

Exhibit 5

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

)
IN RE: ROUNDUP PRODUCTS) MDL No. 2741
LIABILITY LITIGATION) Case No. 16-md-02741-VC

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)
This document relates to:)
)
ALL ACTIONS)
)

VIDEOTAPED DEPOSITION OF DR. CHADI NABHAN
Rosemont, Illinois
Monday, January 15, 2018

Reported by:
PAULA CAMPBELL, CSR, RDR, CRR, CRC
JOB NO. 136021

Page 2

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7 January 15, 2018
8 8:53 A.M.
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11 Videotaped discovery deposition of
12 DR. CHADI NABHAN, held at CROWNE PLAZA CHICAGO
13 O'HARE, 5440 North River Road, Rosemont,
14 Illinois, pursuant to notice before Paula
15 Campbell, CSR, RDR, CRR, CRC.
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Page 3

1 **A P P E A R A N C E S:**
2 **THE MILLER FIRM**
3 Attorneys for the Plaintiffs and the witness
4 180 Railroad Avenue
5 Orange, Virginia 22960
6 **BY: TIMOTHY LITZENBURG, ESQ.**
7
8
9 **HOLLINGSWORTH, LLP**
10 Attorneys for the Defendant Monsanto Company
11 1350 I Street, N.W.
12 Washington, D.C. 20005
13 **BY: KIRBY T. GRIFFIS, ESQ.**
14 **STEPHANIE SALEK, ESQ.**
15
16
17 **ALSO PRESENT:**
18 Robert Zellner, Videographer
19
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21
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Page 4

1 ----- I N D E X -----
2
3 WITNESS EXAMINATION BY PAGE
4 DR. CHADI NABHAN MR. GRIFFIS 6, 113
5 MR. LITZENBURG 111
6
7 -----EXHIBITS-----
8 PAGE LINE
9 Exhibit 29-1 Supplemental Report of 6 15
10 Dr. Chadi Nabhan, M.D.,
11 Pursuant to PTO N. 34
12 and In Support of
13 General Causation on
14 Behalf of Plaintiffs
15 Exhibit 29-2 article entitled, 6 21
16 "Glyphosate Use and
17 Cancer Incidence in the
18 Agricultural Health
19 Study"
20 Exhibit 29-3 Monsanto Company's 7 3
21 Notice to Take Oral and
22 Videotaped Deposition of
23 Dr. Chadi Nabhan
24 Exhibit 29-4 malathion monograph 92 23
25

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1 **VIDEOGRAPHER:** And good morning. This is
2 the start of tape labeled number one of the
3 videotaped deposition of Dr. Chadi Nabhan taken
4 in the matter of In re: Roundup Products
5 Liability Litigation in the United States
6 District Court for the Northern District of
7 California, bearing Case Number 16-MD-02741-VC.
8 This deposition is being held at the Crowne
9 Plaza Chicago O'Hare Hotel, at 5440 North River
10 Road in Rosemont, Illinois, 60018, on Monday,
11 January 15th, 2018, at approximately 8:53 A.M.
12 My name is Robert Zellner from TSG
13 Reporting, Inc., and I am the legal video
14 specialist. And the court reporter is Paula
15 Campbell, also in association with TSG
16 Reporting.
17 And will counsel please introduce
18 yourselves for the record.
19 **MR. LITZENBURG:** Tim Litzenburg for the
20 plaintiff and the witness.
21 **MR. GRIFFIS:** Kirby Griffis of
22 Hollingsworth, LLP, for Monsanto.
23 **MS. SALEK:** Stephanie Salek from
24 Hollingsworth, LLP for Monsanto.
25 **VIDEOGRAPHER:** Thank you.

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1 And will the court reporter please swear in
 2 the witness.
 3 REPORTER: Would you please raise your
 4 right hand.
 5 CHADINABHAN,
 6 called as a witness, having been duly sworn,
 7 was examined and testified as follows:
 8 EXAMINATION
 9 BY MR. GRIFFIS:
 10 Q. Good morning, sir.
 11 A. Good morning.
 12 Q. We've met one time, and that was at your
 13 previous deposition; is that right?
 14 A. Correct.
 15 (Exhibit 29-1 marked for identification.)
 16 Q. I have marked as Exhibit 1 -- and these
 17 exhibits that I'm about to describe are in front of
 18 you, sir -- Exhibit 1 your supplemental expert
 19 report; correct?
 20 A. Correct.
 21 (Exhibit 29-2 marked for identification.)
 22 Q. As Exhibit 2, an article by Andreotti and
 23 others appearing in the Journal of the National
 24 Cancer Institute in 2018 entitled "Glyphosate Use
 25 and Cancer Incidence in the Agricultural Health

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1 Study"; correct?
 2 A. Correct.
 3 (Exhibit 29-3 marked for identification.)
 4 Q. And as Exhibit 3, the notice of this
 5 deposition; correct?
 6 A. Correct.
 7 Q. Have you seen the notice of deposition
 8 before, sir?
 9 A. I have.
 10 Q. It asks you to provide us with documents
 11 that you have reviewed regarding glyphosate and
 12 non-Hodgkin lymphoma, or either of those, since our
 13 last deposition.
 14 What have you brought in response to that,
 15 sir?
 16 A. Actually, I don't have anything in print.
 17 I've reviewed the paper, the -- that you have, which
 18 is Exhibit 2. I reviewed the editorial comment that
 19 was written in the journal at the same time, written
 20 by Elizabeth Ward, and I've refreshed my mind with
 21 the previous papers that we discussed at the
 22 previous deposition, specifically the DeRoos study
 23 from 2005. That's about it.
 24 I have read some of the other depositions
 25 that were done. Dr. Neugut's deposition, I had a

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1 chance to read that. I read Dr. Jamison's
 2 deposition as well, and I read two documents, one by
 3 Dr. Ritz and one by Dr. Mucci that was provided to
 4 me by counsel.
 5 Q. Those were expert reports?
 6 A. Yes.
 7 Q. Anything else, sir?
 8 A. No.
 9 Q. So you mentioned some previous papers, such
 10 as DeRoos 2005, which we discussed at your prior
 11 deposition. Other than that, the only new things
 12 that you have reviewed since your last deposition
 13 concerning glyphosate and non-Hodgkin lymphoma or
 14 glyphosate alone or non-Hodgkin lymphoma alone are
 15 the Journal of National Cancer Institute's study
 16 2018, the editorial comment by Elizabeth Ford [sic],
 17 and depositions of Drs. Neugut and Jamison and
 18 expert reports of Dr. Ritz and Mucci; is that
 19 correct?
 20 A. Correct.
 21 Q. The publication that is Exhibit 2, sir, the
 22 Journal of the National Cancer Institute 2018
 23 publication, how did that come to your attention?
 24 A. I actually do get a table of contents for a
 25 lot of the oncology-specific journals that I --

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1 through my e-mail, and then it was also provided to
 2 me by counsel. But I have learned about it because
 3 I have -- I get table of contents for about 20
 4 journals that -- whenever something is -- is out
 5 oncology related, I get notified.
 6 Q. When you received the table of contents
 7 mentioning this article, did you retrieve it and
 8 read it then?
 9 A. Not all of the journals I can get the
 10 actual full article. I get the abstracts usually,
 11 so I wasn't able to immediately retrieve it, but
 12 then subsequently I did.
 13 Q. How long did you spend reviewing this
 14 article?
 15 A. I did not keep track of the number of
 16 hours. I would say maybe about two hours, give and
 17 take.
 18 Q. And did you -- you know, we discussed at
 19 your last deposition at some length your methodology
 20 and your process for evaluating scientific
 21 literature.
 22 Did you apply the same process and
 23 methodology in reviewing this article that you
 24 applied previously in reviewing scientific
 25 literature about glyphosate and non-Hodgkin

