

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

Before The Honorable Vince Chhabria, Judge

EDWARD HARDEMAN,)	
)	
Plaintiff,)	
)	
VS.)	NO. C 16-00525 VC
)	
MONSANTO COMPANY,)	
)	
Defendant.)	
_____)	

San Francisco, California
Friday, March 8, 2019

TRANSCRIPT OF PROCEEDINGS

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I N D E X

Friday, March 8, 2019 - Volume 10

PLAINTIFF'S WITNESSESPAGE VOL.REEVES, WILLIAM

By Video Testimony (not reported)

1395 10

FARMER, DONNA

By Video Testimony (not reported)

1395 10

DEFENDANT'S WITNESSESPAGE VOL.MUCCI, LORELEI

(SWORN)

1396 10

Direct Examination by Ms. Matthews Johnson

1396 10

Cross-Examination by Ms. Wagstaff

1458 10

Redirect Examination by Ms. Matthews Johnson

1538 10

LEVINE, ALEXANDRA

(SWORN)

1547 10

Direct Examination by Mr. Stekloff

1548 10

E X H I B I T STRIAL EXHIBITSIDEN EVID VOL.

454

1396 10

PROCEEDINGS

1 Friday - March 8, 2019

8:21 a.m.

2 P R O C E E D I N G S

3 ---000---

4 (Proceedings were heard out of presence of the jury:)

5 **THE COURT:** Hi, everybody. So you had something you
6 wanted to talk about?

7 **MR. STEKLOFF:** Just a few things before Dr. Levine
8 testifies so that I stay completely within the bounds of the
9 various orders that --

10 **THE COURT:** Is Dr. Levine testifying first?

11 **MR. STEKLOFF:** No. Dr. Mucci is testifying first. I
12 figured instead of on a short break, it was a better time to
13 cover it.

14 There are really three things to cover, Your Honor. The
15 first is I'm not re-visiting any of your rulings on the
16 questions we proposed for Dr. Levine.

17 **THE COURT:** Okay.

18 **MR. STEKLOFF:** With respect to Dr. Arber, we had
19 proposed a question we did not propose to Dr. Levine. You had
20 allowed that question.

21 **THE COURT:** Yes.

22 **MR. STEKLOFF:** I want to -- I would like to ask that
23 question, but replacing the word "pathologist" with
24 "oncologist" for Dr. Levine, and I just wanted to make sure
25 that was okay.

PROCEEDINGS

1 **THE COURT:** You have the same objection?

2 **MS. MOORE:** Yes, Your Honor. And given your ruling,
3 we understand.

4 **THE COURT:** That's overruled. That's fine.

5 **MR. STEKLOFF:** Second, Your Honor -- and I don't want
6 to overdo this -- but in the same timeframe that I'm asking
7 these questions, I am going to shift to specific causation and
8 Mr. Hardeman and probably a few questions about
9 Dr. Weisenburger's differential methodology, so not his general
10 causation opinions.

11 I'm sort of just flagging that maybe a little leeway -- I
12 don't think I will be asking maybe really leading questions,
13 but I do want to ask questions that are careful so that if they
14 are too open-ended, I think they would be difficult. For
15 example, Why don't you think Roundup was a causation of
16 Mr. Hardeman's cancer, that could lead to a path that we don't
17 want to go down. So sort of just flagging -- if it is okay, I
18 would like some leeway on a little bit of leading so I'm
19 careful.

20 **THE COURT:** I think that makes sense given that we
21 want to cabin the testimony.

22 **MS. MOORE:** And we're fine with that in the answer,
23 Your Honor. It depends on the question obviously.

24 **THE COURT:** Yeah, I mean, obviously once we get into
25 the meat of it --

PROCEEDINGS

1 **MR. STEKLOFF:** Thank you, Your Honor.

2 And then we are not seeking to re-visit your ruling on
3 Dr. Arber and BCL6, but I wanted to flag -- I wanted to raise
4 the issue of -- I think you think that similar testimony would
5 be appropriate from Dr. Levine in her report at page 23, and
6 she --

7 **THE COURT:** Testimony similar to what I'm allowing for
8 Dr. Arber?

9 **MR. STEKLOFF:** No. Sorry. Testimony -- testimony
10 that you were precluding from Dr. Arber about the BCL6 gene
11 mutation and its relationship to hepatitis C. And I have a
12 copy of the report if it is easier, but in her report,
13 Your Honor, on page 23 --

14 **THE COURT:** I'm sensing, by the way -- I'm going to
15 pull it up. But I'm sensing that this may be one we need to
16 spend a little more time talking about during a break because I
17 want to bring the jury right in at 8:30 today.

18 **MR. STEKLOFF:** No problem.

19 **THE COURT:** Okay. What page did you say?

20 **MR. STEKLOFF:** 23, second-to-last page, Your Honor.

21 **MS. MOORE:** It is about Dr. Shustov, Your Honor.

22 **THE COURT:** Wow, Shustov said that in his report?

23 **MS. MOORE:** Your Honor, I actually don't know. I
24 don't have Shustov's report with me. We haven't called him to
25 testify in the case. The jury hasn't even heard Dr. Shustov's

PROCEEDINGS

1 name, so we don't see any relevance at all to bringing this up.
2 I think it is another way to get in evidence that the Court has
3 excluded.

4 **THE COURT:** Yeah, I mean, it appears from Dr. Levine's
5 report -- in the way she describes Dr. Shustov's report -- that
6 Dr. Shustov said something that was clearly wrong, and she is
7 rebutting it; but nobody on behalf of the Plaintiff at trial
8 has said that clearly wrong thing.

9 And so I don't -- it is not clear to me just from -- I'm
10 only just glancing at this. It is not clear why -- again, it
11 is not clear that there is anything for her to rebut in that
12 regard.

13 **MR. STEKLOFF:** And I agree, Your Honor, that
14 Dr. Weisenburger did not specifically mention the BCL6 gene, so
15 it was a little different than what Dr. Shustov had in his
16 report. Dr. Weisenburger did have a blowup of the -- of what
17 he claimed to be a specific patient that was just like
18 Mr. Hardeman who had specific genetic translocations that
19 disappeared following antiviral treatment.

20 **THE COURT:** Yeah, but that sounds like you are arguing
21 the same point that you were arguing about Dr. Arber. I will
22 tell you -- I will look at this a little more closely, and we
23 can continue this conversation maybe over the lunch break or
24 something like that.

25 How long do you anticipate Dr. Mucci to take? You said

PROCEEDINGS

1 like an hour, hour and a half, something like that.

2 **MS. MATTHEWS JOHNSON:** That's where we are aiming for.

3 **MS. WAGSTAFF:** I have something I need to raise about
4 Dr. Mucci.

5 **THE COURT:** Okay.

6 **MS. WAGSTAFF:** Last Friday we received an updated
7 materials considered list. And as you recall, Dr. Mucci is
8 providing testimony on epidemiology only. She has not offered
9 throughout the entire litigation anything on the other two
10 pillars; and her updated reliance list included the mechanistic
11 studies and some studies on the other pillars of science.

12 This morning I talked to Monsanto's counsel to ask to what
13 extent they are going to elicit testimony on these, and we
14 think that any testimony related to a reliance or a
15 consideration of mechanistic data or toxicology data to form
16 her opinion or even to support her opinion is a new opinion
17 that has not gone through the proper steps and should not be
18 allowed this late in the game and was not disclosed previously.
19 We think that is different than just updating your material
20 list with new --

21 **THE COURT:** Well, I have pulled up her report.

22 **MS. WAGSTAFF:** Sure.

23 **THE COURT:** I'm -- it looks like she did go through
24 the Bradford-Hill analysis. Am I right about that?

25 **MS. WAGSTAFF:** She did not do a Bradford-Hill

PROCEEDINGS

1 analysis.

2 **THE COURT:** Okay. I'm sorry.

3 **MS. WAGSTAFF:** She did not do a Bradford-Hill
4 analysis. She did not do a weight of the evidence analysis,
5 and she only opined on the epidemiology. She has stated that
6 in the Johnson trial; and these articles on mechanistic data,
7 the Bolognesi and the Paz-y-Mino, were added last Friday.

8 **MS. MATTHEWS JOHNSON:** Just to be clear, Dr. Mucci
9 does not intend to offer an opinion on any mechanistic or
10 animal studies. She did update her materials considered list.
11 There have been updates across various litigations, just to be
12 clear; and those were just notifying things she has read.
13 There is some hepatitis C articles that are now on there.
14 There is going to be no testimony from her at all about
15 hepatitis of any sort, but these are materials that she has
16 looked at.

17 As we explained, it is not a reliance issue. It is simply
18 an issue of these are things that she has additionally looked
19 at. Her testimony is going to be about epidemiology.

20 I do think in a prior case there was cross-examination on
21 the question of whether she looked at other studies. If that
22 comes up on cross-examination, her truthful answer would be
23 Yes, I looked at these other studies. So I think that's the
24 way that it would come out if it came out at all.

25 **THE COURT:** Okay.

PROCEEDINGS

1 **MS. WAGSTAFF:** So as long as it will not come out on
2 direct that she has considered more than one of the pillars for
3 opining her opinion, then I'm okay with that because I will not
4 elicit that on cross.

5 **MS. MATTHEWS JOHNSON:** No. I think the issue is, as I
6 said, she is not relying on anything else. So if we do -- are
7 you saying she can't say she has looked at these studies at
8 all? I want to make sure because we would need to instruct the
9 witness if she has to actually say she actually didn't read the
10 studies.

11 **THE COURT:** Well, I mean, I don't understand why that
12 would come out on direct if she is coming out to -- if she is
13 coming here to offer an opinion on the epidemiology.

14 **MS. MATTHEWS JOHNSON:** Okay. And she does have a view
15 on epidemiology being the most important, so that is also part
16 of her testimony.

17 **THE COURT:** Okay. All right.

18 There were problems on BART today, and we have one juror
19 who is a few minutes late because of BART. So we will probably
20 start in just four or five minutes. I will see you-all then.

21 **MS. MOORE:** Thank you, Your Honor.

22 (Recess taken at 8:30 a.m.)

23 (Proceedings resumed at 8:38 a.m.)

24 (Proceedings were heard in the presence of the jury:)

25 **THE COURT:** Good morning, everybody.

PROCEEDINGS

1 Okay. You have a little bit more, testimony, right? Why
2 don't you go ahead and put that on.

3 **MS. WAGSTAFF:** Your Honor, Plaintiffs continue the
4 deposition through their Monsanto corporate witness,
5 Dr. William Reeves.

6 **(Video was played but not reported.)**

7 **THE COURT:** Is that it for Dr. Reeves?

8 **MS. WAGSTAFF:** I believe that is it for Dr. Reeves.
9 And, your Honor, Plaintiffs would move into evidence Trial
10 Exhibits 100, 505, 506, 508, 509, 510, 511, 512, 514 and 515.

11 **MR. STEKLOFF:** If I can just review them with counsel
12 on a break.

13 **THE COURT:** Sure.

14 **MR. STEKLOFF:** I don't expect any issues. I think we
15 would move in the exhibit that was shown in the latter portion,
16 which I think was Exhibit 95.

17 **THE COURT:** Okay.

18 All right. Next witness.

19 **MS. MOORE:** Your Honor, Plaintiffs call Dr. Donna
20 Farmer, another employee of Monsanto.

21 **THE COURT:** Go ahead.

22 **(Video was played but not reported.)**

23 **MS. MOORE:** Your Honor, Plaintiff would move to enter
24 into evidence Trial Exhibit 454.

25 **MR. STEKLOFF:** No objection, Your Honor.

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1 **THE COURT:** Okay. It will be admitted.

2 (Trial Exhibit 454 received in evidence)

3 **MR. STEKLOFF:** Just to be clear, it was the e-mail --
4 no objection, Your Honor.

5 **THE COURT:** Anything else from the Plaintiffs?

6 **MS. WAGSTAFF:** Your Honor, Plaintiff rests.

7 **MR. STEKLOFF:** Your Honor, we have a motion but we
8 will reserve it for later.

9 **THE COURT:** That sounds fine.

10 Does Monsanto have any witnesses?

11 **MS. MATTHEWS JOHNSON:** Yes, we do, Your Honor.

12 Monsanto calls Dr. Lorelei Mucci.

13 LORELEI MUCCI,

14 called as a witness for the Defendant, having been duly sworn,
15 testified as follows:

16 **THE CLERK:** State your full name and spell your last
17 name for the record.

18 **THE WITNESS:** My name is Lorelei Mucci, L-O-R-E-L-E-I,
19 M-U-C-C-I.

20 DIRECT EXAMINATION

21 **BY MS. MATTHEWS JOHNSON**

22 **Q.** Good morning, Doctor.

23 **A.** Good morning.

24 **Q.** Would you please introduce yourself to the jury?

25 **A.** Yes, my name is Lorelei Mucci. I live in Boston,

1 Massachusetts. And I work at Harvard University at the School
2 of Public Health.

3 Q. What is your profession?

4 A. I'm a cancer epidemiologist.

5 Q. Do you have some slides that describe your background and
6 education?

7 A. Yes, I do.

8 **MS. MATTHEWS JOHNSON:** May we have permission to
9 publish the first slide, Your Honor?

10 **THE COURT:** Go ahead.

11 **BY MS. MATTHEWS JOHNSON**

12 Q. Doctor, what is a cancer epidemiologist?

13 A. So an epidemiologist is one of the scientific disciplines
14 of public health. Epidemiology focuses on trying to understand
15 why diseases occur in humans, and so cancer epidemiology
16 specifically focuses on trying to understand why cancer occurs
17 in humans and how to prevent cancer from happening.

18 Q. Now, have you ever met a Dr. Beate Ritz?

19 A. I have not.

20 Q. Well, she was here last week and she testified, and she
21 said that you were a "young colleague who had no training, no
22 specialty in going out into the field or asking people about
23 their work or their environmental exposures."

24 Let me ask you: Is that accurate?

25 A. No, that is not correct.

1 Q. Please explain.

2 A. So for the -- I have worked as an epidemiologist for the
3 past 16 years and have been involved in a number of different
4 studies collecting information from individuals participating
5 in these studies. And most recently I'm leading a global study
6 of prostate cancer patients where we are asking the patients
7 about environmental exposures, what lifestyle factors they are
8 engaged in, what medications they are taking and what their
9 quality of life is. So I have been very engaged in collecting
10 data from a range of different patient populations.

11 Q. Okay. And in this study is it across many countries? Is
12 it just here in the United States or is it across many
13 countries?

14 A. So this study is being conducted in the United States and
15 in nine other countries around the world.

16 Q. Involving how many men?

17 A. So we are recruiting 5,000 men for this study.

18 Q. Tell us the different types of cancers that you have been
19 involved with researching as a cancer epidemiologist.

20 A. I have been studying several different types of cancers
21 throughout my experience. I have worked in the areas of breast
22 cancer and prostate cancer. I have looked at colorectal
23 cancer. Liver cancer. I have done some work also in childhood
24 cancers, really several different cancer types.

25 Q. Let's take a step back a bit and talk about where you went

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1 to school, where you grew up.

2 **MS. MATTHEWS JOHNSON:** And if we may, may we publish
3 the next slide, please?

4 **MS. WAGSTAFF:** No objection, Your Honor.

5 **THE WITNESS:** So actually, I grew up in Boston, just
6 outside of Boston. I attended for my bachelor's degree, Tufts
7 University. I studied biology in Tufts, and I graduated in
8 1989. Afterwards, I moved out to Seattle for a few years where
9 I worked in a research lab looking at doing experiments in
10 cells.

11 I moved to Wyoming also for a year where I worked with the
12 pathologist for the State of Wyoming. And then after coming
13 back to Boston, I attended Boston University where I received
14 my master's degree in epidemiology and biostatistics, and then
15 I completed my doctoral degree in epidemiology at Harvard.

16 **BY MS. MATTHEWS JOHNSON**

17 **Q.** And did you do any postgraduate research and study?

18 **A.** Yes. So after completing my doctoral degree, it is pretty
19 common to do what is called a postdoctoral fellowship. I spent
20 time as a postdoctoral fellow at the Karolinska, which is one
21 of the leading medical epidemiology institutes in Sweden.

22 **Q.** I think the jury has heard in Sweden they keep really,
23 really accurate health records; is that correct?

24 **A.** Yes, they do. So they are able to track health, including
25 cancer, in the population. And for cancer research in Sweden,

1 they have been studying cancer at a national level for about 60
2 years.

3 **Q.** So why did you go into this field of studying cancer?

4 **A.** So there were really both personal and professional
5 reasons. From a professional perspective, you know, 16 million
6 individuals around the world are diagnosed with cancer each
7 year. It is really the leading cause of mortality in the
8 world. So as a public health researcher, I wanted to have an
9 impact on improving the health through reducing cancer
10 incidence and trying to understand what the causes are.

11 On a personal level I have lost two grandparents to
12 cancer. I have lost two aunts also to cancer, and have had
13 several family members and friends who have been diagnosed with
14 cancer, so both professionally and personally.

15 **Q.** You mentioned I think that you have -- I think a couple of
16 jobs, if I'm not mistaken.

17 **MS. MATTHEWS JOHNSON:** May we publish the next slide?

18 **THE COURT:** Any objection?

19 **MS. WAGSTAFF:** No objection.

20 **MS. MATTHEWS JOHNSON:** So -- I'm sorry. Let's go
21 back. Sorry about that. Thank you.

22 **BY MS. MATTHEWS JOHNSON**

23 **Q.** All right. Tell us what you do as an associate professor
24 at Harvard.

25 **A.** So I have several different responsibilities as a faculty

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1 member. One of them is teaching, so I currently teach a course
2 on the epidemiology of cancer. I mentor our master students
3 and doctoral students in cancer epidemiology, and then I'm also
4 involved in research as well. And at the School of Public
5 Health, I also am responsible for overseeing the cancer
6 epidemiology and cancer prevention program.

7 **Q.** What is the Dana Farber Harvard Cancer Center?

8 **A.** So the Dana Farber Harvard Cancer Center is a center that
9 is funded by the National Cancer Institute. It brings together
10 seven different institutions from around the Boston medical
11 area, including the Harvard School of Public Health. It also
12 institutes, like, the Dana Farber Cancer Institute, Mass
13 General Hospital. And the goal of this cancer center is to
14 bring together researchers across all of the disciplines, so
15 bringing together physicians, population science -- including
16 epidemiology and basic science -- with the idea of trying to
17 accelerate our understanding for cancer prevention and
18 treatment of cancer.

19 **Q.** How long has it been around?

20 **A.** So it's one of the -- it is the oldest cancer center in
21 the country. The idea of the cancer center started in 1947,
22 and it was first funded by the National Cancer Institute in the
23 1980s. And it is currently also the largest cancer center in
24 the country with more than 1,200 scientists and physicians that
25 are part of this cancer center.

1 Q. So tell me about this idea of team science. What is team
2 science?

3 A. So in cancer research now, we are breaking down what we
4 call the silos. So people are working really across different
5 disciplines together. So as an example, as an epidemiologist
6 in my own research, I work very closely with physicians as well
7 as basic scientists with the idea that people coming from these
8 different points of view of cancer research can help inform
9 each other and really provide the best science to tackle the
10 questions, both in prevention and treatment. So the idea of
11 working together, you are going to be much more productive and
12 find new discoveries much more quickly than if you work just in
13 isolation.

14 Q. So we are not going to go through your 300-plus published
15 papers or the chapters that you have edited in textbooks, but
16 just give us a brief overview of sort of the areas in which you
17 have published.

18 A. Yeah. So the work I have done in cancer research really
19 is in many different areas. You know, one of the areas that I
20 have worked on is, as I said, trying to understand why cancer
21 occurs. So it could be looking at things like physical
22 activity or obesity or even inherited factors like family
23 history or genetic factors.

24 I have also done some research -- once individuals are
25 diagnosed with cancer -- trying to understand whether specific

1 factors, for example, looking again at physical activity. So
2 once a person is diagnosed with cancer, looking at whether
3 engaging in even regular physical activity -- walking
4 briskly -- could actually lower the risk of different cancer
5 types. And then also looking at quality of life and trying to
6 understand after a person is diagnosed with cancer, how can we
7 improve both survival from cancer but also quality of life for
8 individuals.

9 **Q.** So you have been on the side where you have been the
10 person writing the article and submitting it. Have you ever
11 been on the other side? They've talked about peer reviewed.
12 Have you ever been a peer reviewer?

13 **A.** Yes. So I currently am a peer reviewer for 40 different
14 medical and cancer journals. In addition, I recently became
15 the senior editor for a journal from an organization called the
16 American Association for Cancer Research. It is the leading
17 international research agency on cancer, and one of their
18 journals is called Cancer Epidemiology, Biomarkers &
19 Prevention. I just became the senior editor for that journal.

20 **Q.** Okay. I and going to read that one more slowly. So you
21 are the senior editor of the cancer -- Journal of Cancer
22 Epidemiology, Biomarkers & Prevention?

23 **A.** Correct.

24 **Q.** And as a senior editor, what is that role?

25 **A.** As senior editor our role is to first -- when a person

1 submits their manuscript to us, we review to see the quality of
2 the science, to see whether it is a good fit for the people who
3 have been reading our journal; and many articles actually at
4 that point will get rejected and not sent out for a formal
5 review by external people.

6 So we -- what we then do, if we decided it met a certain,
7 you know, level of quality, we would then send it out to two or
8 three independent experts for them to review; give critiques of
9 the study. And then once we got that data back, as the senior
10 editor, we would make a decision whether there is still sort of
11 large potential gaps in the evidence or if we should -- if we
12 think it is a good-quality study.

13 **Q.** Is it fair to say that not everything that is in draft
14 form is ever going to make it into a publication?

15 **A.** Yes. Absolutely. That is absolutely correct.

16 **Q.** I would like to talk just briefly about some of your areas
17 of research.

18 **MS. MATTHEWS JOHNSON:** We are up and running. Thank
19 you so much.

20 **BY MS. MATTHEWS JOHNSON**

21 **Q.** Let's actually start at the bottom here. It says you are
22 program chair for the Prostate Cancer Research Program. Just
23 tell us just a little bit about what that is.

24 **A.** Yeah. So the U.S. Army actually is one of the big funders
25 for cancer research. It first started in the 1980s with breast

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1 cancer, and then the second program they funded research on was
2 prostate cancer, which is an area that I do a lot of research
3 in. And so currently the prostate cancer research program from
4 the U.S. Army funds \$100 million per year in research.

5 And serving on the programmatic committee, my role is to
6 make funding decisions about grants that are submitted to our
7 agency to review the quality and think about which are the ones
8 that are going to have the biggest impact for patients. And
9 then also to set what we say is the vision for the next year,
10 what are the types of grants we want to fund. For example, a
11 big area of interest for us is supporting young investigators
12 early on in their careers. So I have just taken on as program
13 chair of the committee.

14 **Q.** And what is the amount that the funding is? I'm sorry. I
15 might have missed it.

16 **A.** Currently we are funding -- the U.S. Army funds
17 \$100 million in prostate cancer every year.

18 **Q.** Now, next I want to talk about a couple of studies: The
19 Nurses' Health Study and the Health Professionals Follow-Up
20 Study.

21 First tell us about the Nurses' Health Study. Is that a
22 cohort study?

23 **A.** Yes. It is one of the earliest cohort studies. It has
24 been going on for about 40 years. It was -- back in the
25 1970's, the investigators recruited 130,000 female nurses. The

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1 idea of recruiting nurses was, first of all, they were
2 interested in health and could provide good quality health
3 information. These nurses had been followed regularly
4 throughout these four decades with questionnaires and other
5 types of ways of collecting information, also including linkage
6 with cancer registries, to identify which of the women have
7 developed different types of cancer.

8 **Q.** It says here you have served as an advisory board member.
9 What are the duties of an advisory board member?

10 **A.** Yeah. So in epidemiology, especially with these cohort
11 studies that go on for many years, it is pretty standard
12 practice to set up external advisory boards. And this is
13 bringing in scientists and researchers who are not directly
14 involved in the study but can provide an independent evaluation
15 and critique of how this study is being done and whether there
16 is any problems that they see with the study, whether there is
17 any potential ways that they can help improve the quality of
18 the study.

19 **Q.** Now, the Health Professionals Follow-up Study, tell us
20 about that one just briefly, please.

21 **A.** Yeah. So the Health Professionals Follow-up Study
22 actually was developed as a companion study to the Nurses'
23 Health Study. So this study includes all men. It started in
24 the 1980s, and there were 50,000 men that were initially
25 recruited. Again, these were veterinarians, optometrists and

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1 dentists with the idea that these would be men who really cared
2 about their health and also could provide very good-quality
3 information about their health.

4 **Q.** And your role as a co-principle investigator is what?

5 **A.** So I am the lead -- one of the two lead investigators on
6 this study, and I'm responsible for the overall scientific
7 conduct of the study. So the quality of the data, getting
8 funding to support the study, reviewing all of the research
9 proposals as well as the research results coming out of the
10 study, so I'm one of the two people responsible overall for
11 this study.

12 **Q.** Now, you said the Nurses' Health Study happens to be all
13 women. The Health Professionals Study happens to be all men.
14 Now, is that information that you are getting out of those
15 studies just apply to nurses or just apply to men who are
16 dentists, for instance?

17 **A.** No, absolutely not. In fact, the results from these two
18 cohorts have really provided important information that has led
19 to new discoveries of the causes of cancer, for example, so
20 they have relevance well beyond nurses and health
21 professionals.

22 **Q.** Now, just tell us just a few things that you have learned
23 just over the course of working with these studies.

