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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.)	Case No. RG17862702
vs.)	
Monsanto Company, et al.)	Pages 4318 - 4603
_____)	Volume 27

Reporter's Transcript of Proceedings

Monday, April 29, 2019

Reported by: Kelly L. Shainline, CSR No. 13476, RPR, CRR
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22 minutes.)

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I N D E X

Monday, April 29, 2019

DEFENDANT'S WITNESSES

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BELLO, CELESTE

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1 Monday, April 29, 2019

8:55 a.m.

2

P R O C E E D I N G S

3

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4

(Proceedings commenced in open court out of

5

the presence of the jury:)

6

THE COURT: Good morning, Counsel.

7

ALL: Good morning, Your Honor.

8

THE COURT: Everybody have a good weekend?

9

MR. MILLER: Yes, we did.

10

MR. WISNER: Your Honor, may I approach?

11

THE COURT: Yes.

12

MR. WISNER: I'm handing you a copy of

13

Dr. Celeste Bello's expert report. She's the witness

14

who's going to be testifying.

15

(Counsel confer off the record.)

16

MR. ISMAIL: Do you want to excuse her? Do

17

you mind stepping out?

18

MR. WISNER: It's not a very long issue. But

19

yesterday afternoon or morning -- yesterday we received

20

an additional materials list for the witness, and it

21

included a publication that was not on her original

22

report. It's the NAPP study from -- NAPP presentation

23

from 2016. And if you look at the report, the only time

24

the NAPP is even remotely discussed, it would be on

25

page 9.

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

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

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

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

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

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

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

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

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

13 **MR. WISNER:** Exactly.

14 **THE COURT:** -- or is it completely different?

15 **MR. WISNER:** It was a presentation given to
16 IARC actually a year after the presentation was given in
17 2015. The final NAPP print publication hasn't come out
18 yet. Dr. Weisenburger testified a bit about that during
19 his direct.

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

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

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

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

6 **THE COURT:** Right.

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

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

12 **MR. WISNER:** You said no to the abstract.

13 **THE COURT:** To the abstract.

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

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

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

24 **THE COURT:** Okay. Go ahead.

25 **MR. ISMAIL:** I was just going to say,

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

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

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

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

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

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

1 report --

2 **THE COURT:** Well, wait, wait. So are you
3 talking about whether she's going to talk about the 2015
4 or talk about NAPP at all, or whether or not you're
5 objecting to her being permitted to talk about the 2016?
6 Because 2016, I may agree with you if she opines about
7 that, that's a new opinion. But if she said she
8 considered 2015 and you're arguing that she shouldn't be
9 permitted to offer an opinion or testimony about the
10 2015, that's a different discussion than we were just
11 having a minute ago.

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

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

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

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

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

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

10 **MR. WISNER:** Sure, but --

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

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

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

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

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

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

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

10 **MR. ISMAIL:** Correct.

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

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

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

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

21 **THE COURT:** I'm always ready.

22 **MR. ISMAIL:** Thank you, Your Honor.

23 **MR. WISNER:** Ready to go, Your Honor.

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

25 **COURT ATTENDANT:** I'll check, Your Honor.

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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,

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

2 **THE COURT:** You may proceed.

3 **MR. ISMAIL:** Thank you, Your Honor.

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

6 May I approach the witness?

7 **THE COURT:** Yes, you may.

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

10 **DIRECT EXAMINATION**

11 **BY MR. ISMAIL:**

12 **Q.** Hi, Dr. Bello.

13 **A.** Good morning.

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

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

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

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

3 A. Yes.

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

7 A. Yes.

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

12 A. Yes.

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

16 A. Yes.

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

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

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

24 A. No.

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

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

6 **A.** Okay.

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

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

15 Then I went to medical school and got my
16 medical doctorate degree at University of South Florida.
17 And this was followed by a residency in internal
18 medicine also at University of South Florida. And then
19 a fellowship in hematology/oncology at University of
20 South Florida which also includes Moffitt Cancer Center
21 where I work today. And have been on faculty ever since
22 2008 finishing fellowship at Moffitt Cancer Center.

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

1 **A.** Yes.

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

5 **A.** No, it's not.

6 **Q.** And are you board-certified?

7 **A.** Yes. In hematology and oncology.

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

10 **A.** Yes.

11 **Q.** What is the Moffitt Cancer Center?

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

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

23 **A.** In the department of malignant hematology.

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

1 **A.** Yes.

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

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

5 **Q.** So do you, in addition to your -- well, let me
6 ask this first. You have teaching responsibilities.

7 We've talked about you being on faculty at these
8 institutions. Do you have any teaching responsibilities
9 for residents and fellows as they're learning oncology?

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

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

16 **A.** Yes.

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

19 **A.** Yes.

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

22 **A.** Seeing patients.

23 **Q.** What are you going to be doing tomorrow?

24 **A.** Seeing patients.

25 **Q.** And what is your specialty in clinical care?

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

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

6 **A.** Yes.

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

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

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

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

19 **A.** Yes, that is fair.

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

22 **A.** Yes.

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

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

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

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

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

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

17 A. Yes.

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

20 A. Yes.

21 Q. And in what areas have you published?

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

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

3 Q. Yes, thank you.

4 A. Okay.

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

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

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

18 A. Yes.

19 Q. Since your fellowship that you described?

20 A. Yes.

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

24 A. Yes.

25 Q. Doctor, consistent with the other witnesses

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

3 A. Yes.

4 Q. What is your hourly rate?

5 A. \$500 an hour.

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

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

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

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

20 A. Yes.

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

23 A. Yes.

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

1 **A.** Yes.

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

5 **A.** Yes.

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

9 **A.** Oh, yes, definitely.

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

12 **A.** No, I did not.

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

16 **A.** No, I don't believe so.

17 **Q.** And can you tell us why?

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

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

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

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

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

8 A. Yes.

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

12 A. Yes.

13 Q. Doctor, what is evidence-based medicine?

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

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

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

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

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

6 A. Yes.

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

10 A. Yes.

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

14 A. Yes.

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

18 THE COURT: Voir dire?

19 MR. WISNER: Yes, Your Honor.

20 VOIR DIRE EXAMINATION

21 BY MR. WISNER:

22 Q. Good morning, Doctor.

23 A. Good morning.

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

1 over to Mr. Ismail. Okay?

2 I appreciate you coming out here on this
3 Monday morning.

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

7 A. That's correct.

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

11 A. Yes.

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

16 A. No.

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

20 A. Yes.

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

24 A. Yes.

25 Q. How many?

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

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

5 A. Yes.

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

8 A. Yes.

9 Q. And you were under oath; right?

10 A. Yes.

11 Q. Same oath you're under today?

12 A. Yes.

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

15 A. Uh-huh.

16 Q. That was false?

17 A. Was it?

18 Q. Well, you just said it was 20.

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

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

21 **MR. WISNER:** May I approach, Your Honor?

22 **THE COURT:** Yes.

23 **BY MR. WISNER:**

24 Q. I'm handing you Exhibit 3146.

25 **MR. WISNER:** Your Honor, you already have a

1 copy of this.

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

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

5 A. Yes.

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

8 A. Yes.

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

10 A. Yes.

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

12 A. Yes.

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

16 A. Yes.

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

19 A. Uh-huh.

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

22 A. Yes.

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

24 A. That's true.

25 Q. And of these 25 publications that you've

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

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

7 Q. Let's do the math.

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

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

13 A. Uh-huh.

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

17 A. Uh-huh.

18 Q. And that's like 13?

19 A. Yeah.

20 Q. So we add 14 to 25, we're still in the
21 40 range, we haven't got to 50 yet; right?

22 Right?

23 A. Yeah, that's correct.

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

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

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

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

10 A. There probably is.

11 Q. Like what?

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

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

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

24 A. Yes.

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

1 for your opinions?

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

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

6 A. Right.

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

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

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

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

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

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

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

23 A. Which one?

24 Q. Number 1.

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

1 edit that material.

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

3 MR. WISNER: May I approach, Your Honor?

4 THE COURT: Yes.

5 BY MR. WISNER:

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

8 A. Yes.

9 MR. WISNER: Okay. Permission to publish?

10 THE COURT: Any objection?

11 MR. ISMAIL: No, Your Honor.

12 THE COURT: So granted.

13 (Exhibit published.)

14 BY MR. WISNER:

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

17 A. Yes.

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

20 A. Yes. Yes.

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

25 A. Yes.

1 **Q.** Not on there, are you?

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

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

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

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

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

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

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

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

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

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

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

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

10 **A.** Yes.

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

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

16 **A.** Yes.

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

21 **A.** Yes.

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

24 **A.** Yes.

25 **Q.** There's no star; right?

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

11 **Q.** All right. So this is false?

12 **A.** No, that's completely true.

13 **MR. ISMAIL:** Objection, Your Honor.

14 **BY MR. WISNER:**

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

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

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

23 **Q.** You do?

24 **A.** Yeah.

25 **Q.** Are you sure?

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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

1 exists, no.

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

4 A. No, I have not.

5 Q. You are not a pathologist; right?

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

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

12 A. Yes.

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

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

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

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

1 Dr. Jameson, Dr. Weisenburger; right?

2 A. Yes.

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

5 A. Yes.

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

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

11 Q. You're not one of them?

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

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

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

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

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

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

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

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

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

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

19 **A.** Not my expertise.

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

23 **THE COURT:** Overruled.

24 **MR. ISMAIL:** Thank you, Your Honor.

25 May I proceed?

1 **THE COURT:** Yes.

2 **DIRECT EXAMINATION (resumed)**

3 **BY MR. ISMAIL:**

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

7 **A.** It's the National Comprehensive Cancer
8 Network.

9 **Q.** What is the National Comprehensive Cancer
10 Network?

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

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

18 **A.** Yes.

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

21 **A.** Yes.

22 **Q.** What is a guidelines document?

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

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

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

7 A. Yes.

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

11 A. Yes.

12 Q. Were you invited to participate in this
13 effort?

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

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

20 A. It is a great honor, yes.

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

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

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

1 cancer research and cancer care?

2 A. Yes, it is.

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

5 A. Yes.

6 Q. Are you an author of this document?

7 A. Yes, I am.

8 Q. Did you contribute meaningfully to this
9 document?

10 A. Yes.

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

13 MR. WISNER: Objection. Speculation.

14 THE WITNESS: No.

15 THE COURT: Overruled.

16 BY MR. ISMAIL:

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

22 A. Yes, they did.

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

1 **A.** Okay.

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

8 **A.** Yes.

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

12 **A.** She does have risk factors, yes.

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

17 **A.** Yes, I did.

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

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

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

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

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

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

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

9 A. Yes, I have.

10 Q. And what did you conclude?

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

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

17 A. Yes.

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

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

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

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

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

11 **Q.** And what body system are lymphocytes part of?

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

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

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

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

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

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

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

13 A. It is.

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

17 A. It does.

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

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

1 to be able to pass that on.

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

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

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

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

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

1 other part is tumor surveillance.

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

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

10 A. Yeah, they're managed differently.

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

15 A. Yes.

16 Q. -- systemically?

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

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

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

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

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

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

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

21 **A.** Yes.

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

25 **A.** Yes.

1 upon for your opinions in this case?

2 A. Yes.

3 MR. ISMAIL: Permission to publish?

4 MR. WISNER: No objection.

5 THE COURT: Granted.

6 BY MR. ISMAIL:

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

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

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

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

1 opposed to never going to the central nervous system?

2 **A.** Yes, it is.

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

7 So let's take these three large columns here.

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

11 **MR. ISMAIL:** Your Honor, may she?

12 **THE COURT:** Yes.

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

17 So if you count all these rows, which is like
18 impossible because this is so zoomed in, it was over
19 10,000 different genes that they looked at.

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

25 And what they found was there were over

1 50 different genes that were expressed differently
2 between systemic and brain.

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

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

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

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

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

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

8 **BY MR. ISMAIL:**

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

14 **A.** Yes, it does.

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

18 **A.** Okay.

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

23 **A.** That's correct.

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

1 oncologist?

2 **A.** Yes.

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

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

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

14 **MR. WISNER:** Objection. Calls for hearsay.
15 Speculation.

16 **THE COURT:** Overruled. She can answer.

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

21 **BY MR. ISMAIL:**

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

25 **A.** Yeah, I am.

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

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

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

7 A. They do.

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

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

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

15 (Exhibit published.)

16 **BY MR. ISMAIL:**

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

20 A. Yes, that's correct.

21 Q. And CNS is central nervous system?

22 A. Yes.

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

24 A. Yes, that's what she has.

25 Q. Now if you go down here to the section

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

3 A. It means cause.

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

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

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

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

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

19 A. It's unknown.

20 Q. Is this a principle that you agree with?

21 A. Yes.

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

25 A. Yes.

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

4 **A.** Yes.

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

8 **A.** Yes, she is.

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

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

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

17 **A.** Yes.

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

21 **A.** Then it would have to be unknown or
22 idiopathic.

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

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

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

6 **A.** Yes, I would.

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

10 **A.** They are not.

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

15 **A.** Okay.

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

20 **A.** No.

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

24 **A.** No.

25 **Q.** Are these things on the far left column all

1 known causes of primary central nervous system lymphoma?

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

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

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

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

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

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

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

1 factors for that disease?

2 A. She does.

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

6 A. Yes, it would.

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

10 A. She was diagnosed March-April, 2015.

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

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

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

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

1 lymphomas too. She also has a history of smoking.

2 I think that was it.

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

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

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

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

16 MR. ISMAIL: Permission to publish,
17 Your Honor?

18 THE COURT: Any objection?

19 MR. WISNER: One second, Your Honor.

20 No objection.

21 THE COURT: Granted.

22 (Exhibit published.)

23 BY MR. ISMAIL:

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

1 **A.** Okay.

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

4 **A.** Yes, it is.

5 **Q.** Is that shown up here at the --

6 **A.** At the top.

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

10 **A.** Yes, it does.

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

16 **A.** Uh-huh.

17 **Q.** What's an incidence rate?

18 **A.** The number of cases that occur in a
19 population.

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

22 **A.** It is different than odds ratio.

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

25 **A.** Right.

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

3 **A.** Yes.

4 **Q.** Okay. So the rate for the younger group is
5 .09 and the rate for the older group is 1.2.

6 **A.** Yes.

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

8 **A.** Over 10.

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

11 **A.** Yes.

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

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

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

21 **A.** Yes.

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

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

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

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

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

12 Q. Thank you.

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

16 A. Yes.

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

19 A. It's an autoimmune condition.

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

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

1 right about it.

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

5 A. Yes.

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

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

10 A. Yes.

11 MR. ISMAIL: Permission to publish?

12 MR. WISNER: No objection.

13 THE COURT: Granted.

14 (Exhibit published.)

15 BY MR. ISMAIL:

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

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

19 A. Yes, that's correct.

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

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

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

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

2 A. Yes.

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

6 A. She does.

7 Q. So is that down here?

8 A. Uh-huh.

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

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

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

25 A. I think it kind of gives evidence that she

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

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

8 A. Yes, there are.

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

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

13 A. Yes.

14 MR. ISMAIL: Permission to publish?

15 MR. WISNER: No objection, Your Honor.

16 THE COURT: Granted.

17 (Exhibit published.)

18 BY MR. ISMAIL:

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

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

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

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

5 A. Yes.

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

7 A. Yes.

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

11 A. Yes, they do.

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

14 A. Yes.

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

17 A. Yes.

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

19 A. Yes.

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

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

1 lymphoma if they had Hashimoto's.

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

4 A. Three. An odds ratio of three.

5 Q. And you indicated it was statistically
6 significant?

7 A. Yeah.

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

12 A. Yes.

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

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

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

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

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

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

9 **A.** No, it is not.

10 **Q.** And why do you say that?

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

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

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

25 **A.** That's correct.

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

4 **A.** Yes, there are.

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

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

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

16 **A.** She did.

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

19 **A.** It is.

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

23 **A.** It is.

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

1 factor that placed her at an increased risk?

2 A. Yes, she was.

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

7 A. No, it does not.

8 Q. Why not?

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

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

21 A. Yes.

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

25 A. Yes.

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

3 **A.** Yes.

4 **MR. WISNER:** Objection. Speculation.

5 **THE COURT:** Overruled.

6 **THE WITNESS:** Yes, it is.

7 **BY MR. ISMAIL:**

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

17 **A.** No.

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

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

24 **A.** Yes.

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

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

3 A. Yes.

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

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

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

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

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

1 standard.

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

6 A. Yes.

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

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

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

15 A. It would be 80 to 90 percent.

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

21 A. Yes.

22 Q. And so when you characterize Mrs. Pilliod's
23 cancer as being idiopathic, does she fall in that 80 to
24 90 percent of unknown causes that you see clinically
25 every week?

1 **A.** Yes, I would say so.

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

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

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

13 **A.** No.

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

19 **A.** No.

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

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

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

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

2 **MR. ISMAIL:** Yes.

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

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

7 **THE WITNESS:** Okay.

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

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

11 **THE COURT:** You may proceed, Mr. Ismail.

12 **MR. ISMAIL:** Thank you, Your Honor.

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

16 **A.** Okay.

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

20 **A.** Yes.

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

25 Can you help us understand what's the

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

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

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

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

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

19 **A.** Yes.

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

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

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

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

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

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

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

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

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

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

3 A. Yes, it does.

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

6 A. Yes, it's listed there.

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

9 A. No, absolutely not.

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

13 A. Yes, each one.

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

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

18 Q. And what did you conclude?

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

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

24 A. I do not.

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

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

3 A. Yes, I'm aware.

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

7 A. Yes.

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

10 A. Yes, there are.

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

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

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

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

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

5 **A.** Yes, I did.

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

10 **A.** No.

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

15 **A.** You would just by numbers alone, that would
16 happen.

17 **Q.** Have you seen that in your clinical practice?

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

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

25 Is that a valid medical or scientific way to

1 approach these questions?

2 A. No. No.

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

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

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

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

13 A. Yes, it is.

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

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

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

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

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

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

1 cancers for which there is this spousal concordance?

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

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

6 Have you read and relied on this paper?

7 A. Yes.

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

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

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

14 A. They do a report on association.

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

17 A. Yes, there are.

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

20 A. Right.

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

23 A. It did. It did.

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

1 before Roundup became available?

2 A. Yes.

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

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

7 MR. ISMAIL: Permission to publish?

8 MR. WISNER: No objection, Your Honor.

9 THE COURT: Granted.

10 (Exhibit published.)

11 BY MR. ISMAIL:

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

19 A. Yes.

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

23 A. They looked at 18 different cancer sites.

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

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

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

8 **A.** Yes, they do.

9 **Q.** And if you turn, Doctor, to Table 2. So in
10 the far left column, spouse cancer site, these are the
11 18 different cancers that they looked at. And then they
12 have it broken down by concordant cancer in husband by
13 wife's cancer. What does that mean?

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

17 **Q.** And then is the opposite --

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

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

23 **A.** Yes.

24 **Q.** How many couples were included in this
25 analysis?

1 **A.** So 56 couples.

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

4 **A.** It does. It gives you more valid results
5 usually.

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

8 **A.** Yeah, it is.

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

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

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

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

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

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

1 than just them living together and being husband and
2 wife.

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

5 A. Yes, there is.

6 Q. And if you turn to 6501.

7 Is this the paper you reviewed?

8 A. Yes.

9 MR. ISMAIL: Permission to publish?

10 MR. WISNER: No objection.

11 THE COURT: Granted.

12 (Exhibit published.)

13 BY MR. ISMAIL:

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

17 A. Yes.

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

22 A. Yes, that's what they concluded.

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

1 **A.** That it probably contributes only a minor
2 role.

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

6 **A.** Yes, they did.

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

9 **A.** Yes.

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

13 **A.** Yes.

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

15 **A.** It is.

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

20 **A.** No, there's not.

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

23 **A.** They did in the discordant ones, yes.

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

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

3 A. Yes, they did.

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

6 A. 92.

7 Q. And --

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

9 Q. Thank you.

10 When you look at this larger study in the
11 92 couples, was there any statistically significant
12 increased risk of the wife developing non-Hodgkin's
13 lymphoma from the husband -- because the husband had the
14 same cancer?

15 A. No.

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

21 A. No, it doesn't.

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

1 **A.** Okay.

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

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

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

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

17 **A.** Yes.

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

25 **A.** No, they actually investigated. They looked

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

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

8 A. It doesn't show that one exists.

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

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

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

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

22 A. Uh-huh, yes.

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

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

1 You can see it.

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

4 A. Yes, I saw that.

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

7 A. I have.

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

12 A. Right. It's pretty rare too.

13 Q. One in 20,000?

14 A. Yeah.

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

17 A. Yeah, those numbers alone --

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

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

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

1 possibly know that.

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

4 **BY MR. ISMAIL:**

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

7 **A.** It was in the deposition.

8 **Q.** That's right --

9 (Simultaneous colloquy.)

10 **THE WITNESS:** The Pilliod.

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

13 **MR. ISMAIL:** I'm happy to.

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

16 **MR. ISMAIL:** Thank you.

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

19 **A.** I did.

20 **Q.** Did he describe his medical history there?

21 **A.** He did.

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

25 **A.** Yes.

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

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

5 **Q.** Thank you.

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

9 **A.** Okay.

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

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

16 **A.** No, they're not all equal.

17 **Q.** And why is that?

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

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

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

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

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

11 A. No, not for humans.

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

14 A. Yes.

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

17 A. Yes.

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

21 A. Yes, I have looked at that.

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

24 A. Yes.

25 Q. Do you think you should just disregard those

1 data, or should they be part of the discussion?

2 A. No, it's important.

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

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

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

16 A. Yes.

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

20 A. No.

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

23 A. Yes.

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

1 genotoxicity --

2 **THE COURT:** Sidebar.

3 (Sidebar held but not reported.)

4 **BY MR. ISMAIL:**

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

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

9 **A.** Yes.