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1 lymphoma?
 2 A. Of course.
 3 Q. And how would you describe the process that
 4 you used to weigh this new study in forming opinions
 5 about glyphosate causation?
 6 A. I'm not sure I understand the question.
 7 How do I describe the process?
 8 Q. Yes.
 9 A. It's similar to the process I apply to any
 10 scientific article with -- that I have an interest
 11 in. I read the paper. I try to understand the
 12 conclusions, and try to understand what
 13 methodologies were applied to each of these
 14 conclusions, and I form an opinion.
 15 Q. How informative do you consider the 2018
 16 National Cancer Institute study to be with regard to
 17 the issue of whether glyphosate-containing
 18 substances can cause non-Hodgkin lymphoma?
 19 A. Well, I always applaud any study that
 20 provides long-term follow-ups. I mean, I think this
 21 is really critical in oncology and in the
 22 literature. There are many studies that usually are
 23 done, and you actually don't get any updated
 24 literature and so forth. But it did not add
 25 anything that -- rather unusual or did not really

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1 change anything pertaining to the body of
 2 literature, but it's good that there is a longer
 3 follow-up. I applaud the authors for doing so.
 4 Q. So there was a previous article that we
 5 talked about, the DeRoos 2005 study --
 6 A. Correct.
 7 Q. -- which reflected the early report of data
 8 from the same set of data; correct?
 9 A. Correct.
 10 Q. And this is the follow-up that you were
 11 just referring to; correct?
 12 A. Yeah. This is the follow-up, and as I
 13 said, I always applaud and I enjoy the fact that
 14 authors and scientists look at follow-up data
 15 because there is much in the literature where you
 16 don't see a lot of follow-up. And I believe there
 17 would be additional papers, follow-up on the AHS.
 18 It is ongoing, so I don't believe this would be the
 19 last paper coming out.
 20 Q. You know that the -- there are multiple
 21 publications from this same set of data on issues
 22 other than glyphosate and non-Hodgkin lymphoma;
 23 correct?
 24 A. Yes, I'm aware of that.
 25 Q. Do you consider the National Cancer

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1 Institute 2018 study to be an improvement and an
 2 expansion on the DeRoos 2005 data?
 3 A. It's an expansion because it reports on
 4 longer follow-up and additional cases that have been
 5 reported, as you are -- well know. You can't really
 6 improve on it because the study is what the study
 7 is. It's been designed in the '90s, and you can't
 8 improve on a study design. I have a lot of
 9 reservations about the study design that was done.
 10 So you can't improve on that. It's already done.
 11 Q. In -- as a piece of evidence that you are
 12 weighing in deciding whether glyphosate-containing
 13 substances can cause non-Hodgkin lymphoma, do you
 14 give more weight to the NCI 2018 study or to the
 15 DeRoos 2005 study?
 16 A. I would give more weight to the NC -- the
 17 JNCI article, because it is obviously longer
 18 follow-up and there are more cases, so I think it
 19 makes sense to take the data that is coming in this
 20 article as an update, and it has more weight because
 21 there are more cases.
 22 Q. And in what ways does the 2018 NCI data
 23 improve on the data from 2005?
 24 A. Longer follow-up. The longer follow-up and
 25 the additional cases that have been reported.

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1 That's pretty much it.
 2 Q. You would agree that this is a piece of
 3 evidence that weighs against causation; correct?
 4 A. It is a piece of evidence that suggests no
 5 causation between glyphosate and non-Hodgkin
 6 lymphoma, which I don't agree with.
 7 Q. So you agree that it is a piece of evidence
 8 against causation, but you disagree overall with
 9 that conclusion that there is no causation; is that
 10 accurate?
 11 A. I do disagree with the conclusion, yes.
 12 Q. And the rest of what I said is accurate as
 13 well; correct?
 14 A. Yes.
 15 Q. As a piece of evidence against a causal
 16 connection between glyphosate-containing substances
 17 and non-Hodgkin lymphoma, how much does this weaken
 18 your original opinion stated in your original expert
 19 report that glyphosate causes non-Hodgkin lymphoma?
 20 A. It does not weaken it at all.
 21 Q. Why doesn't it weaken it at all?
 22 A. It doesn't add any information. It just
 23 adds longer follow-up to a previously done study.
 24 It provides no additional scientific information of
 25 substance.

1 Q. Okay. Could you explain, please, what you
2 mean by "adding no additional scientific
3 information" between the DeRoos 2005 data and the
4 NCI 2018 data?

5 A. So the JNCI paper basically adds longer
6 follow-up. So the follow-up now is through 2012 for
7 North Carolina and 2013 for Iowa. So that's really
8 what it adds. And it is rather predictable and
9 expected with longer follow-up you will have more
10 cases reported of cancer in general, non-Hodgkin
11 lymphoma.

12 That's really all what this study adds. It
13 doesn't change the way the study was designed, it
14 doesn't change the drop of follow-up questionnaires,
15 it doesn't change the fundamental flaws that exist
16 in the Agricultural Health Study that were present
17 previously in the DeRoos study.

18 Q. I'm just trying to understand fully the
19 difference between your statement that this -- this
20 has more weight than DeRoos 2005, given the
21 additional follow-up, but adds nothing of scientific
22 value. Could you explain what you mean, please?

23 A. What I mean by "more weight" is when you
24 have a longer follow-up study or you have additional
25 study that reports on the actual trial itself, you

1 conclusions, but I don't dismiss it.

2 Q. What information, data, or conclusions in
3 the NCI 2018 study do you consider to be reliable?

4 A. As I said, the -- the way the Agricultural
5 Health Study has been set to look at the incidence
6 of cancer and pesticides, including glyphosate, and
7 from these cancers, non-Hodgkin lymphoma, has been
8 established several decades ago. So that's not
9 going to change, the way the study is designed and
10 the way the study is conducted. All what we are
11 going to see is additional follow-up and additional
12 cases and additional things that are reported with
13 longer follow-up.

14 So what the JNCI paper adds is that, with
15 longer follow-up, this is what we have seen in terms
16 of additional cases, and the conclusions of this
17 particular paper mirrors the conclusions of the
18 DeRoos paper. There are no really differences in
19 conclusions, the way I read this paper. Basically,
20 the conclusions of this paper are rather similar to
21 the conclusions of the 2005 paper.

22 Q. What size epidemiological study would it
23 take to shake your conviction that
24 glyphosate-containing substances cause non-Hodgkin
25 lymphoma?

1 will take the output or you would take the results
2 of the latest follow-up, and it -- basically, you
3 don't need to go back and take a look at DeRoos any
4 longer.

5 In other words, in the future, as we
6 continue to evaluate the Agricultural Health Study,
7 nobody's going, in my opinion, to go back and take a
8 look at DeRoos study any more in 2005. Why would
9 they? We have now an update in 2018, so that
10 becomes the benchmark at which you compare future
11 updates against. That's what I mean.

12 Q. Okay. In your opinion, is this study so
13 flawed -- I know we'll be talking about some of the
14 flaws that you believe exist in the study later --
15 is it so flawed that it isn't of any value in
16 assessing whether glyphosate-containing substances
17 can cause non-Hodgkin lymphoma?

18 A. Well, it really depends how you define
19 "value." I believe anything in the literature does
20 bring some kind of value, and I think we -- we just
21 have to take this in the context of other
22 epidemiologic evidence and other body of literature
23 that exists. I don't dismiss anything that is
24 published that is being peer reviewed and out in the
25 literature. I may not agree with all the

1 MR. LITZENBURG: Objection to form.

2 A. So there is no such a thing. You actually
3 have to define this a priori. Prior to designing
4 the study, you have to decide, what -- what am I
5 looking for, how do I design the study, what are the
6 number of subjects I'm actually looking at, what's
7 the power of the study, et cetera, and you make that
8 decision.

9 I'm not an epidemiologist or a
10 statistician, but you don't make these decisions
11 actually after the fact. You actually make these
12 decisions in the process when you design a study.