24 **A.** Yeah. So one of the important findings that have come out
25 of these two studies has been really establishing that regular

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1 aspirin use is associated with a lower risk of colorectal
2 cancer. That is now a finding that is accepted by the U.S.
3 Preventive Service Task Force.

4 Another really important area of research that these two
5 studies have participated in is helping to refine our
6 understanding that regular physical activity and really just
7 even -- as I mentioned, just brisk walking can lower the risk
8 of several different types of cancer, including breast cancer,
9 colorectal cancer and advanced prostate cancer.

10 There is other health outcomes we have looked at as well.
11 So many, many important findings have emanated from these two
12 studies.

13 **Q.** Doctor, let's turn to why you are here today. Why are you
14 here today?

15 **A.** I was asked to provide an opinion on the epidemiological
16 evidence on whether there is a causal association between
17 exposure to glyphosate and non-Hodgkin's lymphoma risk.

18 **Q.** Now, to be clear, you have looked at many different kinds
19 of cancer, risk factors for cancer; but you have not looked
20 specifically at pesticides and NHL before becoming involved
21 here; is that right?

22 **A.** No, I have not.

23 **Q.** Now, did you approach this question the same way that you
24 approached these questions in your professional life in your
25 career?

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1 A. Yes.

2 Q. And how is that?

3 A. So I identified all of the available epidemiological
4 studies on this topic of glyphosate exposure and non-Hodgkin's
5 lymphoma, and then also looked at all of the
6 epidemiology-related materials that looked at validation
7 studies within this body of literature; reviewed each of them
8 and looked at the strengths and potential weaknesses, and then
9 evaluated my opinion based on all of the available
10 epidemiology.

11 Q. And when you use that methodology -- and what you are
12 about to tell the jury here today, is this the same thing that
13 you would tell your colleagues back at Harvard?

14 A. Yes, it is.

15 Q. Is it the same things you would teach your students?

16 A. Yes.

17 Q. Let me ask you, Doctor, about what your opinion is.

18 **MS. MATTHEWS JOHNSON:** Is there any objection?

19 **MS. WAGSTAFF:** No objection, Your Honor.

20 **BY MS. MATTHEWS JOHNSON**

21 Q. What is your opinion, Doctor?

22 A. So based on my review of all of the epidemiology studies,
23 there is no evidence of a causal association between glyphosate
24 exposure and the risk of non-Hodgkin's lymphoma.

25 Q. And by "glyphosate" does that also include Roundup?

1 A. Yes.

2 Q. Do you hold this opinion to a reasonable degree of
3 scientific certainty?

4 A. Yes, I do.

5 Q. Now, I would like to talk a little bit about epidemiology
6 and the role of epidemiology in looking at causes of cancer.

7 How does epidemiology fit into the larger body of science
8 and other things that people may look at in evaluating
9 questions like whether something is a risk factor or could
10 actually be a cause of cancer?

11 A. Right. Well, if we want to understand why cancer occurs
12 in humans, the ideal population to study is human beings. So
13 therefore, the epidemiology studies really are the highest
14 level of evidence that we have in trying to understand any
15 relationship between a risk factor and cancer risk.

16 Q. Now, there has been a lot of testimony that has already
17 come in here over the past several days, and at times there has
18 been an image up and causation is at the top, and there are
19 three points underneath. One is epidemiology. One is
20 mechanistic. The other says animal.

21 I just want to ask you, Dr. Mucci, do you agree with that
22 image of causation?

23 A. No, I don't.

24 Q. And why is that?

25 A. So as I mentioned, you know, really if you want to

1 understand why cancer is occurring in humans, the best model --
2 the best level of evidence we have is studying populations of
3 humans, the epidemiology studies. I think the studies that are
4 done in animals or in cells can be helpful in two ways.

5 One is if there is no epidemiology studies that exist, you
6 can identify potential hypotheses about potential relationships
7 of exposures that you might want to then test in a human
8 population. So that is one way we use these kind of animal
9 studies and cell line studies.

10 The other way we can think of it is if we have several
11 epidemiology studies that suggest -- that come together
12 supporting strong evidence of a positive association, you can
13 then look at mechanisms of why there might be this relationship
14 between an exposure and disease. That can also be really
15 helpful if we want to think about prevention. In order to
16 think about prevention, we have to understand mechanism.

17 So those two bodies of science really can help in those
18 two ways, but ultimately if we want to understand why cancer
19 occurs in humans, we really need to study human beings.

20 Q. Okay. Now, we are going to now, I guess, talk about
21 different types of epidemiology studies. I want to show you
22 something that is in evidence.

23 MS. MATTHEWS JOHNSON: It is Exhibit 1467.

24 MS. WAGSTAFF: No objection.

25 \\\

1 BY MS. MATTHEWS JOHNSON

2 Q. Are you able to see that, Doctor?

3 A. Yes.

4 Q. Okay. Great. So this is from Dr. Ritz's Epi 200A class
5 that she teaches at UCLA. She just taught it just the other
6 week. And it is a table -- it says table 1, Validity for
7 Etiologic Inference, According to Study Design.

8 So let's just pause right there. What is etiologic
9 inference?

10 A. So etiology is the area of research where we are trying to
11 understand causes. So in this case here that we are talking
12 about trying to understand the causes of cancer, but more
13 generally it is the types of studies that help identify the
14 causes of disease.

15 Q. Near the top we have the Prospective Cohort Study. Do you
16 agree with Dr. Ritz that the cohort studies are generally the
17 most accepted in the scientific community?

18 A. Yes, I do.

19 Q. And in this case -- and we will dig into this in a
20 moment -- thank you -- we have a cohort study. Is that cohort
21 study AHS?

22 A. Yes, the Agricultural Health Study.

23 Q. And then down the line here, you have something called
24 nested case control studies. But just to be clear, is a nested
25 case control study something that is inside of a cohort study;

1 is that right?

2 **A.** Yes, it is. So none of the case control studies that have
3 published on glyphosate and non-Hodgkin's lymphoma would be
4 considered these nested case control studies.

5 **Q.** Okay. So if we have just general case control studies, do
6 they belong -- where do they belong in relation to the nested
7 case control studies?

8 **A.** Somewhere between probably the time series and
9 cross-sectional studies.

10 **MS. MATTHEWS JOHNSON:** You will have to endure my
11 penmanship, sorry.

12 **BY MS. MATTHEWS JOHNSON**

13 **Q.** So, Doctor, let's talk about some of the way -- the
14 difference between the way a cohort study works and the way a
15 case control study works. And did you do -- do you have an
16 example that you -- to kind of run us through that difference.

17 **A.** Yes, I do.

18 **MS. WAGSTAFF:** No objection.

19 **MS. MATTHEWS JOHNSON:** If we can have the screen.

20 **BY MS. MATTHEWS JOHNSON**

21 **Q.** Okay. So if we are talking about a cohort study, just to
22 give an example, how would we look at this question of tooth
23 decay and drinking sugary versus non-sugary drinks for a cohort
24 study?

25 **A.** Right. So the question -- the causal question we would be

1 asking here is, Does regular drinking of sugary drinks increase
2 the risk of tooth decay in children, let's say.

3 **Q.** And so what happens as you go forward in time with a
4 cohort study?

5 **A.** Right. So what we would then do in this situation if we
6 wanted to do a cohort study is we would identify a group of
7 children. At the start of the study, you would want all of the
8 children to be free of any tooth decay. And then we would
9 collect information about whether or not they regularly drank
10 sugary drinks. For example, we could collect that data from a
11 questionnaire.

12 **Q.** Okay. And so, again, my animation jumped ahead of me, but
13 you are here in time. Nobody has tooth decay. You go forward
14 in time and see who gets tooth decay and whether they eat
15 sugary drinks or not.

16 **A.** Exactly. And there are several advantages in this kind of
17 approach and this design that reduces or eliminates any
18 potential specific types of bias in the study.

19 **Q.** Okay. So now a case control study, if we look here at the
20 time marker is at present and then going backwards. Can you
21 explain what we are seeing here?

22 **A.** Sure. So with a case control study, what we do would be
23 first to identify the cases, what we call the cases. Those
24 would be a group of children who already have tooth decay. The
25 next step would then be -- and this can be some of the

1 challenges with case control study -- is to identify the right
2 group of controls or people who don't have tooth decay. So
3 they really should come from the same population that the cases
4 came from, and that can be one of the challenges.

5 And then you would ask -- again, it could be through
6 questionnaires -- ask the children to look -- think back in the
7 past about whether or not they drank sugary beverages.

8 **Q.** Okay. So -- thank you very much.

9 So let's talk about the way case control studies and
10 cohort studies can be the same, which is -- you mentioned
11 questionnaires. Do you use questionnaires in case control
12 studies and cohort studies?

13 **A.** Yes. It is probably the most common way in which we
14 collect information on participants in these studies.

15 **Q.** And do you do interviews of people in case control studies
16 and cohort studies?

17 **A.** Yes, we do.

18 **Q.** All right. So are you really gathering information from
19 people in both of these kinds of studies?

20 **A.** Yeah. You are collecting information in both of the
21 studies; although, you know, because people have been already
22 diagnosed with a disease, sometimes the case control studies
23 can cause problems since you're -- whether they have the
24 disease or not could have some influence on the way they
25 remember information.

1 **MS. MATTHEWS JOHNSON:** May we show the next slide,
2 please?

3 **BY MS. MATTHEWS JOHNSON**

4 **Q.** All right. So in the course of looking at this question,
5 NHL and Roundup, did you look at both case control and cohort
6 studies?

7 **A.** Yes, I did.

8 **Q.** Okay. And did you consider it important to do that?

9 **A.** Absolutely. It's important to use the same approach in
10 reviewing all of the literature and exactly in the same way
11 with the same level of scrutiny.

12 **Q.** Okay. And just off top, is there a value to the case
13 control studies?

14 **A.** Yes, there is.

15 **Q.** Okay. And are you here to testify today that AHS, the
16 cohort study, is a perfect study with no flaws, no problems?

17 **A.** No, I'm not.

18 **Q.** So let's talk a little bit about just right now your
19 overview of these two types of studies.

20 So first, tell us about your overall assessment of the
21 case control studies?

22 **A.** Right. So for all of the case control studies that have
23 looked at glyphosate non-Hodgkin's lymphoma, really we can
24 describe these studies as exploratory. What I mean by that is
25 none of these case control studies that have been published

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1 really look specifically at the question of glyphosate and
2 non-Hodgkin's lymphoma.

3 And that's really important because the way that you do
4 the study, if you are looking at, you know, these studies we
5 are looking at between 30 and 50 different pesticides, when you
6 do that kind of study is different than if you are focused
7 specifically on glyphosate. So that is one issue.

8 Second issue, the U.S. -- the studies that were done in
9 the United States, as well as even the early Swedish study,
10 really were in the early years soon after glyphosate was first
11 introduced on the market. And the reason that is important is
12 that cancer really -- all types of cancer take many, many
13 years, if not decades, to occur after someone is exposed to a
14 substance. So if you only have a short amount of time between
15 when people in your study might theoretically first start using
16 glyphosate and when the cancer cases were collected, you just
17 really -- you are concerned that you don't have enough -- what
18 we call -- latency period for the cancer to really occur.

19 Third -- the third issue with all of these studies is the
20 small case numbers. And what I mean by that is not the total
21 number of non-Hodgkin's lymphoma cases, but actually -- what is
22 actually more important when we think about the power of a
23 study is the number of cases that were exposed and the number
24 of controls that were exposed. And those numbers were, for all
25 the case control studies, were very small.

1 And then finally, really an important aspect of any
2 epidemiology studies is this idea that you want to
3 disentangle -- when you are looking at the association, the
4 exposure, you are looking at from all of the other factors that
5 people might be doing at the same time. You want to separate
6 those things out. And so in this case, these studies did not
7 properly adjust for the use of other pesticides in their
8 analyses.

9 **Q.** Okay. So now just please give us, as I said, a brief
10 overview of the Agricultural Health Study.

11 **A.** So as we talked about, I mean, this study did have some
12 potential issues. However, there were a lot of strengths in
13 the study as well.

14 First is the power of the study. Its overall size in
15 terms of the number of exposed cases was tenfold or greater
16 than the number of any of the exposed cases in the case control
17 study, so really a much larger study. And the timeframe of
18 when the cases were diagnosed, you could really start to look
19 at whether being exposed for 20 or more years or 10 or more
20 years led to cancer risk that some of the earlier studies could
21 not do.

22 Secondly, the way they captured cancer in the Agricultural
23 Health Study was by linking it together with cancer registry
24 data. And why that was important was in cohort studies, you
25 want to make sure that you are able to capture every case of

1 cancer that occurs. And using these cancer registries allows
2 that to happen.

3 Third, because, you know, again, because this study wasn't
4 exploratory, it was very focused on the hypothesis about
5 glyphosate. They did a very careful adjustment and approach to
6 adjusting for other pesticides.

7 And then finally, there is a number of validation studies
8 that were done to assess the quality of the information that
9 was being collected.

10 **Q.** So when you say "validation," I just want to make sure --
11 I want to put a pin in that. What does that mean when you say
12 something is being validated?

13 **A.** So, you know, in this example, in the Agricultural Health
14 Study, we have data that was being collected from
15 questionnaires. We can then compare that information on the
16 questionnaires with some sort of what we say "gold standard,"
17 and see how -- what the quality of the information is. And
18 that's pretty important to assess and show that the way you are
19 collecting data in your study is a good quality.

20 **MS. MATTHEWS JOHNSON:** May we show the next slide on
21 the Agricultural Health Study?

22 **MS. WAGSTAFF:** No objection.

23 **MS. MATTHEWS JOHNSON:** No problem.

24 **BY MS. MATTHEWS JOHNSON**

25 **Q.** So we have looked at this before. The Agricultural Health

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1 Study ran for years, and there are -- is it fair to say that
2 there are a lot of publications, a lot of articles that came
3 out of the Agricultural Health Study over those many years?

4 **A.** Yes. To date there have been more than 250 publications
5 that have been published on this cohort.

6 **Q.** And then there is the cohort consortium, and I see two
7 studies you are involved with; and the Agricultural Health
8 Study is involved there as well; is that right?

9 **A.** So the National Cancer Institute has formed a consortium
10 of all of the cancer epidemiology cohorts. There are now 40
11 cohorts, part of the consortium from 15 different countries.
12 The Agricultural Health Study is one of the 40 cohorts included
13 in this consortium.

14 **Q.** So I'm just going to show you now the findings from the
15 two papers that related to glyphosate, one in 2005.

16 **MS. WAGSTAFF:** No objection.

17 **BY MS. MATTHEWS JOHNSON**

18 **Q.** And so in 2005, is it true that as a result of the 2005,
19 there was no association between glyphosate exposure and all
20 cancer incidence including NHL? Was that the finding in 2005?

21 **A.** Yes, it was.

22 **Q.** And then in 2018, was there another paper that made the
23 same finding?

24 **A.** Yes. So in 2018 they actually had 11 to 12 additional
25 years of information for whether cancer occurred. They had

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1 more than ten times greater number of cases and exposed cases,
2 so really a much more powerful analysis of this question. They
3 found no association and no evidence of any dose response
4 between glyphosate and cancer overall as well as for
5 non-Hodgkin's lymphoma and any of the subtypes of non-Hodgkin's
6 lymphoma.

7 **Q.** And did this paper from 2018 actually get an award?

8 **A.** Yes, it did. So the lead author of the study received
9 Outstanding Research Paper by staff scientists from the
10 director -- one of the directors of the National Cancer
11 Institute.

12 **Q.** Okay. So next I want to talk about one of the
13 publications that was early on, Alavanja 1996. It is -- if you
14 want to turn to it -- we are not going to comb through it right
15 now, but if you want to look at it --

16 **MS. WAGSTAFF:** Do you have a binder for me?

17 **MS. MATTHEWS JOHNSON:** Yes, we do need a binder. So
18 sorry. She doesn't have one either. We are all going to get
19 binders. Thank you.

20 May I approach the witness, Your Honor?

21 **THE COURT:** Sure.

22 **BY MS. MATTHEWS JOHNSON**

23 **Q.** We are not going to comb all the way through this paper,
24 just to be clear. But if we look at -- it is Exhibit -- for
25 the record -- Alavanja 1996, it is Exhibit 1021.

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1 Doctor, just a couple things out of here. Is it, in your
2 experience as an epidemiologist, common to publish a paper as a
3 big study like this is getting underway?

4 **A.** Yes. This is very standard to present an overview of the
5 study during the first couple of years of its conduct.

6 **Q.** Okay. And does it talk about the goals of the study, for
7 instance?

8 **A.** Yes, it does.

9 **Q.** All right. And just some baseline information. Is there
10 a table in there where they talk about pesticide use as the
11 study is about to begin?

12 **A.** Yes, in table 1.

13 **Q.** Okay. And what was about the average number of years that
14 people were already using pesticides at the time that the study
15 started?

16 **A.** So on average in this cohort they were using for 23 years
17 of pesticide exposure, and that is just the average use in the
18 population. Some people were using actually for many more
19 years than that.

20 **Q.** And what about days per year?

21 **A.** So on -- again, on average, they were using pesticides for
22 about 15 days per year. But, again, that is the average, and a
23 lot more people were using more than that.

24 **Q.** Okay. And then at the time -- and I know that this came
25 out in a later publication -- but at the time these 50-plus

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1 thousand people got involved in the Agricultural Health Study,
2 what percentage of people were already using glyphosate?

3 **A.** So 75 percent of the participants at the very start of the
4 study were already using glyphosate, so about three in four of
5 the individuals.

6 **Q.** At the start?

7 **A.** At the start.

8 **Q.** And is there some discussion in here, even in these early
9 years, about how to measure exposure? Can you tell us about
10 the 200 families that they talk about in this study?

11 **A.** Yeah. So they were -- since the information on pesticide
12 exposure was one of the important factors they were studying
13 and they wanted to make sure that the quality of that data was
14 really high, and so they used -- they recruited 200 farm
15 families to be able to look at how well the data they are
16 collecting from the questionnaires related to internal measures
17 that are measured in urine. So urine is one way that we
18 measure different compounds such as pesticides. So they could
19 use these data to test the validity of the questionnaire data.

20 **Q.** Okay. So let's look at a little timeline.

21 **THE COURT:** Any objection?

22 **MS. WAGSTAFF:** No objection.

23 **BY MS. MATTHEWS JOHNSON**

24 **Q.** So first we see here 54,251 people do the first
25 questionnaire when they sign up in the mid'-90s; is that right?

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1 **A.** Yes, it is.

2 **Q.** Okay. And you have this arrow pesticide information going
3 back. So is this the questions about pesticide use?

4 **A.** Yes, so exactly. So on -- at baseline at the start of the
5 study they were asked not only whether they were currently
6 using different pesticides, but also about what type of
7 pesticides they used all the way back to the 1950s in some
8 cases.

9 **Q.** And there is a cancer info arrow, and it is going forward.
10 So just to be clear, what does that mean about the cancer
11 information that this study was going to collect for this
12 54,000 people?

13 **A.** Yes, so -- so none of these individuals at the start of
14 the study had cancer; and that is, again, one of the important
15 features of a cohort study. So they were able to link all
16 54,000 individuals over time and identify in every case all of
17 the cancer cases that occurred in this population.

18 **Q.** So let me ask you this: If 75 percent of these people had
19 already reported glyphosate use, if any -- any of that group of
20 75 percent of those people had gotten any kind of cancer since
21 that first questionnaire, was the study going to keep --
22 capture that data?

23 **A.** Yes. And also even for the 25 percent who were initially
24 unexposed in both groups, all of the cases of cancer would be
25 identified.

1 Q. Okay.

2 MS. MATTHEWS JOHNSON: May I go to the next slide?

3 MS. WAGSTAFF: No objection.

4 BY MS. MATTHEWS JOHNSON

5 Q. So I think you have already talked about this the cancer
6 databases. Is this actually a legal requirement for doctors?
7 They have got to report these cancers?

8 A. Yes. In all 50 states in the United States it is
9 mandated, it is legally required, that physicians report every
10 diagnosis of cancer. And that's the way that each state tracks
11 the -- you know, how big the cancer burden is in their state.
12 So it is legally required.

13 Q. Now, I would like to talk a little bit about
14 questionnaires, just briefly.

15 MS. MATTHEWS JOHNSON: May we go to the next slide?

16 MS. WAGSTAFF: No objection.

17 BY MS. MATTHEWS JOHNSON

18 Q. So we have heard some testimony about these questionnaires
19 that folks got when they came in to get their license
20 application. Did you actually read Dr. Ritz's testimony?

21 A. Yes, I have.

22 Q. Okay. And there was a lot of conversation about people
23 don't really want to do this. They come in. They just want to
24 get their license and get out. In your experience with
25 enrolling people in studies and your breadth of experience in

1 this area, do you agree with that?

2 **A.** No, absolutely not. If anything, the people who decide
3 they want to be a part of a study, like a cohort study, are
4 very committed to not only being a part of the study but really
5 learning about their own health as well.

6 Just as a quick sidenote, being part of this Health
7 Professionals Follow-up Study where people have been part of it
8 for 30 years, when a participant dies, we often get notes from
9 the family members telling them about how important being part
10 of this cohort study has been in their life. So, if anything,
11 I think there is good evidence to suggest the opposite; that
12 people really want to be a part of the study.

13 **Q.** In terms of knowing whether people took it seriously and
14 filled in the information accurately, were there actual
15 articles written as they tried to make sure they had a good
16 questionnaire or getting good information?

17 **A.** Exactly. You know, as we mentioned earlier, when you are
18 collecting data from questionnaires, you do want to be, as an
19 epidemiologist, thoughtful about whether the information that
20 you are collecting is a good quality.

21 And so one way that you can look at this is by doing
22 different validation studies. And so there have been several
23 different validation studies to assess the quality of the
24 information that has been collected, and all of these studies
25 together have shown that the questionnaires have been able to

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1 collect very good data on pesticides, including glyphosate.

2 **MS. MATTHEWS JOHNSON:** Go to the next slide.

3 **MS. WAGSTAFF:** No objection.

4 **BY MS. MATTHEWS JOHNSON**

5 **Q.** So we have talked about there is a first questionnaire. I
6 just want you to explain just very briefly, the 4,000 people
7 who returned a year later. What happened with that?

8 **A.** Yeah. So, you know, out of the 57,000 individuals who
9 have filled out the first questionnaire, 4,000 of them had to
10 come back about a year later to renew their pesticide
11 application, you know, licenses. And so that was a natural
12 experiment in which the investigators can say, Hey, let's use
13 these 4,000 individuals since they are coming back, to allow us
14 to assess the consistency of the information they provided on
15 the first questionnaire. They basically gave them the same
16 questionnaire they filled out at baseline, and then they could
17 compare the answers and say -- you know, if they said they were
18 ever smoking at the start of the study, did they still report
19 they are ever smoking. If they ever used this pesticide, are
20 they still saying they ever used that pesticide.

21 **Q.** And how good do they think the questionnaires were,
22 running this test with the 4,000?

23 **A.** So they found really high concordance or agreement on the
24 two questionnaires for the pesticides. And, in fact, for many
25 of the pesticides, including glyphosate, the consistency of the

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1 information was even higher than for factors such as physical
2 activity, which we use commonly in studying epidemiology. So
3 the data of quality was quite good for the pesticides,
4 including glyphosate.

5 **MS. MATTHEWS JOHNSON:** Can we go to the next slide?

6 **MS. WAGSTAFF:** No objection.

7 **BY MS. MATTHEWS JOHNSON**

8 **Q.** All right. Now, there has also been some discussion about
9 whether people would really want to do this. And so this is
10 just -- just a snippet from the letter -- a letter that went
11 out. And this is the letter that went with the questionnaire;
12 is that right?

13 **A.** Yes, it is.

14 **Q.** Okay. If you can just read the first sentence of the
15 second paragraph.

16 **A.** The study will give you information you may find helpful
17 in making decisions for your health and the health of your
18 family.

19 **Q.** And in your experience someone coming in and joining a
20 study, are they going to want to provide good information?

21 **A.** Yes, absolutely.

22 **Q.** And do they maybe want to get good information as a
23 result?

24 **A.** Absolutely. So, you know, given that there were concerns
25 that farmers might be at increased risk for different diseases,

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1 you know, it makes a lot of sense that people would really want
2 to participate and give good quality data --

3 **MS. WAGSTAFF:** Your Honor, this starts to call for
4 speculation.

5 **THE COURT:** Overruled.

6 **THE WITNESS:** So we know this from the cohort studies
7 that I have been engaged in where, you know, people want to
8 give accurate information because they care about their health.
9 They care about things that are happening to their families.

10 **BY MS. MATTHEWS JOHNSON**

11 **Q.** So let's take a look at a question -- just one of the
12 questions. We are not going to go through the whole
13 questionnaire.

14 This is just one question. And going through it, was --
15 let me be clear here. This is about -- one question about
16 Roundup. And just for the record, Jury is another name for a
17 different brand of Roundup, correct?

18 **A.** Yes.

19 **Q.** Not a jury like a jury in a courtroom.

20 **A.** That's right.

21 **Q.** Okay. But there was a long list of pesticides; is that
22 right?

23 **A.** Yes. There were data collected on 50 different pesticides
24 on the questionnaire.

25 **Q.** Okay. And if you could just go across and just tell us

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1 what they were asked about.

2 **A.** Right. So there were several different pieces of
3 information collected. They first asked participants to report
4 whether they had ever used glyphosate or -- in this case
5 glyphosate -- but other pesticides. They asked how many years
6 they had either personally mixed or applied the pesticide in an
7 average year, how many days were the individuals applying the
8 pesticide, and then finally they asked how far back did you
9 first start using this pesticide so they could really get a
10 cumulative estimate of the total number of days over a person's
11 lifetime that they were using the pesticide.