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

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

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

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

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

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

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

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

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

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

3 **A.** Every day.

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

6 **A.** Yes, this is.

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

12 **A.** I am.

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

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

20 **MR. WISNER:** Objection. Well beyond the
21 scope.

22 **MR. ISMAIL:** It was a generic question.

23 **THE COURT:** If she knows.

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

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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.

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

4 **A.** Yes.

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

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

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

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

25 **A.** They did.

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

4 **A.** Yes.

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

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

8 **Q.** And what did they find?

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

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

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

22 **A.** Yes.

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

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

3 A. No.

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

6 Is this another paper you read and considered?

7 A. Yes.

8 Q. Is this another aerial spraying study?

9 A. It is.

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

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

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

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

25 Are you there? The bottom right column.

1 A. Okay. 994?

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

3 A. Yes, okay.

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

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

7 Q. How did these researchers describe their own
8 data?

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

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

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

19 (Exhibit published.)

20 **BY MR. ISMAIL:**

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

1 **A.** Yes, that is what they concluded.

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

4 **A.** I do.

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

9 **A.** Yes.

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

12 **A.** They did. They did.

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

14 **A.** It is.

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

16 **A.** Yes, it's Table 4.

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

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

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

3 **A.** Yes.

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

6 **A.** Yes.

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

11 **A.** There was not.

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

15 **A.** Okay.

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

18 **A.** Yes.

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

22 **A.** Yes.

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

25 **A.** Yes.

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

4 **A.** Yes.

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

8 **A.** Yes.

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

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

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

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

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

1 trying to be similar but without the actual condition.

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

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

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

14 **A.** Yes, there are.

15 **Q.** Can you give us some examples?

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

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

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

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

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

13 A. Yes.

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

18 A. Yes, it is.

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

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

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

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

7 A. Definitely, yeah.

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

11 A. Yes.

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

14 A. Yes.

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

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

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

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

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

5 A. The adjusted data.

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

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

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

15 A. Yes.

16 Q. Is that a case-control study?

17 A. It is.

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

21 A. Yes.

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

24 A. It was not.

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

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

4 **A.** Yes, it has.

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

6 Is that the Hohenadel paper?

7 **A.** Yes.

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

10 **A.** Yes.

11 **MR. ISMAIL:** So any objection?

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

14 **THE COURT:** Has this been published before?

15 **MR. ISMAIL:** It has.

16 **MR. WISNER:** It hasn't.

17 (Pause in the proceedings.)

18 **BY MR. ISMAIL:**

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

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

24 **A.** Yes.

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

1 **A.** Yes.

2 **Q.** And that came out in 2015.

3 **A.** Yes.

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

7 **A.** They do.

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

11 So have you read each of these studies?

12 **A.** I have.

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

14 **A.** Yes.

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

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

19 **A.** The 2002 one does, yes.

20 **Q.** Why is the De Roos 2005 in yellow?

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

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

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

1 that were actually exposed to the formulated glyphosate.

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

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

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

9 A. Yes.

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

14 A. Yes, that's correct.

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

19 A. Yes.

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

23 A. They do.

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

1 **A.** The adjusted is more important.

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

6 **A.** It shows that the risk does not exist.

7 **Q.** There was one paper here, the De Roos paper in
8 2003, that's different than the 2005 paper; correct?

9 **A.** Yes.

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

11 **A.** Yes.

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

14 **A.** Yes.

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

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

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

24 **A.** It does not.

25 **Q.** Had there been additional epidemiology studies

1 that have been done and published since 2015?

2 A. Yes.

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

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

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

11 A. Yes.

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

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

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

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

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

1 **A.** Yes.

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

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

6 **A.** It is.

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

9 **A.** Yes.

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

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

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

20 **A.** Yes.

21 **Q.** Okay. So let's turn --

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

24 **THE COURT:** Noon.

25 **MR. ISMAIL:** Noon. Okay.

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

4 **A.** It has not.

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

7 **A.** These are presentations that were presented at
8 conferences.

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

11 **A.** Yes.

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

13 **A.** Okay.

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

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

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

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

1 in their place.

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

5 A. Yes.

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

9 A. Yes.

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

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

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

22 A. That's correct.

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

25 A. Yes.

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

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

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

11 **A.** Yes.

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

13 **A.** Yes.

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

17 **A.** Well, it went down.

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

19 **A.** No.

20 **Q.** Why is that?

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

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

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

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

7 Q. Now, here in frequency, number of days per
8 year, the researchers put "2 or below" and "more than
9 2"; right?

10 A. Yes.

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

14 A. Yes.

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

19 A. It does, it matters.

20 Q. And tell us why?

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

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

1 **A.** If you include proxies, there is.

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

5 **A.** No.

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

8 **A.** Yes.

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

11 **A.** The greater than 7.

12 **Q.** Is that essentially a null finding here?

13 **A.** Right. It showed no association.

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

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

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

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

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

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

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

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

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

21 **A.** Yes, there are.

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

24 **A.** Yes.

25 **Q.** Okay. So have there been more than one

1 publication from the Agricultural Health Study?

2 A. Yes.

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

5 A. Yes.

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

8 A. The De Roos 2005, yes.

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

12 A. Yes, there has been.

13 Q. And what's that study?

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

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

18 And is this the 2018 publication updating the
19 Agricultural Health Study?

20 A. Yes.

21 Q. Now, is this a cohort study?

22 A. It is.

23 Q. Just to orient folks here, who funded this
24 study?

25 A. So the NIH, National Institutes of Health,

1 funded this study.

2 Q. And in terms of the author affiliations here,
3 if we look down to this description, we don't have to go
4 through every one, but in terms of where these
5 scientists and researchers come from, where they publish
6 this research, can you give us a quick overview of that?

7 A. Yeah. A lot of them work for either the NIH
8 or the National Cancer Institute.

9 Q. Does it also include university academic
10 researchers as well?

11 A. It does. University of Iowa. And I thought
12 there was -- well, Drexel. I thought Nebraska was on
13 here, but I think I have my studies confused.

14 Q. And in addition, we talked about this
15 peer-review publication with all these scientists on it.
16 What journal was this published in?

17 A. So this was published in the *Journal of the*
18 *National Cancer Institute*.

19 Q. Is that a well respected journal?

20 A. It is.

21 Q. Okay. Now just remind us, Dr. Bello, just
22 what the overview of the Agricultural Health Study was
23 or is? Is it still ongoing?

24 A. It's still ongoing, yes.

25 Q. Tell us about sort of just the general design

1 of that study.

2 A. Well, they took like over 50,000 licensed
3 pesticide users in the state of Iowa and North Carolina,
4 and they gave them a questionnaire to kind of assess
5 what they use, what they've been exposed to, different
6 factors in their life.

7 And then they followed them over time with
8 subsequent questionnaires. And then also looked through
9 cancer registries to see if any of them developed
10 lymphoma.

11 Q. So the use of cancer registries, is that a --
12 how significant is that in your review of this study as
13 to how reliable it is?

14 A. They're pretty reliable. Cancer registries
15 are usually government-run registries that record people
16 who get certain cancer diagnoses.

17 Q. Is it well accepted in cancer research to rely
18 on those registries?

19 A. It is.

20 Q. Now, at the time that the individuals were
21 enrolled in the study, is that the first time that they
22 were exposed to any sort of pesticide?

23 A. No, it was not.

24 Q. And how do we know that?

25 A. They had questionnaires that mentioned how

1 long they used it.

2 Q. And so at the -- when the study began, had
3 there been, for the participants, years of pesticide
4 exposure even before that?

5 A. Yeah. I don't remember the exact number, but
6 it was several years before they had filled out that
7 questionnaire.

8 Q. Okay. On this question of confounding that
9 we've been talking about, did these researchers from the
10 National Cancer Institute and others design their study
11 to control for confounders?

12 A. They did.

13 Q. What kind of confounders did they control for?

14 A. They controlled for a bunch of stuff, age,
15 past medical history, pesticide exposure, as well as
16 industrial exposures. I know there was some, like,
17 fuels they adjusted for, radiation exposure they
18 adjusted for. So there was quite a few work-related and
19 environmental-related.

20 Q. Given the rigor that these scientists used to
21 control for confounders, how does that impact your
22 interpretation of how reliable the data is?

23 A. It makes the data a lot more reliable taking
24 all of that into account.

25 Q. Okay. We've talked about AHS having the

1 De Roos '05 publication and the Andreotti 2018. Have
2 there been other papers published out of the
3 Agricultural Health Study?

4 A. There have been.

5 Q. And is it a database that has been used to
6 examine lots of questions about cancer and the
7 participants in the study?

8 A. Yes.

9 Q. Now I want to turn now to what -- overall what
10 did these researchers find in the Agricultural Health
11 Study?

12 A. Overall they found no association between
13 glyphosate and non-Hodgkin's lymphoma.

14 Q. Okay. So let's look at the data. So Table 2
15 is on page 4. The data that's specific to NHL is on the
16 next page. I'm just orienting that we're looking at the
17 table that shows cancer incidence in relation to
18 intensity-weighted lifetime days of glyphosate use in
19 Agricultural Health Study. Okay?

20 A. Okay.

21 Q. And if you turn to the next page, page 5, you
22 see non-Hodgkin's lymphoma listed here.

23 A. Yes.

24 Q. Now, the way these researchers broke it up,
25 they have these Q1, Q2, Q3, and Q4. Remind us what

1 those different looks at the data are getting at.

2 **A.** So those were different quartiles of exposure.
3 What they were trying to account for was different
4 levels of exposure that some people may have been
5 exposed to more of the glyphosate verse others. They
6 were trying to account for that.

7 Also, because they called it
8 intensity-weighted, they used a formula to determine the
9 intensity like how much of the exposure, so not to just
10 say how frequently they used it, but to what extent.

11 So if somebody was just kind of spraying just
12 a little bit, that would get like a lower intensity
13 verse somebody who was like having just mixing batches
14 of it, that would get a higher intensity. So they
15 called this an intensity-weighted exposure.

16 **Q.** Now, are these the relative risks and the
17 confidence intervals reported for those four looks at
18 the data?

19 **A.** Yes.

20 **Q.** Is there any statistically significant
21 increased risk in the matter of how often the
22 patients -- individuals were exposed?

23 **A.** No, none of the -- none of the quartiles of
24 exposure showed an increase of risk.

25 **Q.** Now, the point estimates are below 1. Does

1 that mean in this study products like Roundup was
2 protective?

3 A. No, it doesn't. Because again the confidence
4 intervals, it's very important to look at that because
5 if it includes 1, that's means your findings can be
6 explained by chance alone. So it's not statistically
7 significant. But you can't say that it's protective.
8 You can just say there was no association.

9 Q. Okay. And is there any evidence of a dose
10 response when you look at this data?

11 A. No.

12 Q. Did these researchers also look at diffuse
13 large B-cell lymphoma in particular?

14 A. Yes, they did.

15 Q. And similarly some of the numbers are below,
16 some of the numbers are above. Are any of them
17 statistically significant?

18 A. No, they're not.

19 Q. And how do you interpret this data in total?

20 A. Again, it shows that there was no
21 statistically significant association between glyphosate
22 and diffuse large B-cell lymphoma.

23 Q. Now, you indicated, Dr. Bello, that in the
24 conduct of this study, the researchers gave a second
25 questionnaire.

1 **A.** Yes.

2 **Q.** And the jury has heard that between the first
3 and the second questionnaire -- let me say that
4 differently -- that a certain percentage of the people
5 didn't fill out the second questionnaire; is that
6 correct?

7 **A.** That's correct.

8 **Q.** Is that at all unusual when you're looking at
9 these studies that go on for two decades or more?

10 **A.** No. In large studies, it's quite common that
11 you'll get some people who will not fill out subsequent
12 surveys.

13 **Q.** And so how did the researchers here address
14 this question about the individuals who didn't fill out
15 the second questionnaire?

16 **A.** They used an imputation or mathematical model
17 to try to fill in some of the blanks.

18 **Q.** And what is imputation?

19 **A.** It's when -- it's kind of like a -- I don't
20 know whether you'd call it like an educated guess, but
21 you're taking information that you know to be true and
22 you're using it with some of the other background
23 factors about that person to try to assume what their
24 answer would have been if they filled out the questions.

25 **Q.** Is imputation a recognized and accepted method

1 of doing epidemiological research?

2 A. It is.

3 Q. Has imputation been used in other well-known
4 and highly regarded studies?

5 A. Yes, it has.

6 Q. And did these researchers validate their
7 imputation model for glyphosate?

8 A. Yes, they did.

9 Q. And we talk about validation, what does that
10 mean?

11 A. It means assessing how true their outcomes
12 were.

13 Q. And did they publish their results?

14 A. They did.

15 Q. In a peer-reviewed publication?

16 A. They did.

17 Q. Now, did these researchers also look to see
18 how their results would change, if at all, if you only
19 looked at people who filled out both the first and
20 second questionnaire?

21 A. They did.

22 Q. So without imputation, what does the data
23 show?

24 A. They found no statistical link between the
25 glyphosate and non-Hodgkin's lymphoma.

1 Q. And is that reported here in the paper?

2 A. It is.

3 Q. I think it's on --

4 A. What page was it in?

5 Q. -- the fourth page.

6 A. On the fourth page?

7 Q. To the left of Table 2.

8 A. Oh, yeah, right up here.

9 Q. So they have this description.

10 To evaluate the impact of using
11 imputed exposure data for participants who
12 did not complete the follow-up
13 questionnaire, we limited the analysis to
14 the 34,698 participants who completed
15 both.

16 Is that correct?

17 A. Yes.

18 Q. So did these -- was this study still large
19 even if you looked at people who only filled out both
20 questionnaires?

21 A. Yes, it was.

22 Q. And did they report, when it comes to
23 non-Hodgkin's lymphoma, whether there was any increased
24 risk?

25 A. They did not show an increased risk.

1 **Q.** And is that how the National Cancer Institute
2 scientists reported in the peer-reviewed journal?

3 **A.** Yes, that is.

4 **MR. ISMAIL:** Your Honor, perhaps this is a
5 good time to stop.

6 **THE COURT:** Yes, it is.

7 All right. So, ladies and gentlemen, we're
8 going to break for lunch and come back at 1:30.

9 Have a good lunch. Don't talk about anything
10 you heard in the courtroom this morning. And we will
11 resume 1:30.

12 (Jury excused for lunch recess.)

13 (Proceedings continued in open court out of
14 the presence of the jury:)

15 **MR. WISNER:** Your Honor, just to quickly put
16 on the record our sidebar.

17 I objected to Dr. Bello providing any expert
18 testimony or opinions regarding the genotoxicity of
19 glyphosate in Roundup as I do not believe it was
20 properly disclosed in her expert report, and I was
21 overruled.

22 **THE COURT:** Okay.

23 **MR. ISMAIL:** Just for the benefit of the
24 record, all the papers that Dr. Bello discussed were
25 disclosed in her report. Indeed Mr. Miller even asked

1 her about the Bolognesi paper at her deposition, in
2 addition to some of these other concepts of the
3 mechanisms of cancer. So it was disclosed.

4 **THE COURT:** I did rule that in fact that the
5 papers were mentioned in her reliance materials and as a
6 result she could talk about them.

7 So have a good lunch.

8 **MR. EVANS:** Your Honor, just handing up the
9 bench brief with a witness -- with a witness, Dr. Mucci
10 on Wednesday, just so you can have a copy.

11 **MR. MILLER:** Do you have a copy for me,
12 counsel? Thank you.

13 **THE COURT:** I did want to just mention in
14 relation to our conversation about the jury
15 instructions. I don't know if you're talking about or
16 discussed an instruction regarding the difference
17 between the time Mr. Pilliod -- Mrs. Pilliod stopped
18 using Roundup and -- Mr. Pilliod stopped using Roundup
19 and consideration of a conduct between those times and
20 how the jury ought to consider that.

21 So that was just on my mind to mention to you
22 that we want to flesh that out and talk about what that
23 should look like.

24 **MR. MILLER:** Sure.

25 **MR. EVANS:** Thank you, Your Honor.

1 (Luncheon recess was taken at 12:01 p.m.)

2 AFTERNOON SESSION

1:38 p.m.

3 (The following proceedings were heard in the
4 presence of the jury:)

5 **THE COURT:** Mr. Ismail, you may continue.

6 **MR. ISMAIL:** Thank you, Your Honor.

7 **BY MR. ISMAIL:**

8 **Q.** Let's finish up our discussion here. When we
9 took the lunch break, we were talking about the
10 Agricultural Health Study, and you were talking about
11 how the researchers there dealt with the situation of
12 certain participants not filling out the second
13 questionnaire, how they addressed that and published
14 that in the literature?

15 **A.** Yes.

16 **Q.** Have there been other criticisms levied at the
17 Agricultural Health Study? Without going into great
18 detail, just in general.

19 **A.** Yes.

20 **Q.** Have the researchers and authors published
21 their response and how they dealt with some of the
22 comments about the methodology of that paper?

23 **A.** Yes, they have.

24 **Q.** And do they -- "they" being the researchers at
25 the National Cancer Institute and others -- stand behind

1 their results and findings of the Agricultural Health
2 Study?

3 A. Yes, they did.

4 Q. Did you consider their comments about the
5 methodology of that paper and the response of the
6 authors in deciding for yourself how much significance
7 to place on that study?

8 A. Yes.

9 Q. When you consider the totality of that
10 information, do you consider AHS to be a reliable study?

11 A. Yes, I do.

12 Q. Does it inform your assessment about whether
13 there's any association between glyphosate and
14 non-Hodgkin's lymphoma?

15 A. Yes, I think it's very helpful.

16 Q. So in our discussion, we were talking about
17 some of the epidemiological data that has come out since
18 IARC. We talked about the map which hasn't been
19 published, but has been presented. We talked about AHS.

20 Has there been other cohort data published?

21 A. Yes.

22 Q. What is that paper called?

23 A. It's by Leon and colleagues. I think they
24 called it the AGRICHOH study.

25 Q. If you turn to Exhibit 6762, can you tell us

1 if that's a publication of the study you just
2 referenced.

3 A. Yes, this is the one.

4 Q. Have you reviewed this paper?

5 A. Yes, I have.

6 Q. And this came out fairly recently, has it not?

7 A. Yes.

8 Q. I think a month or so ago?

9 A. I think it was February. No, March --
10 February 2019.

11 Q. Very good.

12 Is this a collection of cohort data?

13 A. It is.

14 Q. Let's go ahead and look at the results that
15 are reported here.

16 If you go to Table 2 on page 8.

17 A. Okay.

18 Q. Tell me when you're there.

19 A. Yeah, I'm there.

20 Q. Okay. Awfully small, but let's see if you can
21 walk us through it.

22 Do we have up on the screen the information
23 from the paper with respect to glyphosate?

24 A. Yes.

25 Q. Okay. And when we talk about the size of

1 studies, you indicated that the more cases that you can
2 consider, the more reliable the data?

3 A. Yes.

4 Q. Or at least the more weight you can give it?

5 A. Yes.

6 Q. And how many -- what's the N here, the number
7 of cases?

8 A. Here, they have 1,131 cases noted.

9 Q. They report whether there's an overall risk of
10 non-Hodgkin's lymphoma in this study.

11 What did they report here as the hazard ratio?

12 A. 0.95.

13 Q. And was that statistically significant?

14 A. It was not.

15 Q. Is this the largest collection of cohort data
16 that has yet been published on glyphosate and NHL?

17 A. Yes, as far as I know.

18 Q. Is there any increased risk reported with this
19 data that came out a month ago?

20 A. No.

21 Q. Similar to what I've asked you before, is the
22 fact that the point estimate is below 1, does that mean
23 it's protective?

24 How would you understand this finding?

25 A. Again, the confidence interval crosses 1,

1 which means these findings are just as likely to happen
2 by chance alone.

3 **Q.** Do they also report information on DLBCL?

4 **A.** They do.

5 **Q.** Is that a smaller number of cases, by
6 definition, since it's a subset?

7 **A.** It is.

8 **Q.** What did they report here for their results?

9 **A.** They showed a hazard ratio of 1.36, and again,
10 it was not statistically significant.

11 **Q.** Is that because the lower amount includes 1?

12 **A.** Yes.

13 **Q.** So based on the three studies that we've
14 looked at since IARC has come out -- the NAPP, the
15 Agricultural Health Study, and the Leon -- what does
16 that tell you, when you look at the totality of the
17 epidemiology data, as to whether glyphosate is
18 associated with NHL?

19 **A.** The totality of the data does not support an
20 association between glyphosate and NHL.

21 **Q.** There's been some discussion of a paper that
22 came out earlier this year, called Zhang.

23 Have you read that paper?

24 **A.** Yes.

25 **Q.** Without going into great detail, what does the

1 Zhang publication do?

2 A. Zhang was trying to pool different studies
3 together to also look at an association between
4 glyphosate and non-Hodgkin's lymphoma.

5 It didn't just use cohort data, it also used
6 some case-control studies and cohorts, and mixed it
7 together to form a meta-analysis, meta results.

8 Q. Did the Zhang paper report any new instances
9 of NHL?

10 A. It didn't.

11 Q. It was just an analysis of existing studies?

12 A. Yes.

13 Q. Did it mix unadjusted data and adjusted data
14 together?

15 A. It did.

16 Q. I forgot to ask you: With respect to the NAPP
17 data we looked at, the AHS, and the Leon, were those
18 adjusted results?

19 A. They were.

20 Q. But as you said, Zhang mixed together adjusted
21 and unadjusted?

22 A. Yes.

23 Q. Did Zhang include all the results from the
24 Agricultural Health Study?

25 A. It didn't.

1 **Q.** And I guess, by definition, it didn't have
2 Leon to include either?

3 **A.** No, it didn't.

4 **Q.** Did Zhang include all the case-control data
5 from North America that we've looked at?

6 **A.** It did not.

