concept?

A. I'm actually not familiar with differential ideology. That's not really something that's used in medicine. It's more of a differential diagnosis, and I am pretty familiar with that.

Q. You do know that there are certain things that cause lymphoma, right?

A. Yes.

Q. In fact, you know that there are certain pesticides that cause lymphoma?

A. There are certain pesticides that are linked to an increased risk of lymphoma, but not an exact cause.

Q. Do you recall giving testimony in this case?

A. I don't remember saying pesticides caused it. I remember saying there was a link to increased risk.

Q. I'll show you.

A. Okay.

MR. WISNER: May I approach, Your Honor?

THE COURT: Yes.

BY MR. WISNER:

Q. That's a copy of your deposition, right?

A. Yes.

Q. And it was -- you were under oath when you testified in that deposition?

A. Yes.

Q. Why don't we turn to page 11. I know it's small print.

Can you read it, Doctor? I'm sorry.

A. I think so.

Q. I tried to save paper.

So page 11, starting at line 11 through 21.

Do you see that portion?

A. Yes.

Q. And in there, you state:

"But there are pesticides that we know do cause non-Hodgkin's lymphoma, like DDT and malathion."

Do you see that?

A. Yes.

Q. You didn't say risk factors; you said "do cause," didn't you?

A. Yeah. So I would say I probably misspoke at that term. Sometimes I do use interchangeably, especially if I'm talking fast.

But I would say now, I would qualify it more as a risk factor, not a cause.

Q. So when we took you at your word back on February 11th, 2019, we shouldn't have?

A. I wouldn't say that.

MR. ISMAIL: Argumentative, Your Honor.

THE COURT: Sustained.

Why don't you approach.

(Sidebar discussion not reported.)

BY MR. WISNER:

Q. All right. The reason why I asked about the other pesticides, Doctor -- and I apologize if I misunderstood -- you gave this distinction during your

direct examination between risk factor and actual causes.

Do you recall that?

A. Yes.

Q. And I was under the impression, based on what you said before, that you believed that at least two pesticides were actual causes.

Is that not correct?

A. No. I apologize if that's what you thought. That was my first deposition ever. I didn't know every single word would be microanalyzed.

So I would say it's, more correctly, a risk factor.

Q. Okay. So you do not think, then, that either DDT or malathion cause non-Hodgkin's lymphoma?

A. I think they are risk factors.

Q. Okay. Well, what does cause non-Hodgkin's lymphoma?

A. Yeah, that's the million-dollar question, unfortunately. In most cases, we don't know.

We know that there are some genetic mutations that can lead to it, but don't directly cause it. We know there are some viruses that seem to increase your risk. But the majority, we don't know what the exact cause is.

Q. I thought you said HIV was a cause.

A. It's a cause for primary central nervous system lymphoma, and for some diffuse large B-cell lymphoma.

Q. And that's because HIV suppresses the immune system, right?

A. It does.

Q. What I don't fully understand is, why do you consider HIV to be a cause -- however it causes cancer -- but DDT and malathion are not?

Why is one a cause and not the other?

A. I think, if -- you know, if you look at the data, especially the data that occurred when HIV first came out in the '80s, you saw a drastic increase in the amount of primary central nervous system lymphomas. And people were wondering, why is this happening?

And then researchers, and there's publications on it, have shown the link between people with HIV. That's what was driving this massive increase in the number of primary central nervous system lymphomas. And depending on which study you look at, it can be sixfold higher in people with HIV.

So when you start to see a huge risk increase like that, you start to think that this is more than just a risk factor; this is causative.

Another analogy would be with cigarette smoking and lung cancer. Some people smoke and don't ever get lung cancer, some people get lung cancer and never smoked. So we know not everyone who smokes gets it, but the odds risk of getting lung cancer in people who smoke, it's, like, 20 times more than people who don't smoke.

So when you have a big association like that, you say, this is more than an increased risk. This is driving this.

Q. So if I understand you correctly, the difference between risk factor and cause is the magnitude of the risk?

A. Not necessarily, but that goes into it.

Q. Okay. And because glyphosate exposure doesn't have a twentyfold increased risk, you don't think it could be a cause?

A. Well, it didn't have any increased risk if you looked at the large sum of data.

Q. We'll get back to glyphosate in a minute. I want to go back to the other risk factors you mention.

You said -- there's a couple of risk factors that you discuss in your report, right?

A. Yes.

Q. You discuss advanced age?

A. Yes.

Q. But you don't think age caused Mrs. Pilliod's cancer, right?

A. No. Again, it's a risk factor for the development of non-Hodgkin's lymphoma. It's more of a signal or a marker that something is going on that's leading or contributing to the increased risk of this condition.

Age by itself -- like, just because you became 60 years old, all of a sudden you'll get a high risk of getting lymphoma; it's more about, what does age signify?

Age signifies that your immune system is getting older. We know that people who are getting older have a less robust immune system. We know you've had more mutations throughout your life, and some of them may have actually become viable mutations that can lead to cancer.

So it's not so much as age causes it, but age is linked to it from what it signifies. There is something else going on in the body around particular agents.

Q. Another thing that happens as you get older is that you have more exposures to things, right?

A. Yes.

Q. So a 12-year-old, at a maximum, can have 12 years of exposure. Whereas someone who's 80 might have 80 years of exposure?

A. Yes.

Q. And you agree that dose makes the poison, right?

A. I think there has to be a link first. And then, if there's a link to a poison -- is that what you referred to? Poison?

Q. You've heard the expression, the dose makes the poison?

A. No, I've never heard that.

Q. Fair enough.

But you would agree, then, that one of the things age captures is increased exposures to environmental factors?

A. Yes.

Q. And one of those factors could be, in lung cancer, for example, smoking?

A. Yes.

Q. Or in the context of NHL, benzine exposure, right?

A. Yes.

Q. And you agree that that causes lymphoma?

A. It's a risk factor, yes.

Q. So you don't think the fact that Mrs. Pilliod was 69 or 70 when she was diagnosed, that fact alone didn't cause her lymphoma, right?

A. No, it didn't cause it.

Q. You've talked about in your report, suppressed immune system.

Do you recall that?

A. Yes.

Q. You mentioned HIV, right?

A. Yes.

Q. You mentioned immunosuppressant drugs following an organ transplant?

A. Yes.

Q. She had neither of those, right?

A. Yes.

Q. You discussed infections, right?

A. Yes.

Q. H. pylori, it's a bacterial infection?

A. Yes.

Q. She didn't have that?

A. No.

Q. You discussed the human herpes virus HHV-8, right?

A. Right.

Q. Epstein-Barr virus, she didn't have that?

A. No, she did not.

Q. Hepatitis C or B, she did not have that?

A. She did not have those diseases.

Q. Autoimmune diseases, you mentioned Sjogren's syndrome.

Do you remember that?

A. Yes.

Q. She didn't have that, right?

A. She had an autoimmune condition. She didn't specifically have Sjogren's, but she had an autoimmune condition.

Q. Okay. We're going to come back to that.

You mentioned benzine exposure, she didn't have that?

A. I don't know about that. I don't know all of her exposure. I can't say she didn't have benzine.

Q. Well, how do you know that didn't cause it, then?

A. It's not a cause; it's a risk factor. But I don't know what her exposure to benzine was.

Q. What about chemotherapy drugs; she didn't have those before her cancer, did she?

A. No.

Q. You mentioned radiation exposure as being a potential risk factor?

A. Yes.

Q. She didn't have any radiation exposure, right?

A. Not that I know of.

Q. You discuss obesity in your report, right?

A. Yes.

Q. And you specifically point out the increased risk with extreme obesity, right?

A. Yes.

Q. She wasn't extremely obese, right?

A. No.

Q. Let's go back to the autoimmune disease.

Do you have your report in front of you?

A. Yes.

Q. On page 6 of your report, you discuss autoimmune disease, is that right, as a risk factor?

A. Yes.

MR. WISNER: Permission to publish her report?

MR. ISMAIL: Sorry?

MR. WISNER: Permission to publish?

MR. ISMAIL: No objection.

THE COURT: Okay.

BY MR. WISNER:

Q. So on page 6 of your report, you state right here:

"Patients with autoimmune disorders,

conditions that occur when a person's immune system attacks healthy cells in their body by mistake, also have an increased incidence of NHL. A pooled analysis," and then you discuss the study.

Right?

A. Yes.

Q. You go on:

"For example, patients with an autoimmune condition called Sjogren's syndrome were 6.5 times more likely to develop NHL."

Do you see that?

A. Yes.

Q. And a second ago, you were talking about how the magnitude of a risk is what drives whether it's a causal link.

Does this one rise to a cause?

A. Again, I think there's more to it than that. It brings it to your attention, and then you have to get mechanistic mechanisms of, you know, why would this cause it? Why would we call this a cause versus a risk factor? Is there any data that says we know why this is causing X, Y, Z to happen?

So I think the risk factor -- it's important to know that because that's going to bring it to your

attention for sure, but then you're going to have to do more research to make a causal link.

Q. And you look at the mechanistic data?

A. Yes.

Q. How does it actually affect the cell, right?

A. Yes.

Q. One of the mechanisms known to cause cancer is genotoxicity, right?

A. Genotoxicity that can evolve to be more mutinous. And carcinogens, yes.

Q. Because when you're causing genetic damage over and over and over again, it increases the chance that you get a mutation, which then increases the chance that you get cancer, right?

A. Yes.

Q. You cited this study, Smedby 2008.

Do you see that?

A. Yes.

Q. I would like to take a look at that study.

It's Exhibit 6002.

Is this that study you cite in your report?

A. Yes.

MR. WISNER: Permission to publish?

MR. ISMAIL: No objection, Your Honor.

THE COURT: Granted.

BY MR. WISNER:

Q. So we're looking at the study right here. And as we see right here, it says:

"Autoimmune disorders and risk of non-Hodgkin's lymphoma subtypes, a pooled analysis within the InterLymph Consortium."

Do you see that?

A. Yes.

Q. Have you ever heard of that group?

A. Yes.

Q. They're people who study lymphoma, right?

A. Yes.

Q. You understand that Dr. Weisenburger is part of that consortium?

A. No, I didn't realize that.

Q. Are you?

A. Am I?

Q. Yeah.

A. No.

Q. So it says right here -- turn to Table 3. This here lists the various -- let's back up for a second.

What they're doing in this study is looking at people who have certain autoimmune diseases, and seeing how many of them later on developed non-Hodgkin's

lymphoma, right?

A. Yes.

Q. And here, we have all these autoimmune diseases they looked at.

They don't mention anything about Hashimoto's here, right?

A. Not in this one, no. Not in this table.

Q. You briefly mentioned ulcerative colitis.

Do you recall that?

A. Earlier today?

Q. Yes.

A. Yes.

Q. It looks like here, there is no increased risk of non-Hodgkin's lymphoma after having ulcerative colitis.

Do you see that?

A. Yes, I do.

Q. And if we turn to the next table, Table 4, they actually break it down by year exposures.

Do you see that?

A. Year of exposure, yes.

Q. So, for example, on the first column, if you were diagnosed with, you know, a disease two to five years ago.

Do you see that?

A. Yes.

Q. Versus whether you were diagnosed six to ten years ago.

Do you see that?

A. Yes.

Q. If we actually look at ulcerative colitis one more time, we specifically look at the six to ten years.

Do you see that, Doctor?

A. Yeah, I see it.

Q. And right here, it has a .73 that's statistically significant.

Do you see that?

A. Yes.

Q. So what this data is showing is that people who have ulcerative colitis statistically significantly have less incidences of non-Hodgkin's lymphoma six to ten years after?

A. Yeah. They showed a statistical significance, yeah.

Q. So it's actually statistically significantly protective?

A. The data shows that, yeah. I think if you looked at larger studies, you would probably see that doesn't pan out. Because it is known that people with inflammatory bowel disease do have a higher incidence of

non-Hodgkin's lymphoma.

So I'm not sure if there was some issue with these cases and controls here, but I know there's larger data that shows that. Because that's one of the accepted risk factors for lymphoma of the intestines, which is non-Hodgkin's lymphoma, so I would have to look at this one further.

Q. This is a study you cited, right?

A. For autoimmune conditions, yeah.

Q. All right. Let's look at another one.

If you go to your report, which is Exhibit 3146, we were looking at this paragraph about autoimmune diseases, and you report:

"Associations with a variety of autoimmune conditions and NHL have been reported," and you cite to Fallah 2014, right?

A. Yeah.

Q. Let's take a look at that study. It's 4972.

I apologize. I don't have a copy of it.

MR. WISNER: Mr. Ismail, do you mind if I publish a digital copy of it?

MR. ISMAIL: That's fine.

BY MR. WISNER:

Q. This is a copy of that paper; is that right?

A. Yes, this is correct.

Q. Do you see it's the same author?

A. Yes.

Q. And if we go into this paper, look at Table 2, they have a discussion of various autoimmune disorders, right?

A. Yes.

Q. And there is a discussion of Hashimoto's.

Do you see that?