12 **Q.** And was there eventually a second questionnaire?

13 **A.** Yes, there was. That questionnaire was asked about seven
14 years after the first questionnaire.

15 **Q.** All right. And tell us how many people were interviewed,
16 live by phone, in that follow up?

17 **A.** So there were data completed on the second questionnaire
18 by 34,698 of the original participants.

19 **Q.** Let me just say right off top, 34,698 is definitely --

20 **A.** Yes.

21 **Q.** -- less than 57,310; is it not?

22 **A.** Yes, it is.

23 **Q.** Okay. So in your experience in doing this kind of work
24 when you have gone out into the field to gather information,
25 have there been times where you can't get back in touch with

1 everybody you got in touch the first time around?

2 **A.** Yes. Absolutely. One particular study that I worked on
3 was a cohort of women from Sweden where only 70 percent of the
4 women completed the second questionnaire.

5 **Q.** Okay. And so that meant you went from 100 percent down to
6 70 percent?

7 **A.** Yes.

8 **Q.** In that particular study?

9 **A.** Yes.

10 **Q.** All right. Were you still able to get useful data out of
11 that study?

12 **A.** Yes. But, I mean, to be clear, when you don't have
13 complete data, and you do have missing data for this, it is a
14 reason to be concerned. So you want to assess are there any
15 differences in the people who gave the second questionnaire
16 than those who didn't. Is there any reason that this missing
17 data might lead to some sort of bias.

18 So it is a reasonable concern to have, and I think one of
19 the important features of the investigators in this study was
20 they tested in several different ways to see whether this
21 missing data caused a problem here, similar to what we did in
22 our study of Swedish women.

23 **Q.** Okay. So let's go to the next slide, if there is no
24 objection. And, again, we are just looking at a few papers --
25 and we are not going to dive into each one of these -- but this

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1 missing data question, was it something that people thought
2 about and wrote articles about and tried to figure out?

3 **A.** Yes, they did. So one of the first things they did was to
4 compare the people who completed the second questionnaire
5 versus those who only completed the first questionnaire. And
6 what was reassuring was when you looked at a range of different
7 lifestyle factors and use of different other factors in the
8 study, there really were no differences in the population. So
9 that gives you some reassurance that this missing data might
10 not cause problems, but then -- sorry.

11 **Q.** Then let me just ask. There has been a word that has been
12 thrown out here over the past several days called "imputation."
13 Are you familiar with that concept?

14 **A.** Yes, I am.

15 **Q.** Is that something you have ever used in your work?

16 **A.** Yes, it is.

17 **Q.** And so is imputation like guessing?

18 **A.** No, it isn't. It is a well-established method that
19 epidemiologists and scientists use in our research to address
20 missing data.

21 **Q.** Now, when Dr. Ritz was here last week, she talked about
22 someone called Farmer Ted. And Farmer Ted was somebody who
23 wasn't using Roundup during the first questionnaire and so he
24 reported no use. And then he didn't fill out the next
25 questionnaire. And so him -- but he became a Roundup user. So

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1 you get lost, right. You get lost in the data because you are
2 listed as not being a user. You don't fill out the second
3 questionnaire. So then he might be missing.

4 Do you recall reading that in the testimony?

5 **A.** Yes, I do.

6 **Q.** So did Dr. Ritz's criticism about Farmer Ted change your
7 confidence in the data from this study?

8 **A.** No, it did not.

9 **Q.** Okay. Well, why is that? Why is that?

10 **A.** So, first of all, it is important to remember that already
11 at the first questionnaire at the start of the study,
12 three-quarters, or 75 percent, of the individuals were already
13 using glyphosate. And then on the second questionnaire for
14 those who completed it, during additional seven years only
15 5 percent more, or a total of 80 percent, so only 5 percent
16 started using it.

17 So when you think about the information on the people we
18 didn't have data on, it was a really, really a small number of
19 individuals. And when you have the potential for bias; but it
20 is only occurring in a very, very small number of individuals,
21 it really can't have any impact on the overall results of your
22 study.

23 **Q.** Okay. So I want to understand. So 75 percent at the very
24 start said they were using glyphosate. So if any of those
25 people ever develop cancer, even if they didn't fill out the

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1 second questionnaire, would that have been captured in this
2 study?

3 **A.** Yes, it would.

4 **Q.** And what you are saying is there was an increase, a little
5 bit of an increase, from 75 to 80 percent --

6 **A.** Yes.

7 **Q.** -- but that increase was small; is that right?

8 **A.** Yes. Exactly, yes.

9 **Q.** Okay. And just to be clear, there were second
10 questionnaires from almost 35,000 people; is that right?

11 **A.** Yes, that's correct.

12 **Q.** And so did the folks in Andreotti actually look at just
13 the 34,000? I just want to go to the article. This is from
14 Andreotti 2018 -- where they only looked at the 34,698 people
15 who actually filled out both questionnaire. Did they do that?

16 **A.** Yeah. So I think we talked about this study actually
17 receiving an award, and I think the reason for this is that
18 they did a very thoughtful analysis really across this study to
19 look at whether bias from this missing data might have caused a
20 problem. They looked at it in three different ways.

21 One of the ways they looked at it was, let's just look at
22 the association between glyphosate use and non-Hodgkin's
23 lymphoma in all 35,000 individuals where we have complete data,
24 and they did -- they saw no association, no evidence of dose
25 response. And, in fact, their findings from that analysis were

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1 basically identical to the analysis where they used the data
2 that was imputed. So it gives you, again, another reassurance
3 that this method of imputation did not introduce any bias. And
4 then you could really test that here by looking at all 35,000
5 people that had the complete data.

6 Q. So when you say "the complete data" for the 34,698 people,
7 there is no imputation for 34,698 people, is there?

8 A. No, there is not.

9 Q. Because you have the two questionnaires?

10 A. Correct.

11 Q. So next in 2019 -- and there has been some discussion that
12 there was criticism, right -- that there was criticism after
13 Andreotti came out about imputation -- at some point did the
14 authors write a letter in 2019 and say -- and actually go back
15 and look at this information one more time?

16 A. Yes. So there was a letter -- and this is a pretty
17 standard approach for having scientific discussions is when a
18 study gets published, other outside people might write a letter
19 raising concern about an issue in the study. So Sheppard and
20 Shaffer wrote a letter raising concerns about the imputation.
21 And so what was really nice to see again with the Agricultural
22 Health Study investigators is they looked to see whether, if
23 they did the imputation method differently, would they then see
24 an association. But, in fact, when they did this new approach
25 to imputation, again, they didn't see any association between

PROCEEDINGS

1 any glyphosate exposure and non-Hodgkin's lymphoma, and,
2 therefore, concluded that the imputation method did not
3 introduce meaningful bias in their study.

4 **Q.** So next I would like to talk about exposure.

5 **MS. WAGSTAFF:** No objection.

6 **THE COURT:** Before we go to that, this is probably a
7 good time for our morning break or a morning break.

8 Remember the different schedule today, everybody, that we
9 are stopping at 1:00 o'clock, and we will just take an extra
10 morning break or two. And we will resume at ten after the
11 hour. Thank you.

12 (Proceedings were heard out of presence of the jury:)

13 **THE COURT:** Why don't we knock out discussion of the
14 Levine issue that you had raised. The upshot here is that I
15 think -- I don't -- I think it is the same issue as Dr. Arber.
16 I don't think that, you know, this response to Shustov comes in
17 because it hasn't come in at the trial because his testimony
18 hasn't come in at the trial. I don't understand how -- I can
19 give you one more chance to explain if you want, but I don't
20 understand how this is any different from how I ruled about
21 Dr. Arber's testimony.

22 **MR. STEKLOFF:** Okay. I think the difference,
23 Your Honor, is that -- I think at least part of the basis for
24 your ruling about Dr. Arber was that this opinion was not
25 disclosed. If we walk back through first --

PROCEEDINGS

1 **THE COURT:** Well, not only was it not disclosed,
2 again, it was inconsistent with -- the implication of what you
3 were proposing Dr. Arber to say was inconsistent with what he
4 did disclose.

5 Anyway, go ahead.

6 **MR. STEKLOFF:** But I think -- I understand that.
7 That's not an issue with Dr. Levine, I don't believe, because I
8 think Dr. Levine very clearly says in her report that BCL6 is
9 associated with the hepatitis C virus. She has literature that
10 she cites is included in her reliance materials. And I will
11 say it is also literature that demonstrates that once HCV is
12 treated through antiviral therapy and there is a sustained
13 viral response, that that does not mean that genetic mutations
14 associated with HCV are automatically eliminated, and it
15 specifically cites to BCL6.

16 **THE COURT:** And everything you just said, everything
17 you just said is fine, I think.

18 **MR. STEKLOFF:** Right.

19 **THE COURT:** The only thing that I am precluding is the
20 testimony that you look at -- when you look at Hardeman's
21 slides that it -- that you see BCL6 mutations that are
22 consistent with having had hepatitis C. That is the part that
23 I'm not allowing.

24 **MR. STEKLOFF:** Understood, Your Honor. And if I can
25 just try one more time.

1 The reason why I think that should be admissible is
2 Dr. Weisenburger's testimony. So Dr. Weisenburger stepped down
3 from the stand and walked through a chart demonstrating that
4 there were translocations in a study that he said were
5 eliminated when you looked at the 15 or so -- the 15 or so
6 patients that were in that study. He said they have certain
7 translocations. It was not BCL6. I think it was something
8 called T14 and T16. This is at approximately page 1207 of the
9 transcript.

10 He then I think -- I don't remember if he was still in the
11 gallery or at his seat -- but he -- but following up on that
12 discussion, at page 1210, he was asked, So once he was cured in
13 2006 of hepatitis C, what happened to any abnormal cells he may
14 have had based on the data here?

15 And then I objected. It was overruled.

16 And then Dr. Weisenburger went on to say that specific
17 mutations were eliminated.

18 **THE COURT:** I understand -- I understand the argument.
19 The same concept applies as applied to Dr. Arber.

20 **MR. STEKLOFF:** Thank you, Your Honor.

21 **THE COURT:** Okay. Thank you.

22 (Recess taken at 10:05 a.m.)

23 (Proceedings resumed at 10:12 a.m.)

24 (Proceedings were heard out of the presence of the jury:)

25 **THE COURT:** Okay. You can go ahead and bring in the

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1 jury.

2 (Pause in proceedings.)

3 (Proceedings were heard in the presence of the jury:)

4 **THE COURT:** Okay. You can resume.

5 **MS. MATTHEWS JOHNSON:** Thank you, Your Honor.

6 **Q.** Good morning, Dr. Mucci.

7 **A.** Good morning.

8 **Q.** Before we turn to exposure, I want to draw your attention
9 to Andreotti 2018, Exhibit 1032, and if you could go to page --
10 the second page, "Statistical Analysis," please.

11 And I wanted to make sure that it was clear that there
12 were some people who moved outside the state; and if they were
13 documented to have moved outside the state, were they excluded
14 from the analysis?

15 **A.** Yes, they were.

16 **Q.** And according to Andreotti 2018 under "Statistical
17 Analysis," is it a few hundred people?

18 **A.** Yeah. 300 people were excluded from the study.

19 **Q.** So we were next going to go to the exposure method.

20 **MS. MATTHEWS JOHNSON:** May I show the next slide?

21 **MS. WAGSTAFF:** No objection, Your Honor.

22 **MS. MATTHEWS JOHNSON:** And while -- if we may have the
23 screen, please.

24 **Q.** All right. So, first, tell us what does "exposure" mean
25 in the context of AHS and pesticides?

1 **A.** Yeah. So in our epidemiology research, we want to try to
2 estimate what the exposure is inside our body to different
3 factors, including pesticides. So the exposure assessment is
4 the way in which we tried best to use the questionnaire data to
5 measure that internal amount of exposure.

6 **Q.** Okay. And --

7 **MS. MATTHEWS JOHNSON:** May I show the next slide?

8 **MS. WAGSTAFF:** No objection, Your Honor.

9 **BY MS. MATTHEWS JOHNSON:**

10 **Q.** So looking at the next slide, this is from Dosemeci. So
11 we saw that there were publications about the exposure issue,
12 and is there a Dosemeci approach to this or an equation or
13 algorithm that's used?

14 **A.** Yeah. So this was the first algorithm that the AHS
15 investigators used to try to estimate the best dose of exposure
16 to pesticides, including glyphosate.

17 And in this --

18 **Q.** And we'll talk about it, I think, in a little bit --

19 **A.** Yeah.

20 **Q.** -- but I just wanted to make sure there was one approach.

21 And then what did Coble do in 2011?

22 **A.** Yeah. And just to kind of explain, so originally, you
23 know, they were interested in looking beyond just the number of
24 days or years somebody was using a pesticide, could additional
25 information be included in that algorithm or in the model to

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1 predict better the exposure. And so this was the first
2 approach that the AHS investigators used.

3 And then about 10 years later, they actually improved this
4 algorithm where they used those biomarkers or biological levels
5 of the pesticides in the urine and compared it to the
6 questionnaires. So they were actually even able to improve the
7 algorithm for measuring the best estimate of exposure to the
8 pesticides.

9 **Q.** So going next to another article or questions -- excuse
10 me -- that were asked, were the folks in the AHS asked about
11 how they applied pesticides?

12 **A.** Yes. So they were able to check all the different ways in
13 which they applied pesticides, including whether they were
14 using a hand spray gun or whether they were using an air blast,
15 for example. So they could actually check multiple responses
16 here with the idea that different ways in which you apply it
17 might lead to different amounts of exposure inside the body.

18 **MS. MATTHEWS JOHNSON:** May I show the next slide?

19 **MS. WAGSTAFF:** No objection.

20 **BY MS. MATTHEWS JOHNSON:**

21 **Q.** And did they also ask about protective equipment?

22 **A.** Yes, they did. So, again, each person in the study could
23 fill out all the ways they might use protective gear. So, for
24 example, using goggles or wearing gloves or just reporting that
25 they didn't use any type of protective gear. Again, with the

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1 idea the more protective gear, the less exposure there would be
2 inside the body.

3 **Q.** Now, was there a separate article by somebody else named
4 DellaValle that asked the question about whether people were
5 using any personal equipment at all?

6 **MS. MATTHEWS JOHNSON:** May I show the next slide?
7 This is DellaValle.

8 **MS. WAGSTAFF:** This is the next slide?

9 **MS. MATTHEWS JOHNSON:** Yes. It is DellaValle.

10 **MS. WAGSTAFF:** No objection.

11 **THE WITNESS:** So --

12 **BY MS. MATTHEWS JOHNSON:**

13 **Q.** And this one -- go ahead, Doctor. Please.

14 **A.** So in this particular study, the Agricultural Health Study
15 investigators presented information about how common it was,
16 for example, to use protective gear.

17 And so from this study, what we could see was actually
18 that less than half of the AHS participants were actually using
19 any sort of protective gear when they were applying or mixing
20 pesticides.

21 **Q.** So they looked at 20,000 farmers and they asked them this
22 question. And just to make sure we're clear, this is a table
23 from that article; right?

24 **A.** Yes, it is.

25 **Q.** And they're asking about personal protective equipment

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1 when applying, and then they said "How many had an affirmative
2 response?", which is I think a confusing way to put that, but
3 what does that mean?

4 **A.** Right. So, you know, less than half were actually using
5 protective gear and, therefore, more than half were not using
6 the protective gear.

7 **Q.** Now, we talked a little bit about there's Dosemeci and
8 Coble and these algorithms, and we are not doing the
9 algorithms, but --

10 **MS. MATTHEWS JOHNSON:** May I go to the next slide?

11 **MS. WAGSTAFF:** No objection, Your Honor.

12 **BY MS. MATTHEWS JOHNSON:**

13 **Q.** Just tell us generally what they tried to do with this
14 information that they got, what they were asking and what they
15 tried to do with it.

16 **A.** Right. So they had all of these six different types of
17 information that were collected from the questionnaires, and
18 they built an algorithm or basically just a mathematical model
19 that they could then compare and say, "Using these six factors,
20 how much exposure is any participant getting from different
21 pesticides?" And then they could actually compare it.

22 So essentially they included information in this algorithm
23 on how many days they were mixing or applying, how many years
24 were they mixing or applying, what method did they use for
25 applying, did they use protective gear, did they personally

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1 mix; and then, finally, did they mix -- fix any equipment with
2 the idea, again, that you might get more exposure from that.
3 And they put all of that information together and then could
4 assign people as having no exposure to glyphosate, small
5 amounts, moderate amounts, or very high exposure to glyphosate.

6 **Q.** And so in Andreotti 2018 where they're presenting all this
7 different data, is there a set of data that is broken down into
8 quartiles?

9 **A.** Yes. So they took all of the individuals in the study,
10 and basically for those who -- the 80 percent who had ever used
11 glyphosate, they divided them into four equal groups. And so
12 then you could look at -- as I said, like looking at those who
13 only had a low-level of exposure to glyphosate, those who had a
14 moderate level, and those really who had the highest level.

15 **Q.** Okay. And so were there four levels that they had
16 ultimately? So the quartiles is for four levels?

17 **A.** Exactly.

18 **Q.** Okay.

19 **A.** Yes.

20 **Q.** Now, when you look at the actual numbers of cases of NHL
21 in each of those quartiles, is that data actually shown by
22 number in the Andreotti 2018 paper?

23 **A.** Yes, it is.

24 **Q.** Okay.

25 **MS. MATTHEWS JOHNSON:** May I go to the next slide?

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1 **MS. WAGSTAFF:** This is the next slide?

2 **MS. MATTHEWS JOHNSON:** Yes.

3 **MS. WAGSTAFF:** No objection, Your Honor.

4 **BY MS. MATTHEWS JOHNSON:**

5 **Q.** And just tell us here what we see.

6 **A.** So the way they divided the exposure data was into
7 quartiles, and what that means is dividing people into four
8 equal groups. So you can see in each of those who had exposure
9 to glyphosate, there were all people -- there were the same
10 number of people.

11 And then you can see at the bottom, those are the number
12 of non-Hodgkin's lymphoma cases in each of the groups,
13 including the group that had no exposure to glyphosate.

14 **Q.** And so in the lowest group there were -- in the group with
15 no exposure to glyphosate, Andreotti 2018 reports 135
16 diagnoses; is that correct?

17 **A.** Yes, it is.

18 **Q.** And then what do they report for the low?

19 **A.** 113 cases of non-Hodgkin's lymphoma.

20 **Q.** And for the medium low?

21 **A.** 104.

22 **Q.** And for the medium high?

23 **A.** 112 cases.

24 **Q.** And for the high?

25 **A.** 111 cases.

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1 Q. And as you look at this data, Doctor, what does that tell
2 you?

3 A. Well, so what it would tell me if you look across the
4 levels of exposure, you don't see any evidence of a higher
5 number of cases or a higher incidence of non-Hodgkin's lymphoma
6 in those who were exposed to the highest levels of glyphosate
7 compared to those with the lowest exposure to glyphosate. So
8 there's no evidence of a dose-response of any sort either.

9 Q. Okay. And breaking it down to another level, did
10 Andreotti 2018 specifically provide numbers on diffuse large
11 B-cell lymphoma?

12 A. Yes, they did.

13 Q. Okay. And so for those who had no exposure to glyphosate,
14 how many diagnoses of DLBCL were there?

15 A. 27.

16 Q. And just so we're clear for the record, is the DLBCL
17 number going to be part of the larger NHL number?

18 A. Yes. It's one of the subtypes of non-Hodgkin's lymphoma.

19 Q. Okay. So for the low category, how many?

20 A. There were 28 cases.

21 Q. And for the medium low, how many cases?

22 A. 23 cases.

23 Q. And for the medium high, how many?

24 A. 30.

25 Q. And for the high, how many?

1 **A.** 22 cases.

2 **Q.** And what does this data tell you?

3 **A.** So, again, there is no evidence of an increased risk of
4 the diffuse large B-cell lymphoma with the highest quartile of
5 exposure to glyphosate compared to those without any exposure.
6 There's no evidence of any dose-response either.

7 **Q.** Now, there's been a lot of testimony sometimes looking at
8 what we've come to learn is a forest plot. There's a dot, and
9 a little line, and the line can cross the 1. But I want to be
10 clear, just because there's a lower number of diagnoses in one
11 group than another group, is that trying to say that it's good
12 for you to use glyphosate?

13 **A.** No, absolutely not. The interpretation from the relative
14 risks in the study really are that there's no association -- no
15 evidence of a positive association and no protective
16 association. There's just no difference in the risk of
17 non-Hodgkin's lymphoma or this diffuse large B-cell in the
18 highest groups versus the lowest groups.

19 **Q.** Now, let's take a step back. There is an article with the
20 author's name is Koutros; is that right?

21 **A.** Yes.

22 **Q.** And were you able to take data from Andreotti 2018 and
23 looking at the Koutros article look at what was the rate of NHL
24 in the U.S. population?

25 **A.** Yeah. So at the time of the study, the rate of the

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1 population -- the rate of non-Hodgkin's lymphoma was
2 1.07 percent.

3 **Q.** In the United States population?

4 **A.** Yes.

5 **Q.** Okay. And going all the way back and looking at the whole
6 cohort, that's everybody in the AHS whose data was ultimately
7 captured and included in Andreotti -- we know some people got
8 excluded because they moved and stuff like that -- but if we go
9 back and look at the rate of NHL in the whole cohort, what was
10 that rate?

11 **A.** 1.06 percent.

12 **Q.** So, again, let me ask you. 1.06 is a tenth of a
13 thousandth less than 1.07; is that right?

14 **A.** Yes, although I would say really there's no difference in
15 the rate in those two populations.

16 **Q.** Okay. So that's where I was headed. So you're not here
17 saying that it's a lower rate?

18 **A.** No.

19 **Q.** Okay. So with that difference, what would you say based
20 on that data, Doctor?

21 **A.** So those data together with the mathematical analyses that
22 were done in the Agricultural Health Study really show no
23 evidence of an association between exposure to glyphosate and
24 risk of non-Hodgkin's lymphoma and no evidence of an
25 association for the risk specifically for diffuse large B-cell

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1 lymphoma.

2 Q. So now I'd like to turn and just take a look at a few of
3 the case-control studies.

4 MS. MATTHEWS JOHNSON: May we go to the next slide?

5 MS. WAGSTAFF: No objection.

6 BY MS. MATTHEWS JOHNSON:

7 Q. So we said at the very outset, Doctor, that you had looked
8 at case-control studies also; is that right?

9 A. Yes. Correct.

10 Q. Okay. And you're not here saying that the case-control
11 studies have no value; is that right?

12 A. No. I'm not saying that, no.

13 Q. And just let me say, in general, it's possible to look at
14 these and what -- let me ask you. I'm not going to speak.

15 You tell me. What is the use of those case-control
16 studies?

17 A. Right. So -- you know, so there had been an observation
18 already back in the 1970s that farmers had an excess risk of
19 non-Hodgkin's lymphoma, and so these early studies, these
20 case-control studies, were exploratory trying to identify what
21 is it about farming that might be leading this increased risk
22 of non-Hodgkin's lymphoma.

23 So these early case-control studies, they were -- you
24 know, as we talked, had some concerns for bias, but they
25 generated hypotheses and they looked at -- you know, each of

1 the studies looked at 30 to 50 pesticides.

2 In those studies they actually saw several pesticides that
3 had suggestively positive numbers, and these then could be
4 things that could be then followed up in a well-designed study
5 specifically addressing the hypothesis for that pesticide.

6 So really we think about in epidemiology there can be
7 exploratory studies that help think about new hypotheses that
8 we want to test in really well-designed studies.

9 **Q.** So if we take a look -- just briefly we're going to run
10 through these because the jury has certainly seen them before.

11 But at the top here, you're asking a question, and so what
12 are the two things that you're looking at or considering, among
13 others, as you're looking at these studies?

14 **A.** So one of the things that I'm looking at is: Are the
15 results properly adjusted for use of other pesticides? Since
16 we know from these studies that people using glyphosate were
17 also using other pesticides, so did the analyses presented in
18 the study properly address for other pesticides and were those
19 results statistically significant?

20 **Q.** Okay. And there's been a lot of talk about statistical
21 significance, but is this about the whiskers not crossing
22 the 1? Is that what that's about sort of?

23 **A.** Yes. It helps to assess the extent whether you have a
24 chance finding or a false positive.

25 **Q.** Okay. And someone has slipped me a very important note,

1 and I'm going to have to go back one slide because this
2 happens. This is why it's a team effort. Thank you.

3 I want to go back because we were talking about this issue
4 of dose-response. And if you look here in the column of no
5 glyphosate exposure, that column is white; and if you go over
6 to the high level, it's red.

7 **A.** Yes.

8 **Q.** And I just want to ask you, do you remember from
9 Dr. Ritz's testimony when she talked about the white paint can
10 and the red paint can and how things can get so mixed up that
11 everything is just all pink? Do you recall that?

12 **A.** Yes, I do.

13 **Q.** Do you agree that that was possible in this study?

14 **A.** No, I don't. So just more generally, when you collect
15 information with questionnaires, you may be concerned that
16 there might be some misclassification and that would lead to
17 this concept. However, when you have data comparing people who
18 don't use any pesticide versus people who are using very high
19 levels of pesticide, you almost never get that kind of
20 misclassification between those two extreme groups.

21 Another example of this is physical activity. You know,
22 if you're running and training for a marathon -- right? -- you
23 would be in this highest level of exposure, and then you have a
24 group that's very sedentary and doesn't do any exercise, you
25 can see that you're never going to misclassify somebody who's

1 running a marathon as somebody being completely sedentary and
2 vice versa.