7 **Q.** Does the Zhang meta-analysis, in your view,
8 suggest that glyphosate -- formulated glyphosate like
9 Roundup is associated with NHL?

10 **A.** No, it does not.

11 **Q.** Okay. So just in terms of the summary of
12 where we're at on the -- this is what we were looking at
13 as of 2015. And then we added some additional data that
14 we just went over with the jury.

15 So with respect to what we're showing here,
16 why did you gray out the De Roos and McDuffie paper on
17 this analysis?

18 **A.** De Roos 2003 and McDuffie are included in the
19 North American Pooled Project, so to not double count
20 the numbers.

21 **Q.** And then the 2005 De Roos paper, why is that
22 grayed out?

23 **A.** That's included in the Andreotti 2018 data.

24 **Q.** And I'm not sure you can see it too well on
25 the screen, but why is Andreotti and Leon in the yellow

1 box?

2 A. Those are cohort studies.

3 Q. So when you look at this information and take
4 care not to double count your studies, overall, what
5 does this show you about whether there's an increased
6 risk between products like Roundup and non-Hodgkin's
7 lymphoma?

8 A. It does not support an association between
9 non-Hodgkin's lymphoma and Roundup.

10 Q. And with respect to whether there's a dose
11 response, these are some of the papers that have looked
12 at the question of dose response with original data.

13 Did the McDuffie and Eriksson papers report a
14 dose response in their analysis?

15 A. They did.

16 Q. Did De Roos and NAPP and Andreotti find a dose
17 response?

18 A. No.

19 Q. When you consider the question of adjusting
20 for other pesticide exposure, did McDuffie and Eriksson
21 adjust for other pesticide exposure in the dose response
22 data?

23 A. No, they did not.

24 Q. And did the three studies that we just looked
25 at here adjust for other pesticide exposure?

1 **A.** Yes, they did.

2 **Q.** Does that -- how do you interpret that data
3 when assessing whether or not there's a dose response
4 with glyphosate products like Roundup?

5 **A.** I think it's important to use the adjusted
6 data, because that's the more accurate data. And they
7 did not show a dose response.

8 So when you're looking for associations,
9 especially with a chemical, you would expect a dose
10 response. At higher doses, you would expect a higher
11 likelihood of the disease you're looking for. These
12 studies did not support that.

13 **Q.** Let's take it back to Mrs. Pilliod. Based on
14 the human data, where you put most of your focus, even
15 if you accept the usage of Roundup that Mrs. Pilliod
16 reported, did her use of Roundup, in your view, put her
17 at an increased use of developing non-Hodgkin's
18 lymphoma?

19 **A.** No, I don't believe so.

20 **Q.** Doctor, we summarized the opinions you talked
21 about with the jury so far today.

22 In terms of how Mrs. Pilliod presented, her
23 clinical course, all her medical records that you
24 reviewed, did you see anything there that would
25 distinguish Mrs. Pilliod from the patients with CNS

1 lymphoma that you see in clinic every week?

2 A. No --

3 MR. WISNER: I would object, Your Honor, this
4 is leading.

5 THE COURT: Overruled.

6 Keep in mind this is direct.

7 MR. ISMAIL: Yes, Your Honor.

8 THE WITNESS: No, her course was pretty common
9 to what I see in most of my primary CNS lymphoma
10 patients.

11 BY MR. ISMAIL:

12 Q. Did you form an opinion as to whether Roundup
13 contributed to Mrs. Pilliod's primary central nervous
14 system lymphoma?

15 A. I don't believe it contributed to her primary
16 central nervous system lymphoma.

17 Q. And after all the information we've talked
18 about with the jury this far, how do you assess the
19 question of causation in her case?

20 A. There's only two known causes for primary
21 central nervous system lymphoma; it's HIV and having an
22 immunodeficiency secondary to medication or a congenital
23 problem. She did not have either one of those.

24 So the totality of the data does not support
25 Roundup as a cause or even a risk factor. So I would

1 say, in my opinion, her case is still idiopathic. Or an
2 unknown cause of her case.

3 Q. Does that put Mrs. Pilliod in the majority or
4 the minority of individuals who develop PCNS lymphoma?

5 A. The majority.

6 Q. Overall, do you believe that the totality of
7 the human epidemiology shows an association or not
8 between Roundup and NHL?

9 A. It does not show an association.

10 Q. Do you have an opinion as to whether Roundup
11 causes NHL at human-relevant doses?

12 A. The data does not support that.

13 Q. Dr. Bello, thank you for your time.

14 MR. ISMAIL: Pass the witness, Your Honor.

15 THE COURT: Cross-examination?

16 MR. WISNER: Yes, Your Honor. Just a few
17 minutes to get set up.

18 THE COURT: That's fine.

19 **CROSS-EXAMINATION**

20 **BY MR. WISNER:**

21 Q. Hi, Doctor. How are you doing?

22 A. Good.

23 Q. We'll be sure to get you out of here today. I
24 know you need to get back to work.

25 Before you got involved in this case, had you

1 heard of IARC?

2 A. I had not.

3 Q. Okay. I'm confused.

4 6184. This was shown to the jury.

5 Do you recall that?

6 A. Yes.

7 Q. You called it "the bible," right?

8 A. Yes.

9 Q. Okay. Well, if we could go to the second
10 page, it says right here, "The International Agency for
11 Research on Cancer."

12 A. Okay.

13 Q. So you have heard of IARC?

14 A. I've never read that line before.

15 Q. They wrote the bible, didn't they?

16 A. No, the WHO did. And I know the authors that
17 have written it, but I've never heard of International
18 Agency -- I've never seen that line on there before.

19 Q. Second page?

20 A. I don't usually look at the second page.

21 Q. Shocking.

22 So you agree, then, that IARC -- I mean, they
23 wrote the bible for what you cited to in your direct.

24 A. They're -- I believe they are a subdivision of
25 the WHO.

1 **Q.** They wrote this document.

2 **A.** I don't know if they literally wrote this
3 document, but they are a portion of the WHO.

4 **Q.** It says "WHO Classification of Tumors of
5 Hematopoietic and Lymphoid Tissue"; talks about who it
6 was edited by; and says "International Agency for
7 Research on Cancer."

8 Do you see that?

9 **A.** Yeah. It's just that some of those authors --
10 I know who Elaine Jaffe is. I know Swerdlow. I don't
11 know if they're part of IARC. So it's kind of
12 interesting; maybe they are, maybe they're not. But I
13 do know them, and I've never heard them bring up IARC.
14 But I know they wrote this book.

15 **Q.** IARC, they actually invite experts from around
16 the world to participate, don't they?

17 **A.** Yes.

18 **Q.** So your colleague, Dr. Jaffe, she might have
19 been invited by IARC to participate in this document?

20 **A.** It's possible. I know she definitely
21 participated in this one.

22 **Q.** Have you ever been invited to IARC?

23 **A.** No, I have not.

24 **Q.** IARC, that's a pretty prestigious
25 organization, would you agree?

1 A. I mean, I think they have a good reputation,
2 for the most part. I don't have any reason to doubt it.

3 Q. And the IARC Monograph, they actually did a
4 fairly exhaustive analysis of the carcinogenicity data
5 for glyphosate, didn't they?

6 A. I'm not sure I would agree with that.

7 Q. Were you there?

8 A. I was not there.

9 Q. Your review of the carcinogenicity data in
10 this case largely consisted of reading IARC, right?

11 A. Not really.

12 Q. You didn't read the Monograph?

13 A. I did read the Monograph.

14 Q. And you know they discuss hundreds of
15 genotoxicity studies, right?

16 A. Yes.

17 Q. You didn't look at them?

18 A. I looked at some of them, yes.

19 Q. You looked at two, right?

20 A. I looked at some of them. I can't say exactly
21 if it was two, but I definitely looked at some of them.

22 Q. Do you have your report up there from before?

23 A. Yeah.

24 Q. I would like you to point out to me where, in
25 your report, you discuss genotoxicity at all.

1 **A.** I don't discuss it in my report.

2 **Q.** If you go to your "Materials Reviewed" list, I
3 reviewed it, and I saw a discussion of Bolognesi and
4 Paz-y-Mino.

5 That's it, right?

6 **A.** Yes, I looked at theirs.

7 **Q.** So we have these reputable scientists at IARC
8 looking at hundreds of studies. You've looked at three,
9 and you think you're qualified to disagree?

10 **A.** No, I've looked at more than just three.

11 **Q.** Where? Show me. I'm looking at your report,
12 Doctor. I can't find more than three.

13 Tell me what I'm missing.

14 **A.** If you look at the EPA, their monologue or
15 draft and summary of this, they have a whole table --
16 about three or four pages long -- about all of the
17 animal data they used to look at it. And that's what I
18 relied on, the animal data. They had more data than was
19 even published.

20 **Q.** You looked at the EPA report; that's what you
21 relied on?

22 **A.** Yes.

23 **Q.** Have you assessed whether or not the animal
24 data cited by the EPA involved citation to fraudulent
25 data?

1 **A.** No. I have no reason to question their
2 statements.

3 **Q.** I'll tell you, the jury and I have looked at
4 it closely. And the very first study the EPA cites was
5 a study done by IBT.

6 Did you know that?

7 **A.** I didn't know that. I don't know what IBT is.

8 **Q.** Because you would probably defer to people who
9 are experts in the field about the history of animal
10 studies, right?

11 **A.** I don't know about that.

12 **Q.** All right. Well, let's go back to your
13 opinions. I want to talk specifically about
14 differential.

15 Do you recall talking about that?

16 **A.** Differential diagnosis?

17 **Q.** Yeah. Or differential ideology.

18 Are you familiar with the concept?

19 **A.** I'm actually not familiar with differential
20 ideology. That's not really something that's used in
21 medicine. It's more of a differential diagnosis, and I
22 am pretty familiar with that.

23 **Q.** You do know that there are certain things that
24 cause lymphoma, right?

25 **A.** Yes.

1 Q. In fact, you know that there are certain
2 pesticides that cause lymphoma?

3 A. There are certain pesticides that are linked
4 to an increased risk of lymphoma, but not an exact
5 cause.

6 Q. Do you recall giving testimony in this case?

7 A. I don't remember saying pesticides caused it.
8 I remember saying there was a link to increased risk.

9 Q. I'll show you.

10 A. Okay.

11 **MR. WISNER:** May I approach, Your Honor?

12 **THE COURT:** Yes.

13 **BY MR. WISNER:**

14 Q. That's a copy of your deposition, right?

15 A. Yes.

16 Q. And it was -- you were under oath when you
17 testified in that deposition?

18 A. Yes.

19 Q. Why don't we turn to page 11. I know it's
20 small print.

21 Can you read it, Doctor? I'm sorry.

22 A. I think so.

23 Q. I tried to save paper.

24 So page 11, starting at line 11 through 21.

25 Do you see that portion?

1 **A.** Yes.

2 **Q.** And in there, you state:

3 "But there are pesticides that we know do
4 cause non-Hodgkin's lymphoma, like DDT and
5 malathion."

6 Do you see that?

7 **A.** Yes.

8 **Q.** You didn't say risk factors; you said "do
9 cause," didn't you?

10 **A.** Yeah. So I would say I probably misspoke at
11 that term. Sometimes I do use interchangeably,
12 especially if I'm talking fast.

13 But I would say now, I would qualify it more
14 as a risk factor, not a cause.

15 **Q.** So when we took you at your word back on
16 February 11th, 2019, we shouldn't have?

17 **A.** I wouldn't say that.

18 **MR. ISMAIL:** Argumentative, Your Honor.

19 **THE COURT:** Sustained.

20 Why don't you approach.

21 (Sidebar discussion not reported.)

22 **BY MR. WISNER:**

23 **Q.** All right. The reason why I asked about the
24 other pesticides, Doctor -- and I apologize if I
25 misunderstood -- you gave this distinction during your

1 direct examination between risk factor and actual
2 causes.

3 Do you recall that?

4 **A.** Yes.

5 **Q.** And I was under the impression, based on what
6 you said before, that you believed that at least two
7 pesticides were actual causes.

8 Is that not correct?

9 **A.** No. I apologize if that's what you thought.
10 That was my first deposition ever. I didn't know every
11 single word would be microanalyzed.

12 So I would say it's, more correctly, a risk
13 factor.

14 **Q.** Okay. So you do not think, then, that either
15 DDT or malathion cause non-Hodgkin's lymphoma?

16 **A.** I think they are risk factors.

17 **Q.** Okay. Well, what does cause non-Hodgkin's
18 lymphoma?

19 **A.** Yeah, that's the million-dollar question,
20 unfortunately. In most cases, we don't know.

21 We know that there are some genetic mutations
22 that can lead to it, but don't directly cause it. We
23 know there are some viruses that seem to increase your
24 risk. But the majority, we don't know what the exact
25 cause is.

1 Q. I thought you said HIV was a cause.

2 A. It's a cause for primary central nervous
3 system lymphoma, and for some diffuse large B-cell
4 lymphoma.

5 Q. And that's because HIV suppresses the immune
6 system, right?

7 A. It does.

8 Q. What I don't fully understand is, why do you
9 consider HIV to be a cause -- however it causes
10 cancer -- but DDT and malathion are not?

11 Why is one a cause and not the other?

12 A. I think, if -- you know, if you look at the
13 data, especially the data that occurred when HIV first
14 came out in the '80s, you saw a drastic increase in the
15 amount of primary central nervous system lymphomas. And
16 people were wondering, why is this happening?

17 And then researchers, and there's publications
18 on it, have shown the link between people with HIV.
19 That's what was driving this massive increase in the
20 number of primary central nervous system lymphomas. And
21 depending on which study you look at, it can be sixfold
22 higher in people with HIV.

23 So when you start to see a huge risk increase
24 like that, you start to think that this is more than
25 just a risk factor; this is causative.

1 Another analogy would be with cigarette
2 smoking and lung cancer. Some people smoke and don't
3 ever get lung cancer, some people get lung cancer and
4 never smoked. So we know not everyone who smokes gets
5 it, but the odds risk of getting lung cancer in people
6 who smoke, it's, like, 20 times more than people who
7 don't smoke.

8 So when you have a big association like that,
9 you say, this is more than an increased risk. This is
10 driving this.

11 **Q.** So if I understand you correctly, the
12 difference between risk factor and cause is the
13 magnitude of the risk?

14 **A.** Not necessarily, but that goes into it.

15 **Q.** Okay. And because glyphosate exposure doesn't
16 have a twentyfold increased risk, you don't think it
17 could be a cause?

18 **A.** Well, it didn't have any increased risk if you
19 looked at the large sum of data.

20 **Q.** We'll get back to glyphosate in a minute. I
21 want to go back to the other risk factors you mention.

22 You said -- there's a couple of risk factors
23 that you discuss in your report, right?

24 **A.** Yes.

25 **Q.** You discuss advanced age?

1 **A.** Yes.

2 **Q.** But you don't think age caused Mrs. Pilliod's
3 cancer, right?

4 **A.** No. Again, it's a risk factor for the
5 development of non-Hodgkin's lymphoma. It's more of a
6 signal or a marker that something is going on that's
7 leading or contributing to the increased risk of this
8 condition.

9 Age by itself -- like, just because you became
10 60 years old, all of a sudden you'll get a high risk of
11 getting lymphoma; it's more about, what does age
12 signify?

13 Age signifies that your immune system is
14 getting older. We know that people who are getting
15 older have a less robust immune system. We know you've
16 had more mutations throughout your life, and some of
17 them may have actually become viable mutations that can
18 lead to cancer.

19 So it's not so much as age causes it, but age
20 is linked to it from what it signifies. There is
21 something else going on in the body around particular
22 agents.

23 **Q.** Another thing that happens as you get older is
24 that you have more exposures to things, right?

25 **A.** Yes.

1 **Q.** So a 12-year-old, at a maximum, can have
2 12 years of exposure. Whereas someone who's 80 might
3 have 80 years of exposure?

4 **A.** Yes.

5 **Q.** And you agree that dose makes the poison,
6 right?

7 **A.** I think there has to be a link first. And
8 then, if there's a link to a poison -- is that what you
9 referred to? Poison?

10 **Q.** You've heard the expression, the dose makes
11 the poison?

12 **A.** No, I've never heard that.

13 **Q.** Fair enough.

14 But you would agree, then, that one of the
15 things age captures is increased exposures to
16 environmental factors?

17 **A.** Yes.

18 **Q.** And one of those factors could be, in lung
19 cancer, for example, smoking?

20 **A.** Yes.

21 **Q.** Or in the context of NHL, benzene exposure,
22 right?

23 **A.** Yes.

24 **Q.** And you agree that that causes lymphoma?

25 **A.** It's a risk factor, yes.

1 **Q.** So you don't think the fact that Mrs. Pilliod
2 was 69 or 70 when she was diagnosed, that fact alone
3 didn't cause her lymphoma, right?

4 **A.** No, it didn't cause it.

5 **Q.** You've talked about in your report, suppressed
6 immune system.

7 Do you recall that?

8 **A.** Yes.

9 **Q.** You mentioned HIV, right?

10 **A.** Yes.

11 **Q.** You mentioned immunosuppressant drugs
12 following an organ transplant?

13 **A.** Yes.

14 **Q.** She had neither of those, right?

15 **A.** Yes.

16 **Q.** You discussed infections, right?

17 **A.** Yes.

18 **Q.** H. pylori, it's a bacterial infection?

19 **A.** Yes.

20 **Q.** She didn't have that?

21 **A.** No.

22 **Q.** You discussed the human herpes virus HHV-8,
23 right?

24 **A.** Right.

25 **Q.** Epstein-Barr virus, she didn't have that?

1 **A.** No, she did not.

2 **Q.** Hepatitis C or B, she did not have that?

3 **A.** She did not have those diseases.

4 **Q.** Autoimmune diseases, you mentioned Sjogren's
5 syndrome.

6 Do you remember that?

7 **A.** Yes.

8 **Q.** She didn't have that, right?

9 **A.** She had an autoimmune condition. She didn't
10 specifically have Sjogren's, but she had an autoimmune
11 condition.

12 **Q.** Okay. We're going to come back to that.

13 You mentioned benzene exposure, she didn't
14 have that?

15 **A.** I don't know about that. I don't know all of
16 her exposure. I can't say she didn't have benzene.

17 **Q.** Well, how do you know that didn't cause it,
18 then?

19 **A.** It's not a cause; it's a risk factor. But I
20 don't know what her exposure to benzene was.

21 **Q.** What about chemotherapy drugs; she didn't have
22 those before her cancer, did she?

23 **A.** No.

24 **Q.** You mentioned radiation exposure as being a
25 potential risk factor?

1 **A.** Yes.

2 **Q.** She didn't have any radiation exposure, right?

3 **A.** Not that I know of.

4 **Q.** You discuss obesity in your report, right?

5 **A.** Yes.

6 **Q.** And you specifically point out the increased
7 risk with extreme obesity, right?

8 **A.** Yes.

9 **Q.** She wasn't extremely obese, right?

10 **A.** No.

11 **Q.** Let's go back to the autoimmune disease.
12 Do you have your report in front of you?

13 **A.** Yes.

14 **Q.** On page 6 of your report, you discuss
15 autoimmune disease, is that right, as a risk factor?

16 **A.** Yes.

17 **MR. WISNER:** Permission to publish her report?

18 **MR. ISMAIL:** Sorry?

19 **MR. WISNER:** Permission to publish?

20 **MR. ISMAIL:** No objection.

21 **THE COURT:** Okay.

22 **BY MR. WISNER:**

23 **Q.** So on page 6 of your report, you state right
24 here:

25 "Patients with autoimmune disorders,

1 conditions that occur when a person's immune
2 system attacks healthy cells in their body by
3 mistake, also have an increased incidence of
4 NHL. A pooled analysis," and then you discuss
5 the study.

6 Right?

7 **A.** Yes.

8 **Q.** You go on:

9 "For example, patients with an autoimmune
10 condition called Sjogren's syndrome were
11 6.5 times more likely to develop NHL."

12 Do you see that?

13 **A.** Yes.

14 **Q.** And a second ago, you were talking about how
15 the magnitude of a risk is what drives whether it's a
16 causal link.

17 Does this one rise to a cause?

18 **A.** Again, I think there's more to it than that.
19 It brings it to your attention, and then you have to get
20 mechanistic mechanisms of, you know, why would this
21 cause it? Why would we call this a cause versus a risk
22 factor? Is there any data that says we know why this is
23 causing X, Y, Z to happen?

24 So I think the risk factor -- it's important
25 to know that because that's going to bring it to your

1 attention for sure, but then you're going to have to do
2 more research to make a causal link.

3 Q. And you look at the mechanistic data?

4 A. Yes.

5 Q. How does it actually affect the cell, right?

6 A. Yes.

7 Q. One of the mechanisms known to cause cancer is
8 genotoxicity, right?

9 A. Genotoxicity that can evolve to be more
10 mutinous. And carcinogens, yes.

11 Q. Because when you're causing genetic damage
12 over and over and over again, it increases the chance
13 that you get a mutation, which then increases the chance
14 that you get cancer, right?

15 A. Yes.

16 Q. You cited this study, Smedby 2008.

17 Do you see that?

18 A. Yes.

19 Q. I would like to take a look at that study.

20 It's Exhibit 6002.

21 Is this that study you cite in your report?

22 A. Yes.

23 **MR. WISNER:** Permission to publish?

24 **MR. ISMAIL:** No objection, Your Honor.

25 **THE COURT:** Granted.

1 **BY MR. WISNER:**

2 Q. So we're looking at the study right here. And
3 as we see right here, it says:

4 "Autoimmune disorders and risk of
5 non-Hodgkin's lymphoma subtypes, a pooled
6 analysis within the InterLymph Consortium."