A. Yes.

Q. And if we look at the data for greater than 60 years old, it has a risk ratio of 1.3.

Do you see that?

A. Yes.

Q. That's about a 30 percent increase, right?

A. Yes.

Q. So you would agree with me that if you look at the data for Hashimoto's, this is 140 cases, that's actually quite a few, right?

A. Yes, it is.

Q. It's a pretty big study?

A. Yeah, it's a good amount of people.

Q. So you would agree with me that when you do these big sort of studies looking at Hashimoto's, the relative risks are very small?

A. It depends what you're looking at. Usually,

the larger the study, the confidence interval range is smaller. The relative risk doesn't usually change based on the number of people in the study. It's usually that the accuracy of the relative risk is what changes.

Q. You showed the jury a different study.

Do you recall that, on your direct?

A. Which one? I'm sorry.

Q. It was the study that had a 3.0 rate.

Do you recall that?

A. Oh, earlier today?

Q. Yeah.

A. Yes.

Q. With Mr. Ismail?

A. Yes, yes.

Q. Let's go back to your paper, your report.

You don't reference that study at all in your report here, do you?

A. No. This is just examples. I didn't -- this was not at all exhaustive. There's definitely even more than that, and more than the Goldin article that we talked about this morning that showed links with autoimmune conditions.

So in no way was this supposed to be all-inclusive. These are just examples of risk factors.

Q. The Goldin article, that's Exhibit 6613. It's

in your binder.

That was the one you showed the jury, right?

A. Let me see. 6613, you said?

Q. It's also on the screen.

A. Yeah, that's it.

Q. And you showed the jury this Table 2 that had the elevated rate for Hashimoto's, right?

A. Yes.

Q. Now, I want to ask you something.

Did you take a look to see if this data was adjusted for other confounders?

A. No.

Q. I thought that was important?

A. It is important, yeah.

Q. Well, if we actually look up here, it talks about it. It says right here that:

"We examined each condition separately using univariate regression models."

Do you see that?

A. Yes.

Q. But then later on, it says -- and that refers to Table 2.

Do you see that?

A. Yes.

Q. And later on, it says:

"Using multivariant hierarchal regression models, we were able to study the impact of all autoimmune conditions simultaneously, incorporating information at the group level. This model also corrects for correlations due to multiple autoimmune conditions in the same individual."

Do you see that?

A. Yes.

Q. So certain people who have autoimmune conditions can have multiple autoimmune conditions?

A. They can.

Q. So, for example, someone can have Hashimoto's or Sjogren's disease?

A. Right. They can have more than one.

Q. And we wouldn't be able to tell if it was the Hashimoto's or the Sjogren's to cause the data to be elevated for Hashimoto's?

A. You wouldn't, unless you looked at the multivariate part.

Q. Exactly. And they didn't actually give that to us in the study, did they?

A. I don't remember, actually. They probably didn't.

Q. If you look at the beginning of this, it says

it's a mini review.

Do you see that?

A. Okay.

Q. This wasn't a comprehensive assessment of autoimmunity, was it?

A. I'm not sure if there was more to it than that. Again, I was just using it as an example of articles showing increased risk with autoimmune conditions.

Q. During direct, Mr. Ismail showed you this chart that both Dr. Nabhan and Dr. Weisenburger used.

Do you recall that?

A. Yes.

Q. I'm not going to go through all of these, but this chart is -- tell me if you understand this, as well.

It shows known risk factors here, right?

A. Yes.

Q. Do you disagree with any of these as risk factors?

A. Let's see. We've got age, gender, race, family history...

No, I don't disagree.

Q. So all of these risk factors, you actually agree with?

A. Yes.

Q. And then what's done here is, we bring over the ones that are applicable on a causative level for Mrs. Pilliod.

So this was Dr. Nabhan's, and he brought over pesticide use.

Do you see that?

A. Yes.

Q. You don't think any pesticides actually cause non-Hodgkin's lymphoma, right?

A. This is a risk analysis, not a causal analysis.

Q. I understand.

Dr. Nabhan was pushing over the causal ones, as he explained in his testimony.

A. I wasn't there for that, but the chart says "risk factors." Certain pesticides are known to be risk factors.

Q. Sure.

A. But they are labeled which ones are, that we know. It's not all pesticides.

Q. Sure. But he had the opinion that certain pesticides are actually causal factors.

You don't agree that any are, right?

A. I don't agree that they're causal.

Q. He also brought over obesity.

Do you see that?

A. Yes.

Q. And you don't think obesity is a causal factor, right?

A. No. It's a risk factor.

Q. And he brought over autoimmune disease, right?

A. Yes.

Q. And he was talking about the Hashimoto's issue?

A. Yes.

Q. And you don't think that's a causal risk factor either?

A. No. Again, it's a risk factor, not a cause.

Q. So do you think it's ever possible to find the cause of cancer, specifically non-Hodgkin's lymphoma?

A. Ever?

Q. Yeah.

A. Yeah. I think, kind of, when we gave the examples earlier. If somebody has HIV or an immunosuppression medication they're on, I would say that caused their lymphoma.

We know lymphomas are highly linked to the immune system and immune disregulation. So there's association, even mechanistic data on that.

I would say that if she was HIV-positive, I would say, slam dunk, that caused her non-Hodgkin's lymphoma.

Q. We talked about DDT, right?

A. Right.

Q. That's a pretty intense pesticide, right?

A. Yes.

Q. If somebody sprayed DDT for 35 years, every day, drenched in it, you wouldn't put that it could have caused their cancer?

A. Not unless I see something that shows it. I can't just assume that because it caused birth defects in pelicans or whatever the major article showed, that it would be causing lymphoma. You would actually have to see scientific data that specifically looked at causing lymphoma.

Q. Sure. And you agree that there's scientific evidence showing DDT causes lymphoma -- is associated with lymphoma?

A. It's a risk factor, yes.

Q. Exactly. And if someone came to you and was spraying gallons and gallons of DDT, would you still not be able to say it's the DDT? Or would you say we don't know?

A. I don't have any science behind DDT actually

causing non-Hodgkin's lymphoma. I could say your use was probably a risk factor and put you at higher risk of developing this, but I can't say it did cause it.

Q. Let's say DDT had six different mice studies, each showing the link to lymphoma, would that help you rise to the level of saying it caused lymphoma here?

MR. ISMAIL: Objection. Calls for speculation.

THE COURT: Sustained.

BY MR. WISNER:

Q. Well, I'm asking your opinion. So I don't want you to speculate about your opinion.

But if I could get what you do know, if there were numerous animal studies supporting malignant lymphoma, would that increase your belief that it was a causal factor?

MR. ISMAIL: Same objection.

THE COURT: Sustained.

BY MR. WISNER:

Q. Okay. Let's talk about Roundup, then, okay?

Roundup doesn't even make it onto this side of the column, does it, for you?

A. Not with the available data.

Q. So it doesn't even make it on the board, right?

A. Right.

Q. But if it did make it on the board -- assume for a second for me that Roundup was a risk factor.

You would have to look at the volume of exposure before you could rule it out as not being a cause of it, right?

A. Again, I think it goes back to your previous question. If there's no data to support it as a risk factor, I can't really assume it's a risk factor.

Q. Hypothetically, let's say Roundup was a risk factor.

You would have to look at exposure before you could rule it out as being a cause, right?

A. If you want me to go to a hypothetical situation, risk factors to causality is a long leap.

Q. Okay. It's such a long leap, in fact, that none of these risk factors are causal in your book, besides HIV, right?

A. For primary central nervous system lymphoma, yes.

Q. I understood you to say that there's no evidence that Roundup causes NHL.

Is that right?

A. I said the totality of the evidence does not support a link with humans and glyphosate causing

non-Hodgkin's lymphoma.

Q. All right. So if I wrote "no evidence" across the board, do you agree with that?

A. No. I would say you have to take all the data in total, not isolated in a little vacuum. The evidence does not support it.

Q. I understand that. That wasn't my question.

My question was this statement: There is no evidence across the board between Roundup -- about Roundup causing non-Hodgkin's lymphoma.

Do you agree with that statement?

A. I would agree that there's no causal data.

Q. Okay. So then you do agree with the statement that there's no evidence across the board?

MR. ISMAIL: Objection. Asked and answered.

THE COURT: Sustained.

MR. WISNER: Your Honor, I haven't got an answer.

THE COURT: It has been asked, and she did answer.

BY MR. WISNER:

Q. You agree, then? That's what I saw in your answer.

Do you agree?

A. I agree that there's no data to support a

causal relationship between Roundup and non-Hodgkin's lymphoma.

Q. Thank you. That wasn't my question.

A. All right.

Q. My question was actually, very specifically, this phrase: No evidence across the board.

Yes or no, do you agree with that?

MR. ISMAIL: This is the fourth time, Your Honor, that she's answered it.

MR. WISNER: She keeps answering a different question.

THE COURT: Can you answer that question, yes or no? If you can, answer it. If not, we will rephrase.

THE WITNESS: I think I keep saying the same thing: I don't think there's any data to support a causal mechanism or relation between Roundup and non-Hodgkin's lymphoma.

BY MR. WISNER:

Q. Do you agree with that or not? You keep saying something different.

Do you agree with that statement or not?

A. I guess that statement, to me, is a little broad. No evidence across the board of what? That's why I keep rephrasing it.

Q. Thank you, that's very helpful. I was trying to get to the bottom of understanding this.

How about: No evidence across the board that Roundup causes NHL.

Would you agree with that?

A. I would agree with that.

Q. All right. And you say that notwithstanding the IARC's classification, right?

A. Yes.

Q. And you say that notwithstanding having reviewed, for example, the expert reports of Dr. Portier, Dr. Jameson, Dr. Ritz, Dr. Weisenburger?

A. Yes.

Q. And you've read Dr. Portier's report, right?

A. I saw his deposition. Is that what you're referring to? Or that letter?

Q. I'm talking about his expert report.

A. Expert report?

Q. Yeah.

A. I looked at it. I don't have it memorized, though.

Q. I'm not going to hold you to that, don't worry.

His report was hundreds of pages long, right?

A. Yeah, he had a long report.

Q. Yours was, like, 15?

A. Right.

Q. And he systematically goes through every single animal study, right?

A. I don't know. I don't remember, actually, if he goes through every single one. I know he summarized a lot of studies.

Q. He also looked at the genotoxicity data, right?

A. Okay.

Q. And you haven't gone through all the genotoxicity data?

A. I've looked at a lot of it. Obviously, I'm not a chemist. Dr. Portier, I think -- is he a toxicologist? I wouldn't go through as much detail as his.

But I did look at the EPA's summary of the significant ones, and they did not see anything that led them to believe that it was genotoxic to humans.

Q. Okay. So I want to go through some of the epi studies.

And you've gone through them in your report, right?

A. Yes.

Q. And it's your opinion that none of these epi

studies provide evidence that Roundup causes NHL, right?

A. Yes.

Q. So let's start off. In your report, you specifically have discussion of each one. It starts on the section on page 9, titled "NHL Epidemiology."

Do you see that?

A. Yes.

Q. The next paragraph -- you have paragraph discussions about various studies, right?

A. Yes.

Q. And the first is the Eriksson 2008 study.

Do you see that?

A. Yes.

Q. And you say at the bottom:

"Another problem with this study is that they mention that glyphosate-based formulations are associated with the development of NHL. But when they use calculations that take into account the use of other pesticides along with glyphosate-based formulations in the people who developed NHL, the link between glyphosate-based formulations and NHL no longer existed."

Do you see that?

A. Yes.

Q. Is that an accurate statement?

A. Yes. Per Table 7, when they adjusted data not seen as statistically significant in this.

Q. You didn't say that. You said it no longer existed; that's what you wrote.

A. Right.

Q. Isn't it true that there is still an elevated, right, even after you adjust for other pesticides?

A. No, that's not true. It wasn't statistically significant.

Q. It's still elevated.

A. It doesn't matter. You have to be statistically significant. Just having a 1.2 or 1.3, if the confidence interval crosses 1, it's not significant. Because 1 is just as likely to happen as 1.2 or 1.3.

Q. Let's take a look at the study.

A. Okay.

Q. I'm handing you Exhibit 1703, the Eriksson study.

That's a copy of the Eriksson study, Doctor?

A. Yes.

Q. All right.

MR. WISNER: Permission to publish? It's already been published.

BY MR. WISNER:

Q. So we're looking at the Eriksson study here. Let's go to Table 7, the very table you cite in your report.

What we have here is a 2.0 statistically significant result in a univariate analysis?

A. With the univariate, yes.

Q. You don't actually report on the univariate analysis in your report, do you?

A. No. Because again, you're going to look at the multivariate -- the multivariate adjusts for other pesticides and other co-founders. So univariate data is not very useful.

Q. Well, I don't understand. A second ago, when you showed the Hashimoto's data, you showed univariate data.

A. Yeah.

Q. So it's useful then but not here?

A. I think, with the Hashimoto's, there's other data we can give you, too. But the thing is, that was just an example of risk factors.