3 So while you might have a little bit of misclassification
4 in these groups next to each other, the extreme comparisons are
5 never going to have that type of misclassification.

6 **Q.** And so speaking from the sedentary couch end, you're
7 essentially saying those kind of people don't typically claim
8 to run marathons?

9 **A.** No, correct, and vice versa.

10 **Q.** Okay. Going back to the case-control studies. So now
11 we're just going to go through them and just do a quick little
12 overview.

13 So Hardell, when you looked at that study, did you see
14 results that were properly adjusted for other pesticides and
15 statistically significant?

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

17 **Q.** What about in Eriksson?

18 **A.** No. And, again, what you can see, you know, part of this
19 is they didn't do a proper adjustment for confounding. They
20 did not have -- they had very small numbers of cases. They did
21 not have statistically significant associations for these
22 analyses properly adjusted.

23 **Q.** What about for Orsi? And Orsi, I think we have all heard,
24 is the French hospital study I think is what people have been
25 calling it.

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1 **A.** Right. Correct. So the results were not properly
2 adjusted or statistically significant.

3 **Q.** And let's talk about De Roos. Just so we're clear,
4 De Roos is a few American studies that were put together; is
5 that right?

6 **A.** Yes. It was a pooled analysis looking at the same time at
7 47 different pesticides, and the challenge with this study is
8 there were only 36 exposed cases, and that study did not do a
9 proper adjustment for confounding, and the result from the
10 hierarchical model was not statistically significant.

11 **Q.** Okay. And so we're going to put a pin in that one. We
12 need to pause on that one for just a moment because in De Roos
13 there was a logistic regression that yielded a number that was
14 statistically significant. So what is your concern about using
15 the logistic and what is your concern about De Roos and the
16 reliability of that number?

17 **A.** So in the epidemiology, the number -- as I mentioned
18 earlier, the number of exposed cases is really important to the
19 overall power of the study; and on average, you want to have
20 about five exposed cases for every variable you put in your
21 model.

22 In the logistic regression model, since they put in all 47
23 pesticides, you actually have less than one exposed case per
24 pesticide in the model so you end up -- and the authors
25 themselves thought to do the hierarchical model as a way of

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1 trying to deal with the fact that they had so few exposed
2 cases.

3 Q. And, finally, McDuffie, which is also sometimes referred
4 to as the Canadian study, what about McDuffie?

5 A. Yeah. So McDuffie, again, found no evidence of a properly
6 adjusted statistically significant association.

7 Q. And just to be clear, McDuffie and Eriksson contain a
8 2-day and a 10-day purported dose-response, and what is the
9 problem with those numbers, Doctor?

10 A. So in neither of the studies when they looked at those
11 estimates of dose-response did they adjust for use of other
12 pesticides, and that really is a problem since we've seen in
13 these studies that the people using the most glyphosate are the
14 ones who are also much more likely to be using other
15 pesticides.

16 So if you don't adjust for other pesticides, you're not
17 being able to disentangle whether an association you see is due
18 to glyphosate or the fact that they're also using other
19 pesticides or using other things farming practices.

20 Q. Okay. So I want to pause, and you mentioned something
21 called a pooled analysis. We don't see pooled analysis over
22 here on Dr. Ritz's chart, do we?

23 A. No.

24 Q. Okay. And do we see meta-analysis over here on Dr. Ritz's
25 chart?

1 **A.** No.

2 **Q.** Okay. So just on meta-analysis, are you familiar with a
3 paper called Zhang that was published within the past few
4 weeks?

5 **A.** Yes, I am.

6 **Q.** Have you reviewed that paper?

7 **A.** Yes, I have.

8 **Q.** What is your opinion of it?

9 **A.** So the method that they used to combine in the
10 meta-analysis the six studies was a flawed approach. There are
11 many articles written about the appropriate way to do
12 meta-analysis when you're looking at different levels of
13 exposure. And I can describe it as in this study they mixed --
14 three of the studies only had ever versus never exposure, two
15 of the studies had very limited estimates of dose-response, and
16 then they had the AHS. So when you're doing that, you're
17 mixing basically apples and oranges and pineapples all
18 together, and it's just not a valid approach to doing
19 meta-analyses.

20 **Q.** And let me ask you specifically about AHS, Andreotti,
21 50,000-plus person study. Did Zhang include all of AHS?

22 **A.** No, they did not. In fact, they only used a very small
23 slice, less than 20 percent, of the full data in that study.
24 And the importance of that is that the full power of the AHS
25 was underestimated in that meta-analysis.

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1 I think the other part about the meta-analysis to mention
2 is that all of those case-control studies that did not do a
3 proper adjustment for pesticide use, you're putting those odds
4 ratios into the meta-analysis. So if you put flawed data into
5 a meta-analysis, you're going to get flawed data out of the
6 meta-analysis.

7 **Q.** So, for instance, De Roos, is De Roos part of Zhang?

8 **A.** Yes, it was.

9 **Q.** Okay. And so if De Roos is 35- to 40-year-old data before
10 you put it in Zhang, is it still 35- to 40-year-old data once
11 it's in Zhang?

12 **A.** Yes, absolutely.

13 **Q.** So next I just want to talk about the Andreotti study and
14 ask the same question, results that are properly adjusted for
15 other pesticides and statistically significant.

16 And here I want to talk about some of the testimony we've
17 heard about some of these ratios being below 1. And I know you
18 read Dr. Ritz's testimony where she said if it's .87, it's
19 13 percent protective, it is a negative association. Do you
20 recall that, Doctor?

21 **A.** Yes, I recall that.

22 **Q.** Do you agree with that?

23 **A.** No, absolutely not. In fact, that's not the correct
24 interpretation of that data. When we look at the results from
25 a study, not only do you want to look at that relative risk

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1 number but also the confidence intervals around that because
2 that gives you a range of values that are consistent with your
3 data.

4 And when you look at that full set of numbers, the proper
5 interpretation and what the interpretation of the authors
6 themselves was was that there was no association.

7 Q. And as you look at the data overall, Doctor --

8 MS. WAGSTAFF: No objection.

9 BY MS. MATTHEWS JOHNSON:

10 Q. -- what is your finding with regard to the rate of NHL in
11 the general population versus the rate of NHL in the AHS study?

12 A. Right. So if we were concerned that glyphosate increased
13 the risk of non-Hodgkin's lymphoma, given the fact that
14 80 percent of the Agricultural Health Study participants were
15 using glyphosate, then you would expect to see the rates of
16 non-Hodgkin's lymphoma higher than the general population but,
17 in fact, that's not what we see at all. The rates of
18 non-Hodgkin's lymphoma in the Agricultural Health Study are the
19 same as that of the general population.

20 Q. And did you use all of this data -- AHS, case-control
21 studies -- to reach your opinion?

22 A. Yes, I did.

23 Q. And what is your opinion about the causal association
24 between Roundup and NHL?

25 A. Based on my evaluation of all of the epidemiological

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1 studies, there's no evidence of a causal association between
2 glyphosate and non-Hodgkin's lymphoma and no evidence of any
3 dose-response.

4 **MS. MATTHEWS JOHNSON:** May I just have one moment,
5 Your Honor?

6 **THE COURT:** Sure.

7 (Pause in proceedings.)

8 **BY MS. MATTHEWS JOHNSON:**

9 **Q.** And are all of those opinions, Doctor, held to a
10 reasonable degree of scientific certainty?

11 **A.** Yes, they are.

12 **MS. MATTHEWS JOHNSON:** We tender the witness,
13 Your Honor.

14 **MS. WAGSTAFF:** Thank you, Your Honor. Just one second
15 while I get organized.

16 (Pause in proceedings.)

17 **CROSS-EXAMINATION**

18 **BY MS. WAGSTAFF:**

19 **Q.** All right. Does everyone have their binders?

20 **A.** Yes.

21 **Q.** Okay. Good morning, Dr. Mucci.

22 **A.** Good morning.

23 **Q.** My name is Aimee Wagstaff.

24 And you just testified that you're a cancer
25 epidemiologist; right?

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1 A. Yes.

2 Q. Okay. You're not an environmental epidemiologist; right?

3 A. No, I'm not.

4 Q. Okay. You're a molecular epidemiologist; right?

5 A. Well, actually, molecular epidemiology is one of the tools
6 I use in my own research to study cancer, but I am a cancer
7 epidemiologist.

8 Q. And before we get into the substance of your opinions,
9 let's talk a little bit about how you got involved in
10 researching the link between Roundup and cancer. Okay?

11 Until Monsanto called you and asked you to serve as an
12 expert witness for the company, you'd never researched
13 glyphosate; right?

14 A. No, I had not.

15 Q. And until Monsanto called you to serve as an expert
16 witness, you'd never researched Roundup; right?

17 A. That's correct.

18 Q. Okay. And, in fact, until that phone call, you'd never
19 investigated any pesticide; correct?

20 A. I had not done my own research on pesticides, but I've
21 certainly read the literature on a range of different
22 pesticides as they relate to cancer.

23 Q. Okay. So you'd never investigated any pesticide before
24 Monsanto called you; right?

25 A. So just to clarify, I have not done my own research but I

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1 have -- I read a number of publications on the topic of
2 pesticides and cancer.

3 Q. Okay. And Monsanto's lawyer published to the jury that
4 you have over 300 published papers; is that right?

5 A. Yes, it is.

6 Q. And none of those relate to Roundup; correct?

7 A. That's correct.

8 Q. None of those relate to any pesticides; is that correct?

9 A. That is correct, yes.

10 Q. And none of those relate to non-Hodgkin's lymphoma; is
11 that correct?

12 A. No, that's not correct. I have published some studies on
13 non-Hodgkin's lymphoma. I've also been involved in -- as
14 editor for a textbook on cancer epidemiology, including a
15 chapter on non-Hodgkin's lymphoma.

16 Q. Okay. And the jury has already heard a parties'
17 stipulation that Monsanto is paying you for your time here
18 today to give an opinion to the jury on whether or not exposure
19 to Roundup causes non-Hodgkin's lymphoma; right?

20 A. Yes. I've been paid for my review of all the evidence, to
21 write an expert report, and to give my opinion on the evidence
22 of the epidemiology studies.

23 Q. Okay.

24 MS. WAGSTAFF: And, Ms. Melen, if we could put up --
25 oh, I'm sorry.

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1 Can we turn on the -- I'm sorry. It was habit. Can we
2 turn on the --

3 Q. So I want to make sure that I have your opinion correct
4 Your opinion is that there is no evidence of causal association
5 between Roundup and non-Hodgkin's lymphoma; right?

6 A. Yes, that's correct.

7 Q. And this was a slide that you made; correct?

8 A. Yes, it is.

9 Q. Okay. It's not that there's a weak association? Your
10 opinion is there is no evidence of any association; is that
11 right?

12 A. So --

13 MS. MATTHEWS JOHNSON: Objection. Misstating the
14 testimony.

15 THE COURT: Overruled.

16 THE WITNESS: So, no, my statement is there's no
17 evidence of a causal association.

18 BY MS. WAGSTAFF:

19 Q. Okay.

20 A. And just to clarify, in our studies sometimes we see
21 statistical associations, but those statistical associations
22 can be due to bias or confounding. So my opinion is that
23 there's no evidence of a causal association.

24 Q. Okay. Fair enough.

25 And your opinion also is that there is no evidence of any

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1 dose-response related to exposure to Roundup and non-Hodgkin's
2 lymphoma; right?

3 **A.** So, again, just to clarify, there's no evidence of a
4 causal association of a dose-response.

5 **Q.** Okay. So you think the evidence shows a dose-response?

6 **A.** No. Again, just to clarify what my opinion is, my opinion
7 is that there's no evidence of a causal association between
8 doses of glyphosate and the risk of non-Hodgkin's lymphoma.

9 **Q.** Okay. No evidence whatsoever?

10 **A.** So, again, no evidence of a causal association.

11 **Q.** And you work for the Harvard T.H. Chan School of Public
12 Health; right?

13 **A.** Yes, that's correct.

14 **Q.** Okay. And John Henshaw is the current president of the
15 Harvard Chan School of Public Health; right?

16 **A.** I'm not sure who that is. Dean Michelle Williams is the
17 head of the Harvard T.H. Chan School of Public Health.

18 **Q.** So you're not familiar with Dr. Henshaw?

19 **A.** No, I'm not.

20 **Q.** Okay. And, Dr. Mucci, this isn't the first time that
21 you've said that there's no risk of a cancer from a chemical
22 despite what the scientific literature says; is that right?

23 **MS. MATTHEWS JOHNSON:** Objection to the form.

24 **THE COURT:** Overruled.

25 **THE WITNESS:** I'm not sure what you're referring to

SIDEBAR

1 specifically.

2 **BY MS. WAGSTAFF:**

3 **Q.** Okay. Isn't it true that in 2008 you were under a
4 congressional investigation for saying that a toxic chemical
5 was not a cancer risk even though the available scientific
6 evidence refuted those statements?

7 **MS. MATTHEWS JOHNSON:** Objection, Your Honor. May we
8 have a sidebar briefly?

9 **THE COURT:** Sure.

10 (The following proceedings were heard at the sidebar:)

11 [REDACTED]

12 [REDACTED]

13 [REDACTED]

14 [REDACTED]

15 [REDACTED]

16 [REDACTED]

17 [REDACTED]

18 [REDACTED]

19 [REDACTED]

20 [REDACTED]

21 [REDACTED]

22 [REDACTED]

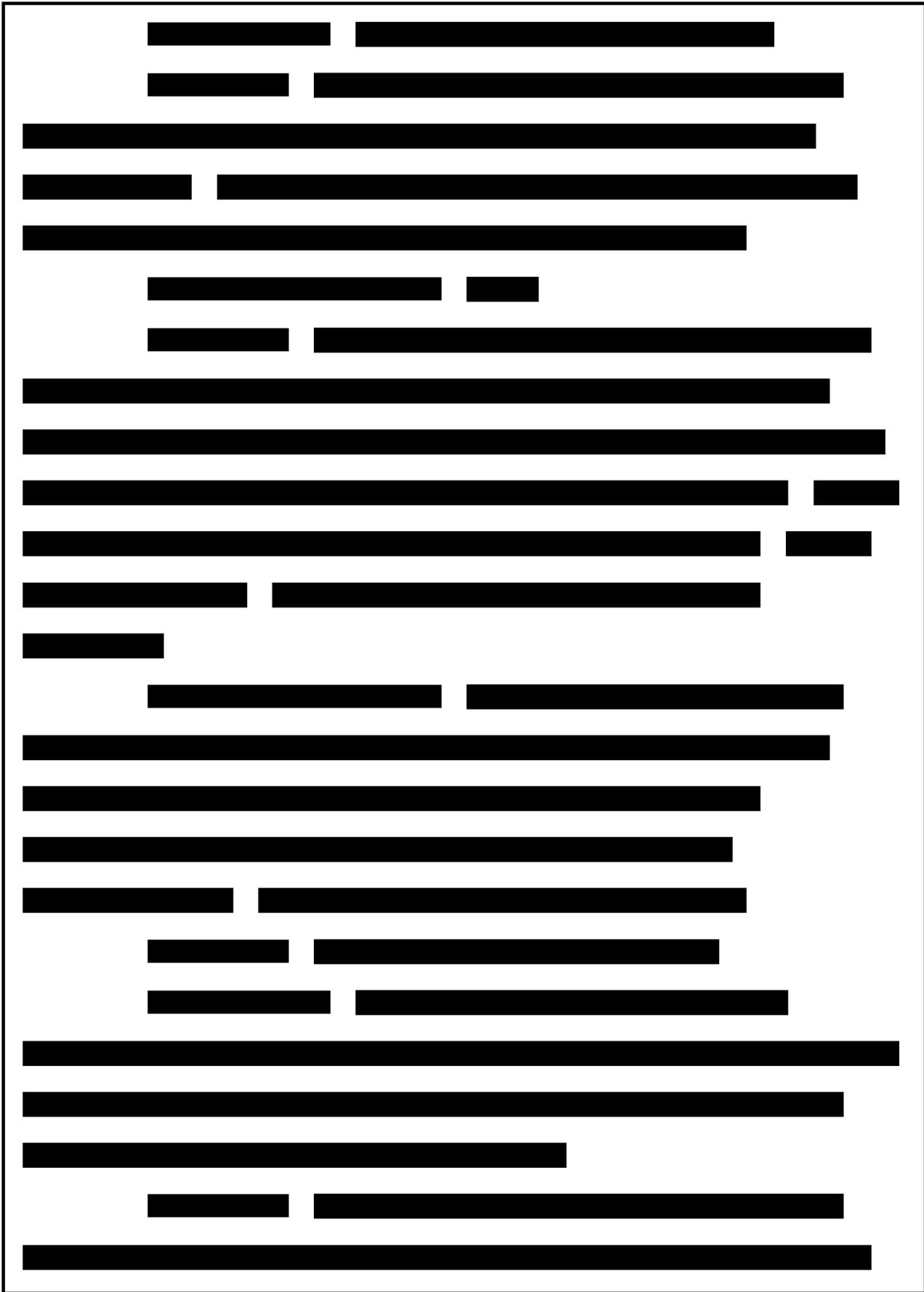
23 [REDACTED]

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[REDACTED] [REDACTED]

[REDACTED]

(The following proceedings were heard in open court:)

BY MS. WAGSTAFF:

Q. All right. Dr. Mucci, were you a member of the acrylamide EPA panel?

A. Yes, I was.

Q. All right. And I've handed you a letter that is dated March 13th, 2008, and it is from the United States House of Representatives Committee on Energy and Commerce. Do you see that?

A. Yes, I do.

Q. And it's written by Chairman John Dingell and Chairman Bart Stupak, the Subcommittee of Oversight and Investigations. Do you see that?

A. Yes, I do.

Q. And have you seen this letter before?

A. I have not, no.

Q. All right. And so this letter, if I can direct you to the second page, paragraph 5. And this is a letter setting forth a congressional investigation; is it not?

A. So I'm not sure what this letter is since I've never seen

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1 it before, but I could tell you a little bit about the -- that
2 committee and also my past research; but, you know, I have not
3 seen this letter previously.

4 **Q.** Sure. And in paragraph 5 it says "Lorelei Mucci." Is
5 that you?

6 **A.** Yes, it is.

7 **Q.** Okay. And it says -- and this is some congressmen writing
8 to the -- looks like the EPA and stating that -- it says at the
9 beginning (reading):

10 "In reviewing this matter, we note that a number of
11 EPA panels assessing the human health effects of toxic
12 chemicals" --

13 Let me put this on the Elmo.

14 Congress says (reading):

15 "In reviewing this matter, we note that a number of
16 EPA panels assessing the human health effects of toxic
17 chemicals" --

18 **THE COURT:** I'm going to interject.

19 **MS. WAGSTAFF:** Okay.

20 **THE COURT:** If you're going to ask questions about
21 this document, you need to describe it accurately.

22 **MS. WAGSTAFF:** Okay.

23 **THE COURT:** This is not Congress saying anything.

24 **MS. WAGSTAFF:** All right.

25 **THE COURT:** This is an individual member of

MUCCI - CROSS / WAGSTAFF

1 Congress -- two individual members of Congress saying
2 something. So I need you to describe this accurately or I will
3 cut off the line of questioning.

4 **MS. WAGSTAFF:** Okay. Sure.

5 **Q.** So this is two members of Congress asking the EPA, and
6 they state (reading):

7 "In reviewing this matter, we note that a number of
8 EPA panels assessing the human health effects of toxic
9 chemicals have included individuals alleged to have
10 pecuniary interests in the chemical industry."

11 Do you see that? Did I read that correctly?

12 **A.** Let's see...

13 (Witness examines document.) And could you define
14 "pecuniary"? I'm not familiar with that word.

15 **Q.** Financial interest.

16 **A.** That would be absolutely incorrect. I had no financial
17 interest in the study of acrylamide that was formed in the
18 formation of food. There was absolutely no financial interest
19 that I had.

20 **Q.** Okay. And it says, "We note, for example, the following,"
21 and it lists nine people, and. Then we go to Number 5, and you
22 had told me that that is you, Lorelei Mucci, and it says
23 (reading):

24 "Lorelei Mucci sits on the EPA acrylamide panel, but
25 has made the following statements, each of which can be

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1 refuted with the available scientific evidence, prior to
2 her selection on the panel."

3 Do you see that?

4 **A.** Yes, I do. And, again, if I could clarify the work that
5 I've done on this topic of acrylamide, that may be helpful in
6 giving some context for this.

7 **Q.** Sure. Absolutely. I just want to get through this
8 paragraph.

9 And so the two members of Congress tell the EPA that your
10 statements, which can be refuted with the available scientific
11 evidence, are as follows (reading):

12 "One, there is little evidence of an association
13 between acrylamide from any specific baked or fried potato
14 product and cancer risk; two, the levels of acrylamide
15 individuals are generally exposed to through food do not
16 appear to increase the risk of cancer; and, three, the
17 intake of acrylamide, no matter how much is consumed, is
18 not a breast-cancer risk factor."

19 Did I read that correctly?

20 **A.** Yes, you have. And so, again, if I could provide some
21 context.

22 **Q.** Sure.

23 **A.** I was a post-doc in 2002 in Sweden when the Swedish Food
24 Administration first found that acrylamide, which is a compound
25 that was formed naturally during cooking practices -- so, for

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1 example, baked potato products and breads have levels of
2 acrylamide -- and so as a post-doctoral fellow, I did research
3 using a number of both case-control and cohort studies
4 investigating whether the amount of acrylamide that people were
5 consuming in their diets increased the risk of several
6 different cancers, including breast cancer.

7 These particular quotes are coming from the manuscripts
8 that I had published on this topic. Those reports were funded
9 by actually the U.S. Army Breast Cancer Program and the
10 National Cancer Institute. There was no suspicious funding at
11 all in any of the studies, and these particular quotes come
12 from the publications.

13 And, in fact, now -- you know, this letter was written in
14 2008 -- in 2019 it's generally accepted by most scientists that
15 the amount of acrylamide that people are exposed to in diet is
16 not a risk factor for cancer, and that's the current state of
17 evidence in 2019.

18 **Q.** Okay. Well, I don't want to get into a side trial of
19 whether or not acrylamide is cancerous or not, but based --
20 back to this letter, these two congressmen were saying that
21 your statements could be refuted by available scientific
22 evidence. Did I read that correctly?

23 **A.** Yes. While you read that correctly, actually, again, as
24 I've said, even back then and now, the totality of evidence in
25 the epidemiology studies does not support associations.

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1 In fact, the reason I was asked to serve on this expert
2 panel was because I'd published in the epidemiology literature
3 looking at dietary acrylamide and cancer risk. So that's, in
4 fact, the reason I was asked to serve as an expert panel
5 member.

6 Q. And, actually, this letter was written, I think we just
7 agreed, on March 13th of 2008; right?

8 A. Yes. Correct.

9 Q. And in 1994, actually part of the available scientific
10 evidence on acrylamide was that IARC had found acrylamide to be
11 a probable carcinogen?

12 **MS. MATTHEWS JOHNSON:** Objection, Your Honor.

13 **THE COURT:** I think it's time to move on. That
14 question is stricken.

15 **BY MS. WAGSTAFF:**

16 Q. Okay. So now let's talk about the opinions you're going
17 to give the jury today.

18 You're not here to give any opinions about Mr. Hardeman;
19 is that correct?

20 A. That's correct.

21 Q. You're not here to give -- you haven't reviewed his
22 medical records; is that correct?

23 A. I have not.

24 Q. You have not -- you have no opinion on his exposure
25 history; correct?

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1 A. I've not looked at his records. I'm not commenting on
2 that, no.

3 Q. And I mean you don't know if he sprayed 1 day or 100 days
4 or 1 year or 26 years; right?

5 A. No, and that information isn't relevant to reviewing the
6 epidemiology studies.

7 Q. Okay. And you're not an oncologist; correct?

8 A. No, I'm not.

9 Q. And you're not a hematologist; right?

10 A. No, I'm not.

11 Q. And you're not a pathologist; right?

12 A. No. But, again, I'm a cancer epidemiologist, and it gives
13 me the background and expertise to be able to review the
14 scientific evidence on this topic.

15 Q. Okay. And you're not a hematopathologist; right?

16 A. No, I'm not.

17 Q. And so your only opinion today is on whether or not
18 exposure to Roundup can cause non-Hodgkin's lymphoma; right?

19 A. Based on the epidemiology, yes.

20 Q. Okay. And that's great. I wanted to move into that.

21 So to be clear, you're not here to offer any opinion
22 whatsoever on the animal studies?

23 A. I actually have reviewed the animal studies -- some of the
24 animal studies and some of the genotoxic information --

25 **MS. WAGSTAFF:** Objection, Your Honor.

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1 **THE COURT:** You can continue your answer.

2 **THE WITNESS:** -- and that information doesn't change
3 my opinion about whether or not glyphosate causes non-Hodgkin's
4 lymphoma.

5 **BY MS. WAGSTAFF:**

6 **Q.** But you are not relying on that information for your
7 opinion? I want to be crystal clear to the jury. Your opinion
8 is based solely on the epidemiological literature?

9 **A.** No, it's -- again, I have considered some of the animal
10 studies and the genotox studies, and those studies in fact even
11 strengthen my opinion that there's no evidence of a causal
12 association.

13 **Q.** All right. And on March 1st, which was just six days ago,
14 we got notice that you reviewed some of the cell studies; is
15 that correct?