7 Do you see that?

8 A. Yes.

9 Q. Have you ever heard of that group?

10 A. Yes.

11 Q. They're people who study lymphoma, right?

12 A. Yes.

13 Q. You understand that Dr. Weisenburger is part
14 of that consortium?

15 A. No, I didn't realize that.

16 Q. Are you?

17 A. Am I?

18 Q. Yeah.

19 A. No.

20 Q. So it says right here -- turn to Table 3.

21 This here lists the various -- let's back up for a
22 second.

23 What they're doing in this study is looking at
24 people who have certain autoimmune diseases, and seeing
25 how many of them later on developed non-Hodgkin's

1 lymphoma, right?

2 A. Yes.

3 Q. And here, we have all these autoimmune
4 diseases they looked at.

5 They don't mention anything about Hashimoto's
6 here, right?

7 A. Not in this one, no. Not in this table.

8 Q. You briefly mentioned ulcerative colitis.
9 Do you recall that?

10 A. Earlier today?

11 Q. Yes.

12 A. Yes.

13 Q. It looks like here, there is no increased risk
14 of non-Hodgkin's lymphoma after having ulcerative
15 colitis.

16 Do you see that?

17 A. Yes, I do.

18 Q. And if we turn to the next table, Table 4,
19 they actually break it down by year exposures.

20 Do you see that?

21 A. Year of exposure, yes.

22 Q. So, for example, on the first column, if you
23 were diagnosed with, you know, a disease two to five
24 years ago.

25 Do you see that?

1 **A.** Yes.

2 **Q.** Versus whether you were diagnosed six to ten
3 years ago.

4 Do you see that?

5 **A.** Yes.

6 **Q.** If we actually look at ulcerative colitis one
7 more time, we specifically look at the six to ten years.

8 Do you see that, Doctor?

9 **A.** Yeah, I see it.

10 **Q.** And right here, it has a .73 that's
11 statistically significant.

12 Do you see that?

13 **A.** Yes.

14 **Q.** So what this data is showing is that people
15 who have ulcerative colitis statistically significantly
16 have less incidences of non-Hodgkin's lymphoma six to
17 ten years after?

18 **A.** Yeah. They showed a statistical significance,
19 yeah.

20 **Q.** So it's actually statistically significantly
21 protective?

22 **A.** The data shows that, yeah. I think if you
23 looked at larger studies, you would probably see that
24 doesn't pan out. Because it is known that people with
25 inflammatory bowel disease do have a higher incidence of

1 non-Hodgkin's lymphoma.

2 So I'm not sure if there was some issue with
3 these cases and controls here, but I know there's larger
4 data that shows that. Because that's one of the
5 accepted risk factors for lymphoma of the intestines,
6 which is non-Hodgkin's lymphoma, so I would have to look
7 at this one further.

8 Q. This is a study you cited, right?

9 A. For autoimmune conditions, yeah.

10 Q. All right. Let's look at another one.

11 If you go to your report, which is
12 Exhibit 3146, we were looking at this paragraph about
13 autoimmune diseases, and you report:

14 "Associations with a variety of autoimmune
15 conditions and NHL have been reported," and
16 you cite to Fallah 2014, right?

17 A. Yeah.

18 Q. Let's take a look at that study. It's 4972.

19 I apologize. I don't have a copy of it.

20 MR. WISNER: Mr. Ismail, do you mind if I
21 publish a digital copy of it?

22 MR. ISMAIL: That's fine.

23 BY MR. WISNER:

24 Q. This is a copy of that paper; is that right?

25 A. Yes, this is correct.

1 Q. Do you see it's the same author?

2 A. Yes.

3 Q. And if we go into this paper, look at Table 2,
4 they have a discussion of various autoimmune disorders,
5 right?

6 A. Yes.

7 Q. And there is a discussion of Hashimoto's.
8 Do you see that?

9 A. Yes.

10 Q. And if we look at the data for greater than
11 60 years old, it has a risk ratio of 1.3.

12 Do you see that?

13 A. Yes.

14 Q. That's about a 30 percent increase, right?

15 A. Yes.

16 Q. So you would agree with me that if you look at
17 the data for Hashimoto's, this is 140 cases, that's
18 actually quite a few, right?

19 A. Yes, it is.

20 Q. It's a pretty big study?

21 A. Yeah, it's a good amount of people.

22 Q. So you would agree with me that when you do
23 these big sort of studies looking at Hashimoto's, the
24 relative risks are very small?

25 A. It depends what you're looking at. Usually,

1 the larger the study, the confidence interval range is
2 smaller. The relative risk doesn't usually change based
3 on the number of people in the study. It's usually that
4 the accuracy of the relative risk is what changes.

5 Q. You showed the jury a different study.

6 Do you recall that, on your direct?

7 A. Which one? I'm sorry.

8 Q. It was the study that had a 3.0 rate.

9 Do you recall that?

10 A. Oh, earlier today?

11 Q. Yeah.

12 A. Yes.

13 Q. With Mr. Ismail?

14 A. Yes, yes.

15 Q. Let's go back to your paper, your report.

16 You don't reference that study at all in your
17 report here, do you?

18 A. No. This is just examples. I didn't -- this
19 was not at all exhaustive. There's definitely even more
20 than that, and more than the Goldin article that we
21 talked about this morning that showed links with
22 autoimmune conditions.

23 So in no way was this supposed to be
24 all-inclusive. These are just examples of risk factors.

25 Q. The Goldin article, that's Exhibit 6613. It's

1 in your binder.

2 That was the one you showed the jury, right?

3 A. Let me see. 6613, you said?

4 Q. It's also on the screen.

5 A. Yeah, that's it.

6 Q. And you showed the jury this Table 2 that had
7 the elevated rate for Hashimoto's, right?

8 A. Yes.

9 Q. Now, I want to ask you something.

10 Did you take a look to see if this data was
11 adjusted for other confounders?

12 A. No.

13 Q. I thought that was important?

14 A. It is important, yeah.

15 Q. Well, if we actually look up here, it talks
16 about it. It says right here that:

17 "We examined each condition separately using
18 univariate regression models."

19 Do you see that?

20 A. Yes.

21 Q. But then later on, it says -- and that refers
22 to Table 2.

23 Do you see that?

24 A. Yes.

25 Q. And later on, it says:

1 "Using multivariant hierarchal regression
2 models, we were able to study the impact of
3 all autoimmune conditions simultaneously,
4 incorporating information at the group level.
5 This model also corrects for correlations due
6 to multiple autoimmune conditions in the same
7 individual."

8 Do you see that?

9 **A.** Yes.

10 **Q.** So certain people who have autoimmune
11 conditions can have multiple autoimmune conditions?

12 **A.** They can.

13 **Q.** So, for example, someone can have Hashimoto's
14 or Sjogren's disease?

15 **A.** Right. They can have more than one.

16 **Q.** And we wouldn't be able to tell if it was the
17 Hashimoto's or the Sjogren's to cause the data to be
18 elevated for Hashimoto's?

19 **A.** You wouldn't, unless you looked at the
20 multivariate part.

21 **Q.** Exactly. And they didn't actually give that
22 to us in the study, did they?

23 **A.** I don't remember, actually. They probably
24 didn't.

25 **Q.** If you look at the beginning of this, it says

1 it's a mini review.

2 Do you see that?

3 A. Okay.

4 Q. This wasn't a comprehensive assessment of
5 autoimmunity, was it?

6 A. I'm not sure if there was more to it than
7 that. Again, I was just using it as an example of
8 articles showing increased risk with autoimmune
9 conditions.

10 Q. During direct, Mr. Ismail showed you this
11 chart that both Dr. Nabhan and Dr. Weisenburger used.

12 Do you recall that?

13 A. Yes.

14 Q. I'm not going to go through all of these, but
15 this chart is -- tell me if you understand this, as
16 well.

17 It shows known risk factors here, right?

18 A. Yes.

19 Q. Do you disagree with any of these as risk
20 factors?

21 A. Let's see. We've got age, gender, race,
22 family history...

23 No, I don't disagree.

24 Q. So all of these risk factors, you actually
25 agree with?

1 **A.** Yes.

2 **Q.** And then what's done here is, we bring over
3 the ones that are applicable on a causative level for
4 Mrs. Pilliod.

5 So this was Dr. Nabhan's, and he brought over
6 pesticide use.

7 Do you see that?

8 **A.** Yes.

9 **Q.** You don't think any pesticides actually cause
10 non-Hodgkin's lymphoma, right?

11 **A.** This is a risk analysis, not a causal
12 analysis.

13 **Q.** I understand.

14 Dr. Nabhan was pushing over the causal ones,
15 as he explained in his testimony.

16 **A.** I wasn't there for that, but the chart says
17 "risk factors." Certain pesticides are known to be risk
18 factors.

19 **Q.** Sure.

20 **A.** But they are labeled which ones are, that we
21 know. It's not all pesticides.

22 **Q.** Sure. But he had the opinion that certain
23 pesticides are actually causal factors.

24 You don't agree that any are, right?

25 **A.** I don't agree that they're causal.

1 Q. He also brought over obesity.

2 Do you see that?

3 A. Yes.

4 Q. And you don't think obesity is a causal
5 factor, right?

6 A. No. It's a risk factor.

7 Q. And he brought over autoimmune disease, right?

8 A. Yes.

9 Q. And he was talking about the Hashimoto's
10 issue?

11 A. Yes.

12 Q. And you don't think that's a causal risk
13 factor either?

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

15 Q. So do you think it's ever possible to find the
16 cause of cancer, specifically non-Hodgkin's lymphoma?

17 A. Ever?

18 Q. Yeah.

19 A. Yeah. I think, kind of, when we gave the
20 examples earlier. If somebody has HIV or an
21 immunosuppression medication they're on, I would say
22 that caused their lymphoma.

23 We know lymphomas are highly linked to the
24 immune system and immune dysregulation. So there's
25 association, even mechanistic data on that.

1 I would say that if she was HIV-positive, I
2 would say, slam dunk, that caused her non-Hodgkin's
3 lymphoma.

4 **Q.** We talked about DDT, right?

5 **A.** Right.

6 **Q.** That's a pretty intense pesticide, right?

7 **A.** Yes.

8 **Q.** If somebody sprayed DDT for 35 years, every
9 day, drenched in it, you wouldn't put that it could have
10 caused their cancer?

11 **A.** Not unless I see something that shows it. I
12 can't just assume that because it caused birth defects
13 in pelicans or whatever the major article showed, that
14 it would be causing lymphoma. You would actually have
15 to see scientific data that specifically looked at
16 causing lymphoma.

17 **Q.** Sure. And you agree that there's scientific
18 evidence showing DDT causes lymphoma -- is associated
19 with lymphoma?

20 **A.** It's a risk factor, yes.

21 **Q.** Exactly. And if someone came to you and was
22 spraying gallons and gallons of DDT, would you still not
23 be able to say it's the DDT? Or would you say we don't
24 know?

25 **A.** I don't have any science behind DDT actually

1 causing non-Hodgkin's lymphoma. I could say your use
2 was probably a risk factor and put you at higher risk of
3 developing this, but I can't say it did cause it.

4 Q. Let's say DDT had six different mice studies,
5 each showing the link to lymphoma, would that help you
6 rise to the level of saying it caused lymphoma here?

7 MR. ISMAIL: Objection. Calls for
8 speculation.

9 THE COURT: Sustained.

10 BY MR. WISNER:

11 Q. Well, I'm asking your opinion. So I don't
12 want you to speculate about your opinion.

13 But if I could get what you do know, if there
14 were numerous animal studies supporting malignant
15 lymphoma, would that increase your belief that it was a
16 causal factor?

17 MR. ISMAIL: Same objection.

18 THE COURT: Sustained.

19 BY MR. WISNER:

20 Q. Okay. Let's talk about Roundup, then, okay?

21 Roundup doesn't even make it onto this side of
22 the column, does it, for you?

23 A. Not with the available data.

24 Q. So it doesn't even make it on the board,
25 right?

1 **A.** Right.

2 **Q.** But if it did make it on the board -- assume
3 for a second for me that Roundup was a risk factor.

4 You would have to look at the volume of
5 exposure before you could rule it out as not being a
6 cause of it, right?

7 **A.** Again, I think it goes back to your previous
8 question. If there's no data to support it as a risk
9 factor, I can't really assume it's a risk factor.

10 **Q.** Hypothetically, let's say Roundup was a risk
11 factor.

12 You would have to look at exposure before you
13 could rule it out as being a cause, right?

14 **A.** If you want me to go to a hypothetical
15 situation, risk factors to causality is a long leap.

16 **Q.** Okay. It's such a long leap, in fact, that
17 none of these risk factors are causal in your book,
18 besides HIV, right?

19 **A.** For primary central nervous system lymphoma,
20 yes.

21 **Q.** I understood you to say that there's no
22 evidence that Roundup causes NHL.

23 Is that right?

24 **A.** I said the totality of the evidence does not
25 support a link with humans and glyphosate causing

1 non-Hodgkin's lymphoma.

2 Q. All right. So if I wrote "no evidence" across
3 the board, do you agree with that?

4 A. No. I would say you have to take all the data
5 in total, not isolated in a little vacuum. The evidence
6 does not support it.

7 Q. I understand that. That wasn't my question.

8 My question was this statement: There is no
9 evidence across the board between Roundup -- about
10 Roundup causing non-Hodgkin's lymphoma.

11 Do you agree with that statement?

12 A. I would agree that there's no causal data.

13 Q. Okay. So then you do agree with the statement
14 that there's no evidence across the board?

15 MR. ISMAIL: Objection. Asked and answered.

16 THE COURT: Sustained.

17 MR. WISNER: Your Honor, I haven't got an
18 answer.

19 THE COURT: It has been asked, and she did
20 answer.

21 BY MR. WISNER:

22 Q. You agree, then? That's what I saw in your
23 answer.

24 Do you agree?

25 A. I agree that there's no data to support a

1 causal relationship between Roundup and non-Hodgkin's
2 lymphoma.

3 Q. Thank you. That wasn't my question.

4 A. All right.

5 Q. My question was actually, very specifically,
6 this phrase: No evidence across the board.

7 Yes or no, do you agree with that?

8 MR. ISMAIL: This is the fourth time,
9 Your Honor, that she's answered it.

10 MR. WISNER: She keeps answering a different
11 question.

12 THE COURT: Can you answer that question, yes
13 or no? If you can, answer it. If not, we will
14 rephrase.

15 THE WITNESS: I think I keep saying the same
16 thing: I don't think there's any data to support a
17 causal mechanism or relation between Roundup and
18 non-Hodgkin's lymphoma.

19 BY MR. WISNER:

20 Q. Do you agree with that or not? You keep
21 saying something different.

22 Do you agree with that statement or not?

23 A. I guess that statement, to me, is a little
24 broad. No evidence across the board of what? That's
25 why I keep rephrasing it.

1 Q. Thank you, that's very helpful. I was trying
2 to get to the bottom of understanding this.

3 How about: No evidence across the board that
4 Roundup causes NHL.

5 Would you agree with that?

6 A. I would agree with that.

7 Q. All right. And you say that notwithstanding
8 the IARC's classification, right?

9 A. Yes.

10 Q. And you say that notwithstanding having
11 reviewed, for example, the expert reports of
12 Dr. Portier, Dr. Jameson, Dr. Ritz, Dr. Weisenburger?

13 A. Yes.

14 Q. And you've read Dr. Portier's report, right?

15 A. I saw his deposition. Is that what you're
16 referring to? Or that letter?

17 Q. I'm talking about his expert report.

18 A. Expert report?

19 Q. Yeah.

20 A. I looked at it. I don't have it memorized,
21 though.

22 Q. I'm not going to hold you to that, don't
23 worry.

24 His report was hundreds of pages long, right?

25 A. Yeah, he had a long report.

1 Q. Yours was, like, 15?

2 A. Right.

3 Q. And he systematically goes through every
4 single animal study, right?

5 A. I don't know. I don't remember, actually, if
6 he goes through every single one. I know he summarized
7 a lot of studies.

8 Q. He also looked at the genotoxicity data,
9 right?

10 A. Okay.

11 Q. And you haven't gone through all the
12 genotoxicity data?

13 A. I've looked at a lot of it. Obviously, I'm
14 not a chemist. Dr. Portier, I think -- is he a
15 toxicologist? I wouldn't go through as much detail as
16 his.

17 But I did look at the EPA's summary of the
18 significant ones, and they did not see anything that led
19 them to believe that it was genotoxic to humans.

20 Q. Okay. So I want to go through some of the epi
21 studies.

22 And you've gone through them in your report,
23 right?

24 A. Yes.

25 Q. And it's your opinion that none of these epi

1 studies provide evidence that Roundup causes NHL, right?

2 A. Yes.

3 Q. So let's start off. In your report, you
4 specifically have discussion of each one. It starts on
5 the section on page 9, titled "NHL Epidemiology."

6 Do you see that?

7 A. Yes.

8 Q. The next paragraph -- you have paragraph
9 discussions about various studies, right?

10 A. Yes.

11 Q. And the first is the Eriksson 2008 study.

12 Do you see that?

13 A. Yes.

14 Q. And you say at the bottom:

15 "Another problem with this study is that they
16 mention that glyphosate-based formulations are
17 associated with the development of NHL. But
18 when they use calculations that take into
19 account the use of other pesticides along with
20 glyphosate-based formulations in the people
21 who developed NHL, the link between
22 glyphosate-based formulations and NHL no
23 longer existed."

24 Do you see that?

25 A. Yes.

1 Q. Is that an accurate statement?

2 A. Yes. Per Table 7, when they adjusted data not
3 seen as statistically significant in this.

4 Q. You didn't say that. You said it no longer
5 existed; that's what you wrote.

6 A. Right.

7 Q. Isn't it true that there is still an elevated,
8 right, even after you adjust for other pesticides?

9 A. No, that's not true. It wasn't statistically
10 significant.

11 Q. It's still elevated.

12 A. It doesn't matter. You have to be
13 statistically significant. Just having a 1.2 or 1.3, if
14 the confidence interval crosses 1, it's not significant.
15 Because 1 is just as likely to happen as 1.2 or 1.3.

16 Q. Let's take a look at the study.

17 A. Okay.

18 Q. I'm handing you Exhibit 1703, the Eriksson
19 study.

20 That's a copy of the Eriksson study, Doctor?

21 A. Yes.

22 Q. All right.

23 **MR. WISNER:** Permission to publish? It's
24 already been published.

25 **BY MR. WISNER:**

1 **Q.** So we're looking at the Eriksson study here.
2 Let's go to Table 7, the very table you cite in your
3 report.

4 What we have here is a 2.0 statistically
5 significant result in a univariate analysis?

6 **A.** With the univariate, yes.

7 **Q.** You don't actually report on the univariate
8 analysis in your report, do you?

9 **A.** No. Because again, you're going to look at
10 the multivariate -- the multivariate adjusts for other
11 pesticides and other co-founders. So univariate data is
12 not very useful.

13 **Q.** Well, I don't understand. A second ago, when
14 you showed the Hashimoto's data, you showed univariate
15 data.

16 **A.** Yeah.

17 **Q.** So it's useful then but not here?

18 **A.** I think, with the Hashimoto's, there's other
19 data we can give you, too. But the thing is, that was
20 just an example of risk factors.

21 So this, we're looking at more, hey,
22 glyphosate, is it a risk factor for non-Hodgkin's
23 lymphoma? No, this study did not show that.

24 **Q.** Well, they do adjust for other pesticides.
25 They have a 1.51 odds ratio.

1 Do you see that?

2 A. Yes.

3 Q. So it's still elevated, right?

4 A. But it's not statistically significant. If
5 you were to do the study again, you could get .78, .92.
6 It's not -- if your confidence interval includes 1, your
7 data is not statistically significant.

8 Odds of any of these numbers, .77 through 2.9
9 occurring, if you were to repeat this trial again and
10 again, any of those numbers can come up equally as much.

11 So, basically, it's not statistically
12 significant.

13 Q. So because it's not statistically significant
14 in your book, you ignore it?

15 A. It's not just my book. That's statistics, in
16 general, in epidemiology. If it's not statistically
17 significant, the data isn't good enough to make an
18 association.

19 Q. The jury has heard from Dr. Beate Ritz.

20 Are you familiar with her?

21 A. No.

22 Q. You read her report?

23 A. Yes.

24 Q. You understand from her report that she spent
25 her life studying occupational exposures to pesticides,

1 right?

2 A. Okay.

3 Q. She's the head of epidemiology at UCLA.

4 You understand that?

5 A. Okay.

6 Q. She actually helped write the statistical
7 books for epidemiology.

8 Do you understand that?

9 A. Okay.

10 Q. She told the jury something different. She
11 said that if you ignore elevated rates because of
12 statistical significance, you'll miss problems.

13 Is that not your understanding?

14 A. I wasn't there for what she said, so I
15 honestly can't agree with you that that's what she said.
16 I don't know why she would say that. Statistics are
17 just statistics. You can't just say 1.5 is better than
18 .98.

19 When you have this confidence interval, if it
20 includes 1, any of these numbers are as likely to happen
21 as the 1.5.

22 So if I were to do this study again, it could
23 be .78, and we're not going to say, oh, it's protective.
24 We're going to say, no, it's still not significant.

25 Q. Well, why don't we look at what the authors

1 said.

2 **A.** Okay.

3 **Q.** They actually discuss the results right here:

4 "Glyphosate was associated with a
5 statistically significant increased odds ratio
6 for lymphoma in our study, and the results
7 will strengthen by a tendency to dose response
8 effect as shown in Table 2. In our former
9 study, very few subjects were exposed to
10 glyphosate, but a nonsignificant odds ratio of
11 2.3 was found. Furthermore, a meta-analysis
12 combining that study with an investigation on
13 hairy-cell leukemia, a rare NHL variant, show
14 the odds ratio for glyphosate of 3.04, that
15 was statistically significant. Recent
16 findings from other groups also associate
17 glyphosate with different B-cell malignancies,
18 such as lymphomas and myeloma."

19 Do you see that?

20 **A.** Yes.