13 BY MR. GRIFFIS:

14 Q. Well, you came to this after the fact.

15 A. Right.

16 Q. You are not an epidemiologist. You weren't
17 designing a study. You were looking at studies that
18 had been published, and you came to a conclusion,
19 without knowing about this because it didn't exist
20 yet, that glyphosate caused non-Hodgkin lymphoma;
21 correct?

22 A. Correct.

23 Q. What size new epidemiology study would it
24 take to shake your conviction?

25 A. Well, at this point, nothing would shake my

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1 conviction because, you know, short of doing the
 2 randomized control trials where you expose some
 3 subjects to glyphosate and others to no glyphosate
 4 and demonstrate that the subjects who received
 5 glyphosate do not have non-Hodgkin lymphoma, similar
 6 to the folks who don't receive glyphosate, and
 7 that's obviously a trial that cannot and should not
 8 be performed.

9 So the body of evidence so far that I have
 10 reviewed is convincing that there is a causation and
 11 an association between glyphosate and non-Hodgkin
 12 lymphoma. This is an update of a previously
 13 published trial in 2005 that I have took under full
 14 consideration when I reviewed the body of literature
 15 before.

16 Q. So it's your view that this is something
 17 that you have previously -- essentially this is
 18 something that you have previously considered since
 19 it's an expansion of data from an article that you
 20 previously considered; is that fair?

21 A. That is correct.

22 Q. Turn to Exhibit 2, sir, which is the
 23 National Cancer Institute 2018 study. I want to ask
 24 you about some specific things therein.
 25 First, I'm in the abstract, the

Page 19

1 conclusions. Do you see that?

2 A. I do.

3 Q. "In this large, prospective cohort study,
 4 no association was apparent between glyphosate and
 5 any solid tumors or lymphoid malignancies overall,
 6 including NHL and its subtypes."
 7 Did I read that right?

8 A. You did.

9 Q. And that was -- that accurately reports
 10 what they found in the NCI 2018 study; correct?

11 A. That reports their conclusions, correct.

12 Q. Page 5, sir, first sentence under the
 13 "Discussion" section: "In this updated evaluation
 14 of glyphosate use and cancer risk in a large
 15 prospective study of pesticide applicators, we
 16 observed no associations between glyphosate use and
 17 overall cancer risk or with total
 18 lymphohematopoietic cancers, including NHL and
 19 multiple myeloma."
 20 I read that correctly?

21 A. You read it correctly.

22 Q. And that accurately describes the findings
 23 of the NCI 2018 study; correct?

24 A. Of the authors who published in the JNCI
 25 paper.

Page 20

1 Q. On Page 7, sir.

2 A. Okay.

3 Q. Let's go to the last paragraph, "In
 4 conclusion, we found no evidence of an association
 5 between glyphosate use and risk of any solid tumors
 6 or lymphoid malignancies, including NHL and its
 7 subtypes."
 8 As we discussed, that accurately describes
 9 the conclusions of the NCI 2018 study; correct?

10 A. That accurately describes the conclusions
 11 that you just read, yes.

12 Q. You read the deposition of Dr. Neugut, you
 13 said?

14 A. I did.

15 Q. Do you agree with Dr. Neugut that -- and
 16 Dr. Neugut is an epidemiology expert that has been
 17 named by the plaintiffs; correct?

18 A. Yes, he is.

19 Q. You agree with him that the Journal of the
 20 National Cancer Institute is one of the most highly
 21 respected journals in the world?

22 MR. LITZENBURG: Object to form.

23 A. I -- I actually don't think that JNC -- I
 24 mean, it's a good journal. I don't think it's one
 25 of the most highly respected journals in the world.

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1 I think there are a lot of papers that get published
 2 there that I have problems with, but it does have a
 3 high impact factor, and it's definitely one of the
 4 very good oncology journals that we view highly. I
 5 think "in the world" is stretching it.

6 BY MR. GRIFFIS:

7 Q. You do -- do you agree with Dr. Neugut that
 8 the Journal of the National Cancer Institute's
 9 impact factor is routinely among the top 5 percent
 10 of all oncology journals in the world?

11 MR. LITZENBURG: Object to form.

12 A. In oncology.

13 BY MR. GRIFFIS:

14 Q. You agree with that?

15 A. It is in the top -- I actually don't have
 16 the actual -- I will have to look it up. I'm not
 17 sure top 5 percent, top 10 percent, but it has a
 18 high impact factor. I don't want to state
 19 mistakenly what it is. I would need to search and
 20 see what the top 5 percent. I'm sure it's in the
 21 public domain.

22 Q. The peer reviewers of the JNCI apply a
 23 rigorous peer review; correct?

24 A. I think peer reviewers for every journal
 25 should apply rigorous peer review, whether it's JNCI

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1 or other papers.
 2 Q. And JNCI has a reputation for rigorous peer
 3 review like other top journals; right?
 4 A. I don't know what peer review process they
 5 have. I don't peer review for them. I peer review
 6 for other journals, but I'm not sure what the peer
 7 review process that exists at the JNCI.
 8 Q. You haven't been asked to peer review for
 9 JNCI?
 10 A. I'm not a peer reviewer for JNCI, no.
 11 Q. Take a look at the authors for Exhibit 2,
 12 sir.
 13 A. Sure.
 14 Q. And you see that under the listing of
 15 authors there is "Affiliation of authors"?
 16 A. I see that, yes.
 17 Q. And by using their -- by designating them
 18 with initials, they show which branches and
 19 subbranches of the National Cancer Institute a
 20 number of the authors belong to.
 21 Do you see that?
 22 A. I see that.
 23 Q. And do you see that one, two, three, four,
 24 five, six, seven, eight of the authors work at the
 25 National Cancer Institute?

Page 23

1 A. I haven't counted. I'll take your word for
 2 it. I'm -- I'm sure you did, one, two, three, four,
 3 five, six at the Occupational and Environmental
 4 Epidemiology Branch, and that's six, and then seven
 5 is the Division of Statistics at the NCI. I think
 6 seven, as you said -- you said seven?
 7 Q. And then formerly of Occupational and
 8 Environmental Epidemiology Branch, over on the next
 9 line, Michael Alavanjas, who is deceased, which is
 10 why is formerly.
 11 A. Okay.
 12 Q. Division of Cancer Epidemiology and
 13 Genetics, National Cancer Institute, so those eight
 14 are National Cancer Institute employees or former
 15 employees due to deceased?
 16 A. Okay. I mean, do you want me to count
 17 them? I'm fine. It could be seven, it could be
 18 eight. I see the majority of the authors are
 19 affiliated with the National Cancer Institute.
 20 Q. And then two more are with the National
 21 Institutes of Health, a epidemiology branch,
 22 National Institute of Environmental Health Sciences
 23 at the National Institutes of Health?
 24 A. I see that, yes, DPS and CGP.
 25 Q. And then the remaining two with the

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1 Department of Epidemiology at the University of
 2 Iowa.
 3 A. And Public Health in Philadelphia.
 4 Q. And Public Health in Philadelphia
 5 respectively; correct?
 6 A. Correct.
 7 Q. The bottom line of the first page, sir,
 8 says, "Published by Oxford University Press 2017.
 9 This work is written by U.S. Government employees
 10 and is in the public domain in the U.S." Correct?
 11 A. Yes, correct.
 12 Q. There are no industry authors or
 13 affiliations for this study; correct?
 14 A. There are no industry authors or
 15 affiliations. I have not looked at any conflict of
 16 interest of these authors, but I'm not aware of any.
 17 Q. At the end, sir, there is a statement about
 18 funding; correct?
 19 A. What page?
 20 Q. It's Page 7.
 21 A. Yeah, I see that.
 22 Q. "This work was supported by the Intramural
 23 Research Program of the National Institutes of
 24 Health, National Cancer Institute, Division of
 25 Cancer Epidemiology and Genetics, National Institute

Page 25

1 of Environmental Health Science, the Iowa Cancer
 2 Registry, and Iowa's Holden Comprehensive Cancer
 3 Center, as well as the NIEHS-funded Environmental
 4 Health Sciences Research Center at the University of
 5 Iowa." Correct?
 6 A. Correct.
 7 Q. So it's all government funding, mostly
 8 federal government funding, to the National
 9 Institutes of Health; correct?
 10 A. Yes, this information is not new. I mean,
 11 this has been the case since the inception of the
 12 Agricultural Health Study. There's nothing new
 13 here.
 14 Q. Do you agree that National Institutes of
 15 Health funding means that high standards and best
 16 practices are used to ensure that the data is
 17 accurate?
 18 A. It doesn't ensure the data is accurate. It
 19 just basically -- all what it does, it provides
 20 funding for a study that the NIH views important.
 21 You don't know what data you will generate from the
 22 funding, because when you fund a study, you don't
 23 really know what you are going to come with the
 24 study. You just decide on funding the study upon
 25 its inception, because you view it important in the

1 public domain.