16 **A.** Well, so, you know, during my review of the epidemiology
17 studies, I had done -- as well as reviewing some authoritative
18 reports, I was very familiar with the animal studies and the
19 genotox studies, and I have since reviewed in detail some of
20 those publications. And, again, the evidence from there
21 actually strengthens my opinion that there is no evidence of a
22 causal association.

23 **Q.** All right. I'm sorry. I didn't think this would be
24 that -- that you would have given the answer that you're
25 relying on animal studies and cell studies because I'd never

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1 heard that opinion before.

2 Could you turn to your testimony --

3 **MS. MATTHEWS JOHNSON:** Objection, Your Honor.

4 **THE COURT:** Overruled.

5 **BY MS. WAGSTAFF:**

6 **Q.** Could you turn to your testimony that you gave last -- you
7 should have a book on your testimony.

8 **A.** Could you give me some information on where to find it,
9 please?

10 **Q.** It's the -- I'm looking for my book actually.

11 So if you could turn to the testimony that you gave last
12 summer, July 31st, 2000 --

13 **A.** I'm sorry. Which book?

14 **Q.** July 31st. It says "Expert Reports."

15 **THE COURT:** I think you need to give her a tab maybe.

16 **THE WITNESS:** I have two books and there's many tabs.

17 **BY MS. WAGSTAFF:**

18 **Q.** Okay. One is your testimony.

19 **THE COURT:** Okay. Why don't you figure out which tab
20 it's at.

21 **MS. WAGSTAFF:** Six.

22 **THE COURT:** Okay.

23 **BY MS. WAGSTAFF:**

24 **Q.** There's an index that labels it. So in --

25 **A.** (Witness examines documents.)

PROCEEDINGS

1 Q. Are you there?

2 A. Yes, I am.

3 Q. Okay. If you could go to page 4318, please.

4 A. (Witness examines document.)

5 Q. Actually, that's the wrong cite, so I will... I will come
6 back to that. All right.

7 So moving on. Sorry, I wasn't anticipating that response.

8 So you are not here to give any opinion on whether or not
9 Roundup causes tumors in mammals; is that correct?

10 A. Again, as it relates to my overall opinion that there's no
11 causal association in humans, it was one piece of the evidence
12 that I used in making that assessment.

13 **MS. WAGSTAFF:** Your Honor --

14 **THE COURT:** Why don't we take a five-minute break.
15 The jury will return at five minutes after the hour.

16 (Proceedings were heard out of the presence of the jury:)

17 **THE COURT:** Okay. And, Dr. Mucci, you should stay in
18 the room.

19 **THE WITNESS:** I'm sorry. Should I stay up here or --

20 **THE COURT:** It doesn't matter where you stay, but you
21 should stay in the room.

22 So I don't really understand what's going on here. We had
23 a discussion about this this morning, and Ms. Wagstaff did not
24 ask her if she had read any of the animal studies.

25 Ms. Wagstaff did not ask her if she had read any of the

PROCEEDINGS

1 mechanistic studies. The only thing Ms. Wagstaff asked her was
2 "You're only offering an opinion on the epidemiology."

3 **MS. MATTHEWS JOHNSON:** That's right.

4 **THE COURT:** And so it seems to me that all of those
5 answers were inappropriate, and I thought we had established
6 very clearly this morning that such answers would be
7 inappropriate.

8 So I think at this point probably, I mean, I'll listen --
9 if Ms. Wagstaff wants it, I think it would probably be
10 appropriate for me to instruct the jury that the jury is only
11 to consider Dr. Mucci's testimony about the epidemiology, and
12 that all of her prior responses about the animal studies and
13 about genotoxicity will be stricken and should be disregarded.

14 **MS. MATTHEWS JOHNSON:** Well, let me just say first,
15 Your Honor, we were very clear about on direct examination
16 exclusively talking --

17 **THE COURT:** Yes, but Ms. Wagstaff did not ask if she'd
18 read the animal literature. She asked "Are you offering an
19 opinion on anything other than the epidemiology studies?" And
20 the answer to that, of course, is no.

21 **MS. MATTHEWS JOHNSON:** And to be clear --

22 **THE COURT:** But the answer that was given was, "Well,
23 actually, I've read the animal studies and I've read the
24 genotox studies, and they actually support my opinion."

25 **MS. MATTHEWS JOHNSON:** Well, let me say first,

PROCEEDINGS

1 Your Honor, I want to take full responsibility if there was any
2 miscommunication with the witness. So let me take, first, full
3 responsibility there.

4 Second, I want to say I do believe Ms. Wagstaff's question
5 was "You have not looked at anything but the epidemiology?"
6 Maybe this is a question of reading back, but --

7 **THE COURT:** I don't think so.

8 **MS. MATTHEWS JOHNSON:** Okay.

9 **THE COURT:** I mean --

10 **MS. MATTHEWS JOHNSON:** And maybe there was confusion
11 on the front end.

12 Certainly what I think would be potentially appropriate is
13 for the witness to be able to clarify, with Ms. Wagstaff
14 leading the witness through it, that "Your opinion is about
15 epidemiology. You are not relying on any genotox or animal
16 studies," because the reliance question is correct in terms of
17 the reliance.

18 So I would -- that would be our submission, that
19 Ms. Wagstaff be able to lead the witness through that with a
20 clear understanding that the fact that things have been read is
21 not sufficient to make it a reliance matter particularly given
22 at the posture that we are here at trial.

23 **THE COURT:** I mean, I would think it would be
24 appropriate to strike all the prior testimony if that's what
25 the plaintiff wants.

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1 **MS. WAGSTAFF:** Your Honor, I'd actually like and think
2 a curative instruction is necessary. I raised this prior to
3 the testimony knowing this was going to be an issue. They
4 added the reliance materials last week. I was very careful in
5 my questions. I did everything we discussed.

6 And now she's muddied the water to the point where I think
7 we need a curative instruction. And I will ask her further
8 questions on it, but I do think the answers need to be struck,
9 and I think your idea of a curative instruction is appropriate.

10 **THE COURT:** Okay. And so the curative instruction
11 should be simply for me to say that Dr. Mucci is only permitted
12 to offer an opinion here on the epidemiology?

13 **MS. WAGSTAFF:** And not on the animal studies or the
14 cellular studies, yes.

15 **THE COURT:** Okay. That's fine.

16 **MS. WAGSTAFF:** Thank you.

17 **THE COURT:** I'll do that. Okay.

18 Do you want to go ahead and bring the jury back in?

19 (Proceedings were heard in the presence of the jury:)

20 **THE COURT:** Okay. Welcome back.

21 So there were -- you heard a series of questions and
22 answers about Dr. Mucci's review of animal studies, toxicology
23 literature, and cellular literature. Dr. Mucci is only here
24 permitted to testify about the epidemiological literature, and
25 so I am striking all of the testimony about the toxicology

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1 literature and the cellular literature and instructing you to
2 disregard it.

3 You can continue.

4 **BY MS. WAGSTAFF:**

5 **Q.** All right. Back to where we were. Dr. Mucci, to be
6 clear, you're not here to offer any opinion on whether Roundup
7 causes tumors in mammals; right?

8 **A.** No, I'm not.

9 **Q.** And, Dr. Mucci, you're not here to offer any opinion on
10 whether Roundup causes malignant lymphomas in mice?

11 **A.** No, I'm not.

12 **Q.** And you're not here to offer an opinion on whether there's
13 a --

14 **THE COURT:** I think we've established that so you can
15 move on now.

16 **MS. WAGSTAFF:** All right.

17 **Q.** And, Dr. Mucci, regarding the cellular data, you're not
18 here to offer any opinion on whether or not Roundup or
19 glyphosate is genotoxic or causes oxidative stress; right?

20 **A.** No, I'm not.

21 **Q.** All right. And, Dr. Mucci, you have written a book on
22 cancer epidemiology; right?

23 **A.** Yes, I have.

24 **Q.** And is this your book?

25 **A.** Yes. It's one of them.

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1 Q. Okay. And I'd like to hand you a few pieces. I have
2 photocopied portions I'm going to ask you about?

3 MS. WAGSTAFF: May I approach, Your Honor?

4 THE COURT: Sure.

5 (Pause in proceedings.)

6 THE WITNESS: Thank you.

7 BY MS. WAGSTAFF:

8 Q. All right. So this book was written -- it looks like this
9 was just published last year; is that right?

10 A. Yes. Correct.

11 Q. Okay. And so this is pretty recent. These are your
12 pretty recent views; is that right?

13 A. Yes, it is.

14 Q. Okay. And so if you turn to the first page, which is
15 page 111. It should be the first page after the cover page.
16 Did I photocopy that right?

17 A. No. I don't have 111 here.

18 Q. You don't have page 111? It says "Chapter 6, Concepts in
19 Cancer"?

20 A. It's not the first page, though.

21 Q. Oh.

22 A. So I don't have 111. Sorry.

23 Q. Okay. Well, we can do this on here then.

24 You have "Concepts in Cancer Epidemiology and Etiology";
25 right?

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1 A. Yes.

2 Q. Okay. And can you tell the ladies and gentlemen of the
3 jury what "etiology" means?

4 A. So etiology, as I mentioned earlier, is understanding why
5 cancer occurs.

6 Q. So you have a section on etiology, which is cause -- it's
7 causation of cancer; right? That's just what you described?

8 A. It's looking at the definition of the cause.

9 Q. Okay. And if you can turn to page 127, which I hope I
10 included --

11 A. Yes.

12 Q. -- there's a "Causal Inference in Epidemiology." I just
13 wanted to orient you to the page. Do you see that?

14 A. Yes, I do.

15 Q. Okay. And so then if you turn to the next page, this
16 section of your book is discussing ways to infer causation from
17 epidemiology; is that right?

18 A. Yes.

19 Q. And this was published last year, and this is your book;
20 right?

21 A. Yes, it is.

22 Q. Okay. And one of the ways that you can infer causation
23 from epidemiology is something looks like called the
24 Bradford-Hill causation analysis; right?

25 A. Yes. These are a set of guidelines that the authors

1 Bradford and Hill put together as a guide for assessing
2 causation. It's one of the ways that we think of it.

3 **Q.** Okay. And it's my understanding you did not do a
4 Bradford-Hill analysis with respect to the epidemiology in this
5 case; is that right?

6 **A.** Yeah, that's correct. And, again, these are a set of
7 guidelines and this is one way in which we assess causation in
8 epidemiology studies, but I did not apply a formal
9 Bradford-Hill analysis here.

10 **Q.** Okay. Without getting into the other way that your book
11 says, your book only lists two ways in this section on how to
12 infer causality; correct?

13 **A.** Actually, that's not exactly correct. There are two
14 tables here; but if you look throughout the textbook, there's
15 many different ways in which we evaluate whether or not there's
16 a cause. So these are two of the tables, but there are many
17 different approaches we use and that are described here in this
18 textbook.

19 **Q.** Sure. Sure. But this section, which is "Causal Inference
20 in Epidemiology," there's only two manners; right?

21 **A.** Again, so this is -- this is part of the approach that's
22 described in this particular chapter, but it's not the complete
23 way in which we think about causation. Again, these are
24 guidelines we do use, that can be used, but I did not do a
25 formal Bradford-Hill analysis.

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1 Q. And you didn't do an informal one either; right?

2 A. Actually, if you look at my report, I do discuss some of
3 the criteria. In fact, in terms of these guidelines, really
4 the only one that scientists agree on as necessary is
5 temporality. So there's actually nine guidelines here. The
6 only one that all scientists agree on is that there has to be
7 temporality, meaning that the exposure has to happen before the
8 disease. The others are, again, a set of guidelines that can
9 be used.

10 Q. Okay. Excellent. And I'm glad you brought up your
11 report.

12 The jury heard you talk a lot about the Andreotti 2018
13 paper, the AHS paper?

14 A. Yes.

15 Q. Do you remember that?

16 A. Yeah. It was one of the studies I referred to in my
17 report.

18 Q. Yeah. And you spent a lot of time walking the jury
19 through that study. Do you remember that?

20 A. Yes, I do.

21 Q. Okay. And what was the date that that study was
22 published?

23 A. I believe it was published in 2018.

24 Q. Okay. And what was the date you gave your expert report
25 in this matter?

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1 A. I provided two expert reports.

2 Q. Your first one.

3 A. I don't remember the date of that report.

4 Q. Okay. If you look to the book where it has your
5 testimony -- are you in that book? -- the first page -- the
6 first tab should be your expert report.

7 A. Yes. So the first expert report was July of 2017.

8 Q. Okay. So you actually formed your opinions and provided a
9 written report that is 70 -- well, 71 -- 72 pages, typed pages,
10 prior to that publication even being published; right?

11 A. Well, the first Agricultural Health Study publication had
12 come out.

13 Q. Sure.

14 A. We also had a draft version of an updated analysis within
15 the Agricultural Health Study that hadn't been published yet
16 but using the same methodology. So there were actually --
17 while there wasn't two formal publications, there were two
18 manuscripts from the Agricultural Health Study that I describe
19 in the report.

20 Q. Sure. So Andreotti hadn't been published yet and wasn't
21 available yet when you submitted your report in this case; is
22 that right?

23 A. Right. That's correct.

24 Q. Okay. And you're only here to testify about epidemiology;
25 right?

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1 **A.** Yes, that's correct.

2 **Q.** Okay. And if we can go back to your book in a moment, but
3 you would agree that a chemical can cause cancer in humans even
4 when the epidemiology is considered limited or inadequate?
5 Would you agree with that?

6 **A.** Not necessarily. I don't agree with that. I think the
7 definition -- I would think you would want to have the context
8 specific. I think it would really depend on the compound and
9 the exposure.

10 **Q.** Sure. So let's turn to page 107 in your book, which
11 hopefully I copied correctly.

12 So this is a chart that's in your epidemiology -- or
13 cancer epidemiology book. And you would agree -- tell me when
14 you're there, Dr. Mucci.

15 **A.** I'm sorry. I don't think I have -- I don't know if I have
16 this here.

17 (Witness examines document.) Oh, here. Yes.

18 **Q.** Do you have it?

19 And you would agree that these are chemicals that are
20 known to be human carcinogens; is that correct?

21 **A.** They're labeled as Group 1 by IARC, yes.

22 **Q.** And you consider them to be human carcinogens; right?

23 **A.** These are considered by IARC to be human carcinogens. I
24 haven't looked formally at all of these pesticides. I haven't
25 reviewed the evidence for these.

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1 Q. Well, in your book on the page before, it states --

2 MS. MATTHEWS JOHNSON: Objection. Could you --

3 THE COURT: I don't know how to rule because I haven't
4 heard the question.

5 MS. MATTHEWS JOHNSON: I'm sorry.

6 BY MS. WAGSTAFF:

7 Q. On the page before you actually state that a Group 1 IARC
8 classification is the benchmark for an identification of human
9 carcinogens; right?

10 A. Yes, that's written there.

11 Q. Okay. So you would agree, then, with me that these are
12 human carcinogens?

13 A. So, again, I -- these are from IARC Group 1
14 classification. I haven't looked at each of these currently so
15 I wouldn't want to say one way or the other about this set of
16 pesticides here.

17 Q. Okay. So the --

18 A. Or chemicals here. Sorry.

19 Q. Okay. So IARC has classified these as a Group 1
20 carcinogen, and it's your --

21 MS. MATTHEWS JOHNSON: Objection, Your Honor.

22 THE COURT: Overruled.

23 BY MS. WAGSTAFF:

24 Q. -- and it's your opinion that a Group 1 classification is
25 the benchmark for a human carcinogen; is that right?

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1 A. Again, it's one of the important ways that we think about
2 causation in cancer.

3 Q. Sure. And so some of these have -- you'll see right here,
4 and this is a chart in your book, and it's labeled "Group 1,
5 Agents with Less Than Sufficient Evidence in Humans" -- that's
6 epidemiology; right?

7 A. Yes, it is.

8 Q. -- "But With Strong Mechanistic Evidence"; right?

9 A. Yes, that's correct.

10 Q. And the mechanistic evidence is sort of the cellular data;
11 right?

12 A. Yes, that's correct.

13 Q. And you're not here today to give any opinion on the
14 mechanistic evidence of glyphosate causing and Roundup;
15 correct?

16 A. No, I am not.

17 Q. So in this chart there are several times when the
18 epidemiology is inadequate, and then this is the animal study
19 section; right? The third column?

20 A. Yes, it is.

21 Q. And you're not giving any opinion on the animal studies
22 today?

23 A. No, I'm not.

24 Q. And then this column on the far right is the mechanistic
25 evidence. So there are scenarios whereby the human evidence is

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1 either inadequate or limited but it's still considered to be a
2 human carcinogen; correct?

3 **A.** Again, this is the list of Group 1 agents, which I think
4 is different than glyphosate, for example. However, I haven't
5 reviewed these specific agents here with respect to their
6 carcinogenicity.

7 **Q.** Sure. But this is your book and you have stated that this
8 classification right here is the benchmark for a human
9 carcinogen; right?

10 **A.** And, again, just to be clear, I said it's one of the
11 benchmarks --

12 **Q.** One.

13 **A.** -- that's used for causation. And, again, these are
14 classified as Group 1 carcinogens, but I haven't reviewed these
15 in detail.

16 **Q.** Okay. Thank you.

17 All right. I'd like to talk a little bit about some of
18 the slides that you used. You put up -- first of all, would
19 you agree that there is exposure misclassification in the AHS?

20 **A.** So in epidemiology, whether it's a case-control or a
21 cohort study, we are always concerned about misclassification.
22 The more important thing to think about is how much and did it
23 lead to bias.

24 So while there may be some misclassification, as I
25 described earlier, it seems highly unlikely that there's

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1 misclassification between those in the highest group versus
2 those in the no exposure.

3 Q. So, yes, you would agree that there is exposure
4 misclassification in the AHS?

5 A. So, again, I think it's a more complicated answer than
6 just yes or no. There may be some but it's very unlikely in
7 those extreme levels of the highest versus no exposure.

8 Q. Okay. And if you could turn to, I think it's the book
9 that's right in front of you, and if you could turn to what I
10 believe is 1011, please. And let me know when you get there.

11 A. (Witness examines documents.) Yes.

12 Q. Okay. So this is the initial Agricultural Health Study
13 questionnaire; right?

14 A. Yes, it is.

15 Q. And you made a slide about this?

16 A. Yes, I did.

17 Q. Because you think it's important; right?

18 A. Yes. It provides information on the way that the exposure
19 dose in the study was created, yes.

20 Q. Okay. And so this questionnaire, which the jury hasn't
21 seen in total, is 22 pages. It's pretty dense; right?

22 A. Yes. While that's true, actually, you know, the
23 investigators themselves think that it would take on average 25
24 minutes. So it's a fairly standard length questionnaire for an
25 epidemiological study.

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1 Q. Okay. And of the questionnaire, you pulled out these two
2 questions to show the jury; right?

3 A. These -- well, actually, I believe that we pulled out more
4 than just these two questions actually.

5 Q. Okay. But you did pull out these two questions as being
6 important to show the jury; right?

7 A. Yes. Correct.

8 Q. And this questionnaire related to how many chemicals?

9 A. So this questionnaire collected information on 50
10 different chemicals -- pesticides.

11 Q. Okay. So name two of the pesticides. We know glyphosate
12 was one of them; right?

13 A. Malathion, 2,4-D.

14 Q. Okay. Let's just -- we can do 2,4-D and glyphosate;
15 right?

16 So let's say that I use a hand spray gun. You see this
17 first one is "How do you personally apply pesticides?" Do you
18 see that?

19 A. Yes, I do.

20 Q. Okay. And this is Number 16 in this questionnaire that
21 you pulled out; right?

22 A. Yes. Correct.

23 Q. So let's say that I am a farmer and I use a hand spray
24 gun -- do you see that? That's an option?

25 A. Yes, I do.

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1 Q. -- to spray glyphosate, but let's say I use a gas canister
2 for 2,4-D. How do I answer this question?

3 A. Well, so actually you would mark all of the options that
4 apply to you in the way in which you personally apply the
5 pesticides. You would actually fill out both of those.

6 Q. But it's a bubble question so how do the people know which
7 one applies to glyphosate and which one applies to 2,4-D?

8 A. Yeah, so, actually, that is a really good question, and
9 you might be worried that because they were asking this general
10 question for pesticides, that it might lead to some measurement
11 error in the dose.

12 However, I think the investigators actually looked at that
13 in both the Dosemeci and Coble approaches to this algorithm.
14 They looked to see whether the fact that they had kind of just
15 these general comments for all pesticides, whether they could
16 still get an accurate dose of different specific pesticides.

17 So I agree that, while it could be a potential for
18 concern, that the AHS investigators actually tested to see
19 whether it might lead to measurement error; and, in fact,
20 actually they found that they could get good estimates of
21 exposure with this kind of information.

22 Q. Okay. So the answer is that the investigators wouldn't
23 have any way to know which one related to glyphosate and which
24 one related to 2,4-D; right?

25 A. Yes. While that's correct, they applied these measures to

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1 all the pesticides. But, again, it didn't end up making any
2 difference in the estimate of the exposure.

3 **Q.** Okay. And so, then, let's look down at the next question
4 that you found was important to show the jury. The next
5 question talks about protective equipment do -- you generally
6 wear when you personally handle pesticides. Do you see that?

7 **A.** Yes. Correct.

8 **Q.** And, once again, it's talking about 50 pesticides?

9 **A.** Yes, it is.

10 **Q.** Okay. So let's say that when I use 2,4-D, that's known to
11 cause cancer -- I don't know if it is or not, but let's say
12 that it is -- so I wear face shields and goggles. Then let's
13 say with glyphosate I wear leather gloves. And you mentioned
14 malathion. Let's say with malathion I wear a respirator and a
15 gas mask. How do I fill this out?

16 **A.** Right. So, again, the question asks the participants to
17 fill out all of the things that apply to them when they're
18 using pesticides; and for this particular set of information,
19 what was kind of more important was whether or not they ever
20 used any sort of personal equipment or not. That was one of
21 the factors that went into the algorithm.

22 And, again, I understand that this raises concern about
23 whether asking the question this way might lead to some
24 problems in the assessment of the exposure; but, again, the
25 investigators investigated -- so, first of all, there's two

1 things.

2 One, the investigator assessed compared to the biomarker
3 in the urine how well it did at estimating exposure. The other
4 factor is in the Andreotti study they looked at both this
5 algorithm that used things like protective gear and how they
6 applied for the exposure and then also just used the cumulative
7 number of days of exposure. So they said, "Well, if we're
8 worried about measurement error, let's just look at the
9 cumulative exposure without this information." And, again, the
10 results were identical.

11 **Q.** Okay. So, once again, the investigators wouldn't have any
12 way to know which protective equipment applied to which
13 chemical; right?

14 **A.** Yes. While that's correct, it actually doesn't have an
15 effect on the estimate of internal dose.

16 **Q.** Why would the investigators ask questions that don't
17 matter?

18 **A.** That actually isn't true. This question actually does
19 matter.

20 **Q.** Okay.

21 **A.** Because they actually showed in the algorithm having
22 information on whether they used protective gear or the method
23 in which they applied more generally in pesticides actually
24 provided more accurate information about the internal exposure
25 for specific pesticides. So it actually does really matter.

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1 Q. Okay. And you've mentioned a few times now using urine to
2 test the glyphosate. I think I've heard you mention that a few
3 times.

4 A. Yes.

5 Q. You're not here to give an opinion on whether or not
6 testing glyphosate levels in urine is an appropriate way to
7 test glyphosate levels; right?

8 A. No, I'm not.

9 Q. Okay.

10 All right. Next I'd like to turn to another chart that
11 you made. And you made this chart; right?

12 A. Yes, I did.

13 Q. And your overall view is that cohort studies seem to be
14 better than case-control studies; right?

15 A. Yeah. And as we discussed earlier, it's not just my view
16 but, in fact, it's actually a standard view of epidemiologists
17 that cohort studies are more -- have more validity than
18 case-control studies.

19 Q. Okay. And you put up here -- you decided to bring up this
20 that Dr. Ritz had showed the jury; right?

21 A. Yes.

22 Q. Okay. And you would agree with me, though, while this
23 could be a general principle, you actually have to look at the
24 specific study; right?

25 A. Absolutely.

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1 Q. So you can't just make some bright-line rule that cohorts
2 trump all case controls; right?

3 A. It's correct that you want to look -- in epidemiology you
4 want to look at the individual studies, and actually that's
5 what this particular figure is. It's the summary of all of the
6 case-control studies and the cohort study. Those look to the
7 topic.

8 Q. Okay. So these are your factors on how you would
9 summarize the case-control studies versus the Agricultural
10 Health Study; is that right?

11 A. These are some of the highlights of some of the issues in
12 the studies.

13 Q. Well, these are your highlights that you decided to show
14 the jury; right?

15 A. These are strengths and limitations that not only I saw
16 when I reviewed the epidemiology studies but, in fact, these
17 are some of the issues that the authors themselves, when they
18 wrote their studies, described.

19 Q. Okay. So let's just look at a few of them, if you will.
20 You say that the case-control studies are -- well, let me just
21 say -- let me just make sure I understand your chart.

22 These four under case-control studies, you view these as
23 negative qualities; correct?

24 A. Yes.

25 Q. Okay. And these four under the Agricultural Health Study,

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1 you view these as positive qualities; right?

2 **A.** Yes, I do.

3 **Q.** So you say that the case-control studies in this case
4 should not be trusted because they are exploratory; right?

5 **A.** So, actually, that's not what I said. What I said was
6 they have value because of these earlier findings that farming
7 increased the risk of non-Hodgkin's lymphoma. So they're not
8 without any value; however, each of the studies were
9 exploratory. They were not looking at the specific hypothesis
10 that glyphosate increased the risk of cancer. They were
11 looking at 30 to 50 pesticides.