21 **Q.** So the people who actually wrote this article,
22 who did this epidemiology study, they are finding that,
23 in fact, glyphosate is a risk factor for lymphoma.

24 **A.** Well, again, if they're quoting their
25 univariate analysis, that's probably where they came up

1 with this.

2 But if you look at the multivariate analysis,
3 it's not linked to causing -- being a risk factor for
4 lymphoma.

5 Q. I don't want to fight with you, Doctor, but I
6 mean, you've never done an epidemiological study
7 yourself, right?

8 A. Oh, yes, I have. I have a master's degree. I
9 had to do that for my thesis.

10 Q. You've published an epidemiological study?

11 A. Yes.

12 Q. Where?

13 A. It's in the library in the vault at University
14 of South Florida. It was my thesis.

15 Q. You conducted an actual epidemiological study?

16 A. Yeah.

17 Q. What was it about?

18 A. It was using the NHANES data. It's a large
19 United States dataset. And it was looking at a risk
20 between H. pylori infections and cardiovascular disease.

21 Q. Fair enough.

22 Let me be more specific: You've never done an
23 epi study on cancer, right?

24 A. Not on cancer.

25 Q. You've done one as part of your master's

1 project?

2 A. For epidemiology, yes.

3 Q. We have these researchers, Dr. Eriksson and
4 Hardell, who published studies looking specifically at
5 pesticides and lymphoma, right?

6 A. Yes.

7 Q. And, in fact, this isn't their first study.
8 They've published multiple studies, right?

9 A. I would assume, yes.

10 Q. You've actually cited them and discuss them in
11 your papers?

12 A. I discussed Eriksson's; this is one I was
13 discussing.

14 Q. And Hardell?

15 A. Yes.

16 Q. And they are the researchers doing
17 occupational epidemiology, right?

18 A. Yes.

19 Q. They are the ones that had the raw data here,
20 right?

21 A. Yes.

22 Q. And they're saying there's an association, and
23 you're saying they're wrong?

24 A. I'm saying the data is the data, and my
25 interpretation is that the multivariate one is the one

1 that matters for humans, and that doesn't show an
2 association.

3 Q. Go farther. You say it no longer exists?

4 A. Right. In my world, it has to be
5 statistically significant or else it just doesn't
6 matter. Or else it's that chance alone could have
7 caused that.

8 Q. Fair enough.

9 In your world, if it's not statistically
10 significant, you ignore it?

11 A. No, I don't ignore it. It does not meet
12 stringent enough to say it's a risk factor.

13 Q. You say you don't ignore it. But in your
14 report, you don't mention any of the statistically
15 significant results that were unadjusted, do you?

16 A. No. Again, I only look at the adjusted ones.

17 Q. So it has to be both statistically significant
18 and adjusted before you'll mention it?

19 A. Right. I want to report the more valid data,
20 not just any data that's out there.

21 Q. Okay. In your report, you also discuss the
22 De Roos study.

23 Do you remember that?

24 A. Yes.

25 Q. And right here, it's the De Roos 2003 study.

1 Do you see that?

2 A. Yes.

3 Q. And you discuss it for a bit -- well,
4 actually, it's just that paragraph. I'll call it back
5 up.

6 It says right here:

7 "The researchers reported that there were
8 trends towards an increased risk of NHL with
9 increased pesticide exposure. They concluded
10 that consideration of multiple pesticide
11 exposures is important when accurately
12 determining the effect of a specific agent."

13 You actually don't report on any of these
14 findings, do you?

15 A. I didn't put that in here, no.

16 Q. On direct examination, you did report the
17 findings for the jury, right?

18 A. Yes.

19 Q. You reported the 1.6 finding from the
20 hierarchal regression?

21 A. Yes.

22 Q. You understand that there was a logistical
23 regression done?

24 A. Yes.

25 Q. But you told the jury that the authors thought

1 the hierarchal regression was the more accurate number?

2 A. Yeah. They say that on page 1 of the report.

3 Q. Do they?

4 A. They do.

5 Q. Well, let's take a look.

6 You know what, the lead author of the De Roos
7 article was who?

8 A. De Roos.

9 Q. She published a study in 2005, right?

10 A. Yes, she did.

11 Q. I'm handing you Exhibit 1629.

12 That's the 2005 article that she published?

13 A. Yeah. The Agricultural Health Study, yes.

14 Q. And in this study, she actually reports on her
15 previous study, doesn't she?

16 A. Where does she mention that? In the
17 discussion?

18 Q. I'll call it out.

19 A. Okay.

20 Q. It says right here -- she says -- she talks
21 about McDuffie.

22 Do you see that?

23 A. Yes.

24 Q. And then she goes:

25 "Similarly, increased NHL risk in men was

1 associated with having ever used glyphosate --
2 odds ratio 2.1, confidence interval 1.1 to
3 4 -- after adjustment for other commonly-used
4 pesticides in a pooled analysis of the
5 National Cancer Institute-sponsored
6 case-control studies conducted in Nebraska,
7 Kansas, and Iowa."

8 Do you see that?

9 **A.** Yes.

10 **Q.** So Dr. De Roos, when she reports on her own
11 study just two years later, she cites the logistical
12 analysis, doesn't she?

13 **A.** She does.

14 **Q.** Because the hierarchal analysis makes
15 assumptions, doesn't it?

16 **A.** I don't really know that it makes assumptions.
17 I think both of them kind of make -- they're both
18 mathematical models. But I know the hierarchal one,
19 they reported in their paper, was the more accurate one
20 for one reason or another.

21 They didn't actually publish the exact formula
22 they used for the hierarchal data, but they do mention
23 it in the paper that this is the more accurate one.

24 **Q.** So the hierarchal model makes assumptions, and
25 it uses those assumptions to weight the results, right?

1 A. I don't know if it uses assumptions. But I
2 know it uses a formula to give weight to certain
3 pesticides. So when you're adjusting for confounders,
4 you're not treating all pesticides as equal.

5 Q. Exactly. And it gives a certain weight to
6 certain things ahead of time?

7 A. Yes.

8 Q. And you make assumptions as part of those
9 weights?

10 A. I don't know if it's assumptions, honestly.

11 **MR. WISNER:** May I approach, Your Honor?

12 **BY MR. WISNER:**

13 Q. This is 158.

14 That's the De Roos 2003 article, right?

15 A. Yes.

16 Q. And in here, we have Table 3, right?

17 A. Yes.

18 Q. And the glyphosate data, they specifically
19 identify those two numbers we've been talking about, the
20 2.1 and the 1.6.

21 Do you see that?

22 A. Yes.

23 Q. And the logistical regression, that's the same
24 method used in Eriksson, right?

25 A. In the adjusted data, yes.

1 Q. Or in the adjusted, it's still logistical
2 regression, right?

3 A. I think this is more of multivariate.

4 Q. But they're still using logistical regression?

5 A. Yes.

6 Q. Same thing with AHS in 2005, right?

7 A. Yes.

8 Q. So all these other studies are using
9 logistical regression.

10 This one did something a little different,
11 right?

12 A. Yes.

13 Q. It's actually discussed in Table 1, right?

14 A. Yes.

15 Q. And to describe that process, it says it gets
16 a 1 if it's classified as a human carcinogen in either
17 assessment.

18 Do you see that?

19 A. Yes.

20 Q. And it's specifically referring to IARC and
21 EPA, right?

22 A. Yes.

23 Q. And if you go down, it says.

24 "Number 8. Probable human carcinogen in one
25 assessment."

1 Do you see that?

2 A. Yes.

3 Q. If we actually look at what glyphosate was
4 given at the time this article was written, it was
5 actually given a .3, right?

6 A. Yes.

7 Q. So it was given the equivalent of, down here:
8 "It would be not assessed by IARC or U.S. EPA
9 or deemed unclassifiable in one or both
10 assessments."

11 Do you see that?

12 A. Yeah.

13 Q. So if this hierarchal regression was done
14 again, it wouldn't be given a .3, right?

15 A. Well, the EPA didn't give it a designation as
16 a carcinogen. So I think what they're saying here is
17 that 0.3, not assessed by IARC or the EPA or deemed
18 unclassifiable in one or both assessments.

19 So they must have felt -- either they decided
20 the EPA's was unclassifiable. I don't know why they
21 would say that. Maybe because the EPA didn't really
22 have an opinion saying it was carcinogenic. I'm just
23 assuming that's what they're thinking.

24 Q. Well, when this was published in 2003, IARC
25 hadn't determined glyphosate to be a probable human

1 carcinogen, right?

2 A. Oh, okay. Well, then that could explain it,
3 if they didn't have data on either one. Right?

4 Q. It didn't exist yet.

5 A. Okay.

6 Q. So if we were to redo this today, it would get
7 a higher number?

8 A. I don't know exactly how they gave these
9 assignments.

10 Because to me, that is a little ambiguous when
11 it says this 0.3, not assessed by IARC or U.S. EPA or
12 deemed unclassifiable in one or both assessments.

13 I'm not sure, like, today, what they would
14 have thought of getting the conflicting EPA IARC data.

15 Which would they choose?

16 Q. Right there, that .6. Probable huge
17 carcinogen in one assessment, IARC; and unclassifiable
18 in the other.

19 A. I don't know if they're saying it's
20 unclassifiable in the other, or if it's just not
21 accessible. I'm honestly not sure. It would probably
22 be better to ask De Roos or one of the authors here.

23 Q. You know that one of the authors on this is
24 Dr. Weisenburger, right?

25 A. Yes.

1 **Q.** And you understand that he tells us that the
2 proper assessment is 2.1?

3 **MR. ISMAIL:** Objection, Your Honor.

4 **THE COURT:** If she knows.

5 **THE WITNESS:** I was going to say, I don't know
6 that to be true or not. I wasn't here to hear his
7 testimony.

8 **BY MR. WISNER:**

9 **Q.** Well, you reported to this jury that the
10 authors think 1.6 is more accurate?

11 **A.** Yes.

12 **Q.** And now we've talked about it, and your point
13 is that we should probably go ask the authors, right?

14 **A.** Yes.

15 **Q.** And if we ask Dr. Weisenburger, we know what
16 his opinion is, right?

17 **A.** Yes.

18 **Q.** And if we look at what Dr. De Roos said two
19 years later, she reports on the logistical regression,
20 right?

21 **A.** Yes.

22 **Q.** So everyone is reporting on the logistical
23 regression, but you still think the hierarchical one is
24 the better one?

25 **A.** I'm just saying what they put on the

1 article -- in the article, on the first page, they say
2 the hierarchal regression analysis is the more accurate
3 one.

4 Q. All right. Well, let's go into the NAPP for a
5 second.

6 By the way, this data here showing a 2.1
7 elevated rate, that adjusted for the pesticides, right?

8 A. It did.

9 Q. Okay. And notwithstanding a doubling of the
10 risk that was statistically significant, you're standing
11 by that there is no evidence, right?

12 A. At the time, even if you went with that, if we
13 want to go down that road and say, yes, the logistical
14 regression showed a statistically significant
15 association, that was only a portion of the data.

16 And then later on, we have more information.
17 So there have been subsequent larger studies that
18 supersede this data, and they don't show an association.

19 So even if I went your route and said I would
20 take the logistical regression over the hierarchal one,
21 which they said was more accurate, we now have more
22 accurate information that doesn't show an association.

23 Q. You do understand that what De Roos did here
24 has never been replicated, right?

25 A. I'm not sure.

1 Q. Well, in the NAPP study, they didn't control
2 for 47 pesticides, did they?

3 A. Well, the NAPP study was never published, so I
4 don't know all the details of it.

5 Q. Well, you talked about it with the jury,
6 didn't you?

7 A. I know. I only had what they showed at a
8 conference. So that's really all I have. They list
9 that they do adjust for some, and they have a little
10 list of some that they adjust for.

11 But it's never been published. Even though it
12 was presented in 2015 and 2016, is still has never been
13 published to this day.

14 Q. Well, then how did you know that this is
15 superseded?

16 A. The De Roos data.

17 Q. Yeah. You said it's been superseded, so you
18 can ignore it, and then you said it hasn't been
19 published.

20 Which is it?

21 **MR. ISMAIL:** Objection, Your Honor.
22 Argumentative.

23 **THE COURT:** Okay. Overruled.

24 But -- overruled.

25 You can answer.

1 **THE WITNESS:** Okay. The Andreotti data is the
2 most accurate Agricultural Health Study data, and that
3 was published in 2018, and that does show a lot more
4 information. That's what I'm referring to, not just
5 NAPP or McDuffie or Hardell.

6 I'm talking about the whole data that we have
7 in a large cohort is the Andreotti data, 2018, Leon's
8 data.

9 **BY MR. WISNER:**

10 **Q.** You understand that the De Roos study was not
11 subsumed in the AHS, right?

12 **A.** You're talking about the 2003 De Roos?

13 **Q.** Yeah, the one we're looking at.

14 **A.** There's two different De Roos studies, is the
15 problem. The De Roos study was a little sample that it
16 took out of a bunch of case-control studies that were
17 published in the United States. So they didn't look at
18 all the data that was available at the time.

19 So even if you go with De Roos 2003, more
20 information came out from Zhang's article, Kantor,
21 McDuffie, all of those came out. And I would say they
22 supersede De Roos' 2003, because now we have the NAPP
23 data which takes all of that into account.

24 And then we have cohort data that takes that
25 even more into account.

1 Q. So you understand that the Kantor study was in
2 this pooled analysis, right?

3 A. Parts of it. Parts of Kantor's data was used
4 in De Roos 2003.

5 Q. Exactly. This is a pooled analysis of all the
6 available data at the time?

7 A. I don't know if it was all, because they only
8 took part of it.

9 Q. What are you basing that on?

10 A. If you look at all of the cases out of Kantor,
11 Howard, and Zhang, there were more cases. De Roos 2003
12 took out maybe 35. But I think there were actually 50
13 or 60 cases, and they just took out a subset of that.

14 Q. Do you know why, in De Roos, they did that?

15 A. I know they mentioned they wanted to have data
16 on multiple pesticides.

17 Q. Exactly. They got rid of the ones that didn't
18 have complete data.

19 A. Yeah.

20 Q. I get where you're going now.

21 So you understand that because De Roos looked
22 at just people with complete data, it's a different
23 analysis than was done in the NAPP, right?

24 A. In -- I guess, if you say -- it is different.

25 Q. Okay.

1 **A.** It's a subset.

2 **Q.** Okay. And so back to where I started on this
3 chain, I apologize if this is confusing.

4 But we have this study in 2003 that does its
5 own sort of unique analysis, looking at 47 other
6 pesticides and adjusting for them.

7 Is it still your opinion to this jury that
8 there is no evidence?

9 **A.** Yes. For causal, it's still my opinion. The
10 totality of the human data does not support that Roundup
11 causes non-Hodgkin's lymphoma.

12 **Q.** So you discussed the NAPP data. And you agree
13 that you don't actually know what that NAPP data is
14 doing because we don't have a publication?

15 **A.** Well, we have their slides which they
16 presented at the conference. But as far as any more
17 small details, that has not been published.

18 **Q.** All right. Let's take a look at the NAPP.
19 You show a presentation from Brazil in 2015,
20 right?

21 **A.** August. Is that August 2015?

22 **Q.** Yeah. It's up on the screen.

23 **A.** Yes.

24 **Q.** And I believe that when you showed this to the
25 jury, you presented data from this table; is that right?

1 **A.** Yes.

2 **Q.** And one of the things I wanted to clarify is:
3 In McDuffie, they had a division of greater than two
4 days of exposure, right?

5 **A.** Yes.

6 **Q.** And that had a doubling of the risk that was
7 statistically significant, right?

8 **A.** Not in the adjusted. They didn't adjust. So
9 I would say no.

10 **Q.** Well, they showed a doubling of the risk that
11 was statistically significant in McDuffie, right?

12 **A.** Yes. Without adjusting for other pesticides.

13 **Q.** So they had that statistically significant
14 greater than two days result that was from unadjusted
15 numbers, right?

16 **A.** Yes.

17 **Q.** And here, they have a 1.73 number, right?

18 **A.** Yes.

19 **Q.** Same thing, greater than two days per year,
20 right?

21 **A.** Yes.

22 **Q.** And it's fully adjusted?

23 **A.** It's adjusted, yes.

24 **Q.** So this suggests -- and McDuffie is part of
25 the NAPP, right?

1 **A.** Yes.

2 **Q.** So it suggests that even though McDuffie
3 wasn't adjusted originally, even after the fact, it's
4 still statistically significant?

5 **A.** Well, I think it's hard to say. Because I
6 don't know for sure what they used from McDuffie. I
7 know they used his data. But I'm assuming from this,
8 because we don't have the actual publication, that maybe
9 they had the raw data and were able to adjust somehow
10 for that. But I don't know for sure.

11 **Q.** And this is a statistically significant
12 elevated rate, right?

13 **A.** That is statistically significant, yes.

14 **Q.** And that's consistent with the data from
15 McDuffie, right?

16 **A.** McDuffie showed a statistically significant
17 increased risk, too.

18 **Q.** And this is a frequency analysis, right?

19 **A.** Of usage, yes.

20 **Q.** And that means how frequently you're using
21 something, right?

22 **A.** Yes.

23 **Q.** Now you talked a little about the Bolognesi
24 and Paz-y-Mino study, remember?

25 **A.** Yes.

1 Q. Those are genotoxicity studies, right?

2 A. Yes.

3 Q. And what they showed was that shortly after
4 exposure to Roundup, there was genotoxicity, right?

5 A. Yes.

6 Q. But after a period of time, that DNA damage
7 seemed to repair itself, right?

8 A. Yes.

9 Q. You understand that in cancer, it's not just
10 one assault to the genome, it's repeated assaults,
11 right?

12 A. Yes, that is correct.

13 Q. It's frequency, right?

14 A. It's multiple DNA damages, not just one.

15 Q. So what this is capturing is repeated hits to
16 the genome. Frequency, right?

17 A. Well, I think that's a bit of a leap. What
18 this is capturing is frequency of use of glyphosate and
19 people developing non-Hodgkin's lymphoma.

20 It didn't actually do a good job at that.
21 Because, yes, it shows greater than two as statistically
22 significant. But then if you look at greater than seven
23 and greater than three and a half years -- which I think
24 we can say is more than two days -- they didn't see the
25 same association.

1 So it's kind of odd that they really couldn't
2 prove a trend with this data.

3 **Q.** I just want to be clear.

4 When we talk about duration, number of years,
5 that could be someone that sprays Roundup once a year
6 for three years, right?

7 **A.** Yes.

8 **Q.** That's not a lot of frequency?

9 **A.** Well, I mean, the greater than two days could
10 have just been that they sprayed for two days in a row,
11 and that's it.

12 **Q.** It could also mean they sprayed 50 times a
13 year, every year for 30 years?

14 **A.** Right. It includes a wide range when you say
15 greater than two days.

16 **Q.** So I'm trying to say that the frequency is
17 capturing a repetition, right?

18 **A.** Well, the word frequency, I would say should
19 be capturing a repetition, but this just says greater
20 than two days per year.

21 So I don't know if the people who answered yes
22 here, if they only did it twice and that was it. That's
23 part of the problem with this data. The cutoffs aren't
24 very well-defined, or they're too broad.

25 **Q.** Lifetime days, that could be someone who

1 sprayed it seven times, right?

2 A. Yes.

3 Q. So if we're trying to look at data that looks
4 at frequency of use, something like Mrs. Pilliod, where
5 she sprayed it, you know, dozens of times a year for
6 28 years, she fits into the frequency use, doesn't she?

7 A. I don't think she fits -- honestly, I would
8 say her lifetime exposure and duration, that might be
9 more informative because we know she had more than two
10 days, three and a half years-plus. And we know she had
11 more than seven days. So, actually, those would
12 probably be more accurate.

13 Q. If we look at the frequency discussion in the
14 study, there's two statistically significant results,
15 isn't there?

16 A. I'm not sure this one was adjusting for other
17 pesticides. I don't believe that it says it's adjusting
18 for other pesticides in this one.

19 Q. I understand.

20 But this is in the same presentation, right?

21 A. It's in the same presentation.

22 Q. And the authors are presenting this data. And
23 they show a 2.42 overall greater than two days, and a
24 near tripling of the risk for DLBCL, correct?

25 A. Again, I think the problem is that this is the

1 more inaccurate chart. This is the unadjusted data.
2 This didn't take into account other pesticides on this
3 data. So it's comparing two different things.

4 **THE COURT:** Let's take a break.

5 (Recess taken at 2:58 p.m.)

6 (Proceedings resumed at 3:14 p.m.)

7 (The following proceedings were heard in the
8 presence of the jury:)

9 **THE COURT:** Mr. Wisner, you may continue.

10 **BY MR. WISNER:**

11 **Q.** I want to talk about confounding, okay?

12 **A.** Okay.

13 **Q.** I mean, that's a big part of the reason why
14 these other case-control studies, you sort of don't
15 think they're helpful, is because they didn't adjust for
16 potential confounders; is that right?

17 **A.** Yes, that's part of the reason. Yes.

18 **Q.** One of the ways I try to think about
19 confounding is that there's two aspects.

20 It has to be associated with exposure, and it
21 has to be associated with cancer, the disease outcome,
22 right?

23 **A.** Yes.

24 **Q.** So if I wanted to do an epidemiological study
25 looking at matches, the use of matches, and lung

1 cancer -- if I were to do an epidemiological study
2 looking at, do people who use matches more frequently
3 have cancer, I probably would see an association, right?

4 A. You probably would, yes.

5 Q. Because there's an obvious confounder, right?

6 A. Yes.

7 Q. That's smoking, right?

8 A. Yes.

9 Q. Sorry, I have to get a yes or no. That's why
10 I look at you. I'm not trying to be rude.

11 So the reason why smoking is a confounder is
12 because people who use matches usually smoke more,
13 right? There's an association between the exposure and
14 the confounder, right?