So this, we're looking at more, hey, glyphosate, is it a risk factor for non-Hodgkin's lymphoma? No, this study did not show that.

Q. Well, they do adjust for other pesticides. They have a 1.51 odds ratio.

Do you see that?

A. Yes.

Q. So it's still elevated, right?

A. But it's not statistically significant. If you were to do the study again, you could get .78, .92. It's not -- if your confidence interval includes 1, your data is not statistically significant.

Odds of any of these numbers, .77 through 2.9 occurring, if you were to repeat this trial again and again, any of those numbers can come up equally as much.

So, basically, it's not statistically significant.

Q. So because it's not statistically significant in your book, you ignore it?

A. It's not just my book. That's statistics, in general, in epidemiology. If it's not statistically significant, the data isn't good enough to make an association.

Q. The jury has heard from Dr. Beate Ritz.

Are you familiar with her?

A. No.

Q. You read her report?

A. Yes.

Q. You understand from her report that she spent her life studying occupational exposures to pesticides,

right?

A. Okay.

Q. She's the head of epidemiology at UCLA.

You understand that?

A. Okay.

Q. She actually helped write the statistical books for epidemiology.

Do you understand that?

A. Okay.

Q. She told the jury something different. She said that if you ignore elevated rates because of statistical significance, you'll miss problems.

Is that not your understanding?

A. I wasn't there for what she said, so I honestly can't agree with you that that's what she said. I don't know why she would say that. Statistics are just statistics. You can't just say 1.5 is better than .98.

When you have this confidence interval, if it includes 1, any of these numbers are as likely to happen as the 1.5.

So if I were to do this study again, it could be .78, and we're not going to say, oh, it's protective. We're going to say, no, it's still not significant.

Q. Well, why don't we look at what the authors

said.

A. Okay.

Q. They actually discuss the results right here:

"Glyphosate was associated with a statistically significant increased odds ratio for lymphoma in our study, and the results will strengthen by a tendency to dose response effect as shown in Table 2. In our former study, very few subjects were exposed to glyphosate, but a nonsignificant odds ratio of 2.3 was found. Furthermore, a meta-analysis combining that study with an investigation on hairy-cell leukemia, a rare NHL variant, show the odds ratio for glyphosate of 3.04, that was statistically significant. Recent findings from other groups also associate glyphosate with different B-cell malignancies, such as lymphomas and myeloma."

Do you see that?

A. Yes.

Q. So the people who actually wrote this article, who did this epidemiology study, they are finding that, in fact, glyphosate is a risk factor for lymphoma.

A. Well, again, if they're quoting their univariate analysis, that's probably where they came up

with this.

But if you look at the multivariate analysis, it's not linked to causing -- being a risk factor for lymphoma.

Q. I don't want to fight with you, Doctor, but I mean, you've never done an epidemiological study yourself, right?

A. Oh, yes, I have. I have a master's degree. I had to do that for my thesis.

Q. You've published an epidemiological study?

A. Yes.

Q. Where?

A. It's in the library in the vault at University of South Florida. It was my thesis.

Q. You conducted an actual epidemiological study?

A. Yeah.

Q. What was it about?

A. It was using the NHANES data. It's a large United States dataset. And it was looking at a risk between H. pylori infections and cardiovascular disease.

Q. Fair enough.

Let me be more specific: You've never done an epi study on cancer, right?

A. Not on cancer.

Q. You've done one as part of your master's

project?

A. For epidemiology, yes.

Q. We have these researchers, Dr. Eriksson and Hardell, who published studies looking specifically at pesticides and lymphoma, right?

A. Yes.

Q. And, in fact, this isn't their first study. They've published multiple studies, right?

A. I would assume, yes.

Q. You've actually cited them and discuss them in your papers?

A. I discussed Eriksson's; this is one I was discussing.

Q. And Hardell?

A. Yes.

Q. And they are the researchers doing occupational epidemiology, right?

A. Yes.

Q. They are the ones that had the raw data here, right?

A. Yes.

Q. And they're saying there's an association, and you're saying they're wrong?

A. I'm saying the data is the data, and my interpretation is that the multivariate one is the one

that matters for humans, and that doesn't show an association.

Q. Go farther. You say it no longer exists?

A. Right. In my world, it has to be statistically significant or else it just doesn't matter. Or else it's that chance alone could have caused that.

Q. Fair enough.

In your world, if it's not statistically significant, you ignore it?

A. No, I don't ignore it. It does not meet stringent enough to say it's a risk factor.

Q. You say you don't ignore it. But in your report, you don't mention any of the statistically significant results that were unadjusted, do you?

A. No. Again, I only look at the adjusted ones.

Q. So it has to be both statistically significant and adjusted before you'll mention it?

A. Right. I want to report the more valid data, not just any data that's out there.

Q. Okay. In your report, you also discuss the De Roos study.

Do you remember that?

A. Yes.

Q. And right here, it's the De Roos 2003 study.

Do you see that?

A. Yes.

Q. And you discuss it for a bit -- well, actually, it's just that paragraph. I'll call it back up.

It says right here:

"The researchers reported that there were trends towards an increased risk of NHL with increased pesticide exposure. They concluded that consideration of multiple pesticide exposures is important when accurately determining the effect of a specific agent."

You actually don't report on any of these findings, do you?

A. I didn't put that in here, no.

Q. On direct examination, you did report the findings for the jury, right?

A. Yes.

Q. You reported the 1.6 finding from the hierarchal regression?

A. Yes.

Q. You understand that there was a logistical regression done?

A. Yes.

Q. But you told the jury that the authors thought

the hierarchal regression was the more accurate number?

A. Yeah. They say that on page 1 of the report.

Q. Do they?

A. They do.

Q. Well, let's take a look.

You know what, the lead author of the De Roos article was who?

A. De Roos.

Q. She published a study in 2005, right?

A. Yes, she did.

Q. I'm handing you Exhibit 1629.

That's the 2005 article that she published?

A. Yeah. The Agricultural Health Study, yes.

Q. And in this study, she actually reports on her previous study, doesn't she?

A. Where does she mention that? In the discussion?

Q. I'll call it out.

A. Okay.

Q. It says right here -- she says -- she talks about McDuffie.

Do you see that?

A. Yes.

Q. And then she goes:

"Similarly, increased NHL risk in men was

associated with having ever used glyphosate -- odds ratio 2.1, confidence interval 1.1 to 4 -- after adjustment for other commonly-used pesticides in a pooled analysis of the National Cancer Institute-sponsored case-control studies conducted in Nebraska, Kansas, and Iowa."

Do you see that?

A. Yes.

Q. So Dr. De Roos, when she reports on her own study just two years later, she cites the logistical analysis, doesn't she?

A. She does.

Q. Because the hierarchal analysis makes assumptions, doesn't it?

A. I don't really know that it makes assumptions. I think both of them kind of make -- they're both mathematical models. But I know the hierarchal one, they reported in their paper, was the more accurate one for one reason or another.

They didn't actually publish the exact formula they used for the hierarchal data, but they do mention it in the paper that this is the more accurate one.

Q. So the hierarchal model makes assumptions, and it uses those assumptions to weight the results, right?

A. I don't know if it uses assumptions. But I know it uses a formula to give weight to certain pesticides. So when you're adjusting for confounders, you're not treating all pesticides as equal.

Q. Exactly. And it gives a certain weight to certain things ahead of time?

A. Yes.

Q. And you make assumptions as part of those weights?

A. I don't know if it's assumptions, honestly.

MR. WISNER: May I approach, Your Honor?

BY MR. WISNER:

Q. This is 158.

That's the De Roos 2003 article, right?

A. Yes.

Q. And in here, we have Table 3, right?

A. Yes.

Q. And the glyphosate data, they specifically identify those two numbers we've been talking about, the 2.1 and the 1.6.

Do you see that?

A. Yes.

Q. And the logistical regression, that's the same method used in Eriksson, right?

A. In the adjusted data, yes.

Q. Or in the adjusted, it's still logistical regression, right?

A. I think this is more of multivariate.

Q. But they're still using logistical regression?

A. Yes.

Q. Same thing with AHS in 2005, right?

A. Yes.

Q. So all these other studies are using logistical regression.

This one did something a little different, right?

A. Yes.

Q. It's actually discussed in Table 1, right?

A. Yes.

Q. And to describe that process, it says it gets a 1 if it's classified as a human carcinogen in either assessment.

Do you see that?

A. Yes.

Q. And it's specifically referring to IARC and EPA, right?

A. Yes.

Q. And if you go down, it says.

"Number 8. Probable human carcinogen in one assessment."

Do you see that?

A. Yes.

Q. If we actually look at what glyphosate was given at the time this article was written, it was actually given a .3, right?

A. Yes.

Q. So it was given the equivalent of, down here:

"It would be not assessed by IARC or U.S. EPA or deemed unclassifiable in one or both assessments."

Do you see that?

A. Yeah.

Q. So if this hierarchal regression was done again, it wouldn't be given a .3, right?

A. Well, the EPA didn't give it a designation as a carcinogen. So I think what they're saying here is that 0.3, not assessed by IARC or the EPA or deemed unclassifiable in one or both assessments.

So they must have felt -- either they decided the EPA's was unclassifiable. I don't know why they would say that. Maybe because the EPA didn't really have an opinion saying it was carcinogenic. I'm just assuming that's what they're thinking.

Q. Well, when this was published in 2003, IARC hadn't determined glyphosate to be a probable human

carcinogen, right?

A. Oh, okay. Well, then that could explain it, if they didn't have data on either one. Right?

Q. It didn't exist yet.

A. Okay.

Q. So if we were to redo this today, it would get a higher number?

A. I don't know exactly how they gave these assignments.

Because to me, that is a little ambiguous when it says this 0.3, not assessed by IARC or U.S. EPA or deemed unclassifiable in one or both assessments.

I'm not sure, like, today, what they would have thought of getting the conflicting EPA IARC data.

Which would they choose?

Q. Right there, that .6. Probable huge carcinogen in one assessment, IARC; and unclassifiable in the other.

A. I don't know if they're saying it's unclassifiable in the other, or if it's just not accessible. I'm honestly not sure. It would probably be better to ask De Roos or one of the authors here.

Q. You know that one of the authors on this is Dr. Weisenburger, right?

A. Yes.

Q. And you understand that he tells us that the proper assessment is 2.1?

MR. ISMAIL: Objection, Your Honor.

THE COURT: If she knows.

THE WITNESS: I was going to say, I don't know that to be true or not. I wasn't here to hear his testimony.

BY MR. WISNER:

Q. Well, you reported to this jury that the authors think 1.6 is more accurate?

A. Yes.

Q. And now we've talked about it, and your point is that we should probably go ask the authors, right?

A. Yes.

Q. And if we ask Dr. Weisenburger, we know what his opinion is, right?

A. Yes.

Q. And if we look at what Dr. De Roos said two years later, she reports on the logistical regression, right?

A. Yes.

Q. So everyone is reporting on the logistical regression, but you still think the hierarchical one is the better one?

A. I'm just saying what they put on the

article -- in the article, on the first page, they say the hierarchal regression analysis is the more accurate one.

Q. All right. Well, let's go into the NAPP for a second.

By the way, this data here showing a 2.1 elevated rate, that adjusted for the pesticides, right?

A. It did.

Q. Okay. And notwithstanding a doubling of the risk that was statistically significant, you're standing by that there is no evidence, right?

A. At the time, even if you went with that, if we want to go down that road and say, yes, the logistical regression showed a statistically significant association, that was only a portion of the data.

And then later on, we have more information. So there have been subsequent larger studies that supersede this data, and they don't show an association.

So even if I went your route and said I would take the logistical regression over the hierarchal one, which they said was more accurate, we now have more accurate information that doesn't show an association.

Q. You do understand that what De Roos did here has never been replicated, right?

A. I'm not sure.

Q. Well, in the NAPP study, they didn't control for 47 pesticides, did they?

A. Well, the NAPP study was never published, so I don't know all the details of it.

Q. Well, you talked about it with the jury, didn't you?

A. I know. I only had what they showed at a conference. So that's really all I have. They list that they do adjust for some, and they have a little list of some that they adjust for.

But it's never been published. Even though it was presented in 2015 and 2016, is still has never been published to this day.

Q. Well, then how did you know that this is superseded?

A. The De Roos data.

Q. Yeah. You said it's been superseded, so you can ignore it, and then you said it hasn't been published.

Which is it?

MR. ISMAIL: Objection, Your Honor. Argumentative.

THE COURT: Okay. Overruled.

But -- overruled.

You can answer.

THE WITNESS: Okay. The Andreotti data is the most accurate Agricultural Health Study data, and that was published in 2018, and that does show a lot more information. That's what I'm referring to, not just NAPP or McDuffie or Hardell.

I'm talking about the whole data that we have in a large cohort is the Andreotti data, 2018, Leon's data.