2 And that's what the NCI and the NIH did.
3 They funded the study and -- because of interests,
4 obviously, to the general public.

5 Q. Have you had an NIH-funded study before?

6 A. No, I'm not a basic scientist. They do
7 more for basic science.

8 Q. I'm going to ask the question again,
9 because I think you focused on the conclusions and
10 whether the conclusions are accurate.

11 A. Sure.

12 Q. My question is this, sir: Do you agree
13 that NIH funding -- and perhaps you don't know, but
14 do you agree that NIH funding means that high
15 standards and best practices are used to ensure that
16 data is accurate?

17 A. Yes.

18 Q. We talked -- the -- let's talk for a moment
19 about peer review with regard to this study, sir.

20 Peer review -- this went through a peer
21 review process, which means that it has been
22 reviewed by experts in the field in order to be
23 accepted for publication; correct?

24 A. Yes.

25 Q. The authors that we just reviewed are

1 A. It was compelling to the peers that
2 reviewed this paper that they wanted this to be
3 published. That's what you can tell from a peer
4 review process.

5 Q. By the way, do you know -- we had some
6 discussion at your prior deposition about the IARC
7 Monograph being published in the Lancet. Do you
8 know if IARC Monographs, when they're published in
9 Lancet are published there just by arrangement
10 automatically or if there is actually a peer
11 reviewed process first?

12 A. I don't know, but I believe there is
13 actually a peer review.

14 Q. Based on --

15 A. I don't -- I don't think there is any paper
16 that gets into Lancet without peer review.

17 Q. And what --

18 A. I review for Lancet Haematology, and I'm
19 not aware -- I mean, the Lancet -- there's no -- to
20 my knowledge, there is no paper that gets published
21 in any of these journals without a review, JNCI or
22 Lancet or Lancet Oncology or whatever it is. All of
23 these are peer review. And I'm a peer reviewer for
24 Lancet Haematology, so I know for a fact that all of
25 these things get reviewed.

1 themselves epidemiology experts, and this would have
2 been reviewed by peers who understand epidemiology
3 as well; correct?

4 A. I presume so. I'm not really sure who
5 reviewed the paper. I think it's -- again, we just
6 don't know who reviewed it, but your presumption is
7 probably accurate, that it will be sent to folks who
8 understand the field, but we just don't know really
9 who peer reviewed it.

10 Q. The body of evidence was robust enough that
11 it was accepted by the peer reviewers, whoever they
12 were; correct?

13 A. So acceptance of papers in the literature
14 does not always necessarily reflect that the paper
15 has no flaws or has -- or the body of evidence is
16 irrefutable. There are many journals and many
17 articles.

18 So what this means, when a paper like this
19 is accepted in the JNCI, it means that the reviewers
20 that reviewed this paper found merit that it -- it
21 is worthy of publication in the JNCI. That's really
22 all that means.

23 Q. You would agree that the body of evidence
24 was robust enough that the peer reviewers accepted
25 it for publication?

1 Whether there's an arrangement between --
2 you know, you could say the same for this, whether
3 there's an arrangement between these authors and the
4 JNCI where you expedite things and just get
5 published and just do a peer review, which is not
6 the same peer review that you would do for other
7 papers, I'm not aware. I don't think we need to
8 speculate that.

9 Q. Okay.

10 A. We don't know.

11 Q. So just to be clear, you don't know whether
12 IARC has an arrangement with Lancet that their
13 publications are deemed peer reviewed internally and
14 don't go through an additional Lancet peer review?

15 A. What I have said is I don't believe any
16 paper gets published in Lancet without being
17 subjected to a peer review. That's what I said.

18 Q. But the basis -- okay. But the basis for
19 that is not inside knowledge about the Lancet's peer
20 review process or their arrangements with IARC?

21 A. The basis of that, that any journal out
22 there usually have this as a particular standard.
23 There's no reason to believe that the Lancet would
24 deviate from the standard.

25 You know, when you look at the JNCI paper,

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1 for example, just to give you just an example, the
 2 paper was received for the first time on
 3 August 22nd, 2017, when you look at the bottom. It
 4 was revised less than four weeks later. And as a
 5 peer reviewer for over 12 journals, for a journal
 6 like the JNCI to have this reviewed and peer
 7 reviewed and submitted back in less than four weeks
 8 is rather unusual for a rigorous peer review, and
 9 then it was accepted within two weeks on
 10 October 6th, 2017.

11 So I don't know how rigorous the peer
 12 review was here, but I can tell from you a Lancet
 13 perspective, it's very rigorous, and it's very
 14 difficult to get a paper in Lancet. The same should
 15 apply for JNCI, but I don't know what kind of
 16 arrangement was here for a paper to be published in
 17 less than four weeks that has thousands of cases and
 18 so forth. So I don't know.

19 Q. You would be equally skeptical if the
 20 Lancet publication was that fast or faster; right?

21 A. I think if I'm going to put my skepticism
 22 hat, I could be skeptical about any paper, when I
 23 usually look at the received and revised. But I
 24 would maintain the hope that all of these journals,
 25 JNCI, Lancet, and all of them, maintain the peer

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1 review process, the rigorous process, because if I'm
 2 going to wear my skepticism hat, I would be skeptic
 3 about this one as well, in terms of peer review, and
 4 I'm -- I'm not going to go there, because I believe
 5 this was peer reviewed and the other one was peer
 6 reviewed.

7 Q. So you're not going to wear your skeptic
 8 hat for either one of them?

9 A. No, I won't.

10 Q. When they did the peer review of the NCI
 11 2018 paper, the peer reviewers would have actually
 12 looked at the hypothesis being explored; correct?

13 A. Yes, of course.

14 Q. And they would have looked at whether the
 15 authors were free of bias; correct?

16 A. Well, that's actually a tough thing, to be
 17 honest. And, again, as -- as somebody who does a
 18 lot of peer reviews, you know, all what you can look
 19 at is the declared conflict of interest, and, you
 20 know, oftentimes, you know, it's really tough to
 21 know all of these conflicts. But we try not to take
 22 it into consideration when we review the papers.

23 And I can tell you, I've advocated for
 24 years that peer review should be blinded to the
 25 reviewers and the authors. I actually think that

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1 any paper that gets submitted for peer review, you
 2 should not know who wrote it or the affiliations of
 3 the authors. So as a peer then, when you look at
 4 the paper, you don't get biased by, oh, this person
 5 is from a prestigious place and this name is great,
 6 so it must be a good paper.

7 But this is not the way things are going,
 8 so right now you get access for the most part to the
 9 authors' names and affiliations and so forth.

10 So whatever these authors declared in their
 11 conflict of interest is usually available for the
 12 peers to look at and make their own decision.