15 A. Yes.

16 Q. And the other reason is because smoking can
17 actually cause lung cancer, right?

18 A. Yes.

19 Q. So these two things really have to be there
20 before you have a confounder, right?

21 A. So you're saying that you have to have an
22 association with --

23 Q. The exposure.

24 A. Yeah.

25 Q. The exposure being matches, you have to have

1 an association with the exposure, and you have to have
2 an association with the disease, right?

3 A. Yeah, I think that's fair.

4 Q. Now, what if we reverse that?

5 We're doing smoking and lung cancer. If we
6 did an association between smoking and lung cancer, we
7 probably would see a risk, right?

8 A. Yes.

9 Q. But what if we adjusted for matches? That
10 wouldn't be a proper confounder, would it?

11 A. Probably not, no.

12 Q. Well, matches and smoking are related, right?
13 Matches and lung cancer don't cause cancer?

14 A. Correct.

15 Q. And the reason why I bring this up is, when
16 you adjust for something that is actually not a cause,
17 you can actually over-adjust your data, right?

18 A. Well, I think, again -- I know it's semantics,
19 but we have to be careful of the word cause versus risk.
20 Confounders are usually adjusting for risk, not actual
21 causes.

22 Q. Fine. We'll use the word association to keep
23 it noncontroversial.

24 If you adjust for potential confounders that
25 aren't actually associated with that disease, that can

1 become an over-adjustment, right?

2 **A.** It can, yes.

3 **Q.** So what we have here is, we have Roundup,
4 right, and NHL. Right?

5 **A.** Yes.

6 **Q.** And you're saying that other pesticides need
7 to be adjusted for, right?

8 **A.** Yes.

9 **Q.** And is that Roundup and other pesticides, are
10 they more likely to be associated with each other?

11 **A.** They are.

12 **Q.** So people who spray Roundup also might spray,
13 I don't know, some other pesticide?

14 **A.** Yes.

15 **Q.** Okay. Are other pesticides associated with
16 NHL?

17 **A.** They are.

18 **Q.** But you said earlier that it depends on the
19 pesticide, right?

20 **A.** It does.

21 **Q.** And so adjustment for other pesticides really
22 just means adjustment for other pesticides that actually
23 are associated with NHL?

24 **A.** Well, those would be the most important,
25 definitely.

1 **Q.** Because if you were adjusting for exposure to
2 pesticides that had nothing to do with NHL, that would
3 be over-adjustment, right?

4 **A.** I don't know if it would be over-adjustment.
5 I think the key thing is that we know there has to be
6 also some scientific link between it.

7 Like, if we were to take your example of the
8 matches and the lung cancer, if we were to rule out or
9 adjust for the people who smoked, we would find no
10 increase between the use of matches and lung cancer,
11 right?

12 **Q.** Because you would be over-adjusting?

13 **A.** Well, you wouldn't be over-adjusting, you
14 would be taking out the causative -- the risk factor.

15 **Q.** The proper confounder, sorry.

16 **A.** Yeah.

17 **Q.** But if you were trying to link smoking and
18 lung cancer, and you adjusted for matches use, you would
19 also eliminate the risk, but for other reasons?

20 **A.** Yeah, but I think the difference is that
21 matches have never been linked with lung cancer, so why
22 would you adjust for matches.

23 **Q.** Precisely. And you have to look and see
24 whether or not the proposed adjustments are actually
25 associated with NHL?

1 **A.** Yeah, it's very helpful.

2 **Q.** So you recall us talking about the McDuffie
3 article earlier, right?

4 **A.** Yes.

5 **MR. WISNER:** Permission to approach,
6 Your Honor?

7 **THE COURT:** Yes.

8 **BY MR. WISNER:**

9 **Q.** One of your criticisms of this study is that
10 it didn't adjust for other pesticides, right?

11 **A.** Yes.

12 **Q.** This is Exhibit 1568. This has been shown
13 already, so it's up on the screen.

14 And what we have here, Doctor, is this table.
15 And this is the one we were talking about a second ago.

16 This is the one we were talking about a second
17 ago. And it's this Table 8, right, that has that
18 greater than two days use, right?

19 **A.** Yes.

20 **Q.** If you look at it here, we have that 2.12,
21 that's statistically significant, right?

22 **A.** This is the -- yeah, the unadjusted? Yes.

23 **Q.** That's right.

24 And they actually didn't do any adjustment in
25 this study, did they?

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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.

1 We talked about multivariate analysis a second
2 ago, right?

3 **A.** Yes.

4 **Q.** That's when you throw in all the potential
5 things you want to study in the same regression, right?

6 **A.** Yes.

7 **Q.** And they talk about DDT, malathion, all these
8 other pesticides, right?

9 And they said that when they did that, it
10 didn't significantly contribute to NHL.

11 **A.** I understand what you're saying. They don't
12 show the data, they just make a line and state it. I'm
13 not sure what they're referring to.

14 **Q.** Well, I mean, we talked about this a second
15 ago. In the matches and cigarette smoking situation,
16 you don't adjust unless there's an association between
17 the confounder and the disease, and they're saying they
18 didn't have one, so they didn't adjust?

19 **A.** But I don't know where they're getting it
20 from, though. That's my problem with the statement.

21 **Q.** Well, that's what it says, right?

22 **A.** It says that. I just don't know where they're
23 getting that from.

24 **Q.** All right. One of the -- I mean, you have a
25 master's in epidemiology, right?

1 **A.** Yes.

2 **Q.** So you're familiar with different concerns and
3 issues in the epidemiology literature, right?

4 **A.** Yes.

5 **Q.** And one of the things is something called --
6 you actually talked about this on direct --
7 misclassification, right?

8 **A.** Yes.

9 **Q.** And one is confounding, one is
10 misclassification.

11 Have you looked at the effects of confounding
12 and misclassification in these epidemiology studies?

13 **A.** Yeah, the authors do, if that's what you're
14 referring to.

15 **Q.** Yeah. Let's take a look at one of the studies
16 I think will be right on point.

17 **MR. WISNER:** Permission to approach,
18 Your Honor?

19 **THE COURT:** Yeah.

20 **BY MR. WISNER:**

21 **Q.** I'm handing you Exhibit 1676.

22 This is an article authored by Dr. Aaron Blair
23 and his colleagues, titled "The Methodological Issues
24 Regarding Confounding and Exposure Misclassification of
25 Epidemiology Studies of Occupational Exposures."

1 Do you see that?

2 A. Yes.

3 MR. WISNER: Permission to publish?

4 THE COURT: Any objection?

5 MR. ISMAIL: This lacks foundation with
6 respect to this witness.

7 BY MR. WISNER:

8 Q. This was published in the Medical Journal of
9 Industrial Medicine.

10 Do you see that?

11 A. Yes.

12 Q. Dr. Blair was head of the National Cancer
13 Institute --

14 A. Okay.

15 Q. -- right?

16 He was also head of the IARC committee on
17 glyphosate, right?

18 A. Okay.

19 Q. So this is somebody who was obviously very
20 familiar with looking at issues relating to confounding
21 and exposure misclassification in epidemiology studies,
22 right?

23 A. I mean, I would assume, yes.

24 MR. WISNER: Permission to publish?

25 THE COURT: Any objection?

1 **MR. ISMAIL:** That's fine.

2 **THE COURT:** Granted.

3 **BY MR. WISNER:**

4 **Q.** So what they're doing here is, they're
5 actually looking at this very issue that I've raised,
6 confounding versus exposure misclassification.

7 Do you see that?

8 **A.** Yes.

9 **Q.** And again, I mentioned this earlier, but it's
10 Dr. Aaron Blair.

11 Do you see that?

12 **A.** Yes.

13 **Q.** And it specifies right here that at the time
14 this was published, he was part of the Division of
15 Cancer Epidemiology and Genetics at the National Cancer
16 Institute.

17 Do you see that?

18 **A.** Yes.

19 **Q.** That's the same group that published the AHS,
20 right?

21 **A.** They sponsored it.

22 **Q.** Look at the Conclusion section right here.

23 It says:

24 "We believe that, of the two of the major
25 methodological issues raised in epidemiologist

1 studies of occupational exposures -- that is,
2 confounding and exposure misclassification --
3 the latter is of far greater concern. It is
4 rare to find substantial confounding in
5 occupational studies, or in other
6 epidemiological studies, for that matter, even
7 by risk factors that are strongly related to
8 the outcome of interest.

9 "On the other hand, exposure misclassification
10 probably occurs in nearly every epidemiologic
11 study. For non-differential
12 misclassification, the type of
13 misclassification most likely in cohort
14 studies, the direction of the bias is largely
15 predictable, that is, a bias of relative risk
16 toward the null."

17 Do you see that?

18 **A.** Yes.

19 **Q.** So what Dr. Blair and his colleagues are saying
20 is -- we were talking about confounding or
21 misclassification.

22 Misclassification is the real problem,
23 particularly in cohort studies?

24 **A.** Yeah. Misclassification is an issue with any
25 epidemiology study, almost.

1 Q. And what it does is, it drives estimates
2 towards the null, right?

3 A. I think the reason they're saying that is
4 because it's going to be both your cases and your
5 non-cases.

6 So your people that developed the condition
7 and your people that don't are going to be misclassified
8 probably equally. So that would make your ratio
9 approach 1, the null.

10 Q. Exactly. It would become no longer
11 significant, right?

12 A. Right. But it's equal in both groups.

13 Q. Exactly. In addition, the magnitude from
14 relatively large amounts of misclassification can be
15 sufficient to lead to the interpretation of no effect,
16 right?

17 A. That's what they say.

18 Q. And Doctor, you've talked a lot about the AHS
19 with this jury?

20 A. Yes.

21 Q. Did you consider the possible risk of
22 misclassification in the AHS?

23 A. Of course.

24 Q. You researched the issue?

25 A. The authors did.

1 **Q.** They actually published a whole article,
2 didn't they?

3 **A.** They did.

4 **MR. WISNER:** Permission to approach,
5 Your Honor?

6 **BY MR. WISNER:**

7 **Q.** Handing you Exhibit 1833. I think I handed
8 you two.

9 This is a journal article, Doctor, published
10 by Blair and colleagues, actually, titled "The Impact of
11 Pesticide Exposure Misclassification on Estimates of
12 Relative Risks in the Agricultural Health Study."

13 Do you see that?

14 **A.** Yes.

15 **Q.** And actually, many of the authors here are the
16 exact same authors that published the AHS that you
17 referenced?

18 **A.** Yes.

19 **MR. WISNER:** Permission to publish,
20 Your Honor?

21 **MR. ISMAIL:** No objection.

22 **BY MR. WISNER:**

23 **Q.** So this is the title, and we have here
24 Dr. Blair.

25 Do you see that?

1 **A.** Yes.

2 **Q.** And we have other people here, for example,
3 Dr. Alavanja.

4 Do you see that?

5 **A.** Yes.

6 **Q.** And Dr. Lynch, for example.

7 Do you see that?

8 **A.** Yes.

9 **Q.** These are all people who are actually authors
10 on the AHS, right?

11 **A.** Yes.

12 **Q.** Dr. Dosemeci, right?

13 And by the way, Doctor, since we're here,
14 Dr. Lynch signed a letter with Dr. Portier in support of
15 IARC, didn't he?

16 **A.** I'm not sure about that.

17 **Q.** Okay.

18 **A.** I don't recall that.

19 **Q.** Do you know that Dr. Dosemeci did that, as
20 well?

21 **A.** No, I'm not aware.

22 **Q.** All right. So it says here, if we just go to
23 the very end, they're obviously talking about the
24 effects of misclassification exposure, right, in the
25 study?

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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.

1 **Q.** A false negative finding, that's when a study
2 is negative, but that's actually not correct, right?

3 **A.** Yeah, that's what that means.

4 **Q.** So, like, in the AHS, if the AHS had a false
5 negative with regards to glyphosate, it would be that
6 it's showing no risk, but there actually is a risk,
7 right?

8 **A.** Yeah.

9 **Q.** And, in fact, the authors of the AHS are
10 straight-up saying that because of the misclassification
11 errors in the AHS, it's likely to have common false
12 negative findings.

13 **A.** I'm not sure that's exactly what they're
14 saying. I haven't actually read this article. I see
15 that they're putting here, "except for in situations,"
16 and they go on to explain this. But I'm not really
17 sure. I actually have to look at this a little further.
18 I'm not quite sure what they were referring to.

19 **Q.** So when you were preparing your report to talk
20 to this jury about the AHS, you didn't look for an
21 article titled "Impact of Pesticide Exposure
22 Misclassification on Estimates of Relative Risks in the
23 Agricultural Health Study."

24 Is that right?

25 **A.** Is that this one?

1 Q. Yeah.

2 A. Yeah. I'm not quite sure. I looked through
3 so many articles, it's possible I looked at this. But I
4 honestly would have to look at it again. It's been a
5 while.

6 Q. Fair enough. I'm not going to try to have a
7 memory test with you. That's fair.

8 But from what we can see here, the authors of
9 the AHS are saying, unless we have a high risk ratio,
10 it's going to be obscured by misclassification.

11 Isn't that true?

12 A. Again, I'm not sure that's exactly what
13 they're saying here.

14 Q. Well, it does say that false negative findings
15 might be common. It says that.

16 A. It says "might." That's the problem I have.
17 Sometimes the wording is not exactly saying that it is.

18 Q. And obviously, you've taken a close look at
19 the AHS, right?

20 A. Yes.

21 Q. And you've specifically looked for
22 misclassification, right?

23 A. I didn't look for misclassification. The
24 authors, they do discuss that as a potential. And I do
25 believe that there are some other publications where

1 they mention that they looked into that.

2 So, yes, it is something that came about when
3 looking at the AHS or any cohort study.

4 Q. Is it your understanding that the authors of
5 the AHS study thought misclassification was just a
6 potential?

7 A. Yes.

8 MR. WISNER: Permission to approach,
9 Your Honor?

10 THE COURT: Yes.

11 BY MR. WISNER:

12 Q. I'm handing you a copy of the AHS, it's
13 Exhibit 2230.

14 I believe you had a copy of this on direct
15 with Mr. Ismail?

16 A. Yes.

17 Q. So we're looking at the AHS. And if you
18 actually look at the study, they actually talk about
19 this.

20 It says right here, talking about the
21 limitations:

22 "First, despite the specific information
23 provided by applicators about use of
24 glyphosate, some misclassification of exposure
25 undoubtedly occurred."

1 Do you see that?

2 A. Yes.

3 Q. So it's not a potential; it undoubtedly
4 occurred, right?

5 A. Yeah. But actually, the next sentence after
6 it is also pretty important. Because you can see that
7 it says:

8 "Given the prospective design, however, any
9 misclassification is likely non-differential."

10 Q. That's right. And it leads to attenuated risk
11 estimates, right?

12 A. So would not overestimate.

13 Q. That's right.

14 It would underestimate risk?

15 A. Well, I don't know if it would underestimate
16 it. It would just be that it's not going to show a
17 false positive.

18 Q. It actually means the exact opposite, Doctor?

19 A. No, no. A false positive is different than
20 actually showing --

21 Q. I'm sorry, false negative.

22 A. False negative?

23 Q. Yeah, that's what I meant.

24 It means it's more likely to show a false
25 negative?

1 **A.** No, it doesn't.

2 **Q.** Well, let me back up.

3 If it's a misclassification, and it's drawing
4 the risk ratios to 1, but the real risk is actually
5 something greater, that would lead to a false negative,
6 right?

7 **A.** If it's drawing in towards the null, it's that
8 it's more likely that you're not going to be able to see
9 an association, whether or not it exists in the positive
10 or the negative, either way.

11 **Q.** That's a good point.

12 And again, you've testified that the AHS shows
13 no association, right?

14 **A.** Correct.

15 **Q.** And this is saying here that misclassification
16 undoubtedly occurred, right?

17 **A.** It also does in any cohort study.

18 **Q.** And it says it would lead to an attenuation of
19 risk estimates, right?

20 **A.** Yeah, it would be more towards the null.

21 **Q.** It also says right here -- the same area, it
22 says:

23 "Finally, it is important to note that these
24 studies have been conducted in different time
25 periods. Changing agricultural practices,

1 such as pesticide application methods and use
2 of personal protective equipment, may impact
3 actual exposure levels. In addition, if
4 changing product formulations or amounts used
5 are associated with risk, this may also impact
6 results."

7 Do you see that?

8 **A.** Yes.

9 **Q.** And we actually know that during the time of
10 the AHS, there were dramatic changes in the agricultural
11 system, right?

12 **A.** Yes.

13 **Q.** And, in fact, people started using more
14 protective gear, didn't they?

15 **A.** I'm not sure about that. I know the use
16 increased over time.

17 **Q.** We know the use of glyphosate dramatically
18 increased, right?

19 **A.** Yes.

20 **Q.** And they're saying here that if that, in fact,
21 happened, it could actually lead to a classification
22 error?

23 **A.** Yes.

24 **Q.** And we know it happened, right?

25 **A.** Yes.

1 Q. So this is just more evidence that, in fact,
2 there's significant misclassification error in the AHS?

3 A. I think what they're mentioning is that this
4 is a possibility.

5 Q. Fair enough.

6 But it's not a possibility that it changed,
7 right? We know that did change.

8 A. I'm sorry, for --

9 Q. So what I'm saying is, we know glyphosate
10 changed; that's not possible, right?

11 A. The use increased over time, yes.

12 Q. So when it says here that changing
13 agricultural practices -- sorry. It says:

14 "If changing product formulations or amounts
15 are used, this may also impact results."

16 Right?

17 A. Right. If they are used.

18 Q. So we know that there was changing amounts,
19 right?

20 A. Right.

21 Q. So we know that it would impact the results?

22 A. No. Again, I think what they're saying is, if
23 this happened, it's possible that it could affect the
24 results.

25 They're throwing out any possibilities, what

1 might make their data not accurate. They're not saying
2 it did happen, just that this is a possibility.

3 Q. Do you have any criticisms of this study?

4 A. I actually don't. They did a great job.
5 50,000 people is quite an accomplishment.

6 Q. They literally followed 30,000, right?

7 A. Well, there were over 50,000 going into the
8 study.

9 Q. But in the follow-up, they actually lost
10 20,000?

11 A. Yes.

12 Q. That's not a criticism you have of it?

13 A. No. That happens quite commonly in large
14 cohort studies, especially as long -- this publication,
15 2018, they followed these people, I think the median was
16 17-plus years. It's very difficult to follow that
17 amount of people for that long of a time.

18 So losing 30 percent is something even a
19 little bit more that you see in very large cohort
20 studies.

21 Q. They lost more like 40 percent, right?

22 A. Okay. I think 38 percent. I don't know the
23 exact number.

24 Q. The second thing was, that wasn't over
25 17 years; that was between 1997 and 2005, right?

1 **A.** I'm just saying, they followed these people
2 over 17 -- that was the median follow with these people.

3 So losing 30 percent, 40 percent, is quite
4 common in large cohort studies that follow people over a
5 decade-plus.

6 **Q.** I understand, but I want to be clear we're
7 talking about the same thing.

8 The original survey was between 1993 and 1997,
9 right?

10 **A.** Yes.

11 **Q.** And the following study, that was between 2001
12 and 2005, correct?

13 **A.** Yes. The follow-up survey was 2001 to 2005.

14 **Q.** So they lost 38 percent between those two time
15 periods, not over 17 years.

16 **A.** Right. It was a long time.

17 I'm just saying, the median follow of this
18 study was 17-plus years. So you're going to lose some
19 people.

20 **Q.** So losing almost 40 percent of the cohort
21 between 1997 and 2005, that's not a criticism you have?

22 **A.** It is not. It happens quite commonly.

23 **Q.** One of the things that the authors state in
24 here -- we can actually just go to the front page. It's
25 right from the Conclusion section.

1 They state that there was some -- sorry. It
2 says right here:

3 "In this large prospective cohort study, no
4 association was apparent between glyphosate
5 and any solid tumors or lymphoid malignancies
6 overall, including NHL and its subtypes."

7 Do you see that?

8 **A.** Yes.

9 **Q.** Is that actually true?

10 **A.** I believe it is. I think they published that
11 on Table 2 or -- yeah.

12 **Q.** It says "subtypes."

13 Is it your understanding that there was no
14 elevated statistically significant results for any
15 subtypes?

16 **A.** I believe so, yes.

17 **Q.** Let's take a look.

18 So if we actually go to Table 3, this is the
19 cancer incidence in relation to lagged
20 intensity-weighted lifetime days of glyphosate use in
21 the Agricultural Health Study.

22 Do you see that?

23 **A.** Yes.

24 **Q.** What they did here is, they broke it into
25 people who had been exposed at least five years ago and

1 people who had been exposed at least 20 years ago,
2 right?

3 A. Yes.

4 Q. You would agree that lymphoma takes quite a
5 while to develop, right?

6 A. Yes.

7 Q. It can take up to 20 years, even?

8 A. It can, yes.

9 Q. So if you look at the data, for example, for
10 non-Hodgkin's T-cell lymphoma. For the median dose, it
11 has, in the 20-year lag, a 2.97 statistically
12 significant result.

13 Do you see that?

14 A. Yes.

15 Q. T-cell lymphoma, that's a subtype, yes?

16 A. Yes.

17 Q. And it's statistically significant?

18 A. It is.

19 Q. And it's elevated?

20 A. It is.

21 Q. So when we go back to the first page, where it
22 says no association was apparent, and it includes NHL
23 and subtypes, that's just not factually correct, is it?

24 A. They probably meant to say B-cell, I'm
25 guessing.

1 **Q.** Okay. So now do you have any criticisms of
2 the study?

3 **A.** I still don't, really. I mean, they only had
4 how many cases here? Nine cases of T-cell lymphoma,
5 ten, out of -- I don't know how many. I can't even add
6 it up here. Nine cases is not a lot. So honestly,
7 T-cell lymphomas, I would say no, I really don't.