BY MR. WISNER:

Q. You understand that the De Roos study was not subsumed in the AHS, right?

A. You're talking about the 2003 De Roos?

Q. Yeah, the one we're looking at.

A. There's two different De Roos studies, is the problem. The De Roos study was a little sample that it took out of a bunch of case-control studies that were published in the United States. So they didn't look at all the data that was available at the time.

So even if you go with De Roos 2003, more information came out from Zhang's article, Kantor, McDuffie, all of those came out. And I would say they supersede De Roos' 2003, because now we have the NAPP data which takes all of that into account.

And then we have cohort data that takes that even more into account.

Q. So you understand that the Kantor study was in this pooled analysis, right?

A. Parts of it. Parts of Kantor's data was used in De Roos 2003.

Q. Exactly. This is a pooled analysis of all the available data at the time?

A. I don't know if it was all, because they only took part of it.

Q. What are you basing that on?

A. If you look at all of the cases out of Kantor, Howard, and Zhang, there were more cases. De Roos 2003 took out maybe 35. But I think there were actually 50 or 60 cases, and they just took out a subset of that.

Q. Do you know why, in De Roos, they did that?

A. I know they mentioned they wanted to have data on multiple pesticides.

Q. Exactly. They got rid of the ones that didn't have complete data.

A. Yeah.

Q. I get where you're going now.

So you understand that because De Roos looked at just people with complete data, it's a different analysis than was done in the NAPP, right?

A. In -- I guess, if you say -- it is different.

Q. Okay.

A. It's a subset.

Q. Okay. And so back to where I started on this chain, I apologize if this is confusing.

But we have this study in 2003 that does its own sort of unique analysis, looking at 47 other pesticides and adjusting for them.

Is it still your opinion to this jury that there is no evidence?

A. Yes. For causal, it's still my opinion. The totality of the human data does not support that Roundup causes non-Hodgkin's lymphoma.

Q. So you discussed the NAPP data. And you agree that you don't actually know what that NAPP data is doing because we don't have a publication?

A. Well, we have their slides which they presented at the conference. But as far as any more small details, that has not been published.

Q. All right. Let's take a look at the NAPP.

You show a presentation from Brazil in 2015, right?

A. August. Is that August 2015?

Q. Yeah. It's up on the screen.

A. Yes.

Q. And I believe that when you showed this to the jury, you presented data from this table; is that right?

A. Yes.

Q. And one of the things I wanted to clarify is: In McDuffie, they had a division of greater than two days of exposure, right?

A. Yes.

Q. And that had a doubling of the risk that was statistically significant, right?

A. Not in the adjusted. They didn't adjust. So I would say no.

Q. Well, they showed a doubling of the risk that was statistically significant in McDuffie, right?

A. Yes. Without adjusting for other pesticides.

Q. So they had that statistically significant greater than two days result that was from unadjusted numbers, right?

A. Yes.

Q. And here, they have a 1.73 number, right?

A. Yes.

Q. Same thing, greater than two days per year, right?

A. Yes.

Q. And it's fully adjusted?

A. It's adjusted, yes.

Q. So this suggests -- and McDuffie is part of the NAPP, right?

A. Yes.

Q. So it suggests that even though McDuffie wasn't adjusted originally, even after the fact, it's still statistically significant?

A. Well, I think it's hard to say. Because I don't know for sure what they used from McDuffie. I know they used his data. But I'm assuming from this, because we don't have the actual publication, that maybe they had the raw data and were able to adjust somehow for that. But I don't know for sure.

Q. And this is a statistically significant elevated rate, right?

A. That is statistically significant, yes.

Q. And that's consistent with the data from McDuffie, right?

A. McDuffie showed a statistically significant increased risk, too.

Q. And this is a frequency analysis, right?

A. Of usage, yes.

Q. And that means how frequently you're using something, right?

A. Yes.

Q. Now you talked a little about the Bolognesi and Paz-y-Mino study, remember?

A. Yes.

Q. Those are genotoxicity studies, right?

A. Yes.

Q. And what they showed was that shortly after exposure to Roundup, there was genotoxicity, right?

A. Yes.

Q. But after a period of time, that DNA damage seemed to repair itself, right?

A. Yes.

Q. You understand that in cancer, it's not just one assault to the genome, it's repeated assaults, right?

A. Yes, that is correct.

Q. It's frequency, right?

A. It's multiple DNA damages, not just one.

Q. So what this is capturing is repeated hits to the genome. Frequency, right?

A. Well, I think that's a bit of a leap. What this is capturing is frequency of use of glyphosate and people developing non-Hodgkin's lymphoma.

It didn't actually do a good job at that. Because, yes, it shows greater than two as statistically significant. But then if you look at greater than seven and greater than three and a half years -- which I think we can say is more than two days -- they didn't see the same association.

So it's kind of odd that they really couldn't prove a trend with this data.

Q. I just want to be clear.

When we talk about duration, number of years, that could be someone that sprays Roundup once a year for three years, right?

A. Yes.

Q. That's not a lot of frequency?

A. Well, I mean, the greater than two days could have just been that they sprayed for two days in a row, and that's it.

Q. It could also mean they sprayed 50 times a year, every year for 30 years?

A. Right. It includes a wide range when you say greater than two days.

Q. So I'm trying to say that the frequency is capturing a repetition, right?

A. Well, the word frequency, I would say should be capturing a repetition, but this just says greater than two days per year.

So I don't know if the people who answered yes here, if they only did it twice and that was it. That's part of the problem with this data. The cutoffs aren't very well-defined, or they're too broad.

Q. Lifetime days, that could be someone who

sprayed it seven times, right?

A. Yes.

Q. So if we're trying to look at data that looks at frequency of use, something like Mrs. Pilliod, where she sprayed it, you know, dozens of times a year for 28 years, she fits into the frequency use, doesn't she?

A. I don't think she fits -- honestly, I would say her lifetime exposure and duration, that might be more informative because we know she had more than two days, three and a half years-plus. And we know she had more than seven days. So, actually, those would probably be more accurate.

Q. If we look at the frequency discussion in the study, there's two statistically significant results, isn't there?

A. I'm not sure this one was adjusting for other pesticides. I don't believe that it says it's adjusting for other pesticides in this one.

Q. I understand.

But this is in the same presentation, right?

A. It's in the same presentation.

Q. And the authors are presenting this data. And they show a 2.42 overall greater than two days, and a near tripling of the risk for DLBCL, correct?

A. Again, I think the problem is that this is the

more inaccurate chart. This is the unadjusted data. This didn't take into account other pesticides on this data. So it's comparing two different things.

THE COURT: Let's take a break.

(Recess taken at 2:58 p.m.)

(Proceedings resumed at 3:14 p.m.)

(The following proceedings were heard in the presence of the jury:)

THE COURT: Mr. Wisner, you may continue.

BY MR. WISNER:

Q. I want to talk about confounding, okay?

A. Okay.

Q. I mean, that's a big part of the reason why these other case-control studies, you sort of don't think they're helpful, is because they didn't adjust for potential confounders; is that right?

A. Yes, that's part of the reason. Yes.

Q. One of the ways I try to think about confounding is that there's two aspects.

It has to be associated with exposure, and it has to be associated with cancer, the disease outcome, right?

A. Yes.

Q. So if I wanted to do an epidemiological study looking at matches, the use of matches, and lung

cancer -- if I were to do an epidemiological study looking at, do people who use matches more frequently have cancer, I probably would see an association, right?

A. You probably would, yes.

Q. Because there's an obvious confounder, right?

A. Yes.

Q. That's smoking, right?

A. Yes.

Q. Sorry, I have to get a yes or no. That's why I look at you. I'm not trying to be rude.

So the reason why smoking is a confounder is because people who use matches usually smoke more, right? There's an association between the exposure and the confounder, right?

A. Yes.

Q. And the other reason is because smoking can actually cause lung cancer, right?

A. Yes.

Q. So these two things really have to be there before you have a confounder, right?

A. So you're saying that you have to have an association with --

Q. The exposure.

A. Yeah.

Q. The exposure being matches, you have to have

an association with the exposure, and you have to have an association with the disease, right?

A. Yeah, I think that's fair.

Q. Now, what if we reverse that?

We're doing smoking and lung cancer. If we did an association between smoking and lung cancer, we probably would see a risk, right?

A. Yes.

Q. But what if we adjusted for matches? That wouldn't be a proper confounder, would it?

A. Probably not, no.

Q. Well, matches and smoking are related, right? Matches and lung cancer don't cause cancer?

A. Correct.

Q. And the reason why I bring this up is, when you adjust for something that is actually not a cause, you can actually over-adjust your data, right?

A. Well, I think, again -- I know it's semantics, but we have to be careful of the word cause versus risk. Confounders are usually adjusting for risk, not actual causes.

Q. Fine. We'll use the word association to keep it noncontroversial.

If you adjust for potential confounders that aren't actually associated with that disease, that can

become an over-adjustment, right?

A. It can, yes.

Q. So what we have here is, we have Roundup, right, and NHL. Right?

A. Yes.

Q. And you're saying that other pesticides need to be adjusted for, right?

A. Yes.

Q. And is that Roundup and other pesticides, are they more likely to be associated with each other?

A. They are.

Q. So people who spray Roundup also might spray, I don't know, some other pesticide?

A. Yes.

Q. Okay. Are other pesticides associated with NHL?

A. They are.

Q. But you said earlier that it depends on the pesticide, right?

A. It does.

Q. And so adjustment for other pesticides really just means adjustment for other pesticides that actually are associated with NHL?

A. Well, those would be the most important, definitely.

Q. Because if you were adjusting for exposure to pesticides that had nothing to do with NHL, that would be over-adjustment, right?

A. I don't know if it would be over-adjustment. I think the key thing is that we know there has to be also some scientific link between it.

Like, if we were to take your example of the matches and the lung cancer, if we were to rule out or adjust for the people who smoked, we would find no increase between the use of matches and lung cancer, right?

Q. Because you would be over-adjusting?

A. Well, you wouldn't be over-adjusting, you would be taking out the causative -- the risk factor.

Q. The proper confounder, sorry.

A. Yeah.

Q. But if you were trying to link smoking and lung cancer, and you adjusted for matches use, you would also eliminate the risk, but for other reasons?

A. Yeah, but I think the difference is that matches have never been linked with lung cancer, so why would you adjust for matches.

Q. Precisely. And you have to look and see whether or not the proposed adjustments are actually associated with NHL?

A. Yeah, it's very helpful.

Q. So you recall us talking about the McDuffie article earlier, right?

A. Yes.

MR. WISNER: Permission to approach, Your Honor?

THE COURT: Yes.

BY MR. WISNER:

Q. One of your criticisms of this study is that it didn't adjust for other pesticides, right?

A. Yes.

Q. This is Exhibit 1568. This has been shown already, so it's up on the screen.

And what we have here, Doctor, is this table. And this is the one we were talking about a second ago.

This is the one we were talking about a second ago. And it's this Table 8, right, that has that greater than two days use, right?

A. Yes.

Q. If you look at it here, we have that 2.12, that's statistically significant, right?

A. This is the -- yeah, the unadjusted? Yes.

Q. That's right.

And they actually didn't do any adjustment in this study, did they?

A. No.

Q. They explain why, though, don't they?

A. Do they?

Q. Yeah, let me show you.

A. Okay.

Q. If you go to Table 7, it says right here: "Among individual pesticides," and it lists a bunch, including DDT and malathion, "were included in the initial multivariate model and found not to contribute significantly to the risk of NHL."

Do you see that?

A. Yes.

Q. So they did an actual multivariate analysis to begin with. They put in these other pesticides, and it turns out that they weren't associated with NHL, so they took them out?

A. I'm not sure that's what they're saying.

Q. That's what it says. It says the initial multivariate model, and found not to contribute significantly to the risk of NHL.

Right?

A. I don't know what initial multivariate model they're referring to.

Q. Fair enough.

We talked about multivariate analysis a second ago, right?

A. Yes.

Q. That's when you throw in all the potential things you want to study in the same regression, right?

A. Yes.

Q. And they talk about DDT, malathion, all these other pesticides, right?

And they said that when they did that, it didn't significantly contribute to NHL.

A. I understand what you're saying. They don't show the data, they just make a line and state it. I'm not sure what they're referring to.

Q. Well, I mean, we talked about this a second ago. In the matches and cigarette smoking situation, you don't adjust unless there's an association between the confounder and the disease, and they're saying they didn't have one, so they didn't adjust?

A. But I don't know where they're getting it from, though. That's my problem with the statement.

Q. Well, that's what it says, right?

A. It says that. I just don't know where they're getting that from.

Q. All right. One of the -- I mean, you have a master's in epidemiology, right?

A. Yes.

Q. So you're familiar with different concerns and issues in the epidemiology literature, right?

A. Yes.

Q. And one of the things is something called -- you actually talked about this on direct -- misclassification, right?

A. Yes.

Q. And one is confounding, one is misclassification.

Have you looked at the effects of confounding and misclassification in these epidemiology studies?