12 I think another important fact that I haven't mentioned is
13 glyphosate in some of them -- there were many, many pesticides
14 that turned out as positive. So, again, it's this idea that
15 these provide hypothesis to test in a more well-designed
16 analysis.

17 **Q.** Okay. And you had mentioned that there were 250 studies
18 that have come from the AHS; right?

19 **A.** Yes, that's correct.

20 **Q.** Give or take a few?

21 **A.** Yes.

22 **Q.** But only two that relate to glyphosate and Roundup; right?

23 **A.** Yes, that's correct.

24 **Q.** And the first one was in 2005?

25 **A.** Yes.

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1 Q. And the second one was in 2018; right?

2 A. Yes, that's correct.

3 Q. Okay. So if you could turn to -- I'm looking at the --
4 stay with the same binder that you're at, please, and if you
5 could turn to the first tab, which I think is Exhibit 100.

6 And you've seen -- tell me when you're there, Dr. Mucci.

7 A. (Witness examines document.) Yes, I'm here.

8 Q. All right. If you'll take a moment to look over that
9 document; or if you've seen it, we can --

10 A. Yes, I'm familiar with this document.

11 Q. Okay. So this is a document July -- let me get a clean
12 copy out. Sorry.

13 This is in July of 2000 -- I'm sorry -- of 1997. I made a
14 note on it so I'm covering it up.

15 And it's written by John Acquavella; right?

16 A. Yes, it is.

17 Q. And who is John Acquavella?

18 A. John Acquavella is an epidemiologist who formerly was an
19 employee of Monsanto.

20 Q. Okay. So when he wrote this, Dr. Acquavella was actually
21 an employee of Monsanto; right?

22 A. I'm not sure if he was at the time or not.

23 Q. Okay. And it's written prior to any results coming out
24 regarding glyphosate and non-Hodgkin's lymphoma; right?

25 A. Yes, it is.

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1 Q. And it's to the Communication Subcommittee, and it looks
2 like he was asked to provide some background thoughts on
3 "epidemiology and Agricultural Health Study that you could use
4 to build positive messages." Do you see that?

5 A. Yes, I see that.

6 Q. Okay. And then he goes on to say (reading):

7 "The limitations of the AHS can be illustrated by
8 comparison with the hypothetical ideal study."

9 Did I read that right?

10 A. Yes, it does.

11 Q. (reading)

12 "The ideal study would have the following
13 characteristics..."

14 Correct?

15 A. Yes, that's correct.

16 Q. Okay. And then he lists -- Dr. Acquavella lists a few of
17 those characteristics; right?

18 A. Yes, he does.

19 Q. Okay. And then he goes on to sort of give a little
20 summary fashion of each one; right?

21 A. Yes, he does.

22 Q. And what he says is (reading):

23 "Most of the diseases to be studied in the AHS have
24 scant reasoning to link them putatively to pesticide
25 exposure."

1 Did I read that right?

2 **A.** Yes.

3 **Q.** (reading)

4 "Thus, much of the research can be termed
5 exploratory."

6 Right?

7 **A.** Yes, that is what he said there.

8 **Q.** And that's not unusual in epidemiology but it is unusual
9 on this big of a scale; right?

10 **A.** Yeah. And so that is, in fact, what he said; however,
11 just to be clear, in the case of glyphosate, actually this was
12 a very hypothesis-driven analysis in the Agricultural Health
13 Studies because there were these exploratory studies --
14 case-control studies that had some suggestive findings. And
15 so, in fact, the study of glyphosate and non-Hodgkin's lymphoma
16 really doesn't refer to what he's saying here.

17 **Q.** Sure. So in 1997 before any of the results were known
18 about what the data would show, Dr. Acquavella, who's an
19 epidemiologist at Monsanto, was telling people that the AHS was
20 an exploratory study?

21 **A.** No. So, again, to be clear, the Agricultural Health Study
22 collected data on many different exposures and many different
23 outcomes. However, the analysis that was done specifically on
24 glyphosate and non-Hodgkin's lymphoma was a very
25 hypothesis-driven study that was following up on some of the

1 results from exploratory studies. So you can't describe that
2 particular set of studies on glyphosate and cancer as
3 exploratory as was written here.

4 **Q.** Okay. So he doesn't separate out glyphosate in this
5 paper, does he?

6 **A.** No, he does not.

7 **Q.** In fact, he says the AHS in total; right?

8 **A.** Well, he actually follows it up and says much of the
9 research is exploratory; but, again, that's not relevant for
10 this set of studies that was done in the Agricultural Health
11 Study on glyphosate.

12 **Q.** Sure. And then it says (reading):

13 "The downside for industry and agriculture in this
14 approach is that exploratory research tends to yield
15 uncertain findings."

16 And you would agree with that; right?

17 **A.** Well, so that is the issue and, indeed, some of the early
18 case-control studies that looked at so many pesticides did
19 yield some findings that had uncertain validity. And, again,
20 the importance of undertaking whether it's a case-control or
21 cohort study, a very hypothesis-driven analysis, that's going
22 to give you the most certain findings.

23 **Q.** Sure. And then he says (reading):

24 "This energizes pesticide opponents, may cause the
25 public to dictate a market change, and typically makes the

1 manufacturer adopt a defensive stance."

2 **A.** I'm sorry, I couldn't comment on that particular statement
3 as an epidemiologist.

4 **Q.** Okay. Fair enough.

5 (reading)

6 "It would have been preferable if the AHS had a
7 limited scope and focused more detail on a few worthy
8 questions."

9 Do you see Dr. Acquavella saying that in 1997?

10 **A.** Yes, I see that. And, in fact, actually, I would really
11 disagree as a cancer epidemiologist. All of the cohort studies
12 that I mentioned earlier that are part of this NCI cohort
13 consortium, one of their value is the fact that they collect
14 detailed information on a range of exposures and can look at
15 their association with a range of the cancers.

16 So, actually, I actually disagree with his statement there
17 because one of the values is you can take with all of this
18 information but do a very hypothesis-driven analysis and design
19 of the study. So even though all the data has been collected,
20 you can still take a very focused look at the data. So I
21 actually really disagree with the comment by Dr. Acquavella
22 here.

23 **Q.** Okay. And then Dr. Acquavella goes on to talk about the
24 exposure assessment. And, again, this is in 1997 prior to any
25 data being finalized with respect to glyphosate. And

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1 Dr. Acquavella says (reading):

2 "The exposure of the assessment in the AHS will be
3 inaccurate."

4 **A.** That is what he says. And I can understand. He also says
5 later that usage does not necessarily mean exposure, and that's
6 actually one of the strengths of the fact that the AHS
7 investigators developed this algorithm where they use the
8 information not only about cumulative days of exposure and
9 years of exposure, but also use of positive -- protective gear
10 and the way in which they applied.

11 So, you know, as I said earlier, you can always worry
12 about misclassification; however, one of the strengths of the
13 AHS was the investigators in multiple ways wanted to assess the
14 quality of the pesticide use, including glyphosate, and
15 actually showed after this memo came out that the quality of
16 glyphosate data and the algorithm used for glyphosate was
17 actually highly valid.

18 **Q.** Okay. And then Dr. Acquavella goes on to say (reading):

19 "Inaccurate exposure classification can produce
20 spurious results."

21 Do you see that?

22 **A.** Yes, I do.

23 **Q.** Okay. And then he states (reading):

24 "In a study of this size, there will be some, perhaps
25 many, spurious exposure-disease findings due to exposure

1 misclassification."

2 Did I read that correctly?

3 **A.** Yes. And, in fact, that is -- that is standard in
4 epidemiology. If you do have a lot of misclassification of
5 your exposure, you're going to get a spurious finding.
6 However, that's not the case here of glyphosate and
7 non-Hodgkin's lymphoma.

8 **Q.** Okay. So you don't agree with Dr. Acquavella's 1997
9 statement that the AHS was exploratory?

10 **A.** The Agricultural Health Study itself collected many, many
11 different pieces of data. What is not exploratory, however, is
12 the actual hypothesis-driven two studies that have been
13 published looking at glyphosate and cancer risk. Those are not
14 exploratory at all.

15 Again, as I explained, cohort studies collect -- one of
16 their strengths is they collect a lot of exposure information,
17 a lot of different outcome information, in which to look at a
18 range of different hypotheses. So it's actually a strength.

19 **Q.** Okay. So you don't agree with Dr. Acquavella's 1997
20 statement that the AHS is exploratory? Yes or no.

21 **A.** No, I don't agree with that.

22 **Q.** And you don't agree with Dr. Acquavella's 1997 statement
23 that the exposure assessment in the AHS will be inaccurate?

24 **A.** While I agree that we should always, as epidemiologists,
25 be concerned whether it's a case-control or a cohort study

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1 about the quality of the exposure information, it's not the
2 case here.

3 And that's one of the advantages we have now in 2019, is
4 so many studies have been done to assess the quality of the
5 data on glyphosate and other pesticides in this cohort. So
6 while in 1997 at the beginning you might have been concerned
7 about it as a problem, now in 2019, given all of the studies
8 that have looked at this, we know it's not a problem.

9 Q. Okay. So to be clear, you do not agree with
10 Dr. Acquavella's 1997 statement that the exposure assessment in
11 the AHS will be inaccurate?

12 A. Again --

13 Q. Yes or no.

14 A. -- it's -- it's --

15 Q. You either agree with it or you don't.

16 A. Well, in 2019 given all of the studies that have been
17 done, no, I don't agree with it.

18 Q. Okay. And one difference between when Dr. Acquavella made
19 these statements in 1997 and as you sit here today testifying
20 to the jury is we know the results now with respect to
21 glyphosate and non-Hodgkin's lymphoma; right?

22 A. That actually isn't the reason that I say that. The
23 reason --

24 Q. I'm not asking you if that's the reason. I'm saying --

25 A. Yes, that is true. Yes, in 2019 we have the two results.

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1 Q. Okay.

2 A. However, we also have all of these other studies that have
3 looked at the quality of the data.

4 Q. And you testified next that case controls were bad because
5 they had "early years" is what you wrote there.

6 A. Well, so this --

7 Q. Hang on. There's no question yet on the table.

8 A. Okay.

9 Q. You're not here to testify or give any opinion on how long
10 it takes to develop non-Hodgkin's lymphoma after exposure to
11 glyphosate or Roundup; right?

12 A. I wouldn't agree with that completely. I think there --
13 as a cancer epidemiologist, one of the critical factors we
14 think about is the latency period, what is the amount of time
15 in which it might take for when an exposure first happens and
16 when cancer develops; and having read a lot about the
17 epidemiology of non-Hodgkin's lymphoma and specifically some of
18 these studies, I can get a sense about the amount of time it
19 takes for these kind of things to happen so...

20 Q. Okay. And you would defer to a doctor who has spent
21 40-plus years investigating the causes of cancer with respect
22 to the latency issue of how long it actually takes; right?

23 A. I'm not sure. I'd have to know who this person was or
24 what the qualifications were. But, again, you know, we know,
25 even as an example, with respect to non-Hodgkin's lymphoma, in

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1 World War II there was a huge atomic bomb in Japan that
2 happened and they have followed the survivors of that bomb to
3 see who develops cancer. And that particular study shows, even
4 in this population highly, highly exposed to radiation through
5 the bomb, that you don't see non-Hodgkin's lymphoma develop
6 until at least 10 or more years. You don't see a
7 dose-response.

8 Q. Okay. And next is small numbers; right?

9 A. Small numbers of cases, yes.

10 Q. And that's sort of related to power over here; correct?

11 A. Yes, it is.

12 Q. Those are the same thing? Power is the same thing as
13 small numbers; right?

14 A. Well, small numbers of exposed cases is one of the aspects
15 that contributes to the power of a study.

16 Q. Okay. And, you know, I've been trying to explain this for
17 a while, but I think that one of your charts actually shows it
18 really well.

19 You made this chart; right?

20 A. Yes, I did.

21 Q. And I just want to make sure I understand this. When
22 you're looking at a chart like this, you have two numbers. You
23 have 11,000 --

24 A. Yes.

25 Q. -- and then you have 22; right?

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1 A. Yes, that's correct.

2 Q. So when you are describing a cohort, you would list the
3 11,000 number; right?

4 A. No. And, again, just to be clear, what you would want to
5 first say is what's the overall size of the cohort, how many
6 cancer cases have occurred in total, and how many of the cases
7 had the exposure. So all of those three components are really
8 critical to the power of a study.

9 Q. Sure. And so when you are, though, describing the size --
10 when you say -- I think that the jury has heard some numbers
11 thrown around about the Agricultural Health Study and they've
12 been between 50,000 or 80,000 depending on if you include the
13 spouses -- you're using this top-line number; right?

14 A. No. So, again, just to be clear -- well, maybe I don't
15 understand your question specifically.

16 Q. Well, when you look at the number, the case-control number
17 is identified as Dr. Ritz identified it, 51 McDuffie; right?

18 A. Those are the exposed cases.

19 Q. Yeah. So this is the number down here at the bottom of
20 your chart?

21 MS. MATTHEWS JOHNSON: Objection, Your Honor. She's
22 showing a different cancer.

23 BY MS. WAGSTAFF:

24 Q. I'm just hypothetically talking about how to understand
25 the apples-to-oranges comparison and power between cohort and

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1 case controls.

2 **A.** Yeah. So --

3 **Q.** There are different numbers that you're looking at. So
4 when AHS has 50,000 people and McDuffie has 51, that's not
5 really a fair comparison, is it?

6 **A.** Well, that's not the comparison you would actually want to
7 make.

8 **Q.** Okay. Right.

9 **A.** In this case you have 51 exposed cases of non-Hodgkin's
10 lymphoma. In the Agricultural Health Study, they had more than
11 400 exposed cases of non-Hodgkin's lymphoma. So even when you
12 just -- that's the apples-to-apples comparison, and what you
13 can see is that there are more than eight times exposed cases
14 in the Agricultural Health Study as there are in McDuffie.

15 **Q.** Okay. And so, then, the last one that you say is bad
16 about the case-control studies is that they fail to properly
17 adjust for other pesticides; right?

18 **A.** Yes.

19 **Q.** Okay. And then you say that the Agricultural Health Study
20 properly adjusts for other pesticides. So, once again, these
21 two are kind of linked together; right?

22 **A.** Yes. Correct.

23 **Q.** Okay. And I think one example that you gave, and this is
24 actually your chart -- and, again, these are your cases that
25 you pulled out. You made this chart; right?

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1 A. Yes.

2 Q. First of all, you showed the jury to make it onto your
3 chart, the cases had to fit two criteria; right?

4 A. Sorry. I don't understand your question.

5 Q. To make it onto your chart -- you made this chart; right?

6 A. Yes, I did.

7 Q. Okay. To make it onto this chart -- or to get a guess in
8 this chart, I guess, because you wrote "no, no, no, no, no,"
9 you would have to be properly adjusted for other pesticides and
10 statistically significant; right?

11 A. Yes, that's correct.

12 Q. Is it your opinion that you ignore data that's not
13 statistically significant?

14 A. So that really depends on the context. So in some
15 cases -- you don't -- first of all, you never ignore any data,
16 but you interpret the data potentially differently depending on
17 the context.

18 Q. Okay. So you should not ignore data that's not
19 statistically significant; right?

20 A. In some -- again, it's really context dependent.

21 Q. So should you ignore data that is not adjusted for other
22 pesticides?

23 A. Well, again, you should never -- and let me restate what I
24 said. We never should ignore any of the data; and in coming to
25 my opinion about this topic, I didn't ignore any data.

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1 However, when you see a result of a study that's not properly
2 adjusted for other pesticide use, it raises concern that the
3 finding you have, even if it's statistically significant, is
4 not biased.

5 So -- and just to be clear, just because something is
6 statistically significant does not mean it's a causal
7 association. So, again, just to be clear, I would not ignore
8 any of the data. However, if a result from a study is not
9 properly adjusted for other confounders and it does see a
10 positive association, that makes me -- that gives me a lot of
11 concern about the results of that study.

12 **Q.** Okay. Well, let's look at De Roos. This is De Roos 2003;
13 right?

14 **A.** Yes, it is.

15 **Q.** Because there is also a De Roos 2005?

16 **A.** Yes. De Roos 2005 is the first Agricultural Health Study
17 Cohort publication.

18 **Q.** Okay. And De Roos 2005 is not on either one of these
19 charts; is that right?

20 **A.** No. Although if we put it on the second chart, there
21 would still not be a positive -- a statistically significant
22 association properly adjusted because the AHS De Roos 2005 is
23 properly adjusted for other pesticides but it's not -- no
24 statistically significant finding.

25 **Q.** Okay. So I wrote "2003" on there just so we wouldn't get

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1 confused. Is that fair?

2 **A.** Yes.

3 **Q.** And the jury heard, it seems like forever ago but it was
4 just Wednesday, from Dr. Weisenburger. Do you know who
5 Dr. Weisenburger is?

6 **A.** Yes, I do.

7 **Q.** Okay. And so I'm going to put up here for you, I believe
8 this is the De Roos 2003 paper, and it is in your book as
9 Exhibit 451. Tell me when you're there.

10 **A.** I'm here.

11 **Q.** All right. And so you testified earlier -- well, let's go
12 back to your chart.

13 You say that -- the De Roos 2003 paper, you just told the
14 jury that it's not properly adjusted for other pesticides; is
15 that right?

16 **A.** Yes, that's correct.

17 **Q.** And what happened in De Roos 2003 is that the authors did
18 a hierarchical regression?

19 **A.** Yes.

20 **Q.** And they did a logistical regression; right?

21 **A.** Yes, they did.

22 **Q.** Okay. So let's -- and the other case-control studies --
23 Hardell, Eriksson, Orsi, McDuffie -- they all did logistical
24 regressions as well?

25 **A.** They did logistical -- logistic regression but did not

1 properly adjust for other pesticides --

2 Q. Sure.

3 A. -- just to be clear.

4 Q. Sure. Sure. And I'm just talking right now about the
5 differences between hierarchical regression and logistical
6 regression. Okay? I'm not throwing the confounding thing on
7 there yet.

8 So the only case-control study that's involved in this
9 case that did a hierarchical regression is De Roos 2003; is
10 that right?

11 A. Yes, it is. And I can explain why that was important to
12 do, and --

13 Q. We'll get to that in just a minute because they heard a
14 lot about it from Dr. Weisenburger --

15 A. Okay.

16 Q. -- who was an author on the paper as well; and maybe when
17 I'm walking you through this, you can tell us why it was
18 important. Okay?

19 A. Okay.

20 Q. So in your opinion, the De Roos 2003 hierarchical
21 regression is not statistically significant; is that right?

22 A. That's correct.

23 Q. Okay. I thought I had these pretty closely memorized, but
24 it is .9; right?

25 A. Yes.

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1 Q. Okay. And .9 is pretty darn close to statistically
2 significant; right?

3 A. Yes. While that's true, the bigger concern here is the
4 approach for adjustment for potential confounding. So that's
5 why for that particular set of data, I gave the statement of
6 no.

7 And if I could just add to that, the proper adjustment for
8 confounding that included the datasets in De Roos also included
9 McDuffie. Actually, in that analysis, the pooled analysis of
10 those studies, that properly adjusted for use of other
11 pesticides did not show any evidence of an association.

12 Q. Are you talking about the NAPP study?

13 A. Yes, I am.

14 Q. Okay. So we'll get to the NAPP study in a minute. And
15 just to remind the jury, the NAPP study took De Roos 2003 and
16 pooled it with Eriksson.

17 But let's just --

18 A. No. Not with Eriksson. With McDuffie.

19 Q. Yeah, with McDuffie.

20 So let's just stay on De Roos 2003 for a minute. Okay?
21 Because based on your table, we should be looking at the
22 hierarchical. But, again, since it's a .9, you're not really
23 telling the jury they should ignore a .9; right?

24 A. No. And, again, just to be clear, my concern with this
25 particular study is not only that particular confidence

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1 interval, but also the fact that -- the approach that they took
2 for adjusting. When you have only 36 exposed cases, adjusting,
3 whether you're using logistic or hierarchical, putting 47
4 pesticides into a model with only 36 cases can cause a lot of
5 problems.

6 **Q.** Okay. So let's just look at this table, if you will.
7 This is the table from De Roos 2003. And, again, this is the
8 only study we've looked at that has done a hierarchical
9 regression. Okay? So there it is right there.

10 And then we just discussed that all the other studies did
11 a logistical regression; right?

12 **A.** Yes.

13 **Q.** Okay. And so if you go all the way down, these are all of
14 the chemicals that they adjusted for; right?

15 **A.** Yes, it is.

16 **Q.** So the De Roos 2003 adjusted for all these chemicals. You
17 get down here to glyphosate. I put a little mark so I could
18 find it easily. There you go.

19 And so you've got -- you can -- these first ones you don't
20 really have to pay attention to for purposes of our question
21 and answer, but the logistical regression is right here
22 (indicating), 2001 -- or 2.1. And there's the hierarchical;
23 right?

24 **A.** Yes, it is.

25 **Q.** And those numbers actually were put up here by Dr. Ritz

1 last week. Okay?

2 And so what you're telling the jury is that you should pay
3 attention to the hierarchical over the logistical; right?

4 **A.** Well, so, again, just to be clear, the authors themselves
5 were concerned with the fact that they had a limited number of
6 exposed cases for several of these pesticides so they took this
7 approach of hierarchical regression, which -- because they had
8 so few exposed cases in many of these settings.

9 So the authors themselves thought the hierarchical
10 approach would provide a more appropriate adjustment, but still
11 you're concerned, given there are only 36 exposed cases in both
12 of these cases, it's not a proper adjustment. The proper
13 adjustment was the way that -- of these data was the NAPP
14 study.

15 And so, I mean -- and we're not also -- you know,
16 something else that we could talk about with the study, it's
17 not just the proper adjustment for confounding or lack thereof
18 or the statistical significance. In this particular study,
19 this was the study where they didn't even have close to 10
20 years of potential latency. They had 45 percent of their
21 controls and 35 percent of their cases actually had died before
22 they started the study. So the data on exposures didn't even
23 come from them. It came from next of kin.

24 So there are actually a lot of problems with this
25 particular study beyond just the statistical significance and

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1 lack of proper adjustment.

2 Q. So, Dr. Mucci, I appreciate your answer, and we are on
3 kind of a clock here, and I think I asked you just if you were
4 telling the jury if this is the number we should use. So I'm
5 sure that your counsel will come back on redirect and --

6 A. Right.

7 Q. -- and give you --

8 A. And -- and --

9 Q. Hang on. Let me get to my next question.

10 THE COURT: Well, wait a minute. She's explaining to
11 you that she doesn't think it's a number worth using for a
12 variety of reasons, and she has a right to answer that
13 question.

14 MS. WAGSTAFF: Okay.

15 THE COURT: So go ahead.

16 THE WITNESS: Right. You know, exactly.

17 So I think when we look at each study, we're not just
18 looking at the number. We're not looking at the relative risk
19 or the confidence interval only. We want to think about
20 everything that went into the quality of the study. We want to
21 see is there evidence of misclassification or not, did they do
22 a proper adjustment for confounding.

23 In this case the fact that so many of the cases and so
24 many controls had already died when the study was done and
25 there were proxies and there was another publication that

1 actually showed that there was bias introduced by the fact that
2 it wasn't the actual respondents who gave the data, so you
3 can't just look at any one number in isolation, you really need
4 to think about the entire study when you come to your opinion
5 about the quality and whether or not to use a specific number
6 in your analysis.

7 **BY MS. WAGSTAFF:**

8 **Q.** And you more artfully said what I was asking you before.
9 You can't just go off of a chart like this to determine when a
10 study is good or bad?

11 **A.** That's absolutely true; however, in this case in that
12 particular table that I gave you, it describes all of the
13 problems with those case-control studies.

14 I absolutely agree there are some cases of very
15 well-conducted, well-analyzed case-control studies. There are
16 some examples of poorly done cohort studies. In this body of
17 literature, however, unfortunately the published case-control
18 studies have a number of potential limitations and issues.
19 They raised some hypotheses to be tested in more well-designed
20 studies, including, for example, the pooled analysis, which did
21 a proper adjustment for confounding.

22 So I absolutely agree with you. You can't make
23 generalities, but in this particular set of literature, the
24 cohort study quality is much, much more valid than the
25 case-control studies.

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1 Q. Back to what I was asking you about, we are back to the
2 hierarchical and logistical. And my understanding of the
3 hierarchical, how it differs from the logistical, is that
4 certain assumptions are made about chemicals and are weighted
5 based on certain factors; is that correct?

6 A. So that's one of the differences.

7 Q. Okay. And so one of the factors -- actually the jury
8 heard from one of the authors of this study, Dr. Weisenburger;
9 but the authors also put in here in table 1 sort of a weight
10 that they were giving each chemical; is that right?

11 A. Yes, it is.

12 Q. And the weight that they gave glyphosate, it looks like is
13 .3; is that right?

14 A. Yes, it is.

15 Q. And so that weight is factored into the hierarchical
16 regression, right?

17 A. Yes, it is.

18 Q. And that is a very important part of the hierarchical
19 regression, right?

20 A. It is one of the parts that goes into it. You can see
21 from all of the columns in the other table, all of these pieces
22 of information went into the matrix that was used for assessing
23 in the hierarchical.

24 Q. Sure.

25 A. So it is one of the factors.

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1 Q. I mean, it is a pretty important one. The .3, it says it
2 is the carcinogenic potential, right?

3 A. Yes, correct.

4 Q. The authors are guessing -- educatedly [sic] guessing --
5 but guessing on certain factors that are going on in the world,
6 the probability that something is a carcinogen, right?