8 **Q.** So a false negative is when something says
9 there's no risk, when we actually know that there is,
10 right?

11 **A.** Yes.

12 **Q.** You mentioned earlier -- you know, the AHS
13 looked at more than just glyphosate, right?

14 **A.** It did.

15 **Q.** It actually looked at malathion and DDT,
16 didn't it?

17 **A.** I believe so, yes.

18 **Q.** Do you know what the results in the AHS were
19 for those?

20 **A.** Yes. I would have to look.

21 **Q.** It's actually not in that study. I'll hand it
22 to you.

23 **A.** Okay.

24 **Q.** Handing you Exhibit 1947.

25 Doctor, we agreed earlier that DDT and

1 malathion are known risk factors for NHL, right?

2 A. Yes.

3 Q. So Exhibit 1947 is "Non-Hodgkin's Lymphoma
4 Risk and Insecticide, Fungicide, and Fumigant Use in the
5 Agricultural Health Study."

6 Do you see that?

7 A. Yes.

8 Q. This is, in fact, one of the documents on your
9 reliance list, isn't it?

10 A. Yes.

11 MR. WISNER: Permission to publish?

12 MR. ISMAIL: No objection.

13 THE COURT: Granted.

14 BY MR. WISNER:

15 Q. So again, we have some of the same arguments,
16 right, Dr. Alavanja.

17 Do you see that?

18 A. Yes.

19 Q. And a bunch of other -- Dr. Lynch.

20 Do you see that?

21 A. Yes.

22 Q. We have Dr. Blair, right?

23 A. Yes.

24 Q. These are all people that are intimately
25 associated with the AHS study, right?

1 **A.** Yes.

2 **Q.** And if we go into the study, we have here
3 Table 2, and it has pesticide exposure never, ever, and
4 adjusted relative risks of total NHL and NHL subtypes.

5 Do you see that?

6 **A.** Yes.

7 **Q.** And then we have these categories. We have
8 total NHL right there, right?

9 **A.** Yes.

10 **Q.** And then we have a specific risk ratio right
11 there, right?

12 **A.** Yes.

13 **Q.** We also have diffuse large B-cell cases,
14 right?

15 **A.** Yes.

16 **Q.** So if we go down here, there's actually a
17 number for malathion.

18 Do you see that? Let me do it closer.

19 Do you see that?

20 **A.** Yes.

21 **Q.** And for total NHL risk, it's .9, and it's not
22 statistically significant, right?

23 **A.** Right.

24 **Q.** So the AHS, when it looked at malathion, it
25 had a false negative, didn't it?

1 **A.** I'm not sure that's accurate to say. I think
2 there's more to it than that. I know that I've not
3 really looked into malathion in this study, so I
4 couldn't tell you more.

5 But I wouldn't call it a false negative. They
6 just didn't see an association in their study.

7 **Q.** Fair enough.

8 You testified already that you know that
9 malathion and DDT are associated for cause?

10 **A.** Yes.

11 **Q.** And the AHS, when it looked at malathion, just
12 like with glyphosate, saw a sub-1 risk ratio that was
13 not statistically significant, correct?

14 **A.** Correct.

15 **Q.** Take a look at what they did with DDT.

16 For DDT, it looks like the risk ratio is 1.

17 Do you see that?

18 **A.** Yes.

19 **Q.** Spot-on null, right?

20 **A.** Yes.

21 **Q.** But we know that DDT is associated with NHL;
22 it just didn't see it in the AHS, right?

23 **A.** They didn't see an association in this study,
24 that's correct.

25 **Q.** So that's another one where we kind of know

1 that the AHS got it wrong?

2 A. I don't think it's as simple as saying that.
3 There could be other factors. It could be that DDT has
4 not been widely used for a long time now, so I don't
5 know how many people they had -- they mentioned the
6 cases, but it could just be variation exposure
7 practices, the way people answer the studies.

8 I don't know. This does not say that it's a
9 false negative; it just means that in their study, they
10 did not find an association.

11 Q. So even though it didn't detect anything from
12 malathion and DDT, which you state are known to be
13 associated, do you now have any criticisms for the AHS?

14 A. I do not.

15 Q. One of the things you mentioned on direct was,
16 you said that it went back 15 years from enrollment,
17 right?

18 A. I'm not sure I said that. I think I said it
19 went back several years.

20 Q. Is it your understanding that it went back
21 about 15 years?

22 A. I know it was awhile, yes.

23 Q. But to be enrolled in the AHS, you wouldn't be
24 sick yet, correct?

25 A. Correct.

1 **Q.** So, for example, if you had been exposed to
2 glyphosate for 15 years, 20 years prior to the AHS, and
3 you had gotten sick from NHL, you wouldn't be allowed to
4 enroll in the study, right?

5 **A.** That's correct.

6 **Q.** So if you had been exposed for 15 years, and
7 you had not gotten sick, you would be allowed to enroll,
8 right?

9 **A.** That's correct.

10 **Q.** So, essentially, the people who did get
11 enrolled in the AHS are people who have knowingly been
12 exposed to pesticides for upwards of 15 years, but had
13 not gotten sick yet?

14 **A.** Yes.

15 **Q.** So these are people who were genetically
16 predisposed to not get sick, right?

17 **A.** No. I don't think you can make that leap.

18 **Q.** All the people who got sick before that
19 15 years, they weren't allowed in the study, were they?

20 **A.** I think that because they were exposed to
21 pesticides for 15 years and didn't get sick, just means
22 they don't have lymphoma.

23 **Q.** Fair enough.

24 What we do know is that this cohort consists
25 of people who, despite being exposed to various

1 pesticides for years, didn't get lymphoma, right?

2 A. The median -- I'm guessing, because I don't
3 have it memorized. It would have been a median exposure
4 of 15 years. The median is kind of like an average. So
5 not everybody enrolled at that time had 15 years of
6 exposure.

7 Q. So, on average, the people that were part of
8 the AHS cohort were people who had been exposed to
9 pesticides, on average, for 15 years.

10 And none of them had lymphoma, right?

11 A. Yes.

12 Q. Are you familiar with a concept called
13 selection bias?

14 A. Yes.

15 Q. And that's where, before you even start to
16 study, you are selecting specific people to be part of
17 it that bias the study, right?

18 A. That's correct.

19 Q. Would you agree that by excluding all the
20 people who had gotten sick already, there was a form of
21 selection bias in the AHS?

22 A. No, I don't agree with that.

23 Q. So notwithstanding this fact, I assume that
24 you still don't have any criticisms for the AHS?

25 A. I still don't.

1 Q. Do you understand how the AHS collected data?
2 Did you actually look at the surveys?

3 A. I did not look at the actual surveys. I know
4 they use surveys.

5 Q. And you understand that it took into account
6 protective gear, right?

7 A. Yes.

8 Q. You also understand -- you've actually read
9 Dr. Ritz's report, so you understand that when they
10 asked for protective gear, they just asked one general
11 question.

12 They didn't ask it for each pesticide, right?

13 A. I'm not sure. I haven't read the actual
14 questionnaire.

15 Q. Well, you do know that this was looking at 50
16 or so pesticides in the AHS, right?

17 A. Yes.

18 Q. And these are people, pesticide applicators
19 trying to get their license, and they show up. And
20 after they've taken their exam, they're asked to
21 participate in this study, right?

22 A. Yes.

23 Q. And in this study, on the spot, they have to
24 tell -- as accurately as they can -- how much pesticide
25 exposure they've had for the last 15 years, right?

1 A. Yes.

2 Q. They have to know how much glyphosate they
3 were using in any given year, right?

4 A. Yes.

5 Q. And then there was a discussion about
6 protective gear, right?

7 A. Yes.

8 Q. And that was part of the dose calculation used
9 in the AHS, right?

10 A. Yes.

11 Q. But if they're using respirators and chemical
12 overalls for these really toxic pesticides, but not
13 using that type of gear for glyphosate, the AHS wouldn't
14 capture that, would it?

15 A. I'm not sure I follow that, sorry. Could you
16 rephrase it. I'm not sure I followed that --

17 Q. Well, the study uses one protective gear
18 question to assess the exposure for all pesticides,
19 right?

20 A. I'm going to agree with you. I'm not quite
21 sure. I didn't see the questionnaire.

22 Q. So when they mark it for what protective gear
23 they use, and they go, gosh, I use a respirator because
24 I spray that DDT stuff, they click respirator.

25 They're going to use that exposure analysis

1 for glyphosate, as well, right?

2 A. So what you're saying is that if they used
3 protective gear for DDT, they're going to assume they
4 used protective gear for glyphosate?

5 Q. Precisely.

6 A. I'm not sure that's what they did in this
7 study.

8 Q. Fair enough.

9 But if they did do that, you would agree that
10 it would lead to even more misclassification?

11 A. Again, they're getting this -- the nice thing
12 about cohort is that you're getting this information
13 from people before they have lymphoma.

14 So if there is a misclassification, it usually
15 is equal between the people who end up getting lymphoma
16 and the people who don't. And that's why they're --

17 Q. Fair enough. And it's non-differential, I
18 agree with you.

19 But non-differential misclassification
20 attenuates risk towards the null?

21 A. Yes.

22 Q. It creates so much noise that you can't see
23 the signal, right?

24 A. I don't know. I don't know that that's an
25 accurate assessment. I think it's going to err towards

1 no association, good or bad.

2 Q. So notwithstanding this issue about exposure
3 and the protective gear, do you have any criticisms now
4 about the AHS?

5 A. I do not.

6 Q. All right. I don't want to spend too much
7 more time, Doctor, but I do want to go over a couple of
8 quick things.

9 You discussed briefly the Leon study.

10 Do you recall that?

11 A. Yes.

12 Q. And in the Leon study -- well, let's actually
13 go back to your report first. We'll go back to the Leon
14 study in a minute.

15 In your report, 3146, on page 16, you talk
16 about prospective cohort studies.

17 Do you recall that?

18 A. On page 16?

19 Q. Yeah. Let me find the section. Very top.

20 This is where you're criticizing Dr. Nabhan's
21 opinions at the bottom. Do you see that?

22 Oh, that's what's wrong. Sorry.

23 A. Okay.

24 Q. Do you see that?

25 A. Yes.

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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.

1 **A.** The pooled data did not show an association.
2 I believe the individual data, like the Norway study.
3 But the pooled, I don't believe showed an association.

4 **Q.** Let's look at it.

5 It's 3146 -- no, it's not. It's 2984. That's
6 my version. I don't know what version you used.

7 **A.** I think it's in the -- I have it here.

8 **Q.** What exhibit number do you have?

9 **A.** Mine is 6762.

10 **Q.** All right. I'm going to display it, but it's
11 going to be my version, which is the same thing.

12 **A.** Okay.

13 **Q.** That's the study in front of you, Doctor?

14 **A.** Yes.

15 **Q.** Okay. And if we go into this study, there is
16 discussion of DLBCL, right?

17 You see that on page 7?

18 **A.** Yes.

19 **Q.** All right. And it says:

20 "There was an elevated meta hazard ratio of
21 DLBCL with ever use of glyphosate, 1.36, 1.00
22 to 1.85."

23 Do you see that?

24 **A.** Yes.

25 **Q.** "With no evidence of heterogeneity of effects

1 among cohorts."

2 Do you see that?

3 A. Yes.

4 Q. So that's an elevated statistically
5 significant rate for DLBCL, right?

6 A. No. The confidence interval includes 1, so
7 you cannot rule out chance alone, or doing this study
8 again and getting a hazard ratio of 1.

9 Q. Come on, Doctor. If we added a decimal, I'm
10 sure we would get to a number eventually, right?

11 MR. ISMAIL: Objection. Argumentative,
12 Your Honor.

13 THE COURT: Sustained.

14 BY MR. WISNER:

15 Q. I mean, you understand that these confidence
16 intervals, they have numbers that go one, sometimes
17 infinitely long, right?

18 A. Usually they don't. They're usually just like
19 this.

20 Q. You know how to do a regression, right?

21 A. A regression?

22 Q. Yeah.

23 A. Yes.

24 Q. That's what they're doing here, right?

25 A. What they're doing is they're doing a meta

1 analysis of hazard ratios, and they pooled data together
2 to come up with this hazard ratio.

3 They found 1.36, but again the confidence
4 interval is what it is, it's 1 to 1.85. So if your
5 confidence interval includes 1, it's not that because
6 it's at the end, 1 is less likely to happen than 1.3
7 because it's in the middle. It's still -- all those
8 numbers are equally as likely to happen if you repeated
9 this study.

10 Q. I'm sorry.

11 Are you saying when you're looking at a curve
12 of probability based on an estimate and confidence
13 interval, are you saying any of those numbers is equally
14 probable?

15 A. Yes. That's exactly what I'm saying.

16 Q. Well, we heard testimony from Dr. Portier
17 explaining the exact opposite. The highest probability
18 is the point estimate, and it's a curve. And as you go
19 away from the point estimate, the probability gets
20 smaller and smaller.

21 That's how biostatistics works, right?

22 MR. ISMAIL: Objection, Your Honor.

23 THE COURT: Sustained.

24 BY MR. WISNER:

25 Q. Okay. Same question. Forget about

1 Dr. Portier.

2 The point estimate is the most probable
3 outcome, and it gets much less likely as you get away
4 from that point, right?

5 A. No, that's not how it works.

6 Q. Okay.

7 A. It doesn't work that way.

8 Q. Okay. Fair enough.

9 So it says right here:

10 "The confidence interval is 1.00."

11 Do you see that?

12 A. Yes.

13 Q. If it said 1.001, we just have one more
14 decimal and had 1, would it then be statistically
15 significant?

16 A. They do have to say that ahead of time, how
17 much their confidence interval is going to include.

18 I would say probably no because usually we
19 only go out to the hundredth place. I don't usually see
20 people go to the thousandth or the millionth when it
21 comes to a confidence interval. So still rounding,
22 1.001, it's still 1.

23 Q. Okay. So even in that scenario, you wouldn't
24 really acknowledge this number because it wasn't, in
25 your view, statistically significant?

1 **A.** Correct.

2 **Q.** Okay. Well, let's go down farther.

3 It talks about cohort specific ratios.

4 Do you see that?

5 **A.** Yes.

6 **Q.** And it has the AGRICAN one, HR 1.67,

7 confidence interval, 1.05 to 2.65, right?

8 **A.** Yes.

9 **Q.** AGRICAN, that's a prospective study?

10 **A.** It's a prospective study, yes.

11 **Q.** And it's elevated, above 1?

12 **A.** Yes, they do show that.

13 **Q.** And it's statistically significant, right?

14 **A.** It is a statistically significant number.

15 **Q.** So earlier when I showed you your report where

16 you said that there was no prospective study that was

17 statistically significant, there's one right here,

18 right?

19 **A.** Well, I think the interpretation of this --

20 you asked me if this was statistically significant, and

21 it is.

22 But if you actually look at the AGRICAN data,

23 they didn't assess direct exposure to the pesticides;

24 they used a crop matrix where they actually kind of

25 guesstimated that these people were exposed to

1 pesticides based on the crop that they farmed.

2 To me, that does not seem to be a very
3 accurate way to assess exposure. So honestly I don't
4 think the AGRICAN data by itself is very reliable. The
5 same thing with the CNAP data. The Agricultural Health
6 Study is the only one that looked and assessed
7 individual usage and not using some kind of crop matrix.

8 I don't know if you have that study, but the
9 crop matrix thing was kind of weird. What they said was
10 if a farmer farmed a specific crop during a specific
11 year, and that pesticide was approved for use in that
12 crop, then they assume the farmer was exposed. That
13 seems like quite a leap.

14 **MR. WISNER:** Your Honor, I move to strike the
15 witness' testimony as nonresponsive. It didn't have
16 anything to do with my question.

17 **THE COURT:** Overruled. Sustained.

18 **MR. WISNER:** I'll ask the question again.

19 **BY MR. WISNER:**

20 **Q.** So earlier when I showed you your report,
21 where you said there was no prospective study that was
22 statistically significant, there's one right here,
23 right?

24 **A.** Well, remember, I didn't have this Leon paper
25 at the time I made that report.

1 Q. I know. I'm with you there. I'm not trying
2 to say --

3 A. So I didn't have the AGRICAN. I would still
4 stand by my statement because I'm not sure I would
5 include these in my list of articles to read. But at
6 the time, I did not have this.

7 Q. Okay. And by the way, I think we're actually
8 confused here, and I think it's my fault. I think this
9 number refers to the CNAP.

10 Do you see that?

11 The first number of 1.06, that refers to
12 AGRICAN?

13 A. Yes.

14 Q. That's my confusion. Sorry, Doctor, I was
15 confused as well.

16 So the CNAP is the 1.67. Do you see that?

17 A. Yes.

18 Q. And you talked a little bit on your direct
19 examination about how the size of the study is really
20 important, correct?

21 A. Yes.

22 Q. And did you look at the different sizes of
23 these cohorts?

24 A. Yes.

25 Q. And size -- do you remember how many lymphomas

1 there were in the CNAP study?

2 **A.** Let me see.

3 **Q.** I'm trying to find it myself.

4 **A.** I don't have that memorized.

5 **Q.** Sure. I'll find it.

6 It should be in Table 2. But this looks
7 wrong.

8 Here we are, okay.

9 So we have glyphosate. We have -- it's not
10 here. Let me find it. One second.

11 It's actually in yours in the supplemental
12 tables; it's not in mine. It's supplemental table
13 number 2.

14 Do you see it?

15 **A.** Are you talking about this one?

16 **Q.** Yeah, exactly.

17 **A.** Okay.

18 **Q.** Do you see that?

19 And it has here the number of non-Hodgkin's
20 lymphoma cases by study.

21 Do you see that?

22 **A.** Yes.

23 **Q.** All right.

24 And for AHS, for example, we're on lymphoma,
25 which is this one right here -- non-Hodgkin's lymphoma,

1 so it's this gray line right here, there was 466.

2 Do you see that?

3 A. Yes.

4 Q. And the CNAP study, where we have that 1.6
5 statistically significant result, there's 1396.

6 Do you see that?

7 A. Yes.

8 Q. So it's over -- about three times greater?

9 A. It is.

10 Q. And so the CNAP study is approximately three
11 times greater, and it has a statistically significant
12 result.

13 But you don't think that shows any evidence of
14 Roundup causing lymphoma?

15 A. Well, again, I think there's more to it than
16 this. There were more non-Hodgkin's lymphoma cases in
17 the CNAP study, but they were not more exposed cases.

18 Again, I don't have the study memorized. But
19 I believe in the CNAP, when they actually went back to
20 look how many people were actually exposed to
21 glyphosate, it was not a high number. That actually,
22 when they asked, were you exposed to glyphosate, there
23 was not a high number there.

24 So I think the exposure and the amount --
25 like, saying there's 1300 lymphomas is not the same as

1 saying 1300 that were exposed to glyphosate.

2 Q. Well, in the -- when you showed the other
3 case-control studies to the jury and you had the number
4 of exposed cases, that's the same number we're looking
5 at here, isn't it?

6 A. I don't think this 1300 is all exposed cases
7 is what I'm saying.

8 Q. I gotcha. Okay.

9 You would agree --

10 A. The 466 for the AHS study, that's exposed
11 cases.

12 Q. To glyphosate?

13 A. I believe so, yeah.

14 Q. I don't understand.

15 Why would they have only exposed cases to
16 glyphosate in this study but not CNAP?

17 A. Because CNAP did not look directly at
18 exposure; they did that crop matrix where they assumed
19 exposure. So we don't know if these people were exposed
20 or not. It's an assumption.

21 Q. You said the table we were just looking at,
22 they were all exposed to glyphosate?

23 A. No. The 446 for the Agricultural Health
24 Study --

25 Q. Yeah.

1 A. -- those should be exposed cases.

2 Q. Exposed to glyphosate or just generally?

3 A. I think it was exposed to glyphosate. If I
4 look back at the AHS study, I think it was 466 cases.

5 Q. But this is looking at all kinds of
6 pesticides, right?

7 A. But if you look at Andreotti 2015 --

8 Q. Sure.

9 A. -- I believe it's 466 exposed cases.

10 Q. No, I understand. But this study is looking
11 at all pesticides, right?

12 A. The Leon?

13 Q. Yeah.

14 A. Yes.

15 Q. And so why would they just use
16 glyphosate-exposed cases if they were looking at all
17 pesticides?

18 A. You know, I don't know. But 466 is the
19 glyphosate cases.

20 Q. I know. Because that chart is looking at
21 glyphosate-exposed cases, right?

22 A. Well, that's what they're trying to say. But
23 in the CNAP, the 1366 were not all glyphosate-exposed
24 cases.

25 Q. Okay.

1 All right. Well -- where did it go? Forget
2 it. Okay.

3 All right, Doctor. I just want to wrap up
4 here and turn you back over to Mr. Ismail. And I
5 appreciate your time and patience here.

6 But you mentioned briefly the Zhang article,
7 right?

8 A. Yes.

9 Q. And that was a meta analysis, right?

10 A. It was.

11 Q. And it shows a statistically significant
12 elevated rate for glyphosate, right?

13 A. That's what they reported, yes.

14 Q. Yeah. And they included the AHS, right?

15 A. They did.

16 Q. And that included data that was fully adjusted
17 and some data that wasn't adjusted?

18 A. Right. It included unadjusted data too.

19 Q. But most of it was actually driven by the AHS,
20 right?

21 A. I'm not sure about that because the Zhang data
22 used a subset of the AHS. So I'm not actually sure that
23 it's accurate to say that most of it was driven by the
24 AHS data.

25 Q. All right. And the Zhang authors, they were

1 formerly with the scientific advisory panel for the EPA,
2 right?

3 **A.** Okay. I wasn't aware of that.

4 **Q.** Well, it's right there in the article.

5 Do you want to look at it?

6 **A.** No, I believe you.