13 Q. Do they -- do peer reviewers look at
 14 whether the authors are free of bias?

15 A. When I peer review, I usually do. I'm not
 16 sure -- I don't know whether the peers that reviewed
 17 this paper did. I don't know. I don't know who
 18 reviewed it.

19 Q. Do peer review -- do the peer -- would the
 20 peer reviewers of JNCI have looked at whether the
 21 conclusions were actually supported by the evidence
 22 that was provided?

23 A. Again, I don't know what they looked at.
 24 It's hard for me to speculate what the peer -- what
 25 the peers that reviewed this paper, who I don't know

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1 who they are, what they looked at and how they
 2 reached the conclusion of publishing or rejecting or
 3 revising it and so forth. I don't know who they
 4 are. I don't know what the process that they
 5 implemented. I did not review the paper, and I
 6 don't know who reviewed it.

7 Q. Okay. Let me read you your testimony
 8 regarding the Lancet peer review of the IARC
 9 Monograph.

10 A. Sure.

11 Q. And tell me if you think that it applies to
 12 this peer review as well.

13 A. Go ahead.

14 Q. "So when you do a peer review, you actually
 15 have to look at the hypothesis, whether the
 16 methodology is sound, whether the authors were free
 17 of bias, and whether their conclusions actually were
 18 supported by the evidence that they provide."

19 That's your testimony regarding the Lancet
 20 peer review of the IARC Monograph. Does that apply
 21 just as well?

22 A. That should be the case for any peer review
 23 for any journal, whether it's Lancet, JNCI, JCO.
 24 What -- what --

25 Q. That should you apply just as well to

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1 Exhibit 2, the JNCI 2018 study; correct?
 2 A. It should apply, yes, but what you asked
 3 me, did it apply, and I said I don't know. But it
 4 should apply for any peer review process. I agree
 5 with that hundred percent.
 6 Q. So it should apply, but you don't know if
 7 it did apply to JNCI. You also don't know if it did
 8 apply to Lancet; right?
 9 A. Absolutely. But, I mean, again, like I
 10 said, I'm trying not to wear my skepticism hat here,
 11 and I would believe that, for the most part, these
 12 papers get reviewed, and the reviewers, if they find
 13 merit to the publication, they will accept. If they
 14 don't, they will reject. And that's really all what
 15 we can say. We just don't know who they are and how
 16 rigorous their review process was.
 17 Q. Had you been asked to peer review this
 18 paper, would you have passed it for publication?
 19 A. Yes. It would be a conflict of interest.
 20 Yes, I would have not reviewed.
 21 Q. Let's say you had no conflict of interest.
 22 Would you have approved it for publication?
 23 A. I mean, I think this would be published
 24 somewhere. Every paper has a journal, and every
 25 journal has to have papers. It's a matter whether

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1 you think this is a JNCI or a JCO or some other less
 2 specialized type of paper, because to me this is a
 3 follow-up data on a previous study.
 4 So, yes, I think the follow-up should be
 5 published. I'm -- I would be very supportive -- I
 6 would have approved it for publication.
 7 The question that I usually look at,
 8 whether this type of paper should be published in a
 9 journal like the JNCI, because the JNCI has a little
 10 broader spectrum in terms of the audience, or maybe
 11 a more specialized journal, like more of a specific
 12 epidemiology journal, specific environmental type of
 13 journal. That would be the thing I would have had
 14 to think about when deciding, but I do believe it
 15 should be published, absolutely. With this long
 16 follow-up, I think it should be published.
 17 Q. Would you have approved it for publication
 18 in JNCI?
 19 A. The thing that -- the reason I don't know
 20 how to answer this because I -- you know, for the
 21 journals that I review for, I know exactly a priori
 22 the type of papers that they want, so I think the
 23 JNCI would tell usually the reviewers that we want
 24 papers that are in the top 25 percent or top
 25 20 percent or top 10 percent. So they usually let

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1 us know how -- how powerful the paper they want in
 2 order for us to approve it.
 3 They also -- most journals will tell you
 4 what the audience that they want. So for some of
 5 the journals I review for, they say, we want this to
 6 apply for the general medical audience, not just
 7 oncologists, not just epidemiologists. So if you
 8 are a primary care physician you would be
 9 interested. And other journals say, we want
 10 something that is practice changing, something
 11 fundamental.
 12 So you will have to know, you know, from
 13 the editor in chief usually and the editorial board
 14 what they are looking for, and if that's what they
 15 are looking for, I see no reason for it not to be
 16 published in the JNCI. I would have approved it.
 17 Q. Okay. So I'm just going back to the
 18 standards for peer review. You were talking about
 19 you being a peer reviewer at your last deposition
 20 and the standards that should be applied, you don't
 21 know if they were applied by particular peer
 22 reviews, but presumably you follow your own
 23 standards in peer review?
 24 A. Yeah, sure.
 25 Q. So in saying that this should be approved

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1 for publication, you actually looked at the
 2 hypothesis, at whether the authors were free of
 3 bias, and whether their conclusions actually were
 4 supported by the evidence that they provide;
 5 correct?
 6 A. Yes, I would look at that. I mean, just
 7 because the study is negative, it doesn't -- and I
 8 disagree with the conclusion, it doesn't mean I'm
 9 going to say it can't be published. I -- I think
 10 it's a very good to have a healthy debate. It's
 11 fine.
 12 Q. Yes, sir. And you have reviewed it, and
 13 you agree that the hypothesis is sound, the authors
 14 are free of bias, and the conclusions are supported
 15 by the evidence provided; correct?
 16 A. I never said the hypothesis is sound. In
 17 fact, I said there are so many flaws in this study
 18 that did not really change just because you have a
 19 longer follow-up. But all I said is, with longer
 20 follow-up, it is appropriate to report on additional
 21 public and additional data and so forth.
 22 The hypothesis, as it was present in the
 23 DeRoos study, remains the same hypothesis in the --
 24 all what this is is just an update. I mean, all
 25 what this is is an update of a previously flawed

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1 study. That's what you did.
 2 Q. Do you --
 3 A. Just --
 4 Q. Do you agree or disagree, sir, that the
 5 conclusions given in the NCI 2018 study are
 6 supported by the evidence provided?
 7 A. The authors' conclusions are supported by
 8 the evidence that they actually showed. The
 9 evidence has a lot of flaws, and subsequently the
 10 conclusions will have a lot of problems. But, yes,
 11 their conclusions is supported by the evidence that
 12 they evaluated.
 13 Q. Looking at Exhibit 1, sir, your
 14 supplemental expert report.
 15 A. Okay.
 16 Q. In the first sentence of the analysis --
 17 you have an introductory paragraph, which I'm
 18 omitting -- the first sentence of your analysis, you
 19 write, "I have read and analyzed this publication,
 20 and my overall opinion remains unchanged." Correct?
 21 A. Correct.
 22 Q. Did your reading an analysis of this
 23 publication, was that as in depth as it would be for
 24 a peer review?
 25 A. Of course. I don't have to make the

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1 decision whether it's accepted or rejected. It's
 2 already published.
 3 Q. But the process that you went through in
 4 reading and analyzing it was as thorough as the
 5 process that you would go through in reviewing a
 6 draft for a publication; is that right?
 7 A. Yes, similar and similar to the body of
 8 literature I reviewed that we discussed in my
 9 previous deposition.
 10 Q. You say, "There are several flaws in this
 11 study that challenges the recent conclusions stated
 12 by Andreotti, et al." Correct?
 13 A. It should have been "challenge," but, yes,
 14 that is it.
 15 Q. And this is the complete list of flaws that
 16 you believe exist in this study; correct?
 17 A. As I was able to discern.
 18 Q. You don't have any other in mind right now;
 19 right?
 20 A. Not at this point.
 21 Q. Okay. We'll run through them, and then we
 22 will talk about them.
 23 The first one was that the study was
 24 restricted to two states, North Carolina and Iowa,
 25 not representing other states; correct?