A. Yeah, the authors do, if that's what you're referring to.

Q. Yeah. Let's take a look at one of the studies I think will be right on point.

MR. WISNER: Permission to approach, Your Honor?

THE COURT: Yeah.

BY MR. WISNER:

Q. I'm handing you Exhibit 1676.

This is an article authored by Dr. Aaron Blair and his colleagues, titled "The Methodological Issues Regarding Confounding and Exposure Misclassification of Epidemiology Studies of Occupational Exposures."

Do you see that?

A. Yes.

MR. WISNER: Permission to publish?

THE COURT: Any objection?

MR. ISMAIL: This lacks foundation with respect to this witness.

BY MR. WISNER:

Q. This was published in the Medical Journal of Industrial Medicine.

Do you see that?

A. Yes.

Q. Dr. Blair was head of the National Cancer Institute --

A. Okay.

Q. -- right?

He was also head of the IARC committee on glyphosate, right?

A. Okay.

Q. So this is somebody who was obviously very familiar with looking at issues relating to confounding and exposure misclassification in epidemiology studies, right?

A. I mean, I would assume, yes.

MR. WISNER: Permission to publish?

THE COURT: Any objection?

MR. ISMAIL: That's fine.

THE COURT: Granted.

BY MR. WISNER:

Q. So what they're doing here is, they're actually looking at this very issue that I've raised, confounding versus exposure misclassification.

Do you see that?

A. Yes.

Q. And again, I mentioned this earlier, but it's Dr. Aaron Blair.

Do you see that?

A. Yes.

Q. And it specifies right here that at the time this was published, he was part of the Division of Cancer Epidemiology and Genetics at the National Cancer Institute.

Do you see that?

A. Yes.

Q. That's the same group that published the AHS, right?

A. They sponsored it.

Q. Look at the Conclusion section right here.

It says:

"We believe that, of the two of the major methodological issues raised in epidemiologist

studies of occupational exposures -- that is, confounding and exposure misclassification -- the latter is of far greater concern. It is rare to find substantial confounding in occupational studies, or in other epidemiological studies, for that matter, even by risk factors that are strongly related to the outcome of interest.

"On the other hand, exposure misclassification probably occurs in nearly every epidemiologic study. For non-differential misclassification, the type of misclassification most likely in cohort studies, the direction of the bias is largely predictable, that is, a bias of relative risk toward the null."

Do you see that?

A. Yes.

Q. So what Dr.Blair and his colleagues are saying is -- we were talking about confounding or misclassification.

Misclassification is the real problem, particularly in cohort studies?

A. Yeah. Misclassification is an issue with any epidemiology study, almost.

Q. And what it does is, it drives estimates towards the null, right?

A. I think the reason they're saying that is because it's going to be both your cases and your non-cases.

So your people that developed the condition and your people that don't are going to be misclassified probably equally. So that would make your ratio approach 1, the null.

Q. Exactly. It would become no longer significant, right?

A. Right. But it's equal in both groups.

Q. Exactly. In addition, the magnitude from relatively large amounts of misclassification can be sufficient to lead to the interpretation of no effect, right?

A. That's what they say.

Q. And Doctor, you've talked a lot about the AHS with this jury?

A. Yes.

Q. Did you consider the possible risk of misclassification in the AHS?

A. Of course.

Q. You researched the issue?

A. The authors did.

Q. They actually published a whole article, didn't they?

A. They did.

MR. WISNER: Permission to approach, Your Honor?

BY MR. WISNER:

Q. Handing you Exhibit 1833. I think I handed you two.

This is a journal article, Doctor, published by Blair and colleagues, actually, titled "The Impact of Pesticide Exposure Misclassification on Estimates of Relative Risks in the Agricultural Health Study."

Do you see that?

A. Yes.

Q. And actually, many of the authors here are the exact same authors that published the AHS that you referenced?

A. Yes.

MR. WISNER: Permission to publish, Your Honor?

MR. ISMAIL: No objection.

BY MR. WISNER:

Q. So this is the title, and we have here Dr. Blair.

Do you see that?

A. Yes.

Q. And we have other people here, for example, Dr. Alavanja.

Do you see that?

A. Yes.

Q. And Dr. Lynch, for example.

Do you see that?

A. Yes.

Q. These are all people who are actually authors on the AHS, right?

A. Yes.

Q. Dr. Dosemeci, right?

And by the way, Doctor, since we're here, Dr. Lynch signed a letter with Dr. Portier in support of IARC, didn't he?

A. I'm not sure about that.

Q. Okay.

A. I don't recall that.

Q. Do you know that Dr. Dosemeci did that, as well?

A. No, I'm not aware.

Q. All right. So it says here, if we just go to the very end, they're obviously talking about the effects of misclassification exposure, right, in the study?

Right, Doctor?

A. I'm sorry, I haven't read this. Let me see. Which paragraph?

Q. I'm at the very end, and I'm talking about the second one.

A. Okay.

Q. It says:

"We draw several conclusions from our methodological work in the AHS."

Do you see that?

A. Yes.

Q. And it says:

"First, the accuracy of reporting"?

A. Yes.

Q. And then it says:

"Second, except in situations where exposure estimation is quite accurate, i.e., correlations of .7 or greater with true exposure, and true relative risks are 3 or more, pesticide misclassification may diminish risk estimates to such an extent that no association is obvious, which indicates false negative findings might be common."

Do you see that?

A. Yes.

Q. A false negative finding, that's when a study is negative, but that's actually not correct, right?

A. Yeah, that's what that means.

Q. So, like, in the AHS, if the AHS had a false negative with regards to glyphosate, it would be that it's showing no risk, but there actually is a risk, right?

A. Yeah.

Q. And, in fact, the authors of the AHS are straight-up saying that because of the misclassification errors in the AHS, it's likely to have common false negative findings.

A. I'm not sure that's exactly what they're saying. I haven't actually read this article. I see that they're putting here, "except for in situations," and they go on to explain this. But I'm not really sure. I actually have to look at this a little further. I'm not quite sure what they were referring to.

Q. So when you were preparing your report to talk to this jury about the AHS, you didn't look for an article titled "Impact of Pesticide Exposure Misclassification on Estimates of Relative Risks in the Agricultural Health Study."

Is that right?

A. Is that this one?

Q. Yeah.

A. Yeah. I'm not quite sure. I looked through so many articles, it's possible I looked at this. But I honestly would have to look at it again. It's been a while.

Q. Fair enough. I'm not going to try to have a memory test with you. That's fair.

But from what we can see here, the authors of the AHS are saying, unless we have a high risk ratio, it's going to be obscured by misclassification.

Isn't that true?

A. Again, I'm not sure that's exactly what they're saying here.

Q. Well, it does say that false negative findings might be common. It says that.

A. It says "might." That's the problem I have. Sometimes the wording is not exactly saying that it is.

Q. And obviously, you've taken a close look at the AHS, right?

A. Yes.

Q. And you've specifically looked for misclassification, right?

A. I didn't look for misclassification. The authors, they do discuss that as a potential. And I do believe that there are some other publications where

they mention that they looked into that.

So, yes, it is something that came about when looking at the AHS or any cohort study.

Q. Is it your understanding that the authors of the AHS study thought misclassification was just a potential?

A. Yes.

MR. WISNER: Permission to approach, Your Honor?

THE COURT: Yes.

BY MR. WISNER:

Q. I'm handing you a copy of the AHS, it's Exhibit 2230.

I believe you had a copy of this on direct with Mr. Ismail?

A. Yes.

Q. So we're looking at the AHS. And if you actually look at the study, they actually talk about this.

It says right here, talking about the limitations:

"First, despite the specific information provided by applicators about use of glyphosate, some misclassification of exposure undoubtedly occurred."

Do you see that?

A. Yes.

Q. So it's not a potential; it undoubtedly occurred, right?

A. Yeah. But actually, the next sentence after it is also pretty important. Because you can see that it says:

"Given the prospective design, however, any misclassification is likely non-differential."

Q. That's right. And it leads to attenuated risk estimates, right?

A. So would not overestimate.

Q. That's right.

It would underestimate risk?

A. Well, I don't know if it would underestimate it. It would just be that it's not going to show a false positive.

Q. It actually means the exact opposite, Doctor?

A. No, no. A false positive is different than actually showing --

Q. I'm sorry, false negative.

A. False negative?

Q. Yeah, that's what I meant.

It means it's more likely to show a false negative?

A. No, it doesn't.

Q. Well, let me back up.

If it's a misclassification, and it's drawing the risk ratios to 1, but the real risk is actually something greater, that would lead to a false negative, right?

A. If it's drawing in towards the null, it's that it's more likely that you're not going to be able to see an association, whether or not it exists in the positive or the negative, either way.

Q. That's a good point.

And again, you've testified that the AHS shows no association, right?

A. Correct.

Q. And this is saying here that misclassification undoubtedly occurred, right?

A. It also does in any cohort study.

Q. And it says it would lead to an attenuation of risk estimates, right?

A. Yeah, it would be more towards the null.

Q. It also says right here -- the same area, it says:

"Finally, it is important to note that these studies have been conducted in different time periods. Changing agricultural practices,

such as pesticide application methods and use of personal protective equipment, may impact actual exposure levels. In addition, if changing product formulations or amounts used are associated with risk, this may also impact results."

Do you see that?

A. Yes.

Q. And we actually know that during the time of the AHS, there were dramatic changes in the agricultural system, right?

A. Yes.

Q. And, in fact, people started using more protective gear, didn't they?

A. I'm not sure about that. I know the use increased over time.

Q. We know the use of glyphosate dramatically increased, right?

A. Yes.

Q. And they're saying here that if that, in fact, happened, it could actually lead to a classification error?

A. Yes.

Q. And we know it happened, right?

A. Yes.

Q. So this is just more evidence that, in fact, there's significant misclassification error in the AHS?

A. I think what they're mentioning is that this is a possibility.

Q. Fair enough.

But it's not a possibility that it changed, right? We know that did change.

A. I'm sorry, for --

Q. So what I'm saying is, we know glyphosate changed; that's not possible, right?

A. The use increased over time, yes.

Q. So when it says here that changing agricultural practices -- sorry. It says:

"If changing product formulations or amounts are used, this may also impact results."

Right?

A. Right. If they are used.

Q. So we know that there was changing amounts, right?

A. Right.

Q. So we know that it would impact the results?

A. No. Again, I think what they're saying is, if this happened, it's possible that it could affect the results.

They're throwing out any possibilities, what

might make their data not accurate. They're not saying it did happen, just that this is a possibility.

Q. Do you have any criticisms of this study?

A. I actually don't. They did a great job. 50,000 people is quite an accomplishment.

Q. They literally followed 30,000, right?

A. Well, there were over 50,000 going into the study.

Q. But in the follow-up, they actually lost 20,000?

A. Yes.

Q. That's not a criticism you have of it?

A. No. That happens quite commonly in large cohort studies, especially as long -- this publication, 2018, they followed these people, I think the median was 17-plus years. It's very difficult to follow that amount of people for that long of a time.

So losing 30 percent is something even a little bit more that you see in very large cohort studies.

Q. They lost more like 40 percent, right?

A. Okay. I think 38 percent. I don't know the exact number.

Q. The second thing was, that wasn't over 17 years; that was between 1997 and 2005, right?

A. I'm just saying, they followed these people over 17 -- that was the median follow with these people.

So losing 30 percent, 40 percent, is quite common in large cohort studies that follow people over a decade-plus.

Q. I understand, but I want to be clear we're talking about the same thing.

The original survey was between 1993 and 1997, right?

A. Yes.

Q. And the following study, that was between 2001 and 2005, correct?

A. Yes. The follow-up survey was 2001 to 2005.

Q. So they lost 38 percent between those two time periods, not over 17 years.

A. Right. It was a long time.

I'm just saying, the median follow of this study was 17-plus years. So you're going to lose some people.

Q. So losing almost 40 percent of the cohort between 1997 and 2005, that's not a criticism you have?

A. It is not. It happens quite commonly.

Q. One of the things that the authors state in here -- we can actually just go to the front page. It's right from the Conclusion section.

They state that there was some -- sorry. It says right here:

"In this large prospective cohort study, no association was apparent between glyphosate and any solid tumors or lymphoid malignancies overall, including NHL and its subtypes."

Do you see that?

A. Yes.

Q. Is that actually true?

A. I believe it is. I think they published that on Table 2 or -- yeah.

Q. It says "subtypes."

Is it your understanding that there was no elevated statistically significant results for any subtypes?

A. I believe so, yes.

Q. Let's take a look.

So if we actually go to Table 3, this is the cancer incidence in relation to lagged intensity-weighted lifetime days of glyphosate use in the Agricultural Health Study.

Do you see that?

A. Yes.

Q. What they did here is, they broke it into people who had been exposed at least five years ago and

people who had been exposed at least 20 years ago, right?