7 A. No. The way they came up with this specifically was based
8 on information that came from the EPA and from IARC.

9 Q. Okay. In 2003 when this was -- when this was done with
10 respect to glyphosate only -- I'm not talking about the other
11 46 chemicals -- with respect to glyphosate, IARC had not made a
12 ruling on glyphosate, right?

13 A. No, they hadn't.

14 Q. And so if you look at the -- how you weighted glyphosate,
15 it talks about exactly what you just said, right?

16 A. Yes.

17 Q. Okay. So it talks about the carcinogenic probability,
18 which is, again, this last column, right?

19 A. Yes.

20 Q. Okay. It says, The value is created by combining the
21 classifications from the IARC Monograph program on the
22 evaluation of carcinogenic risk to humans and the EPA
23 integrated risk information system?

24 A. Yes, that's correct.

25 Q. So they do some sort of analysis based on what the EPA has

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1 said about the chemical and what IARC has said about the
2 chemical?

3 **A.** That's what it says, yes.

4 **Q.** And then it gives you -- it says 1.0, .9. It goes all the
5 way down -- I'm not going to read them all the way down. But
6 it goes all the way down and gives it a different weight for
7 this column based on what the two entities had said, right?

8 **A.** Yes, that's what it says.

9 **Q.** Okay. When this paper was published, it was a .3.
10 Glyphosate was a .3. And that was accurate for 2003, right, as
11 far as we know?

12 **A.** Yeah. As far as we know, yes.

13 **Q.** Okay. And since 2003, IARC has ruled that glyphosate is a
14 probable carcinogen, right?

15 **A.** That's the classification they have labeled it.

16 **Q.** Okay. So it says right here .6, a probable human
17 carcinogen in one assessment. Okay. So we know that it would
18 at least --

19 **MS. MATTHEWS JOHNSON:** Objection to the incomplete
20 reading.

21 **THE COURT:** Sustained.

22 **BY MS. WAGSTAFF**

23 **Q.** And unclassifiable in the other.

24 **MS. MATTHEWS JOHNSON:** I object to foundation for this
25 question, "unclassifiable in the other."

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1 **THE COURT:** You can answer the question if you know
2 how to.

3 **THE WITNESS:** Right. I don't think that's the case in
4 this set of studies since EPA actually did make a
5 classification, which was that it was not a carcinogen.

6 **BY MS. WAGSTAFF**

7 **Q.** Okay. So let's see. Where would that be then on here?

8 **A.** It's actually not clear from the way they have labeled
9 these where it would fall in that particular setting.

10 **Q.** But it is clear that it wouldn't be a .3?

11 **A.** Actually, it is not clear. I couldn't tell you since it
12 is not clear, but it doesn't fit .3. It doesn't fit, perhaps,
13 some of the others, so it's not clear where it would go into.

14 **Q.** Okay. Well, let's look .3 is not assessed by IARC or EPA
15 IRIS or deemed unclassifiable in one or both assessments. So
16 it wouldn't fit .3 anymore.

17 **A.** Again, it is not clear where it would fit into any of them
18 actually.

19 **Q.** Sure. We know it wouldn't fit .3 because IARC has now --
20 the first sentence of .3 is not assessed by IARC. We know that
21 that's not true anymore, right?

22 **A.** Again, so it was assessed by IARC. It is just not clear
23 to me, based on the way the authors defined this, where it
24 would actually go. So I couldn't say one way or the other
25 where it would fit.

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1 Q. Sure. I understand you can't make an opinion on where it
2 would fit, but you can at least agree that it would no longer
3 be a .3?

4 A. Again, I couldn't tell you what it would be because it
5 doesn't fit into any of these particular categories.

6 Q. Okay. So the fact that the first sentence of .3 says, Not
7 assessed by IARC, you can't agree with me that now that's
8 changed?

9 A. I appreciate that it has changed; but, however, it is not
10 clear to me where they would have categorized glyphosate in
11 this particular example.

12 Q. Okay. Let's just assume that it is no longer a .3 because
13 IARC has assessed it, okay. Let's just assume that. This
14 number is no longer correct, right?

15 A. Again, it's unclear, even if it did change, how it would
16 change the estimate here. We don't have that kind of
17 information available, so you couldn't say one way or the other
18 how it would affect the relative risk estimate.

19 Q. Okay. So it would change it. I mean, it is a factor. It
20 is .3. Is it your testimony that that -- this column right
21 here of the carcinogenic probability, is it your testimony that
22 that doesn't -- if that number changes, it doesn't matter?

23 A. Again, since -- what I would like to see is the actual
24 data. I would like to see if they reran this hierarchical how
25 it would affect -- I don't think any of us could speculate how

PROCEEDINGS

1 it would change. However, what we do know -- and probably what
2 is more important in the studies notwithstanding the
3 limitations of these studies -- is we actually have the more
4 appropriate adjustment than either the logistic or
5 hierarchical, which is the pooled analysis from the NAPP study.

6 **Q.** Okay. But you -- but I was just asking you about this
7 because you told the jury that this was the number you
8 should -- that they should pay attention to, is the
9 hierarchical.

10 **MS. MATTHEWS JOHNSON:** Objection to the misstatement
11 of testimony.

12 **THE COURT:** Sustained.

13 **BY MS. WAGSTAFF**

14 **Q.** Okay. Let's actually look -- the jury has heard about it
15 from one of the authors; Dr. Weisenburger. Let's actually look
16 at *De Roos* 2005. If you will --

17 **THE COURT:** Maybe, before we turn to that, maybe now
18 would be a good time for our last break before we finish the
19 trial day.

20 Why don't we resume at ten minutes after the hour?

21 (Proceedings were heard out of presence of the jury:)

22 **THE COURT:** You might want to stick around for just a
23 second because I want to raise the issue of the discussion of
24 this chart from her book. It seems to me that Ms. Wagstaff was
25 doing fine on this issue of toxicology and the cell studies

PROCEEDINGS

1 before she got to this chart.

2 Now, I think that once she got to this chart, that opens
3 the door -- it is unfair to Dr. Mucci to preclude her from
4 saying what she knows about toxicology and the cell studies
5 after using this chart where her book identifies some
6 substances that were classified as Class 1 carcinogens without
7 adequate evidence from cancer studies in humans.

8 I mean, that is the kind of thing we were discussing at
9 the beginning of the trial day this morning that would open the
10 door to allow Dr. Mucci to say what she knows about toxicology
11 and cell studies. And I think -- as applied to the discussion
12 she had about this chart with Ms. Wagstaff -- I think now she
13 has the right to say, Yes, there are some carcinogens that --
14 where there is inadequate epidemiological evidence, but it has
15 been concluded that they are carcinogens from the other
16 evidence; but here is why I don't believe that could possibly
17 be the case with glyphosate.

18 I think that's fair game now.

19 **MS. WAGSTAFF:** So, Your Honor, if you will remember --
20 because I grappled over how to get this chart in front of her
21 without bringing up IARC -- and if you look back at --

22 **THE COURT:** I'm not talking about IARC.

23 **MS. WAGSTAFF:** I understand that.

24 **THE COURT:** I think it was appropriate to introduce
25 IARC in the way that you did.

PROCEEDINGS

1 **MS. WAGSTAFF:** Okay. So one thing that I will say is
2 that I actually don't -- it is not -- I'm okay with her talking
3 about how sometimes when people look at the carcinogenicity of
4 a chemical, you should look at all three. I'm okay with her
5 saying that. And I'm even okay with her testifying that
6 sometimes she did.

7 I don't think she can say in this case, though, that she
8 looked at all three with respect to glyphosate or Roundup
9 because that wasn't her opinion. That is not what she did.

10 And so if she wants -- if her counsel on redirect wants to
11 say that, Yeah, that this one, pick any one, areca nut had
12 inadequate and sufficient -- it was genotoxic and explain why
13 that is, I think that is appropriate. But I don't think that
14 she can then -- that opens the door for her to then say, Oh, I
15 looked at --

16 **THE COURT:** I don't agree. I think the way -- the way
17 you did this -- and the problem is this line of questioning
18 combined with my earlier curative instruction really creates a
19 misimpression about Dr. Mucci's opinion. And I think she has
20 the right to explain, Yes, the areca nut, there is not adequate
21 epidemiological evidence, and here is why, and here is why we
22 still think that it is carcinogenic. But I don't think that I
23 have now looked at the -- at this, that and the other thing and
24 in the toxicology area, in the cell data area, and it
25 doesn't -- it doesn't change my opinion on the epidemiology in

PROCEEDINGS

1 this case.

2 I think that's -- you went too far down the road. And
3 it's not fair to leave that misimpression about her testimony
4 now. So I'm -- I will allow -- if you choose to go down that
5 road, I will allow that now on redirect. And I will even say,
6 you know, I previously instructed you to disregard that
7 testimony; but Dr. Mucci has an opportunity to explain the
8 discussion during cross-examination about this chart.

9 **MS. WAGSTAFF:** And I assume, then, I can cross-examine
10 her on the mechanistic studies and the animal studies. If she
11 does that, it opens the door --

12 **THE COURT:** Of course.

13 **MS. WAGSTAFF:** -- I can ask her whatever I want about
14 those.

15 **THE COURT:** Of course, yeah. Okay. Be back in a few
16 minutes.

17 (Recess taken at 12:07 p.m.)

18 (Proceedings resumed at 12:12 p.m.)

19 **MS. WAGSTAFF:** Your Honor, may I seek clarification on
20 something prior to the jury coming in?

21 **THE COURT:** Sure.

22 **MS. WAGSTAFF:** All right. So with respect to the page
23 in the book we were just talking about, the Bradford-Hill page,
24 I would --

25 **THE COURT:** The Bradford-Hill page?

PROCEEDINGS

1 **MS. WAGSTAFF:** I'm sorry, not the Bradford-Hill page.

2 **THE COURT:** The one I was just talking about was
3 page 107.

4 **MS. WAGSTAFF:** Right. That's what I meant. Sorry,
5 Your Honor.

6 **THE COURT:** Okay.

7 **MS. WAGSTAFF:** So these are the IARC classifications.

8 **THE COURT:** Yes.

9 **MS. WAGSTAFF:** You obviously know that. In Portier's
10 cross-examination, Monsanto designated testimony where they
11 defined what "limited" meant by IARC, asked him if he agreed
12 with that definition of IARC. Portier said that he did. It is
13 page 331.

14 And so if we are going to go down this path, I think that
15 I should be allowed to ask questions on what these mean in
16 terms of limited, inadequate, sufficient, genotoxicity. I
17 think if we are going down that path, and Monsanto is going to
18 ask Dr. Mucci questions on it, that I should be able to, on
19 recross, follow up with that.

20 **THE COURT:** I don't think so. I mean, you say if we
21 are going down the path. You are the one who took us down the
22 path.

23 **MS. WAGSTAFF:** Sure.

24 **THE COURT:** And she -- I think she has the opportunity
25 to explain why she views glyphosate differently than the areca

MUCCI - CROSS / WAGSTAFF

1 nut, for example, based on all of the materials she has
2 reviewed. And I don't think we need to get into what these
3 IARC definitions are.

4 **MS. WAGSTAFF:** Okay. I mean, they are already in the
5 case. They are in evidence through Dr. Portier, so --

6 **THE COURT:** Okay. I don't think -- I think under 403,
7 that's not a road we are going to continue to go down. She
8 just has an opportunity to clarify her testimony with respect
9 to this chart.

10 All right. Go ahead and bring them in.

11 (Proceedings were heard in the presence of the jury:)

12 **THE COURT:** You can continue.

13 **BY MS. WAGSTAFF**

14 **Q.** All right, Dr. Mucci. Are you ready?

15 **A.** Yes.

16 **Q.** Just to re-orient where we were prior to our break, we
17 were talking about the *De Roos* 2003 and the two logistical
18 versus hierarchical numbers, right?

19 **A.** Yes.

20 **Q.** Okay. And this first number, which is the logistical
21 regression, that actually shows a statistically significant
22 doubling of the risk, and it is adjusted for other -- for 47
23 other pesticides.

24 **A.** So you said -- there were a lot of different statements in
25 that statement. So I just want to be clear that --

MUCCI - CROSS / WAGSTAFF

1 Q. It is statistically significant?

2 A. Yes. While that is statistically significant, it does not
3 imply a doubling of the risk. Again, this isn't the proper
4 approach for adjustment for confounding here. So a doubling of
5 risk would suggest causality; here what we see is a statistical
6 association. It wasn't a proper adjustment for confounding.

7 Q. So what does 2.1 mean? Doesn't that mean a doubling of
8 the risk?

9 A. Again, just to be clear, a doubling of the risk would
10 infer causality. That number is 2.1. However, that is not
11 evidence of a causal association. That is not an appropriate
12 adjustment for other pesticides.

13 Q. I understand -- I understand your opinion that 2.1 is not
14 causality in this instance and with this case, but I'm asking
15 you, 2.1 means -- an epidemiologist would call that a doubling
16 of the risk, right?

17 **MS. MATTHEWS JOHNSON:** Objection. Asked and answered.

18 **THE COURT:** Overruled.

19 **THE WITNESS:** Again, just to be clear, the relative
20 number is 2.1. When you put it into the words of saying it's a
21 doubling of risk, that implies causality. In this case, again,
22 this is a statistical association. It is not a causal
23 association.

24 **BY MS. WAGSTAFF**

25 Q. Sure. And I understand that. But I'm saying outside of

MUCCI - CROSS / WAGSTAFF

1 this courtroom, if you were talking to your epidemiology
2 colleagues back in Boston, would you call this a doubling of
3 the risk?

4 **A.** In this particular case, no, I would not. And the reason
5 is that it is not a causal association.

6 **Q.** Okay. But let's say it is not glyphosate. Let's say
7 it's -- let's go up here to a different one that has 2.4. Is
8 that a doubling of the risk?

9 **A.** So, again just to be clear, I have not studied that
10 particular pesticide. I would -- there are the same
11 limitations with this data set. The issues not only with
12 confounding but proxy bias, the really short latency of this
13 study, I would not say that is a doubling of risk. I haven't
14 studied that particular pesticide, so it is really -- I'm just
15 trying to be helpful --

16 **Q.** Sure.

17 **A.** -- and say that it is really context dependent. And when
18 you use the words like "doubling the risk," again, that implies
19 causality.

20 **Q.** Okay. And I haven't said anything about causality and
21 what that number means. Those are your words. I'm just asking
22 if epidemiologists refer to a 2.1 odds ratio as doubling of the
23 risk?

24 **A.** Again, in some settings they might.

25 **Q.** Okay.

1 **A.** And then other settings they might not. It would really
2 depend on the greater context. As epidemiologists, we are not
3 looking at solely just one number. We are looking at the
4 totality of a study.

5 **Q.** Okay. Have you ever in your entire -- I think you said
6 you have been an epidemiologist for 16 years?

7 **A.** Yes, I have.

8 **Q.** Have you ever referred to a 2.1 odds ratio as doubling of
9 the risk?

10 **A.** In certain settings, yes. But perhaps in other settings I
11 might not have.

12 **Q.** Okay. So *De Roos* was one of the authors in this paper,
13 right?

14 **A.** Yes, she was.

15 **Q.** And Dr. *De Roos* did the next paper which is *De Roos* 2005,
16 right?

17 **A.** Yes, that's correct.

18 **Q.** And I think that that is Number 451, please.

19 And this is the first agricultural --

20 **A.** No, I'm sorry. 451 I think is still the case-control
21 study.

22 **Q.** 528.

23 All right. Are you there?

24 **A.** Yes, I am.

25 **Q.** Okay. And so this is two years after the study we just

MUCCI - CROSS / WAGSTAFF

1 looked at, right?

2 **A.** Well, it was two years in terms of publication, but the
3 case control -- the cases in controls were created in the 1980s
4 and early 1990s, just to be clear.

5 **Q.** Sure. Yes. Sure. This is a paper that deals with the
6 Agricultural Health Study data, right?

7 **A.** Yes, it does.

8 **Q.** So this paper does not deal with the data that we just
9 looked at, right?

10 **A.** It is a separate study, yes.

11 **Q.** Okay. Completely new set of data. However, in this study
12 the authors describe the previous results in landscape, right?
13 If you turn to page 53.

14 **A.** I'm sorry. My copy of the article is very blurry. It is
15 very hard to read.

16 **Q.** I have got it pulled up -- I actually have a clean copy.

17 **MS. WAGSTAFF:** May I approach?

18 **THE COURT:** Sure.

19 **THE WITNESS:** Thank you.

20 **BY MS. WAGSTAFF**

21 **Q.** 53 on the left-hand column -- and I'm sorry if it is
22 blurry. That wasn't my -- and this is under the Discussion
23 section, but it starts with -- if you look on my screen, you
24 can kind of get a -- kind of get a feel for where I am.

25 Do you see that, Dr. Mucci?

MUCCI - CROSS / WAGSTAFF

1 A. Yes, I do.

2 Q. Okay. So in this 2005 report, study, Dr. De Roos is
3 reporting sort of on the lay of the land with respect to the
4 case controls, right?

5 A. Yes, she is.

6 Q. Okay. And so she talks about all of the case controls
7 really that the jury has learned about. She talks about
8 *Hardell* and *Eriksson*, right?

9 A. Yes.

10 Q. And then she talks about how *Hardell* then pooled it with
11 another *Hardell* 2002, right?

12 A. Yes.

13 Q. And then she goes on and she talks about a more extensive
14 study conducted across a large region of Canada found an
15 elevated risk of NHL associated with glyphosate use more
16 frequent than two days. You are familiar with that study,
17 right?

18 A. Yes, I am.

19 Q. That is the *McDuffie* study.

20 And then she talks about her own study, right? The next
21 one is her own study.

22 A. Yes, it is.

23 Q. This is the data she chose to put in a later study with
24 respect to sort of how people should remember her study, right?

25 A. Yes, it is.

MUCCI - CROSS / WAGSTAFF

1 Q. Okay. So Dr. De Roos, two years later, decides to tell
2 people, Increased NHL risk in men was associated with having
3 ever used glyphosate, and she gives the logistical regression
4 numbers, right?

5 A. Yes, she does.

6 Q. And she says, After adjustment for commonly used
7 pesticides in a pooled analysis of National Cancer
8 Institute-sponsored case control conducted in Nebraska, Kansas,
9 Iowa and Minnesota; is that right?

10 A. That's what she --

11 Q. And she cites her own paper, right?

12 A. Yes.

13 Q. Okay. Next, let's talk about the *Zhang* study. I think
14 you mentioned the *Zhang* study that came out a month ago or so.

15 A. Yes.

16 Q. Okay. And you understand -- you have read this study,
17 right?

18 A. Yes, I have.

19 Q. It came out, I think, March 6th -- or February 6th?

20 A. It came out recently, yes.

21 Q. February 5th.

22 And this is a meta-analysis.

23 A. Could you tell me where in the book it is, please?

24 Q. 554. Take a moment to --

25 A. I'm there.

MUCCI - CROSS / WAGSTAFF

1 Q. Okay. So this is the most recent data that we have on
2 non-Hodgkin's lymphoma and exposure to Roundup, right?

3 A. This is the most recent publication, but it is actually,
4 you know, using data that had been accumulated over time. So
5 just to be clear, again.

6 Q. Sure. And this is a meta-analysis, right?

7 A. Yes, it is.

8 Q. And there were other meta-analysis done with respect to
9 Roundup and non-Hodgkin's lymphoma, right?

10 A. Yes, that's correct.

11 Q. And did you review those other meta-analyses?

12 A. Yes, I have.

13 Q. So you reviewed the Chang meta-analysis?

14 A. Yes.

15 Q. You reviewed the Schinasi meta-analysis?

16 A. Yes, I have.

17 Q. And you reviewed the one by IARC?

18 A. I have, yes.

19 Q. Okay. And so this one is a little different than the
20 other three, right?

21 A. Yes, it is.

22 Q. And this one is a little different because they actually
23 did sort of a dose response how to use meta-analysis, right?

24 A. No. Actually, that's not really correct. In fact, what
25 they did was sort of a hodgepodge of results. Three of the six

MUCCI - CROSS / WAGSTAFF

1 studies did ever-never. Two of the remaining studies had some
2 measure of dose response using unadjusted for pesticides. And
3 then there was one clear dose response. So it wasn't clearly a
4 dose response analysis.

5 Q. Okay. So -- so the *Zhang* authors looked at the high
6 use -- the high-exposure people, right?

7 A. No. Again, just to be clear, three of the six studies
8 didn't have dose response to present. So in those they were
9 only looking at ever versus never exposure.

10 Q. Okay. But some of them -- some of the analysis they did
11 were with respect to the high-exposure people; is that fair?

12 A. Well, the highest in those particular studies, yes.

13 Q. Sure.

14 A. But, again, just to be clear, two of those three studies
15 that had information on dose response were not adjusted for
16 other pesticides, and that's an important factor in any
17 meta-analysis.

18 Q. Sure. Okay. So unlike -- and the three previous
19 meta-analyses -- Chang, Schinasi and IARC -- did not do those
20 high-exposure analyses, right?

21 A. No. They focused on ever versus never exposure.

22 Q. So this was sort of a new analysis done, right?

23 A. It was new, but it was not a correct methodology. This
24 isn't an appropriate way of combining results from studies. It
25 is not appropriate to mix the results from different categories

1 of exposure. We don't do this in epidemiology.

2 Q. Okay. And so what the *Zhang* authors found was -- and it
3 says, Accepted Manuscript across here. I'm sorry if that is a
4 little confusing to read. I will highlight it.

5 But what the *Zhang* authors found was, Overall in
6 accordance with the evidence from experimental animals and
7 mechanistic studies, our current meta-analysis of human
8 epidemiological studies suggests a compelling link between
9 exposures to glyphosate based-herbicide -- and Roundup is a
10 glyphosate based-herbicide, right?

11 A. Yes, it is.

12 Q. Okay. An increased risk for NHL, right?

13 A. That is what it said. However, what they have come up
14 with is a biased analysis combining data including results that
15 were not adjusted for other pesticides.

16 And let me be clear, as an epidemiologist when we review
17 the studies, we review the independent epidemiological
18 literature. We look at the quality of the data going into
19 those studies. And as I discussed earlier, there were many
20 flaws, including the fact that they were not adjusted properly
21 for other pesticides.

22 So I think when you take into account the results of a
23 meta-analysis, you have to think about what was the quality of
24 the studies going into it.

25 **MS. WAGSTAFF:** Okay. Give me just one minute, and I

MUCCI - CROSS / WAGSTAFF

1 may be finished.

2 (A brief pause was had.)

3 **BY MS. WAGSTAFF**

4 **Q.** I have one last set of questions for you, Dr. Mucci.

5 I want to return back to sort of the bio-monitoring
6 opinion that you gave today with respect to testing urine or
7 testing Roundup and/or glyphosate in the urine. Do you
8 remember those?

9 **A.** Yes, I do.

10 **Q.** Okay. And did the bio-monitoring studies look at the
11 level of exposure in urine to quantify dose?

12 **A.** They were using it, I believe, to help inform on the
13 ability of the algorithm to appropriately classify people as
14 either high or low exposure to different pesticides.

15 **Q.** Okay.

16 **A.** So not to necessarily give a specific dose, and I think
17 there were some concerns of whether you could use the urine
18 levels to give a specific dose, but generally to quantify
19 people as either having high levels of exposure to different
20 pesticides or low levels of exposure.

21 **Q.** Okay. And you would agree if glyphosate is not rapidly
22 excreted through urine, then that method would not be very
23 accurate?

24 **MS. MATTHEWS JOHNSON:** Objection. Outside the scope
25 of direct.

MUCCI - REDIRECT / MATTHEWS JOHNSON

1 Dr. Ritz had testified that this classification should be .8 or
2 .9, probable in one assessment and possible in another,
3 probable in both, do you agree that that could be a
4 classification?

5 **A.** No. In fact, absolutely not because the EPA was
6 classifiable; and it was not listed as a possible human
7 carcinogen.

8 **Q.** Thank you.

9 I'm going to stick with the ELMO, and next we are going to
10 take a look at *De Roos* 2005. And so you were asked about *De*
11 *Roos* 2005 and what it said about earlier studies.

12 Just to be clear: What is the finding of Anneclaire De
13 Roos and the fellow authors in 2005 about glyphosate? What is
14 the finding of this study?

15 **A.** So based on the results of the cohort analysis, there was
16 no evidence of an association between glyphosate and
17 non-Hodgkin's lymphoma and no evidence of a dose response.

18 **Q.** Okay. And within this study, they do talk about prior
19 studies; and they start at the top talking about their finding
20 here. Provided evidence of no association between glyphosate
21 exposure and NHL incidence.

22 Is that correct?

23 **A.** Yes, correct.

24 **Q.** And then Ms. Wagstaff went through some of the discussion
25 of the prior studies, but she stopped. She stopped right here

MUCCI - REDIRECT / MATTHEWS JOHNSON

1 actually. And can you tell us what the very next sentence is
2 that appears.

3 **A.** These previous studies were retrospective in design and
4 thereby potentially susceptible to recall bias of exposure
5 reporting.

6 **Q.** And then what is the -- let me highlight it for you
7 first -- okay.

8 **A.** Our analysis of the AHS cohort had a prospective design
9 which should largely eliminate the possibility of recall bias.

10 **Q.** And then in Alavanja 1996 -- and we are not going to go
11 back to that on the ELMO -- but was there a discussion of the
12 cohort studies there as well?

13 **A.** Yes, there were.

14 **Q.** What did Alavanja 1996 say about that? If you want to go
15 to your binder --

16 **A.** I'm sorry. I actually --

17 **Q.** It is going to be in the black binder.