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1 A. That's correct.
 2 Q. "Second, the study essentially ended in
 3 2001, not accounting for the more expanded and
 4 increased use of glyphosate after that year."
 5 correct?
 6 A. Correct.
 7 Q. "Third, and most importantly," you write,
 8 "significant dropout rate in study participants
 9 where follow-up and full interviews were completed
 10 for only 63 percent of individuals." Correct?
 11 A. Correct.
 12 Q. "Additionally, the AHS study relied on
 13 self-reporting, which certainly resulted in some
 14 additional misclassification of exposure/use."
 15 Correct?
 16 A. Correct.
 17 Q. And "Lastly, in the authors' own admission,
 18 there was an increased risk of multiple myeloma with
 19 glyphosate exposure." Correct?
 20 A. Correct, and acute leukemia as well.
 21 Q. And the last one isn't a flaw in the study;
 22 correct?
 23 A. Say again? I'm sorry.
 24 Q. You don't consider the last one to be a
 25 methodological flaw in the study; correct?

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1 A. It's not a methodological flaw, no.
 2 Q. It is instead a point in favor of
 3 glyphosate-containing substances causing some type
 4 of cancer; right?
 5 A. Correct.
 6 Q. As far as the one that you have identified
 7 as most important, the significant dropout rate,
 8 would you please explain why you consider that to be
 9 a flaw?
 10 A. You basically have missing data for
 11 40 percent -- almost 40 percent of individuals. I
 12 mean, so -- I mean, it's very difficult, rather
 13 impossible, to make a sound conclusion on a study
 14 that was powered with the assumption that you need
 15 to have all of these patients enrolled and
 16 reporting, and then 40 percent you don't have enough
 17 information on.
 18 So it's very difficult for me, as I sit
 19 here, to figure out, how would you actually reach a
 20 conclusion when you don't have information -- proper
 21 information for -- for that many patients.
 22 Q. Do you know the process that was used to
 23 address that issue?
 24 A. When I looked at the paper, they talked
 25 about, you know, imputation of data, which, again,

1 I'm not an epidemiologist, but I don't believe that
2 this is an appropriate way of -- you're simply
3 guessing, I mean, pretty much. Imputation, to me,
4 is you're trying to guess the data on 40 percent,
5 almost 40 percent of folks we don't have information
6 on. That's really what it is. It's just a fancier
7 word for statistics -- statisticians to use who are
8 doing imputation of data.

9 But at the end of the day, you're really
10 guessing, and you're trying to fill in the blanks.
11 And maybe if you're filling the blanks for
12 5 percent, 7 percent of the folks that you did not
13 have a follow-up, I would be tolerant of that. But
14 when you're close to 40 percent, that's really
15 stretching it.

16 So whatever methodology, imputation, not
17 imputation, it doesn't matter to me. If you have
18 40 percent that you are missing, and you are trying
19 to fill in the blanks, it's just not going to
20 resonate with me as a scientist and as a lymphoma
21 specialist.

22 Q. And you believe that the conclusions of the
23 NCI 2018 study irrevocably depend upon the
24 imputations of that missing data; correct?

25 A. Well, I think a lot of the conclusion is

1 dependable on that, yes.

2 Q. And if there was a portion that didn't
3 depend on that, you would have no objection to that
4 conclusion; right?

5 A. I would -- again, I would look at it. I
6 mean, I realize that they did a lot of analysis for
7 folks who had the follow-up and other individuals
8 who did not have the follow-up, and they tried to do
9 the imputation and they did the analysis only for
10 patients who they had the information on. So I'm
11 fully aware of all of the analysis that they did.

12 And, again, it's -- what I said is that the
13 missing data and the -- is not going to be, in my
14 mind, remedied by the imputation of data. You
15 probably have to ask a lot of statisticians and
16 epidemiologists of this. But as a clinician, when
17 you tell me you have 40 percent missing and you did
18 whatever you did to fill in the blanks, you've lost
19 me as a clinician.

20 Q. Okay. So analyzing imputation and whether
21 it can accurately fill gaps in data is beyond you?

22 A. It's like funny accounting. You can always
23 make the spreadsheet look nice. So, again,
24 statisticians will have ways to try to figure out,
25 how can we actually remedy a flaw in a particular

1 study design. That's fine. It's great. But as a
2 clinician, when I have to take this into account,
3 it's very difficult to take it into account because
4 you have a lot of missing information.

5 If you take any type of trial in the
6 oncology literature and you say, we've lost data on
7 40 percent of patients, and these are the results,
8 you will have a lot of eyebrows raised trying to
9 figure out how you can reach a conclusion with that
10 many dropout rate.

11 Again, I recognize there are other
12 statistical methods to remedy all of these things.
13 What I'm saying is, I don't agree with them because
14 somehow the authors or the scientists or the folks
15 who are in charge of the AHS should have figured out
16 a way to assure low dropout rate, more follow-up,
17 more rigorous follow-up. That's really where the
18 rigor is, in the design of the study and how you
19 conduct the study, not after the fact.

20 Q. So do you believe that imputation makes
21 studies invalid for your consideration, regardless
22 of how rigorous or reliable epidemiologists believe
23 imputation to be?

24 A. I may not agree with what epidemiologists
25 come up with because I'm a clinician ultimately, and

1 I will have to figure out how to counsel patients
2 based on the available body of the literature.

3 What I said -- I didn't say it would be
4 invalid. I would say it makes any study
5 significantly less powerful. I am fully aware that
6 imputation is actually a statistical methodology and
7 it does exist and people do it, so I can't dismiss a
8 particular methodology that is being done by my
9 colleagues, whether they are statisticians or
10 epidemiologists.

11 What I said is when I see that process
12 being applied to 40 percent, then I have issues with
13 that, and I question the significance of it. And I
14 don't know what the threshold where I don't have a
15 significance, but, you know, 5 to 10 percent, maybe
16 I have some tolerance to that. But 40 percent is
17 too much for me to accept any type of a statistical
18 method that tries to guess data because similar -- I
19 mean, again, you are guessing data and trying to
20 fill in the blanks.

21 Q. So at 40 percent -- it's actually --

22 A. 37 percent.

23 Q. -- 37 percent.

24 A. We are just saying 40 percent.

25 Q. At 37 percent, you don't care what the

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1 epidemiologists have to say about the reliability of
 2 imputation or what the studies say about the
 3 reliability of the AHS imputation process. It's not
 4 good enough for you; is that what -- is that a fair
 5 description?
 6 A. I didn't say I don't care. I said I
 7 don't -- I believe the clinical significance of any
 8 type of a study that has missing data of 37 percent
 9 or 40 percent is very questionable, and whatever
 10 process you try to do as a statistician or as an
 11 epidemiologist to remedy that is going to be
 12 questionable for me as a clinician because you are
 13 ultimately guessing the data based on data of
 14 others.
 15 I mean, if you try to simplify to a layman
 16 person, what is imputation? It's guessing. I mean,
 17 at the end of the day, I'm not an epidemiologist or
 18 a statistician, so I have to explain things to
 19 myself to understand them. Imputation of data is
 20 you take the data that's available for other folks
 21 that you have data on and you try to guess data for
 22 people you don't have data on. How rigorous is
 23 that? It's not rigorous.
 24 So, again, for somebody who treats patients
 25 and who have treated patients, that's really where I