A. Yes.

Q. You would agree that lymphoma takes quite a while to develop, right?

A. Yes.

Q. It can take up to 20 years, even?

A. It can, yes.

Q. So if you look at the data, for example, for non-Hodgkin's T-cell lymphoma. For the median dose, it has, in the 20-year lag, a 2.97 statistically significant result.

Do you see that?

A. Yes.

Q. T-cell lymphoma, that's a subtype, yes?

A. Yes.

Q. And it's statistically significant?

A. It is.

Q. And it's elevated?

A. It is.

Q. So when we go back to the first page, where it says no association was apparent, and it includes NHL and subtypes, that's just not factually correct, is it?

A. They probably meant to say B-cell, I'm guessing.

Q. Okay. So now do you have any criticisms of the study?

A. I still don't, really. I mean, they only had how many cases here? Nine cases of T-cell lymphoma, ten, out of -- I don't know how many. I can't even add it up here. Nine cases is not a lot. So honestly, T-cell lymphomas, I would say no, I really don't.

Q. So a false negative is when something says there's no risk, when we actually know that there is, right?

A. Yes.

Q. You mentioned earlier -- you know, the AHS looked at more than just glyphosate, right?

A. It did.

Q. It actually looked at malathion and DDT, didn't it?

A. I believe so, yes.

Q. Do you know what the results in the AHS were for those?

A. Yes. I would have to look.

Q. It's actually not in that study. I'll hand it to you.

A. Okay.

Q. Handing you Exhibit 1947.

Doctor, we agreed earlier that DDT and

malathion are known risk factors for NHL, right?

A. Yes.

Q. So Exhibit 1947 is "Non-Hodgkin's Lymphoma Risk and Insecticide, Fungicide, and Fumigant Use in the Agricultural Health Study."

Do you see that?

A. Yes.

Q. This is, in fact, one of the documents on your reliance list, isn't it?

A. Yes.

MR. WISNER: Permission to publish?

MR. ISMAIL: No objection.

THE COURT: Granted.

BY MR. WISNER:

Q. So again, we have some of the same arguments, right, Dr. Alavanja.

Do you see that?

A. Yes.

Q. And a bunch of other -- Dr. Lynch.

Do you see that?

A. Yes.

Q. We have Dr. Blair, right?

A. Yes.

Q. These are all people that are intimately associated with the AHS study, right?

A. Yes.

Q. And if we go into the study, we have here Table 2, and it has pesticide exposure never, ever, and adjusted relative risks of total NHL and NHL subtypes.

Do you see that?

A. Yes.

Q. And then we have these categories. We have total NHL right there, right?

A. Yes.

Q. And then we have a specific risk ratio right there, right?

A. Yes.

Q. We also have diffuse large B-cell cases, right?

A. Yes.

Q. So if we go down here, there's actually a number for malathion.

Do you see that? Let me do it closer.

Do you see that?

A. Yes.

Q. And for total NHL risk, it's .9, and it's not statistically significant, right?

A. Right.

Q. So the AHS, when it looked at malathion, it had a false negative, didn't it?

A. I'm not sure that's accurate to say. I think there's more to it than that. I know that I've not really looked into malathion in this study, so I couldn't tell you more.

But I wouldn't call it a false negative. They just didn't see an association in their study.

Q. Fair enough.

You testified already that you know that malathion and DDT are associated for cause?

A. Yes.

Q. And the AHS, when it looked at malathion, just like with glyphosate, saw a sub-1 risk ratio that was not statistically significant, correct?

A. Correct.

Q. Take a look at what they did with DDT.

For DDT, it looks like the risk ratio is 1.

Do you see that?

A. Yes.

Q. Spot-on null, right?

A. Yes.

Q. But we know that DDT is associated with NHL; it just didn't see it in the AHS, right?

A. They didn't see an association in this study, that's correct.

Q. So that's another one where we kind of know

that the AHS got it wrong?

A. I don't think it's as simple as saying that. There could be other factors. It could be that DDT has not been widely used for a long time now, so I don't know how many people they had -- they mentioned the cases, but it could just be variation exposure practices, the way people answer the studies.

I don't know. This does not say that it's a false negative; it just means that in their study, they did not find an association.

Q. So even though it didn't detect anything from malathion and DDT, which you state are known to be associated, do you now have any criticisms for the AHS?

A. I do not.

Q. One of the things you mentioned on direct was, you said that it went back 15 years from enrollment, right?

A. I'm not sure I said that. I think I said it went back several years.

Q. Is it your understanding that it went back about 15 years?

A. I know it was awhile, yes.

Q. But to be enrolled in the AHS, you wouldn't be sick yet, correct?

A. Correct.

Q. So, for example, if you had been exposed to glyphosate for 15 years, 20 years prior to the AHS, and you had gotten sick from NHL, you wouldn't be allowed to enroll in the study, right?

A. That's correct.

Q. So if you had been exposed for 15 years, and you had not gotten sick, you would be allowed to enroll, right?

A. That's correct.

Q. So, essentially, the people who did get enrolled in the AHS are people who have knowingly been exposed to pesticides for upwards of 15 years, but had not gotten sick yet?

A. Yes.

Q. So these are people who were genetically predisposed to not get sick, right?

A. No. I don't think you can make that leap.

Q. All the people who got sick before that 15 years, they weren't allowed in the study, were they?

A. I think that because they were exposed to pesticides for 15 years and didn't get sick, just means they don't have lymphoma.

Q. Fair enough.

What we do know is that this cohort consists of people who, despite being exposed to various

pesticides for years, didn't get lymphoma, right?

A. The median -- I'm guessing, because I don't have it memorized. It would have been a median exposure of 15 years. The median is kind of like an average. So not everybody enrolled at that time had 15 years of exposure.

Q. So, on average, the people that were part of the AHS cohort were people who had been exposed to pesticides, on average, for 15 years.

And none of them had lymphoma, right?

A. Yes.

Q. Are you familiar with a concept called selection bias?

A. Yes.

Q. And that's where, before you even start to study, you are selecting specific people to be part of it that bias the study, right?

A. That's correct.

Q. Would you agree that by excluding all the people who had gotten sick already, there was a form of selection bias in the AHS?

A. No, I don't agree with that.

Q. So notwithstanding this fact, I assume that you still don't have any criticisms for the AHS?

A. I still don't.

Q. Do you understand how the AHS collected data? Did you actually look at the surveys?

A. I did not look at the actual surveys. I know they use surveys.

Q. And you understand that it took into account protective gear, right?

A. Yes.

Q. You also understand -- you've actually read Dr. Ritz's report, so you understand that when they asked for protective gear, they just asked one general question.

They didn't ask it for each pesticide, right?

A. I'm not sure. I haven't read the actual questionnaire.

Q. Well, you do know that this was looking at 50 or so pesticides in the AHS, right?

A. Yes.

Q. And these are people, pesticide applicators trying to get their license, and they show up. And after they've taken their exam, they're asked to participate in this study, right?

A. Yes.

Q. And in this study, on the spot, they have to tell -- as accurately as they can -- how much pesticide exposure they've had for the last 15 years, right?

A. Yes.

Q. They have to know how much glyphosate they were using in any given year, right?

A. Yes.

Q. And then there was a discussion about protective gear, right?

A. Yes.

Q. And that was part of the dose calculation used in the AHS, right?

A. Yes.

Q. But if they're using respirators and chemical overalls for these really toxic pesticides, but not using that type of gear for glyphosate, the AHS wouldn't capture that, would it?

A. I'm not sure I follow that, sorry. Could you rephrase it. I'm not sure I followed that --

Q. Well, the study uses one protective gear question to assess the exposure for all pesticides, right?

A. I'm going to agree with you. I'm not quite sure. I didn't see the questionnaire.

Q. So when they mark it for what protective gear they use, and they go, gosh, I use a respirator because I spray that DDT stuff, they click respirator.

They're going to use that exposure analysis

for glyphosate, as well, right?

A. So what you're saying is that if they used protective gear for DDT, they're going to assume they used protective gear for glyphosate?

Q. Precisely.

A. I'm not sure that's what they did in this study.

Q. Fair enough.

But if they did do that, you would agree that it would lead to even more misclassification?

A. Again, they're getting this -- the nice thing about cohort is that you're getting this information from people before they have lymphoma.

So if there is a misclassification, it usually is equal between the people who end up getting lymphoma and the people who don't. And that's why they're --

Q. Fair enough. And it's non-differential, I agree with you.

But non-differential misclassification attenuates risk towards the null?

A. Yes.

Q. It creates so much noise that you can't see the signal, right?

A. I don't know. I don't know that that's an accurate assessment. I think it's going to err towards

no association, good or bad.

Q. So notwithstanding this issue about exposure and the protective gear, do you have any criticisms now about the AHS?

A. I do not.

Q. All right. I don't want to spend too much more time, Doctor, but I do want to go over a couple of quick things.

You discussed briefly the Leon study.

Do you recall that?

A. Yes.

Q. And in the Leon study -- well, let's actually go back to your report first. We'll go back to the Leon study in a minute.

In your report, 3146, on page 16, you talk about prospective cohort studies.

Do you recall that?

A. On page 16?

Q. Yeah. Let me find the section. Very top.

This is where you're criticizing Dr. Nabhan's opinions at the bottom. Do you see that?

Oh, that's what's wrong. Sorry.

A. Okay.

Q. Do you see that?

A. Yes.

Q. And you write:

"To the contrary, there is no prospective epidemiologic data that show a statistically significant association between glyphosate-based formulations and the development of NHL or any subtype."

That's what you wrote, right?

A. Yes.

Q. Admittedly, you wrote that sentence before the Leon study, right?

A. I did.

Q. So that's proven to be untrue now, right?

A. I'm not sure that's correct.

Q. Well, the Leon study looked at a subtype, correct?

A. It did.

Q. DLBCL?

A. Yes.

Q. And it did show a statistically significant association between Roundup exposure and DLBCL?

A. In the pooled data with Leon, it did not show a statistically significant association with DLBCL.

If you took -- you're talking about Leon, with the AGRICOH and the Norwegian study?

Q. Yes, absolutely.

A. The pooled data did not show an association. I believe the individual data, like the Norway study. But the pooled, I don't believe showed an association.

Q. Let's look at it.

It's 3146 -- no, it's not. It's 2984. That's my version. I don't know what version you used.

A. I think it's in the -- I have it here.

Q. What exhibit number do you have?

A. Mine is 6762.

Q. All right. I'm going to display it, but it's going to be my version, which is the same thing.

A. Okay.

Q. That's the study in front of you, Doctor?

A. Yes.

Q. Okay. And if we go into this study, there is discussion of DLBCL, right?

You see that on page 7?

A. Yes.

Q. All right. And it says:

"There was an elevated meta hazard ratio of DLBCL with ever use of glyphosate, 1.36, 1.00 to 1.85."

Do you see that?

A. Yes.

Q. "With no evidence of heterogeneity of effects

among cohorts."

Do you see that?

A. Yes.

Q. So that's an elevated statistically significant rate for DLBCL, right?

A. No. The confidence interval includes 1, so you cannot rule out chance alone, or doing this study again and getting a hazard ratio of 1.

Q. Come on, Doctor. If we added a decimal, I'm sure we would get to a number eventually, right?

MR. ISMAIL: Objection. Argumentative, Your Honor.

THE COURT: Sustained.

BY MR. WISNER:

Q. I mean, you understand that these confidence intervals, they have numbers that go one, sometimes infinitely long, right?

A. Usually they don't. They're usually just like this.

Q. You know how to do a regression, right?

A. A regression?

Q. Yeah.

A. Yes.

Q. That's what they're doing here, right?

A. What they're doing is they're doing a meta

analysis of hazard ratios, and they pooled data together to come up with this hazard ratio.

They found 1.36, but again the confidence interval is what it is, it's 1 to 1.85. So if your confidence interval includes 1, it's not that because it's at the end, 1 is less likely to happen than 1.3 because it's in the middle. It's still -- all those numbers are equally as likely to happen if you repeated this study.

Q. I'm sorry.

Are you saying when you're looking at a curve of probability based on an estimate and confidence interval, are you saying any of those numbers is equally probable?

A. Yes. That's exactly what I'm saying.

Q. Well, we heard testimony from Dr. Portier explaining the exact opposite. The highest probability is the point estimate, and it's a curve. And as you go away from the point estimate, the probability gets smaller and smaller.

That's how biostatistics works, right?

MR. ISMAIL: Objection, Your Honor.

THE COURT: Sustained.

BY MR. WISNER:

Q. Okay. Same question. Forget about

Dr. Portier.

The point estimate is the most probable outcome, and it gets much less likely as you get away from that point, right?

A. No, that's not how it works.

Q. Okay.

A. It doesn't work that way.

Q. Okay. Fair enough.

So it says right here:

"The confidence interval is 1.00."

Do you see that?

A. Yes.

Q. If it said 1.001, we just have one more decimal and had 1, would it then be statistically significant?

A. They do have to say that ahead of time, how much their confidence interval is going to include.

I would say probably no because usually we only go out to the hundredth place. I don't usually see people go to the thousandth or the millionth when it comes to a confidence interval. So still rounding, 1.001, it's still 1.