18 **A.** Yep.

19 **MS. MATTHEWS JOHNSON:** One moment, please, Your Honor.

20 (A brief pause was had.)

21 **THE WITNESS:** Dr. Alavanja, that is the 1996?

22 **BY MS. MATTHEWS JOHNSON**

23 **Q.** Exactly. Yes. And if you can go -- I believe you are
24 going to see it on the second page. There is a study about
25 cohort studies. It is on the right-hand side of the page.

MUCCI - REDIRECT / MATTHEWS JOHNSON

1 Did you find it?

2 **A.** Yes.

3 **Q.** Perfect.

4 **MS. MATTHEWS JOHNSON:** Okay. Can we call it up here?
5 Is it possible to get Alavanja 1996?

6 **BY MS. MATTHEWS JOHNSON**

7 **Q.** And if you can just read what it says about the prior
8 cohort studies, Doctor.

9 **A.** Just under Prospective Cohort Study, that part here?

10 **Q.** No, I'm sorry. They are talking about the prior
11 case-control studies. I apologize.

12 **A.** Sorry.

13 **Q.** I'm saying the wrong thing. I should be saying
14 case-control studies. I apologize for that.

15 **A.** I have it here.

16 In case-control studies, nondifferential misclassification
17 due to inaccurate recall of exposure history would be expected
18 to underestimate the true risk while better recall on the part
19 of cases; i.e., case recall bias, could bias estimates in
20 either direction. In cohort studies -- is that enough?

21 **Q.** Yes. And then if you go to the next -- we are on the ELMO
22 now. If you can just go to the next page, I'm directing them
23 there now. Oh, she switched the ELMO -- I'm sorry.

24 **THE CLERK:** Do you need the ELMO?

25 **MS. MATTHEWS JOHNSON:** If we can go back to the

1 screen. Sorry about that.

2 **BY MS. MATTHEWS JOHNSON**

3 **Q.** Yes. If we can go back to this -- exactly. What page
4 were you reading from, Doctor?

5 **A.** Top of page 363.

6 **Q.** Okay. If we can go forward one page at a time on the
7 screen that I'm looking at -- stand by for one moment.

8 Okay. Then the top of page 363, where are we, Doctor?

9 **A.** I'm sorry.

10 **Q.** Which column were you reading from?

11 **A.** I was reading from the top left column.

12 **Q.** Okay. And if we can put that on the main screen as well,
13 do we have the right thing called up here, Doctor?

14 **A.** Yes, correct.

15 **Q.** Okay. Yes, in case-control studies.

16 Okay. So is this reflecting some of your concerns about
17 the case-control studies, doctor?

18 **A.** Yes, that was one of the concerns that they raised.

19 **Q.** In the -- in the course of planning for the AHS study?

20 **A.** Absolutely, yes.

21 **Q.** Okay. Thank you so much for your patience on that.

22 So, next, I would like to look at your textbook. And I
23 will need the ELMO again.

24 So Ms. Wagstaff talked to you about the textbook, a couple
25 pages out of it. That has several chapters; does it not?

1 A. Yes, it does.

2 Q. In fact, is Chapter 27 a chapter on non-Hodgkin's
3 lymphoma?

4 A. Yes, it is.

5 Q. And in there is there a risk factor summary -- that is
6 table 27-1 -- in that textbook?

7 A. Yes, there is. We provided a summary risk factor for all
8 of the cancers in the textbook.

9 MS. WAGSTAFF: Counsel, what page is that?

10 MS. MATTHEWS JOHNSON: That is going to be page 655
11 for the record.

12 BY MS. MATTHEWS JOHNSON

13 Q. This is of your textbook -- textbook of cancer
14 epidemiology; is that right, Doctor?

15 A. Yes, that's correct.

16 Q. Chapter 27?

17 A. Yes.

18 Q. Table 27-1, page 655.

19 And if we go up just a little bit here, we have
20 description of -- it says here, Well-confirmed risk factors at
21 the top?

22 A. Yes.

23 Q. If we go all the way to the top, Epidemiology of
24 non-Hodgkin's lymphoma NHL subtypes risk factor summary?

25 MS. WAGSTAFF: Objection, Your Honor. Can we do a

SIDEBAR

1 sidebar? Can we take that off the screen?

2 (The following proceedings were heard at the sidebar:)

3 [REDACTED]

4 [REDACTED]

5 [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED]

9 [REDACTED]

10 [REDACTED]

11 [REDACTED]

12 [REDACTED]

13 [REDACTED]

14 [REDACTED]

15 [REDACTED]

16 [REDACTED]

17 [REDACTED]

18 [REDACTED]

19 [REDACTED]

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4 [REDACTED] [REDACTED]

5 (Sidebar ended.)

6 (The following proceedings were heard in open court:)

7 **BY MS. MATTHEWS JOHNSON**

8 **Q.** So table 27-1 from your textbook of cancer epidemiology,
9 page 655, has a table Epidemiology of non-Hodgkin's lymphoma,
10 NHL subtypes, risk factor summary.

11 Do you list well-confirmed risk factors, Doctor?

12 **A.** Yes, we do.

13 **Q.** And included in that -- can we go down here where it says
14 where there is weak, if any, relationship exists based on
15 substantial data?

16 **A.** Yes.

17 **Q.** Okay. And what is listed there?

18 **A.** Pesticides --

19 **Q.** Okay.

20 **A.** -- solvents, blood transfusions and vaccinations.

21 **Q.** Okay. And among pesticides -- is glyphosate a pesticide?

22 **A.** Yes, it is.

23 **Q.** And in your textbook you have stated that weak, if any,
24 relationship exists based on substantial data; is that correct?

25 **A.** Yes, correct.

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1 Q. And is that what is in your textbook also what you have
2 been studying and looking at here in this case?

3 A. Yes, it is.

4 Q. Thank you.

5 Now, Doctor, I just want to confirm here -- after the
6 cross-examination and the questions that you received on
7 cross-examination -- what is your opinion concerning the
8 existence of any dose response for glyphosate or Roundup and
9 any risk of NHL?

10 A. You know, in thinking about this, all of the studies that
11 have published on dose response, we have the results of two
12 case-control studies where you are -- they were not adjusted
13 for other pesticides. So there is concern that the results of
14 those studies might have bias. When you look at the results
15 from the two Agricultural Health Study, where they took a
16 proper adjustment for confounding as well as all of the other
17 issues that we looked at and showed strength of the study,
18 there is no evidence of a dose response between glyphosate
19 exposure and non-Hodgkin's lymphoma or for any of the NHL
20 subtypes.

21 Q. And what is your observation of the rate of NHL in the
22 general population as opposed to the cohort of AHS?

23 A. Right. So, again, when we compared the rate in the
24 general population, it was 1.07 percent. When we looked at it
25 in the Agricultural Health Study, where 80 percent of the

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1 people were exposed to glyphosate, the rate was identical. It
2 was 1.06 percent.

3 Q. And what is your opinion on whether there is a causal
4 association between Roundup and NHL?

5 A. My opinion is there is no evidence of a causal association
6 between glyphosate and risk of non-Hodgkin's lymphoma in
7 humans.

8 Q. And do you still hold that opinion to a reasonable degree
9 of scientific certainty?

10 A. Absolutely, yes.

11 MS. MATTHEWS JOHNSON: One moment, please, Your Honor.

12 (A brief pause was had.)

13 MS. MATTHEWS JOHNSON: We have no further questions.

14 THE COURT: Anything on recross?

15 MS. WAGSTAFF: No questions, Your Honor.

16 THE COURT: Okay. You can step down, Dr. Mucci.

17 THE WITNESS: Thank you, Your Honor.

18 MR. STEKLOFF: We have Dr. Levine.

19 THE COURT: Let's do 15 minutes with Dr. Levine, yeah.

20 MR. STEKLOFF: We will grab here, and we call

21 Dr. Alexandra Levine.

22 THE COURT: Okay.

23 ALEXANDRA LEVINE,

24 called as a witness for the Defendant, having been duly sworn,

25 testified as follows:

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1 oncologist. And the jury has heard these terms. But just to
2 remind them, can you explain what a hematologist is?

3 **A.** Sure. A hematologist is somebody who specializes in
4 diseases of the blood, and these could be non-cancerous kinds
5 of things like anemia, and an example.

6 An oncologist is somebody who takes care of cancer of all
7 types theoretically. A hematologic oncologist is somebody who
8 specializes in cancers of the blood system, and that's what I
9 do.

10 **Q.** And how does non-Hodgkin's lymphoma fit into that?

11 **A.** Non-Hodgkin's lymphoma is a type of malignancy of the
12 blood system. That is my specific area of research and
13 interest. And most of my patients do have non-Hodgkin's
14 lymphoma.

15 **Q.** In your over 40 years, how many patients -- have you
16 treated thousands of treatments with non-Hodgkin's lymphoma?

17 **A.** Yeah, I have treated thousands. At a time I was at the
18 county hospital -- the big county hospital in Los Angeles -- I
19 was in charge of the lymphoma service there for decades. I was
20 in charge of all of the patients with lymphoma there and
21 supervised their care. We had a weekly clinic where we saw
22 about a hundred patients a week, most of them were lymphoma
23 patients or leukemia, acute leukemia or non-Hodgkin's lymphoma.
24 I would go over all of those cases with the interns and
25 residents, the student doctors, if you will; but I was

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1 ultimately responsible.

2 I was also the chairman of the hematology department for a
3 number of decades. I was responsible for making the schedule,
4 and it was important for me to be on service taking care of the
5 patients while hospitalized. I did that purposefully six
6 months out of the year.

7 So I have a lot of experience. I have seen many, many,
8 thousands of patients with non-Hodgkin's lymphoma.

9 **Q.** And are you still treating patients with non-Hodgkin's
10 lymphoma today?

11 **A.** Yes, I am.

12 **Q.** Okay. So we are -- in a moment we will walk through all
13 of your -- through your academic work and your clinical work.

14 On this slide I just wanted to flag next to MD, you also
15 have an MACP. Can you please explain to the jury what that is?

16 **A.** Yes. That stands for Master of the American College of
17 Physicians. And it is an honorary position. This is the
18 largest society that is directed toward physicians who are
19 primarily internal medicine doctors. Hematology is a
20 subspecialty. Oncology is a subspecialty of internal medicine.
21 And I was elected a master, which is the most prestigious level
22 of designation for that American College of Physicians.

23 **Q.** So can you, please, using this slide, just walk the --
24 walk the jury through your academic background.

25 **A.** Yes. First I graduated undergraduate right here at

1 Berkeley, at UC Berkeley. That was in 1966.

2 I then went to medical school at USC School of Medicine.
3 That was important to me. That was part of the county
4 hospital, and my heart was really in that county hospital. I
5 wanted to be there.

6 **Q.** Can I stop you there for a moment? Why is it that you
7 went into medicine?

8 **A.** When I was very young, in junior high school and even in
9 grammar school, I said I wanted to be a doctor. And I have no
10 idea really why I said it at that time, but will always feel
11 blessed in the sense that somehow I did. Nobody in my family
12 has ever been a doctor. I just said that.

13 Now that I'm older, I know very well why I went into this.
14 I like people. I love people. I like to deal with people. I
15 can communicate with people. I care about people. Medicine
16 allowed me to spend my life with people who were in some sort
17 of difficulty.

18 And the other thing that really I like is I like
19 challenges. I like difficulties. And I like to figure out the
20 answers to those problems. And combining medicine allowed me
21 to deal with people who are in trouble who I might be able to
22 help and allowed me a challenge to see what I could do to try
23 to help as well.

24 **Q.** And so can you now explain to the jury what you did after
25 getting your medical degree at USC, what the next step was in

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1 terms of your internship and residency?

2 **A.** The next step after receiving an MD degree -- you aren't
3 really licensed at that moment. You need another year of --
4 theoretically called apprenticeship. We call that an
5 internship. So I was an intern in internal medicine at the
6 county hospital. I then became a resident in internal
7 medicine. That's the next step in training, also at the county
8 hospital. And that is called the LA County USC Medical Center.

9 **Q.** Then it looks like you went on to have a fellowship at
10 hematology and oncology at Emory University. Can you explain
11 why you chose to focus on hematology and oncology at that time?

12 **A.** It is a long story. I will shorten it. Basically it was
13 a tremendous challenge to me. Patients with cancer were a
14 real -- there was a real possibility to find answers and to
15 help people. Some of those cancers were curable. That meant
16 that there was hope. There was hope for the patients. There
17 was hope for me.

18 I like the challenge. And I like the fact that I believe
19 that that field was going to change in the years ahead. And it
20 allowed me to be in a field that was going to move and change
21 and become hopefully better than it was when I started.

22 **Q.** And then after you left Emory, did you continue to focus
23 on hematology as a fellow at -- back again at USC?

24 **A.** Yes. So that was the training in Emory; turned out to be
25 primarily general oncology, and I wanted more training

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1 specifically in hematologic oncology.

2 **Q.** Okay. So let's now turn to your clinical experience. And
3 when we are talking about clinical experience, are we focusing
4 here on your care and treatment of patients?

5 **A.** Yes.

6 **Q.** And can you explain first -- you touched on this a little
7 bit at the outset -- but can you, just on a high level, explain
8 the work that you did at USC between 1977 and 2006 and your
9 various positions during that time?

10 **A.** Yes. I finished my fellowship. And as soon as I did, I
11 became an assistant professor of medicine; and I was given the
12 responsibility of being the director of the hematologic
13 neoplasia service at the county hospital, overseeing the
14 patients who had non-Hodgkin's lymphoma, but also leukemia,
15 myeloma and other such diseases. And I continued that -- in
16 that position until I left USC at the end of 2006.

17 At a certain point USC opened a cancer hospital at that --
18 that was the USC Norris Cancer Hospital. I will get to that in
19 a moment.

20 Before that I was an interim chief at the division of
21 medical oncology for a year. From 1991 to 2006, I was chief of
22 the division of hematology.

23 When USC opened the Norris Cancer Hospital, I became the
24 deputy clinical director of the cancer center in general. That
25 means both the clinical aspects and the clinical research

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1 aspects that were going on at that comprehensive cancer center.
2 I became medical director of the Norris Cancer Hospital in
3 1996, and I did that until I left USC in 2006 at the end of
4 December.

5 I then went to City of Hope. I became chief medical
6 officer at the City of Hope. I was in that administrative job
7 for ten years. And in January of 2017 I was almost 74 years
8 old. I was tired of the administrative aspects. I wanted to
9 concentrate and just go back and keep taking care of my
10 patients, but I left the job as chief medical officer and right
11 now I'm a professor at City of Hope; and I am a hematologist
12 oncologist clinical care, taking care of patients.

13 **Q.** And we have heard a little bit that you were the chief
14 medical officer, but as the chief medical officer from 2007 to
15 2016 -- first of all, did you hire Dr. Weisenburger?

16 **A.** Yes, I did.

17 **Q.** And also were you responsible -- I mean, technically did
18 all of the doctors at City of Hope during that time period --
19 whether they were oncologists, pathologists or any other type
20 of doctor -- report to you?

21 **A.** Yes. All of the doctors reported to me. I was
22 responsible for the quality of their care. I was responsible
23 for the patient satisfaction related to their care. I was
24 responsible for their teaching activities. And I was also
25 responsible for overseeing their clinical research activities.

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1 Q. And even though you had a lot of administrative
2 responsibilities during that time -- during that entire time
3 period, were you still also -- bless you -- taking care of
4 patients who had cancer?

5 A. I was always taking care of patients. I can't -- I have
6 to always take care of patients.

7 Q. And you mentioned that you -- you became a professor and
8 stepped down as chief medical officer in 2017. How regularly
9 are you seeing patients now?

10 A. My regular clinic is one full day a week. People get ill,
11 and that usually ends up being about two days a week. I had
12 three different calls from patients this morning. So it's --
13 it's not a full-time job, but it's a two-day a week full-time
14 job and then all the calls and issues that come up in the
15 meantime.

16 Q. And are you seeing patients with non-Hodgkin's lymphoma
17 almost every week?

18 A. Yes, every week.

19 Q. And are you seeing patients with diffuse large B-cell
20 lymphoma almost every week?

21 A. Almost every week.

22 Q. And is that in your practice the most common or one of the
23 most common forms of non-Hodgkin's lymphoma?

24 A. I'm considered a specialist in non-Hodgkin's lymphoma, and
25 doctors from other places in the city or the country or even

1 the world will send me patients with non-Hodgkin's lymphoma.
2 So my practice is very much specialized in that area.

3 **Q.** Now, during your career, have you also taught medical
4 students or fellows or residents about hematology, oncology,
5 non-Hodgkin's lymphoma, and other issues?

6 **A.** Yes. Teaching is an important part of my job. I have
7 been teaching since I started as an intern, really. I have
8 continued to teach to the present time. Still teach at USC,
9 even though I'm not officially employed at USC at this point.
10 I give lectures to the community -- to just community members.
11 I give lectures to medical students, to interns, to residents,
12 to physicians. I speak at conferences and so forth. So I do a
13 lot of teaching.

14 **Q.** And I see -- we have talked about USC and City of Hope.
15 There is also a reference here to a Claremont Graduate
16 University School of Community and Global Health. Can you just
17 briefly describe what that is?

18 **A.** Yes. I'm an adjunct professor there. That means I'm not
19 officially employed there, but I teach there and am considered
20 an adjunct part of their faculty.

21 **Q.** And at City of Hope, you also have the title of Melinda
22 and Norman Payson, Professor of Medicine?

23 **A.** Yes. It is an honorary kind of thing. It is a named
24 professorship. And that means the Payson family donated money
25 to the City of Hope for specific use in lymphoma research and

1 gave a title to my role in that regard.

2 Q. And as part of the teaching that you have done again for
3 now over 40 years, have you taught specifically about
4 non-Hodgkin's lymphoma?

5 A. Definitely.

6 Q. Have you taught about some of the causes of non-Hodgkin's
7 lymphoma?

8 A. Yes, I have.

9 Q. Have you also been involved in research during your
10 career?

11 A. Yes.

12 Q. And the jury has heard a lot about peer-reviewed articles,
13 but we see here you have published over 300 peer-reviewed
14 articles?

15 A. That's correct.

16 Q. Have you published articles about non-Hodgkin's lymphoma?

17 A. Yes, I have.

18 Q. Have you published articles about some of the causes of
19 non-Hodgkin's lymphoma?

20 A. Yes, I have.

21 Q. And now -- I think it will be Monday -- but are we going
22 to talk about hepatitis C on Monday? Are we going to talk
23 about hepatitis C on Monday?

24 A. Yes.

25 Q. And have you published articles about hepatitis C?

1 **A.** Yes, I have.

2 **Q.** Including the relationship between hepatitis C and
3 non-Hodgkin's lymphoma?

4 **A.** Yes, I have.

5 **Q.** Okay. It also -- we have -- for reference on the slide --
6 that you have been involved in over 70 book chapters.

7 Can you just explain -- the jury just saw a book chapter,
8 or a book -- but can you just explain very briefly what that
9 means, the difference between a book chapter and a
10 peer-reviewed article?

11 **A.** A peer-reviewed article is very, very carefully reviewed
12 by external experts in the field who look -- and they are
13 looking for any defect, anything that might not ring true in
14 the article. It must be approved before it is published.

15 A book chapter is less intensive in the sense of peer
16 review. Somebody will be asked to edit a book. I have done
17 that as well. And let's say the book is on lymphoma, and they
18 will -- the editor will then call somebody who has expertise in
19 a given type of lymphoma or treatment of lymphoma or a certain
20 cause of lymphoma and ask if you will write such a chapter.
21 And I have agreed to do that about 70 times at this point. It
22 takes a lot of time to write those chapters, and I decided at a
23 certain point that I would agree to write only one a year, and
24 so that's what I did.

25 **Q.** And if we can get through this slide, I think we have

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1 covered the fact that your research has really focused on the
2 treatment and causes of lymphoma; is that fair?

3 **A.** Correct.

4 **Q.** And it's included lymphomas caused by infectious organisms
5 such as HIV, HTLV1 and hepatitis C. Is that also correct?

6 **A.** Yes.

7 **Q.** And then we have -- there is a reference here at the
8 bottom that you were a member of the board of Scientific
9 Councilors in two different five-year periods associated with
10 the National Cancer Institute. Maybe to wrap up today, can you
11 just please explain what your role was when you were a member
12 of that board?

13 **A.** The board of Scientific Councilors is an honorary position
14 as well. Scientists and physicians are chosen from around the
15 country to come to the National Cancer Institute itself and to
16 review the research being done by the scientist at the NCI to
17 determine whether their science is optimal or whether their
18 science needs to be changed in some way or discussed in some
19 way.

20 So we review the scientists and doctors who work and do
21 research at the National Cancer Institute. I was asked to do
22 that on two occasions. Each one was a five-year term.

23 **Q.** And the National Cancer Institute, I think the jury has
24 heard, that is associated with the National Institutes of
25 Health, correct?

PROCEEDINGS

1 **A.** It is within the National Institutes of Health, the
2 institute specifically designated to study cancer, its causes,
3 its treatment, and so forth.

4 **Q.** Based on your participation in this board -- I mean, are
5 they looking for leaders in the country on cancer and lymphoma
6 and related issues?

7 **A.** Yes, they are looking for leaders in those areas who might
8 come to look in an objective way at the science done by their
9 own scientists at the National Cancer Institute.

10 **MR. STEKLOFF:** Your Honor, I'm happy to keep going
11 or --

12 **THE COURT:** I think this is probably a great place to
13 stop.

14 And so we are breaking for the weekend, so I will just
15 remind everybody, once again, you have to be very careful not
16 to speak with anybody about this or to expose -- be exposed to
17 any information about this, any media reports.

18 If you learn that you have been exposed to something or
19 somebody else has been exposed to something that they shouldn't
20 have been, please let us know right away. Don't do any of your
21 own independent research, all of my admonitions.

22 And we will resume at 8:30 sharp on Monday morning. Thank
23 you.

24 (Proceedings were heard out of presence of the jury:)

25 **THE COURT:** If there is anything that anybody needs to

PROCEEDINGS

1 talk about this afternoon, it will have to be later.

2 **MS. WAGSTAFF:** I don't think Plaintiffs have anything.

3 **MS. MOORE:** We don't, Your Honor. We just have to
4 tender the 454. It has been redacted since the version we gave
5 to the Court originally. It has already been admitted today.

6 **THE COURT:** Okay. All right.

7 So -- but everybody needs to stay in the courtroom for
8 five minutes before leaving. Theresa will let you know when
9 you can leave because, as I have said in the past, we need to
10 give the jurors a chance to ride the elevator down and all that
11 before people leave.

12 Okay. So we will see you -- you have got some filings due
13 I think on Sunday. You wanted to talk about --

14 **MR. BRAKE:** The next go of the trial.

15 **THE COURT:** I have thought about it a little bit more.
16 I guess my inclination is the same as the one I expressed
17 earlier which is that I think it would be fine to kind of --
18 you know, assuming we don't have a mistrial in this one -- that
19 we kind of press the pause button a little bit after this
20 verdict and after the March verdict in the State court.

21 So I would be comfortable pushing this trial back a -- the
22 Stevick trial back a little bit in other words. If there is a
23 mistrial in this case, we would try this case again in May.

24 **MR. BRAKE:** Understood. If that's Your Honor's
25 ruling, that's Your Honor's ruling. I have talked to the

PROCEEDINGS

1 leadership team. I have talked to counsel for Monsanto. Most
2 importantly talked to my clients, Christopher and Elaine
3 Stevick. We are all in concordance to go forward on May 6.
4 I'm not trying to argue with you. I'm telling you what our
5 position is and what we have discussed amongst ourselves.

6 **THE COURT:** I didn't realize that was everybody else's
7 preference. So then what I would say is as of now, full steam
8 ahead. I'm not sure the exact date would be May 5 or 6th or
9 the one we identified.

10 **MR. BRAKE:** May 6th.

11 **THE COURT:** In the May/June timeframe we will -- most
12 likely can work something out.

13 **MR. BRAKE:** Of course. In order to prepare and have
14 witnesses here, it is going to be important for us to know
15 sooner rather than later the exact day Your Honor wants to
16 start.

17 **THE COURT:** Understood.

18 **MR. BRAKE:** As I understand what you are saying now is
19 it is going to be in that timeframe, but we don't know for
20 sure.

21 **THE COURT:** As of now I think you can operate on the
22 assumption it will be in the May/June timeframe, but I can't
23 give you a precise date right now.

24 **MR. BRAKE:** Understood. Yes, sir. Thank you very
25 much.

PROCEEDINGS

1 **MR. STEKLOFF:** Your Honor, I think the record is well
2 preserved. Just so there is no ambiguity, the motion that I
3 reserved at the end of Plaintiff's case is a directed verdict
4 motion. We don't have to hear it now, but I just wanted that
5 to be on the record.

6 **THE COURT:** Got it. We will see you Monday morning.
7 I assume we will have some stuff to talk about Monday morning,
8 so everybody make sure to be here right at 8:00 o'clock.

9 **MS. WAGSTAFF:** Thanks. Have a good weekend.

10 **THE COURT:** You too.

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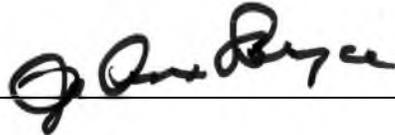
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CERTIFICATE OF REPORTERS

I certify that the foregoing is a correct transcript
from the record of proceedings in the above-entitled matter.

DATE: Friday, March 8, 2019



Jo Ann Bryce, CSR No. 3321, RMR, CRR, FCRR
U.S. Court Reporter



Marla F. Knox, RPR, CRR
U.S. Court Reporter