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1 question the type of methodology that's being done
 2 to remedy the information.
 3 Q. You understand that there's a mathematical
 4 formula which is adjusted and tweaked based on --
 5 A. I'm pretty -- I'm pretty sure.
 6 Q. -- based on empirical sampling of the data?
 7 A. Pretty sure, a lot of math and a lot of
 8 squares and roots and all of these things. Like I
 9 said, like funny accounting.
 10 Q. And you understand that nobody guesses
 11 anything?
 12 A. There's a lot --
 13 Q. They apply a mathematical formula?
 14 A. There's a lot of guessing.
 15 Q. How do you know?
 16 A. In imputation, there's a lot of guessing.
 17 I mean --
 18 Q. Sir, you just explained you don't know how
 19 to evaluate imputation as an epidemiologist. How do
 20 you know there is --
 21 A. I can evaluate as a clinician, okay? I'm
 22 not an epidemiologist, nor am I a statistician. But
 23 as a clinician, as I told you, if you need to
 24 explain what imputation to a patient or a family
 25 member or a colleague, so you can say all of this

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1 buzz word, it's a math formula and all of these
 2 things.
 3 But at the end of the day, you are trying
 4 to basically guess. It's trying to guess to try to
 5 fill in the blanks of information that is missing.
 6 Maybe there's a math formula and all of this, but --
 7 but, ultimately, it is guessing.
 8 You don't have the primary data. That's
 9 what I'm trying to say. You actually do not have
 10 the data. So you try to figure out how to fill in
 11 the blanks, so whatever method you do, it does not
 12 take away from the fact that you didn't have the
 13 data. Do you have the data on these 37 percent?
 14 No.
 15 Q. Do you agree with Dr. Neugut? You read his
 16 deposition. Do you agree with Dr. Neugut that
 17 imputation is a standard and valuable method for
 18 dealing with unreported data in epidemiology
 19 studies?
 20 A. I agree with that definition because that's
 21 what they try to do in epidemiology study, but just
 22 recall, we are talking 37 percent that is missing
 23 here.
 24 Q. Do you agree with Dr. Neugut that that
 25 level of unreported data is comparable to very

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1 reliable studies that have been done and relied on
 2 by clinicians in the field?
 3 A. I can't comment on that, because I have not
 4 reviewed all of that.
 5 Q. Have you started seeing patients since our
 6 last deposition, sir?
 7 A. I'm not seeing patients now because of my
 8 travel schedule, but I have a couple of things that
 9 I'm exploring.
 10 Q. How long has it been since you've seen
 11 patients?
 12 A. Sixteen months.
 13 Q. In Exhibit 2, sir, the NCI 2018 report --
 14 A. Okay.
 15 Q. -- on Page 2, I'm in the second column --
 16 A. Okay.
 17 Q. -- and I'm about three quarters of the way
 18 down the top paragraph.
 19 A. Under "Statistical Analysis"?
 20 Q. No, above that one.
 21 A. Okay.
 22 Q. "For participants who did not complete the
 23 follow-up questionnaire, 37 percent," do you see
 24 that?
 25 A. Yeah, I see that.

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1 Q. Okay. "For participants who did not
 2 complete the follow-up questionnaire, 37 percent, a
 3 data-driven multiple imputation procedure was used
 4 to impute pesticide use since enrollment."
 5 Did I read that correctly?
 6 A. You read it correctly.
 7 Q. Do you know what "multiple imputation" is?
 8 A. I presume it's several formulas that, you
 9 know, you use the second formula based on the output
 10 of the first formula, and so forth.
 11 Q. I presume you've never done imputation
 12 yourself or reviewed or assessed imputation
 13 yourself; is that right?
 14 A. That's right, I have not.
 15 Q. Under "Statistical Analysis," I'm about
 16 nine or ten lines down, "We use Poisson regression."
 17 Do you see that sentence?
 18 A. I see that, yes.
 19 Q. "We use Poisson regression to calculate
 20 incidence rate ratios and 95 percent confidence
 21 intervals and Proc Mianalyze," that's a computer
 22 program, "to obtain the appropriate variants for the
 23 imputed data."
 24 And then there's a Statistics Institute
 25 citation for Proc Mianalyze.

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1 Are you able to explain that description of
 2 the imputation procedure, sir?
 3 A. I'm unable to explain that -- that
 4 particular procedure, no.
 5 Q. I assume you don't have a criticism of that
 6 particular procedure because you don't understand
 7 it; is that fair?
 8 A. So my criticism -- let me rephrase -- which
 9 was very, very clear. My criticisms are the dropout
 10 and the loss of follow-up. That's -- that's what I
 11 was critiquing.
 12 In any study, when you don't have data on
 13 37 percent primary data, on 37 percent of study
 14 participants, that's the biggest critique. And what
 15 I said, whatever process you do to remedy this,
 16 whether imputation or something else, I have a
 17 problem with as a clinician. I may not know exactly
 18 what the procedure is or the process you're doing,
 19 but you've lost me when you say 37 to 40 percent of
 20 folks you lost the primary data on.
 21 So, yes, I applaud you for trying to remedy
 22 this, and there's probably a lot of methodology to
 23 do so. It does not take away from the fact that
 24 this becomes a very weak evidence when you don't
 25 have that primary data. I don't need to know what

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1 the process is. All what I need to know is you lost
 2 data on 37 to 40 percent of folks.
 3 Q. Okay. So just once you hear that the data
 4 has been lost on 37 to 40 percent, that's enough for
 5 you?
 6 A. That's more than enough, yes.
 7 Q. And is that enough for you to discount a
 8 study entirely and not give it any weight, sir?
 9 A. As I said, the study is published. It's
 10 been published before, several other manuscripts
 11 from the AHS have been published, as you said in the
 12 beginning. So it doesn't mean -- again, it
 13 becomes -- it's a weakness of the study, it's a flaw
 14 of a study.
 15 Sadly, every study has strengths and
 16 weaknesses, and so we can't -- we can't dismiss the
 17 fact that this is a major weakness of this study. I
 18 don't dismiss it, because I don't dismiss anything
 19 in the body of literature, but I may -- it will make
 20 me question and have issues with the conclusions of
 21 this particular study.
 22 Q. It causes -- let's put it this way, sir, I
 23 understand you said that you would approve it for
 24 publication --
 25 A. Uh-hum.

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1 Q. -- and that the conclusions of the authors
 2 were supported by the evidence that they provided,
 3 and so on, you approve -- you approve of its
 4 existence. But I'm asking you something else. I'm
 5 asking you about your own personal analysis that you
 6 made as to whether the evidence supports the
 7 conclusion that glyphosate-containing substances
 8 cause non-Hodgkin lymphoma.
 9 And as to that analysis, your own analysis
 10 of the weight of the evidence, you've given no
 11 weight to this study; is that right?
 12 A. I've given it weight that it exists, but it
 13 didn't change my opinion, because all what this did
 14 is it's reported an additional ten years of
 15 follow-up for an already flawed study.
 16 Q. It didn't change your opinion at all;
 17 right?
 18 A. Of course not.
 19 Q. Page 3 of 8, and I'm looking at the first
 20 full paragraph on this page, the full paragraph
 21 above "Results, and here they're discussing some of
 22 the procedures that they used to assess whether
 23 imputation changed or didn't change the outcome of
 24 their -- of the results that they reported; right?
 25 A. Yes.

1 Q. It says, "In addition, we conducted
2 sensitivity analyses to evaluate the impact of
3 including additional exposure information," i.e.,
4 imputation; right?

5 A. Yes.

6 Q. "First, we calculated risk estimates
7 including cancer incidence data for the complete
8 follow-up period with only exposure information
9 collected at enrollment." Right?

10 A. I see that, yes.

11 Q. So what that means, sir, is that they --
12 there were two questionnaires that were done in this
13 study, and the dropout that you are criticizing
14 happened between the first questionnaire and the
15 second questionnaire; right?

16 A. Yes, the first questionnaire was done at
17 enrollment.

18 Q. And 37 percent of people who answered the
19 first questionnaire did not answer the second;
20 correct?

21 A. Correct.

22 Q. So the first thing that they did to
23 check -- as a check on the imputation procedure was
24 to run all the numbers and the data just with the
25 people who completed both questionnaires; correct?