Q. Okay. So even in that scenario, you wouldn't really acknowledge this number because it wasn't, in your view, statistically significant?

A. Correct.

Q. Okay. Well, let's go down farther.

It talks about cohort specific ratios.

Do you see that?

A. Yes.

Q. And it has the AGRICAN one, HR 1.67, confidence interval, 1.05 to 2.65, right?

A. Yes.

Q. AGRICAN, that's a prospective study?

A. It's a prospective study, yes.

Q. And it's elevated, above 1?

A. Yes, they do show that.

Q. And it's statistically significant, right?

A. It is a statistically significant number.

Q. So earlier when I showed you your report where you said that there was no prospective study that was statistically significant, there's one right here, right?

A. Well, I think the interpretation of this -- you asked me if this was statistically significant, and it is.

But if you actually look at the AGRICAN data, they didn't assess direct exposure to the pesticides; they used a crop matrix where they actually kind of guesstimated that these people were exposed to

pesticides based on the crop that they farmed.

To me, that does not seem to be a very accurate way to assess exposure. So honestly I don't think the AGRICAN data by itself is very reliable. The same thing with the CNAP data. The Agricultural Health Study is the only one that looked and assessed individual usage and not using some kind of crop matrix.

I don't know if you have that study, but the crop matrix thing was kind of weird. What they said was if a farmer farmed a specific crop during a specific year, and that pesticide was approved for use in that crop, then they assume the farmer was exposed. That seems like quite a leap.

MR. WISNER: Your Honor, I move to strike the witness' testimony as nonresponsive. It didn't have anything to do with my question.

THE COURT: Overruled. Sustained.

MR. WISNER: I'll ask the question again.

BY MR. WISNER:

Q. So earlier when I showed you your report, where you said there was no prospective study that was statistically significant, there's one right here, right?

A. Well, remember, I didn't have this Leon paper at the time I made that report.

Q. I know. I'm with you there. I'm not trying to say --

A. So I didn't have the AGRICAN. I would still stand by my statement because I'm not sure I would include these in my list of articles to read. But at the time, I did not have this.

Q. Okay. And by the way, I think we're actually confused here, and I think it's my fault. I think this number refers to the CNAP.

Do you see that?

The first number of 1.06, that refers to AGRICAN?

A. Yes.

Q. That's my confusion. Sorry, Doctor, I was confused as well.

So the CNAP is the 1.67. Do you see that?

A. Yes.

Q. And you talked a little bit on your direct examination about how the size of the study is really important, correct?

A. Yes.

Q. And did you look at the different sizes of these cohorts?

A. Yes.

Q. And size -- do you remember how many lymphomas

there were in the CNAP study?

A. Let me see.

Q. I'm trying to find it myself.

A. I don't have that memorized.

Q. Sure. I'll find it.

It should be in Table 2. But this looks wrong.

Here we are, okay.

So we have glyphosate. We have -- it's not here. Let me find it. One second.

It's actually in yours in the supplemental tables; it's not in mine. It's supplemental table number 2.

Do you see it?

A. Are you talking about this one?

Q. Yeah, exactly.

A. Okay.

Q. Do you see that?

And it has here the number of non-Hodgkin's lymphoma cases by study.

Do you see that?

A. Yes.

Q. All right.

And for AHS, for example, we're on lymphoma, which is this one right here -- non-Hodgkin's lymphoma,

so it's this gray line right here, there was 466.

Do you see that?

A. Yes.

Q. And the CNAP study, where we have that 1.6 statistically significant result, there's 1396.

Do you see that?

A. Yes.

Q. So it's over -- about three times greater?

A. It is.

Q. And so the CNAP study is approximately three times greater, and it has a statistically significant result.

But you don't think that shows any evidence of Roundup causing lymphoma?

A. Well, again, I think there's more to it than this. There were more non-Hodgkin's lymphoma cases in the CNAP study, but they were not more exposed cases.

Again, I don't have the study memorized. But I believe in the CNAP, when they actually went back to look how many people were actually exposed to glyphosate, it was not a high number. That actually, when they asked, were you exposed to glyphosate, there was not a high number there.

So I think the exposure and the amount -- like, saying there's 1300 lymphomas is not the same as

saying 1300 that were exposed to glyphosate.

Q. Well, in the -- when you showed the other case-control studies to the jury and you had the number of exposed cases, that's the same number we're looking at here, isn't it?

A. I don't think this 1300 is all exposed cases is what I'm saying.

Q. I gotcha. Okay.

You would agree --

A. The 466 for the AHS study, that's exposed cases.

Q. To glyphosate?

A. I believe so, yeah.

Q. I don't understand.

Why would they have only exposed cases to glyphosate in this study but not CNAP?

A. Because CNAP did not look directly at exposure; they did that crop matrix where they assumed exposure. So we don't know if these people were exposed or not. It's an assumption.

Q. You said the table we were just looking at, they were all exposed to glyphosate?

A. No. The 446 for the Agricultural Health Study --

Q. Yeah.

A. -- those should be exposed cases.

Q. Exposed to glyphosate or just generally?

A. I think it was exposed to glyphosate. If I look back at the AHS study, I think it was 466 cases.

Q. But this is looking at all kinds of pesticides, right?

A. But if you look at Andreotti 2015 --

Q. Sure.

A. -- I believe it's 466 exposed cases.

Q. No, I understand. But this study is looking at all pesticides, right?

A. The Leon?

Q. Yeah.

A. Yes.

Q. And so why would they just use glyphosate-exposed cases if they were looking at all pesticides?

A. You know, I don't know. But 466 is the glyphosate cases.

Q. I know. Because that chart is looking at glyphosate-exposed cases, right?

A. Well, that's what they're trying to say. But in the CNAP, the 1366 were not all glyphosate-exposed cases.

Q. Okay.

All right. Well -- where did it go? Forget it. Okay.

All right, Doctor. I just want to wrap up here and turn you back over to Mr. Ismail. And I appreciate your time and patience here.

But you mentioned briefly the Zhang article, right?

A. Yes.

Q. And that was a meta analysis, right?

A. It was.

Q. And it shows a statistically significant elevated rate for glyphosate, right?

A. That's what they reported, yes.

Q. Yeah. And they included the AHS, right?

A. They did.

Q. And that included data that was fully adjusted and some data that wasn't adjusted?

A. Right. It included unadjusted data too.

Q. But most of it was actually driven by the AHS, right?

A. I'm not sure about that because the Zhang data used a subset of the AHS. So I'm not actually sure that it's accurate to say that most of it was driven by the AHS data.

Q. All right. And the Zhang authors, they were

formerly with the scientific advisory panel for the EPA, right?

A. Okay. I wasn't aware of that.

Q. Well, it's right there in the article.

Do you want to look at it?

A. No, I believe you.

Q. Okay. And the scientific advisory panel for the EPA, that's a group of scientists that review the EPA's work, right?

A. Okay, yes.

Q. You've never participated in a scientific advisory panel, right?

A. Not for the EPA.

Q. Okay. The Zhang authors also looked at rodent studies, right?

A. They reported some, yes.

Q. They looked at specifically lymphoma, right?

A. They did.

Q. And they actually found elevated rates of lymphoma in mice exposed to glyphosate, didn't they?

A. They report that, yes.

Q. And that's a pretty significant finding, wouldn't you agree?

A. Well, again, I don't agree that that's a pretty significant finding.

Because, again, the rodent data is not the same as human data. The rodent data were rodents exposed to like thousands of times the doses that a human would be exposed to.

So, for me, rodent data is not that significant. And it also was not that significant for the EPA either.

So I would say it's in their article, but I'm not quite sure it's a significant finding.

Q. Well, you understand the EPA, they didn't actually find the lymphoma; that's Dr. Portier.

You understand that, right?

MR. ISMAIL: Objection, Your Honor.

THE COURT: Overruled, if she knows.

THE WITNESS: I don't know.

BY MR. WISNER:

Q. You haven't carefully looked at the animal data; is that right?

A. No. I looked at it. The EPA -- the monogram or OPP or whatever you want to call it -- it's got, like, three pages of all the animal data they looked at it.

And they summarized it there and basically say they didn't see any increased risk in the mice models for lymphoma.

So I think they're more -- if I had to pick one, I would say that was more encompassing than what Zhang presented in the article.

Q. Okay. For what it's worth, though, Zhang did report lymphoma findings in six mice studied, correct?

A. They reported it, yes.

Q. And Dr. Zhang, she's a toxicologist, right?

A. You know, I honestly don't know that answer.

Q. Do you know if she's a toxicologist here at Berkeley?

A. I don't know her specialty, no.

Q. All right.

In the Zhang study, they actually do a -- they sort of plot -- they discuss all the various data on the various epidemiological case-control studies that they used.

Do you recall that?

A. Yes.

Q. And we actually created this from the Zhang. It's from Table 7. And it talks about the various studies that they included. The red ones are the cohort studies, right?

A. Yes.

Q. That's Andreotti and De Roos '05?

A. Yes.

Q. And it has the various blue studies that are the case-control studies, right?

A. Yes.

Q. Down here they have the various meta analysis that have been done with all these combined?

A. Okay.

Q. Right? And you've actually reviewed the Schinasi and the meta analysis, haven't you?

A. Yes.

Q. You've actually reviewed IARC meta analysis?

A. Yes.

Q. You reviewed the Chang and Delzel meta analysis, right?

A. Yes.

Q. And, of course, you reviewed Zhang?

A. That's this one?

Q. That's right.

A. Yes.

Q. So we have right here something that the jury has heard a lot about, but if you look over here, the vast majority of these risk ratios are to the right of 1.

Do you see that?

A. Yes.

Q. And, in fact, if you look at the meta

analysis, every single one is to the right and statistically significant, right?

A. Well, I think again, kind of the same thing with the Zhang article, you have to look what's put into the meta analysis.

Like Schinasi and Leon, again, I read these a long time ago, but I know they included data that was not adjusted. I know that for a fact. So if your meta analysis is using unadjusted data, you're not going to get a valid meta analysis.

The same thing with some of the ones you have in the bluish color. Some of those did not use adjusted data.

These are not all equal. These are comparing kind of apples to oranges. You're not going to compare a huge cohort study to Hardell's -- I don't know if you have Hardell on there. You're not going to compare it to a study of 12 people that didn't even report an association or a multivariate analysis looking at other pesticides.

So I think this is nice to see. But, again, I think you really have to look at what were these articles looking at for their data.

Q. Do you remember what my question was?

A. I think you asked me if that was significant.

Q. No, I'll read the question back to you.

A. Okay.

Q. So I asked you, so earlier, whoops. So my question to you was...

THE REPORTER: Do you want me to read it back?

MR. WISNER: Yeah.

(Record read as follows: "Q. And, in fact, if you look at the meta analysis, every single one is to the right and statistically significant, right?")

THE WITNESS: Okay. So yes.

BY MR. WISNER:

Q. Okay. So it's yes?

A. Yes.

Q. All right. And I understand you think that the Schinasi and Leon authors were wrong?

A. Right. They included unadjusted data.

Q. And Leon, that's actually the same author from the recent cohort study?

A. That's correct.

Q. Yeah. And we have IARC. You think they're wrong?

A. Well, not wrong, but they included unadjusted data.

Q. That's right. And Chang and Delzel, they're

wrong for including unadjusted data, too?

A. Yeah. That's not very accurate.

Q. Do you know who paid for that study?

A. I do not.

Q. Would it surprise you to learn it was Monsanto?

A. One way or another, industries do sponsor studies. It happens.

Q. Would it surprise you?

A. It wouldn't surprise me.

Q. And then Zhang, et al., this is obviously their study, right?

A. Yes.

Q. And they give two assessments, one for including the recent Andreotti study and one for using the 2005 data, right?

A. Yes.

Q. And as you can see, it doesn't make a lick of difference, right?

A. Right.

Q. So I guess what I want to ask you, Doctor, is: Have you done a probability calculation of the likelihood of having so many risk ratios be to the right of 1 by chance alone?

A. Well, I don't think that's an accurate way to

assess the data, to do a probability. We're not flipping a coin here. We're looking at actual data that has other factors behind it. This is living, moving data.

So a probability assessment, yeah, if I was flipping a coin, if it was a 50/50 chance for each one, that's not what we're looking at here. Each one of these studies, I believe had higher likelihood or lower likelihood of showing an association just based on the study design.

Q. So to be clear, Doctor, earlier you were saying that statistical significance, there's a probability just as likely as it being on one end of the tail as the other, right?

A. Yeah, the confidence interval.

Q. Yeah. That it's equally likely for it to be in any of those spots, right?

A. Yes.

Q. And if the true risk was 1, and everything that we saw was just random chance, wouldn't you expect to see then odds ratios basically going back and forth to the right -- left and right of 1?

A. No. These studies don't rely on random chance; they actually use some science behind formulating these. These are not random chance events.

There's more to it than that.