7 **Q.** Okay. And the scientific advisory panel for
8 the EPA, that's a group of scientists that review the
9 EPA's work, right?

10 **A.** Okay, yes.

11 **Q.** You've never participated in a scientific
12 advisory panel, right?

13 **A.** Not for the EPA.

14 **Q.** Okay. The Zhang authors also looked at rodent
15 studies, right?

16 **A.** They reported some, yes.

17 **Q.** They looked at specifically lymphoma, right?

18 **A.** They did.

19 **Q.** And they actually found elevated rates of
20 lymphoma in mice exposed to glyphosate, didn't they?

21 **A.** They report that, yes.

22 **Q.** And that's a pretty significant finding,
23 wouldn't you agree?

24 **A.** Well, again, I don't agree that that's a
25 pretty significant finding.

1 Because, again, the rodent data is not the
2 same as human data. The rodent data were rodents
3 exposed to like thousands of times the doses that a
4 human would be exposed to.

5 So, for me, rodent data is not that
6 significant. And it also was not that significant for
7 the EPA either.

8 So I would say it's in their article, but I'm
9 not quite sure it's a significant finding.

10 **Q.** Well, you understand the EPA, they didn't
11 actually find the lymphoma; that's Dr. Portier.

12 You understand that, right?

13 **MR. ISMAIL:** Objection, Your Honor.

14 **THE COURT:** Overruled, if she knows.

15 **THE WITNESS:** I don't know.

16 **BY MR. WISNER:**

17 **Q.** You haven't carefully looked at the animal
18 data; is that right?

19 **A.** No. I looked at it. The EPA -- the monogram
20 or OPP or whatever you want to call it -- it's got,
21 like, three pages of all the animal data they looked at
22 it.

23 And they summarized it there and basically say
24 they didn't see any increased risk in the mice models
25 for lymphoma.

1 So I think they're more -- if I had to pick
2 one, I would say that was more encompassing than what
3 Zhang presented in the article.

4 **Q.** Okay. For what it's worth, though, Zhang did
5 report lymphoma findings in six mice studied, correct?

6 **A.** They reported it, yes.

7 **Q.** And Dr. Zhang, she's a toxicologist, right?

8 **A.** You know, I honestly don't know that answer.

9 **Q.** Do you know if she's a toxicologist here at
10 Berkeley?

11 **A.** I don't know her specialty, no.

12 **Q.** All right.

13 In the Zhang study, they actually do a -- they
14 sort of plot -- they discuss all the various data on the
15 various epidemiological case-control studies that they
16 used.

17 Do you recall that?

18 **A.** Yes.

19 **Q.** And we actually created this from the Zhang.
20 It's from Table 7. And it talks about the various
21 studies that they included. The red ones are the cohort
22 studies, right?

23 **A.** Yes.

24 **Q.** That's Andreotti and De Roos '05?

25 **A.** Yes.

1 Q. And it has the various blue studies that are
2 the case-control studies, right?

3 A. Yes.

4 Q. Down here they have the various meta analysis
5 that have been done with all these combined?

6 A. Okay.

7 Q. Right? And you've actually reviewed the
8 Schinasi and the meta analysis, haven't you?

9 A. Yes.

10 Q. You've actually reviewed IARC meta analysis?

11 A. Yes.

12 Q. You reviewed the Chang and Delzel meta
13 analysis, right?

14 A. Yes.

15 Q. And, of course, you reviewed Zhang?

16 A. That's this one?

17 Q. That's right.

18 A. Yes.

19 Q. So we have right here something that the jury
20 has heard a lot about, but if you look over here, the
21 vast majority of these risk ratios are to the right of
22 1.

23 Do you see that?

24 A. Yes.

25 Q. And, in fact, if you look at the meta

1 analysis, every single one is to the right and
2 statistically significant, right?

3 **A.** Well, I think again, kind of the same thing
4 with the Zhang article, you have to look what's put into
5 the meta analysis.

6 Like Schinasi and Leon, again, I read these a
7 long time ago, but I know they included data that was
8 not adjusted. I know that for a fact. So if your meta
9 analysis is using unadjusted data, you're not going to
10 get a valid meta analysis.

11 The same thing with some of the ones you have
12 in the bluish color. Some of those did not use adjusted
13 data.

14 These are not all equal. These are comparing
15 kind of apples to oranges. You're not going to compare
16 a huge cohort study to Hardell's -- I don't know if you
17 have Hardell on there. You're not going to compare it
18 to a study of 12 people that didn't even report an
19 association or a multivariate analysis looking at other
20 pesticides.

21 So I think this is nice to see. But, again, I
22 think you really have to look at what were these
23 articles looking at for their data.

24 **Q.** Do you remember what my question was?

25 **A.** I think you asked me if that was significant.

1 Q. No, I'll read the question back to you.

2 A. Okay.

3 Q. So I asked you, so earlier, whoops. So my
4 question to you was...

5 **THE REPORTER:** Do you want me to read it back?

6 **MR. WISNER:** Yeah.

7 (Record read as follows: "Q. And, in fact,
8 if you look at the meta analysis, every single
9 one is to the right and statistically
10 significant, right?")

11 **THE WITNESS:** Okay. So yes.

12 **BY MR. WISNER:**

13 Q. Okay. So it's yes?

14 A. Yes.

15 Q. All right. And I understand you think that
16 the Schinasi and Leon authors were wrong?

17 A. Right. They included unadjusted data.

18 Q. And Leon, that's actually the same author from
19 the recent cohort study?

20 A. That's correct.

21 Q. Yeah. And we have IARC. You think they're
22 wrong?

23 A. Well, not wrong, but they included unadjusted
24 data.

25 Q. That's right. And Chang and Delzel, they're

1 wrong for including unadjusted data, too?

2 A. Yeah. That's not very accurate.

3 Q. Do you know who paid for that study?

4 A. I do not.

5 Q. Would it surprise you to learn it was
6 Monsanto?

7 A. One way or another, industries do sponsor
8 studies. It happens.

9 Q. Would it surprise you?

10 A. It wouldn't surprise me.

11 Q. And then Zhang, et al., this is obviously
12 their study, right?

13 A. Yes.

14 Q. And they give two assessments, one for
15 including the recent Andreotti study and one for using
16 the 2005 data, right?

17 A. Yes.

18 Q. And as you can see, it doesn't make a lick of
19 difference, right?

20 A. Right.

21 Q. So I guess what I want to ask you, Doctor, is:
22 Have you done a probability calculation of the
23 likelihood of having so many risk ratios be to the right
24 of 1 by chance alone?

25 A. Well, I don't think that's an accurate way to

1 assess the data, to do a probability. We're not
2 flipping a coin here. We're looking at actual data that
3 has other factors behind it. This is living, moving
4 data.

5 So a probability assessment, yeah, if I was
6 flipping a coin, if it was a 50/50 chance for each one,
7 that's not what we're looking at here. Each one of
8 these studies, I believe had higher likelihood or lower
9 likelihood of showing an association just based on the
10 study design.

11 Q. So to be clear, Doctor, earlier you were
12 saying that statistical significance, there's a
13 probability just as likely as it being on one end of the
14 tail as the other, right?

15 A. Yeah, the confidence interval.

16 Q. Yeah. That it's equally likely for it to be
17 in any of those spots, right?

18 A. Yes.

19 Q. And if the true risk was 1, and everything
20 that we saw was just random chance, wouldn't you expect
21 to see then odds ratios basically going back and forth
22 to the right -- left and right of 1?

23 A. No. These studies don't rely on random
24 chance; they actually use some science behind
25 formulating these. These are not random chance events.

1 There's more to it than that.

2 Q. I'm sorry, but for example right here, the
3 Eriksson study, 2008, that had the 2.0 that was the
4 unadjusted number, right?

5 A. Right.

6 Q. And then we had the adjusted number, which had
7 the 1.5, right?

8 A. Right.

9 Q. And that was no longer statistically
10 significant?

11 A. Correct.

12 Q. And you said, I don't care about that data
13 because I can't rule out chance, right?

14 **MR. ISMAIL:** Objection, Your Honor.

15 **THE COURT:** Restate, Counsel.

16 **BY MR. WISNER:**

17 Q. You don't consider that relevant data for
18 whether or not Roundup causes cancer because you can't
19 rule out chance, right?

20 A. Right. If the confidence interval includes 1,
21 then you cannot rule out chance as getting those
22 results.

23 Q. So when you have all these different studies
24 looking at the data, and they keep finding themselves to
25 the right of 1, have you considered what the probability

1 of that actually happening was if there was no real
2 risk?

3 **A.** No. Because again, I don't think it's a
4 probability exercise. These are all different studies.

5 So I'm not -- again, they're not taking
6 chance. They're not just throwing up a coin and saying,
7 is it going to be heads or tails? Then I would tell
8 you, yeah, you have to do a probability analysis.

9 But these are studies that are all different,
10 all designed differently -- well, some have some
11 overlapping data.

12 So it's not going to be up to chance that
13 you're going to get the results. Some of these are
14 better designed than others, so it's not just up to
15 chance.

16 **Q.** And isn't it true that when you consistently
17 see odds ratios to the right of 1 in different studies,
18 looking at different populations, and you see it across
19 the board statistically significant for meta studies,
20 doesn't that indicate that there's actually a risk here,
21 Doctor?

22 **A.** No. I think, again, it's the same thing.
23 You've got to look at what were they looking at? Is
24 this a case-control? Are they adjusting?

25 And then if it includes 1, it's not

1 significant. It doesn't matter if the dot goes to the
2 right of 1. If it includes 1, it's not significant.

3 Q. Now, Doctor, you previously -- oh, crap.
4 Almost out of time. Sorry.

5 All right, Doctor. I'll wrap up.

6 You testified previously that you -- every
7 week people come into your office that have lymphoma and
8 ask you if Roundup causes their cancer, right?

9 A. They do.

10 Q. Every week?

11 A. Pretty much, yeah.

12 Q. And when they ask you if Roundup was a cause
13 of their cancer, you tell them that it wasn't, right?

14 A. Well, initially, how it started was I didn't
15 even know there was this --

16 MR. WISNER: Your Honor, I'm trying to get her
17 out of here, if she can just answer yes or no to my
18 question.

19 THE WITNESS: It's not as simple as that.

20 THE COURT: Well, her answer is going to be
21 her answer.

22 BY MR. WISNER:

23 Q. All right. Please.

24 A. All right. Well, initially people were asking
25 about it, and I was like, well, let me look into this

1 because I'm getting asked every day is there an
2 association.

3 So I did kind of do a literature search
4 looking to see if there was anything published and
5 didn't really see anything.

6 Then, you know, it started happening more and
7 more, more and more publicity. And so once I got more
8 of the data -- especially from this trial, I've had more
9 data than I can memorize here -- I do tell them, I don't
10 think it causes non-Hodgkin's lymphoma.

11 Q. Okay. And you say that notwithstanding all
12 the data we've seen, right?

13 A. Correct.

14 Q. So if somebody comes into your office and
15 says, Doctor, I'm currently spraying Roundup every day,
16 and I have this lymphoma, should I stop spraying it,
17 what do you tell them?

18 A. You know, I really don't get into their
19 activities like this. But what I would say is there is
20 not totally any data that supports Roundup being a risk
21 factor for non-Hodgkin's lymphoma. So I can't say you
22 need to stop. Because I don't really consider it a risk
23 factor.

24 Q. And isn't it true you've never investigated
25 whether or not Roundup is a promoter of cancer, have

1 you?

2 A. No, I have investigated it.

3 Q. You have?

4 A. Yes. I've looked through over 50 studies and
5 countless numbers of people here on this data and have
6 not seen anything.

7 Q. Do you understand the difference between an
8 initiator and a promoter?

9 A. Yes.

10 Q. And have you specifically looked at whether or
11 not Roundup is a promoter of cancer?

12 A. In the literature?

13 Q. Yeah.

14 A. Yes.

15 Q. What studies have you looked at?

16 A. Well, I think any of the studies that show
17 like, the carcinogenicity, any of the animal data, none
18 of them show it being a promoter. I can't remember any
19 of them reporting that.

20 Q. You never looked at the George study, did you?

21 A. I don't know what that is.

22 MR. WISNER: No further questions, Your Honor.

23 **REDIRECT EXAMINATION**

24 **BY MR. ISMAIL:**

25 Q. Mr. Wisner put up -- I'll try not to hit

1 anyone with this -- put up this board that he asked you
2 some questions about, okay.

3 And he was asking you, well, gee whiz, there's
4 a bunch of numbers to the right of 1 here.

5 Do you recall this last set of questions?

6 **A.** Yes.

7 **Q.** All right.

8 So do the Zhang authors actually report the
9 totality of the Andreotti data?

10 **A.** No, they don't.

11 **Q.** So if they actually included what the
12 Andreotti authors reported in their study, where would
13 that point estimate be?

14 **A.** I can only speculate, but it would probably
15 be --

16 **Q.** Just for Andreotti itself --

17 **A.** Right.

18 **Q.** -- they report a 1.12.

19 You recall we went over with the jury the
20 actual results of Andreotti?

21 **A.** Yes.

22 **Q.** And if you included all the data, just for
23 Andreotti, would that point estimate be to the left of
24 1?

25 **A.** It would be.

1 Q. And if you included -- I see Leon, the study
2 that just came out last month, that had an odds ratio of
3 .95, correct?

4 A. That's correct.

5 Q. And that would be a point estimate to the left
6 of 1?

7 A. It would be, yes.

8 Q. And we looked at the NAPP. The NAPP isn't
9 included in here, right?

10 A. That's correct.

11 Q. And if we looked at the self-responders from
12 NAPP, do you recall that, the point estimate was below
13 1?

14 A. Yes, it was.

15 Q. And so that would be another number over here,
16 correct?

17 A. Yes.

18 Q. And so is it fair to say to the jury all the
19 point estimates for glyphosate products like Roundup are
20 to the right of 1 in the epidemiology studies?

21 A. No, that's not fair.

22 Q. So you were asked a lot of questions about
23 Andreotti and the AHS study, and I'm not going to go
24 over all that in great detail. But there were some
25 questions about a paper by Dr. Blair -- that's not

1 right.

2 Well, let me put up the Andreotti paper.

3 A. 1676?

4 Q. So this is the paper Counsel showed you,
5 right?

6 A. Yes.

7 Q. So he told you about some of the authors here.

8 And this paper, he was asking you about
9 concerns about various methodology designs in the AHS
10 study, whether there was misclassification.

11 You remember that line of questions?

12 A. Yes.

13 Q. And were some of the very same authors
14 actually in the Andreotti paper?

15 For example, we see Dr. Lynch. So the paper
16 that Mr. Wisner showed you included some authors in the
17 later -- well, let me ask this: The Andreotti paper,
18 did that get published after the paper that Mr. Wisner
19 showed you?

20 A. The 2018, yes.

21 Q. And so even with the paper that Mr. Wisner
22 showed you, some of those same authors published in the
23 Andreotti paper, correct?

24 A. Correct.

25 Q. And if we go to their conclusion, these same

1 authors that talked about whether there's a concern for
2 misclassification and whether there's non-differential
3 exposure, all those questions he asked you.

4 If you go to the conclusion in the abstract,
5 what did these authors conclude -- including some of the
6 very same authors he referenced to you a moment ago --
7 as to the question of non-Hodgkin's lymphoma?

8 A. They concluded that there was no association.

9 Q. Using the data from the Agricultural Health
10 Study?

11 A. Yes.

12 Q. Now, you were asked some questions about the
13 NAPP?

14 A. Yes.

15 Q. And I believe Counsel showed you the data this
16 way.

17 Do you recall he pulled out that one point
18 estimate?

19 A. Yes.

20 Q. And as someone who has training in
21 epidemiology and is a cancer researcher, is it
22 appropriate in your view, Doctor, just to select one
23 number from the analyses presented here and draw your
24 conclusions from that?

25 A. No.

1 Q. What should you do instead?

2 A. You have to look at the totality of the data.

3 Q. And when you actually look at the totality of
4 the data here, what does it show?

5 A. It doesn't show an association.

6 Q. And he asked you, well, couldn't someone who
7 used it for more than three and a half years only spray
8 once or twice a year.

9 Do you recall that question?

10 A. Yes.

11 Q. Well, as to the frequency, is there any
12 markation here that the individual was using glyphosate
13 more frequently than in the years analysis?

14 A. No, there isn't.

15 Q. And so someone who used it for 30 years in
16 this study, what was their relative risk?

17 A. There was no association.

18 Q. Would this be another point estimate to the
19 left of 1?

20 A. It could be.

21 Q. And if someone used it more than seven
22 lifetime days, is there any basis whatsoever to say
23 there's an increased risk --

24 A. No.

25 Q. -- in the NAPP?

1 You were asked some questions about subtype
2 finding in the Leon, the DLBCL in the pooled analysis.

3 **A.** Yes.

4 **Q.** You told the jury that that was not
5 statistically significant?

6 **A.** Yes.

7 **Q.** Have there been other studies that looked at
8 DLBCL?

9 **A.** Yes.

10 **Q.** Any of those show an increased risk as a
11 subtype?

12 **A.** They did not.

13 **Q.** I believe that's all the questions I have for
14 you. Let me just double-check with my colleagues.

15 As to that final question, Dr. Bello --

16 **MR. WISNER:** It's well beyond the scope,
17 Your Honor.

18 **THE COURT:** I don't know what it is.

19 **MR. ISMAIL:** It's an analysis of DLBCL. I'm
20 sorry, Your Honor.

21 **THE COURT:** I don't recall that we touched on
22 this.

23 **MR. ISMAIL:** Counsel asked about the DLBCL
24 finding from Leon. I'm putting it in the context of all
25 the others.

1 **MR. WISNER:** Your Honor, I didn't touch any of
2 those studies in the subtype analysis.

3 If they want to do this, she's going to have
4 to come back tomorrow, and I don't want to do that.

5 **MR. ISMAIL:** I'll withdraw the question.

6 **THE COURT:** Okay.

7 **BY MR. ISMAIL:**

8 **Q.** Any basis in the literature you've seen to
9 suggest that glyphosate products like Roundup increase
10 the risk of DLBCL when you look at the totality of the
11 data?

12 **A.** No.

13 **Q.** He was asking you about how you select which
14 particular pesticides to control for.

15 Do you recall that?

16 **A.** Yes.

17 **Q.** And he was talking about Dr. Blair's paper and
18 whatnot and other researchers.

19 Did the researchers at the National Cancer
20 Institute make a decision as to which are the
21 appropriate pesticides to control for?

22 **A.** They did.

23 **Q.** Did they report their analysis after deciding
24 which are the ones -- were the appropriate ones to
25 control for?

1 A. They did.

2 Q. Is that the data you shared with the jury?

3 A. Yes.

4 Q. The NAPP researchers we looked at, did they
5 select which pesticides they wanted to control for?

6 A. They did.

7 Q. Did they just willy-nilly pick all the
8 pesticides in the world, or did they make specific
9 decisions which to control for?

10 A. They made specific decisions.

11 Q. And when you shared that data with the jury,
12 were you looking at the adjusted data based on how those
13 researchers controlled for pesticide exposure?

14 A. Yes.

15 Q. And based on that, was there any increased
16 risk shown for NHL?

17 A. There was not.

18 **MR. ISMAIL:** Thank you, Doctor.

19 **MR. WISNER:** Very short, very short. Just on
20 those points.

21 **RE CROSS - EXAMINATION**

22 **BY MR. WISNER:**

23 Q. You mentioned that you have to look at the
24 totality of data; is that right?

25 A. Yes.

1 Q. But that totality of data does not include to
2 you data that's not statistically significant, right?

3 A. Well, you look at it. But if you're going to
4 use it to make your decision, you wouldn't take data
5 that's not statistically significant.

6 Q. Okay. And also when it comes to looking at
7 the totality of data, you don't consider as part of your
8 causation assessment data that wasn't adjusted for other
9 pesticides?

10 A. Well, again, I think it's kind of the same.
11 You consider it. If you see the data, you can look at
12 it, but when you see it wasn't adjusted for other
13 pesticides, it doesn't carry as much weight as the
14 others.

15 Q. Not only doesn't it carry weight; you don't
16 consider it at all.

17 A. I wouldn't say I don't consider it. I
18 consider everything.

19 Q. Well, just now when I showed you those meta
20 analyses, you disregarded it because they included
21 unadjusted data, right?

22 **MR. ISMAIL:** Objection, Your Honor.

23 **THE COURT:** Overruled.

24 **THE WITNESS:** No. I looked at those. I
25 looked at all those studies. I didn't just disregard

1 them.

2 **MR. WISNER:** Okay.

3 Thank you, Your Honor.

4 Thank you so much for your time, Dr. Bello.

5 **THE COURT:** Thank you, Dr. Bello. Well, let
6 me just chat with the jury.

7 Ladies and gentlemen, we're done for the day.
8 We will start again tomorrow at 9:00 a.m. Please don't
9 think about this case when you walk out the door, juror
10 amnesia, and have a good evening.

11 (The following proceedings were heard out of
12 the presence of the jury:)

13 **MR. ISMAIL:** We may have time tomorrow to
14 discuss the charge.

15 Counsel have discussed it, and it may be a
16 shorter day in terms of the evidence tomorrow than 4:31.

17 **THE COURT:** Promises, promises.

18 **MR. ISMAIL:** Indeed.

19 **MR. WISNER:** It will.

20 **MR. ISMAIL:** But if the Court would rather
21 defer that, that's fine. But there may be some time at
22 the end of the day tomorrow.

23 **THE COURT:** You said jury instructions?

24 **MR. ISMAIL:** I said "the charge." It's a
25 Chicago phrase.

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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.)

1 State of California)
2 County of Alameda)

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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;

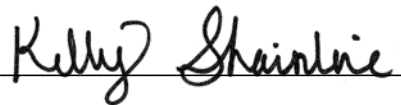
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That we are not a party to the action or related to a party or counsel;

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