Q. I'm sorry, but for example right here, the Eriksson study, 2008, that had the 2.0 that was the unadjusted number, right?

A. Right.

Q. And then we had the adjusted number, which had the 1.5, right?

A. Right.

Q. And that was no longer statistically significant?

A. Correct.

Q. And you said, I don't care about that data because I can't rule out chance, right?

MR. ISMAIL: Objection, Your Honor.

THE COURT: Restate, Counsel.

BY MR. WISNER:

Q. You don't consider that relevant data for whether or not Roundup causes cancer because you can't rule out chance, right?

A. Right. If the confidence interval includes 1, then you cannot rule out chance as getting those results.

Q. So when you have all these different studies looking at the data, and they keep finding themselves to the right of 1, have you considered what the probability

of that actually happening was if there was no real risk?

A. No. Because again, I don't think it's a probability exercise. These are all different studies.

So I'm not -- again, they're not taking chance. They're not just throwing up a coin and saying, is it going to be heads or tails? Then I would tell you, yeah, you have to do a probability analysis.

But these are studies that are all different, all designed differently -- well, some have some overlapping data.

So it's not going to be up to chance that you're going to get the results. Some of these are better designed than others, so it's not just up to chance.

Q. And isn't it true that when you consistently see odds ratios to the right of 1 in different studies, looking at different populations, and you see it across the board statistically significant for meta studies, doesn't that indicate that there's actually a risk here, Doctor?

A. No. I think, again, it's the same thing. You've got to look at what were they looking at? Is this a case-control? Are they adjusting?

And then if it includes 1, it's not

significant. It doesn't matter if the dot goes to the right of 1. If it includes 1, it's not significant.

Q. Now, Doctor, you previously -- oh, crap. Almost out of time. Sorry.

All right, Doctor. I'll wrap up.

You testified previously that you -- every week people come into your office that have lymphoma and ask you if Roundup causes their cancer, right?

A. They do.

Q. Every week?

A. Pretty much, yeah.

Q. And when they ask you if Roundup was a cause of their cancer, you tell them that it wasn't, right?

A. Well, initially, how it started was I didn't even know there was this --

MR. WISNER: Your Honor, I'm trying to get her out of here, if she can just answer yes or no to my question.

THE WITNESS: It's not as simple as that.

THE COURT: Well, her answer is going to be her answer.

BY MR. WISNER:

Q. All right. Please.

A. All right. Well, initially people were asking about it, and I was like, well, let me look into this

because I'm getting asked every day is there an association.

So I did kind of do a literature search looking to see if there was anything published and didn't really see anything.

Then, you know, it started happening more and more, more and more publicity. And so once I got more of the data -- especially from this trial, I've had more data than I can memorize here -- I do tell them, I don't think it causes non-Hodgkin's lymphoma.

Q. Okay. And you say that notwithstanding all the data we've seen, right?

A. Correct.

Q. So if somebody comes into your office and says, Doctor, I'm currently spraying Roundup every day, and I have this lymphoma, should I stop spraying it, what do you tell them?

A. You know, I really don't get into their activities like this. But what I would say is there is not totally any data that supports Roundup being a risk factor for non-Hodgkin's lymphoma. So I can't say you need to stop. Because I don't really consider it a risk factor.

Q. And isn't it it true you've never investigated whether or not Roundup is a promoter of cancer, have

you?

A. No, I have investigated it.

Q. You have?

A. Yes. I've looked through over 50 studies and countless numbers of people here on this data and have not seen anything.

Q. Do you understand the difference between an initiator and a promoter?

A. Yes.

Q. And have you specifically looked at whether or not Roundup is a promoter of cancer?

A. In the literature?

Q. Yeah.

A. Yes.

Q. What studies have you looked at?

A. Well, I think any of the studies that show like, the carcinogenicity, any of the animal data, none of them show it being a promoter. I can't remember any of them reporting that.

Q. You never looked at the George study, did you?

A. I don't know what that is.

MR. WISNER: No further questions, Your Honor.

REDIRECT EXAMINATION

BY MR. ISMAIL:

Q. Mr. Wisner put up -- I'll try not to hit

anyone with this -- put up this board that he asked you some questions about, okay.

And he was asking you, well, gee whiz, there's a bunch of numbers to the right of 1 here.

Do you recall this last set of questions?

A. Yes.

Q. All right.

So do the Zhang authors actually report the totality of the Andreotti data?

A. No, they don't.

Q. So if they actually included what the Andreotti authors reported in their study, where would that point estimate be?

A. I can only speculate, but it would probably be --

Q. Just for Andreotti itself --

A. Right.

Q. -- they report a 1.12.

You recall we went over with the jury the actual results of Andreotti?

A. Yes.

Q. And if you included all the data, just for Andreotti, would that point estimate be to the left of 1?

A. It would be.

Q. And if you included -- I see Leon, the study that just came out last month, that had an odds ratio of .95, correct?

A. That's correct.

Q. And that would be a point estimate to the left of 1?

A. It would be, yes.

Q. And we looked at the NAPP. The NAPP isn't included in here, right?

A. That's correct.

Q. And if we looked at the self-responders from NAPP, do you recall that, the point estimate was below 1?

A. Yes, it was.

Q. And so that would be another number over here, correct?

A. Yes.

Q. And so is it fair to say to the jury all the point estimates for glyphosate products like Roundup are to the right of 1 in the epidemiology studies?

A. No, that's not fair.

Q. So you were asked a lot of questions about Andreotti and the AHS study, and I'm not going to go over all that in great detail. But there were some questions about a paper by Dr. Blair -- that's not

right.

Well, let me put up the Andreotti paper.

A. 1676?

Q. So this is the paper Counsel showed you, right?

A. Yes.

Q. So he told you about some of the authors here.

And this paper, he was asking you about concerns about various methodology designs in the AHS study, whether there was misclassification.

You remember that line of questions?

A. Yes.

Q. And were some of the very same authors actually in the Andreotti paper?

For example, we see Dr. Lynch. So the paper that Mr. Wisner showed you included some authors in the later -- well, let me ask this: The Andreotti paper, did that get published after the paper that Mr. Wisner showed you?

A. The 2018, yes.

Q. And so even with the paper that Mr. Wisner showed you, some of those same authors published in the Andreotti paper, correct?

A. Correct.

Q. And if we go to their conclusion, these same

authors that talked about whether there's a concern for misclassification and whether there's non-differential exposure, all those questions he asked you.

If you go to the conclusion in the abstract, what did these authors conclude -- including some of the very same authors he referenced to you a moment ago -- as to the question of non-Hodgkin's lymphoma?

A. They concluded that there was no association.

Q. Using the data from the Agricultural Health Study?

A. Yes.

Q. Now, you were asked some questions about the NAPP?

A. Yes.

Q. And I believe Counsel showed you the data this way.

Do you recall he pulled out that one point estimate?

A. Yes.

Q. And as someone who has training in epidemiology and is a cancer researcher, is it appropriate in your view, Doctor, just to select one number from the analyses presented here and draw your conclusions from that?

A. No.

Q. What should you do instead?

A. You have to look at the totality of the data.

Q. And when you actually look at the totality of the data here, what does it show?

A. It doesn't show an association.

Q. And he asked you, well, couldn't someone who used it for more than three and a half years only spray once or twice a year.

Do you recall that question?

A. Yes.

Q. Well, as to the frequency, is there any markation here that the individual was using glyphosate more frequently than in the years analysis?

A. No, there isn't.

Q. And so someone who used it for 30 years in this study, what was their relative risk?

A. There was no association.

Q. Would this be another point estimate to the left of 1?

A. It could be.

Q. And if someone used it more than seven lifetime days, is there any basis whatsoever to say there's an increased risk --

A. No.

Q. -- in the NAPP?

You were asked some questions about subtype finding in the Leon, the DLBCL in the pooled analysis.

A. Yes.

Q. You told the jury that that was not statistically significant?

A. Yes.

Q. Have there been other studies that looked at DLBCL?

A. Yes.

Q. Any of those show an increased risk as a subtype?

A. They did not.

Q. I believe that's all the questions I have for you. Let me just double-check with my colleagues.

As to that final question, Dr. Bello --

MR. WISNER: It's well beyond the scope, Your Honor.

THE COURT: I don't know what it is.

MR. ISMAIL: It's an analysis of DLBCL. I'm sorry, Your Honor.

THE COURT: I don't recall that we touched on this.

MR. ISMAIL: Counsel asked about the DLBCL finding from Leon. I'm putting it in the context of all the others.

MR. WISNER: Your Honor, I didn't touch any of those studies in the subtype analysis.

If they want to do this, she's going to have to come back tomorrow, and I don't want to do that.

MR. ISMAIL: I'll withdraw the question.

THE COURT: Okay.

BY MR. ISMAIL:

Q. Any basis in the literature you've seen to suggest that glyphosate products like Roundup increase the risk of DLBCL when you look at the totality of the data?

A. No.

Q. He was asking you about how you select which particular pesticides to control for.

Do you recall that?

A. Yes.

Q. And he was talking about Dr. Blair's paper and whatnot and other researchers.

Did the researchers at the National Cancer Institute make a decision as to which are the appropriate pesticides to control for?

A. They did.

Q. Did they report their analysis after deciding which are the ones -- were the appropriate ones to control for?

A. They did.

Q. Is that the data you shared with the jury?

A. Yes.

Q. The NAPP researchers we looked at, did they select which pesticides they wanted to control for?

A. They did.

Q. Did they just willy-nilly pick all the pesticides in the world, or did they make specific decisions which to control for?

A. They made specific decisions.

Q. And when you shared that data with the jury, were you looking at the adjusted data based on how those researchers controlled for pesticide exposure?

A. Yes.

Q. And based on that, was there any increased risk shown for NHL?

A. There was not.

MR. ISMAIL: Thank you, Doctor.

MR. WISNER: Very short, very short. Just on those points.

RECROSS-EXAMINATION

BY MR. WISNER:

Q. You mentioned that you have to look at the totality of data; is that right?

A. Yes.

Q. But that totality of data does not include to you data that's not statistically significant, right?

A. Well, you look at it. But if you're going to use it to make your decision, you wouldn't take data that's not statistically significant.

Q. Okay. And also when it comes to looking at the totality of data, you don't consider as part of your causation assessment data that wasn't adjusted for other pesticides?

A. Well, again, I think it's kind of the same. You consider it. If you see the data, you can look at it, but when you see it wasn't adjusted for other pesticides, it doesn't carry as much weight as the others.

Q. Not only doesn't it carry weight; you don't consider it at all.

A. I wouldn't say I don't consider it. I consider everything.

Q. Well, just now when I showed you those meta analyses, you disregarded it because they included unadjusted data, right?

MR. ISMAIL: Objection, Your Honor.

THE COURT: Overruled.

THE WITNESS: No. I looked at those. I looked at all those studies. I didn't just disregard

them.

MR. WISNER: Okay.

Thank you, Your Honor.

Thank you so much for your time, Dr. Bello.

THE COURT: Thank you, Dr. Bello. Well, let me just chat with the jury.

Ladies and gentlemen, we're done for the day. We will start again tomorrow at 9:00 a.m. Please don't think about this case when you walk out the door, juror amnesia, and have a good evening.

(The following proceedings were heard out of the presence of the jury:)

MR. ISMAIL: We may have time tomorrow to discuss the charge.

Counsel have discussed it, and it may be a shorter day in terms of the evidence tomorrow than 4:31.

THE COURT: Promises, promises.

MR. ISMAIL: Indeed.

MR. WISNER: It will.

MR. ISMAIL: But if the Court would rather defer that, that's fine. But there may be some time at the end of the day tomorrow.

THE COURT: You said jury instructions?

MR. ISMAIL: I said "the charge." It's a Chicago phrase.

MR. MILLER: Your Honor, he's not from around here.

THE COURT: Is Mr. Brady here?

MR. EVANS: It's infectious, Your Honor.

MR. WISNER: I think tomorrow we will have a couple hours at the end of the day. I don't anticipate his direct being very long, my cross will not be very long; it's a relatively narrow issue.

So we'd like, if possible, to substantively get a lot done tomorrow if we could.

THE COURT: That's fine.

MR. WISNER: Thank you, Your Honor.

MR. MILLER: Thank you, Your Honor.

(Proceedings adjourned at 4:32 p.m.)

State of California)
)
County of Alameda)

We, Kelly L. Shainline and Lori Stokes, Court Reporters at the Superior Court of California, County of Alameda, do hereby certify:

That we were present at the time of the above proceedings;

That we took down in machine shorthand notes all proceedings had and testimony given;

That we thereafter transcribed said shorthand notes with the aid of a computer;

That the above and foregoing is a full, true, and correct transcription of said shorthand notes, and a full, true and correct transcript of all proceedings had and testimony taken;

That we are not a party to the action or related to a party or counsel;

That we have no financial or other interest in the outcome of the action.

Dated: April 29, 2019

Kelly L. Shainline
CSR No. 13476, CRR

Lori Stokes
CSR No. 12732, RPR