1 A. You -- "in primary analyses, we include
2 exposure" -- that's what you're talking about?

3 Q. Yeah, in that paragraph.

4 A. Yes, I see the paragraph.

5 Q. And in that paragraph they describe, again,
6 all three of the sensitivity checks that they used
7 to assess the imputation procedure; right?

8 A. I think they just repeat the same. I'm not
9 sure how -- I'm not sure how much in depth they
10 describe it. They talk about conducting several
11 sensitivity analyses, evaluating the impact of
12 including exposure data, et cetera. So they did
13 repeat what they said to conclude the results. I
14 see that.

15 Q. Well, they assessed the data for -- based
16 just on information collected from the first
17 questionnaire. They assessed the data for people
18 who answered -- just for people who answered both
19 questionnaires, and they truncated the follow-up
20 period to 2005. Three different checks on the data;
21 correct?

22 A. I see that, yes.

23 Q. And what they reported for all three is
24 that they still found no association between
25 glyphosate-containing substances and non-Hodgkin

1 A. I see that.

2 Q. The second thing that they did is, "We
3 examined associations excluding imputed exposure
4 data, thereby limiting analyses to participants who
5 completed both the enrollment and follow-up
6 questionnaires."

7 That's the one I just described; right?

8 A. I think that's the one you just mentioned,
9 they actually calculated the data based on the folks
10 who answered both.

11 Q. And, "Finally, because the last exposure
12 information was collected between 1999 and 2005, we
13 truncated follow-up at 2005 to coincide with this
14 exposure period." Correct?

15 A. Correct.

16 Q. So what they did in the last one is
17 shortened the follow-up period to match with the
18 questionnaire data that had been collected; correct?

19 A. Yes.

20 Q. If you turn to Page 4, sir. I'm in
21 Column 1.

22 A. Okay.

23 Q. In the long paragraph starting "in primary
24 analyses," they describe all three of these
25 procedures that they followed; right?

1 lymphoma; correct?

2 A. That's what they found.

3 Q. And all three of those sensitivity checks
4 involved more data and more exposed cases than exist
5 in the rest of the case control epidemiology,
6 correct, put together?

7 A. It's more than the DeRoos trial, the
8 update, yes. This is more of the update.

9 Q. I'm not talking about the DeRoos. I'm
10 talking about the case control studies like Eriksson
11 that you rely on for your conclusion that
12 glyphosate-containing substances cause non-Hodgkin
13 lymphoma?

14 A. I rely on more than just Eriksson. I rely
15 on other things. I rely on Eriksson and other
16 epidemiology data and the IARC and so forth. It's
17 not just Eriksson.

18 Q. If you put all the epidemiology data that
19 you rely on together, there are fewer exposed cases
20 than for any of these sensitivity checks alone;
21 correct?

22 A. I really have to do the math. Honestly, I
23 don't know. But if somebody has done the math and
24 this is what you came up with, there is no reason
25 for me to doubt the information. But I haven't done

1 that math. I haven't -- I haven't done and looked
 2 at all of the cases that were reported in all of the
 3 papers I looked and compared the number of cases
 4 here. It's not difficult to do, but I haven't done
 5 it.

6 Q. Now, in doing an imputation -- in applying
 7 an imputation formula, sir, an imputation formula
 8 would only bias results if the nonresponders, the
 9 people who didn't respond to the second
 10 questionnaire who did respond to the first, if their
 11 exposure to glyphosate was systematically different
 12 than the responders' exposure to glyphosate;
 13 correct?

14 A. I'm sorry. Can you repeat the question?

15 Q. Yes. When -- when there's a piece of
 16 missing data in an epidemiology study -- I will
 17 start out more generally. When there is a piece of
 18 missing data in an epidemiology study and that piece
 19 is filled in somehow, it's only going to bias the
 20 results in a particular direction if the filling in
 21 isn't random, doesn't contain random error.

22 Like, if you say, this person had one more
 23 exposure day than he really had, and this person had
 24 one less exposure day than he really had and you
 25 make little mistakes that cancel out, it doesn't

1 affect your final result. But if you tend to make
 2 mistakes all in the same direction, then it would
 3 tend to affect your final result; right?

4 A. Oh, I see -- I see what you're saying. I
 5 think if the -- I see what you're saying. I think
 6 if the -- if the remedy, whatever that remedy which
 7 I think we -- I already said I'm not a big fan of
 8 any type of remedy when you have that high of a
 9 dropout. But if the remedy is random, as you are
 10 mentioning, it hopefully should even out that you
 11 don't have one bias towards one direction or
 12 another.

13 Q. And in order to -- that's the difference
 14 between differential and nondifferential --

15 A. Yes.

16 Q. -- bias; right?

17 To have differential bias, the probability
 18 of someone responding to the second questionnaire
 19 would have to be associated with their glyphosate
 20 exposure and their health outcome; right?

21 A. Yes.

22 Q. And there's no reason to suppose that
 23 someone's likelihood of responding to the second
 24 questionnaire is related to their exposure to
 25 glyphosate and their health outcome; correct?

1 A. We don't -- we don't know. There's no
 2 reason. We don't know one way or the other. That's
 3 my point about the guessing part. I mean, we are
 4 already -- just the line of questioning back and
 5 forth, it just tells us we are trying to guess what
 6 happened.

7 Q. All three of the sensitivity analyses that
 8 were performed in the JNCI 2018 article could
 9 themselves be published as a set of data that is
 10 more powerful and robust and larger in volume than
 11 the entire body of case control studies that you
 12 rely on; correct?

13 A. I think you -- this is -- you asked me this
 14 question before. I said I haven't done the count.
 15 There's no reason for me to think it's not. If
 16 you've done the count and you're accurate, then it's
 17 probably right. I just have not counted this
 18 myself.

19 Q. So they looked at the data three different
 20 ways without imputation, and looking at that data
 21 all three of those ways without imputation yielded
 22 the same overall result, no association between
 23 glyphosate-containing substances and non-Hodgkin
 24 lymphoma; correct?

25 A. That's what they found, yes.

1 Q. So with regard to those sensitivity
 2 analyses and those conclusions that there was no
 3 association between glyphosate-containing substances
 4 and non-Hodgkin lymphoma, your imputation criticism
 5 doesn't apply; right?

6 A. How so? I'm confused how my -- again, let
 7 me just repeat. I never critiqued any of the
 8 processes that the epidemiologists or statisticians
 9 do, whether it's imputation or some other fancy
 10 terminology.

11 What I critiqued was specifically the high
 12 dropout rate in a study that is prospective, and I
 13 said, rigorous ways of assuring proper follow-up of
 14 these folks that were enrolled should have been
 15 applied if you want to reach the proper answer.
 16 There is no reason to wait years until you get
 17 questionnaires. It could be ways of having more
 18 rigorous follow-up.

19 I don't critique particular processes that
 20 I'm not fully familiar with or I don't apply as a
 21 clinician, but a dropout rate of that high is what I
 22 critiqued.

23 Q. Take a look, sir, at Page 4 of 8.

24 A. Yes.

25 Q. The first column.

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1 A. Yes.
 2 Q. And I am -- let's go to the second batch of
 3 numbers, just to orient yourself.
 4 A. Table 2?
 5 Q. No, sir. There are some numbers in that
 6 paragraph.
 7 A. Okay. Sure, no problem.
 8 Q. Confidence interval and so on. And above
 9 that they describe their first sensitivity analysis.
 10 They say, "We conducted several sensitivity
 11 analyses," and then the first one they describe is,
 12 "When restricted to exposure reported at
 13 enrollment," i.e., to just the data collected in the
 14 first questionnaire, "the rate ratio and the highest
 15 exposure quartile was 0.82."
 16 A. Sorry, I don't know where he's reading.
 17 Where are you reading? Oh, the second paragraph,
 18 okay. I thought it's the first paragraph, okay.
 19 Q. Yes, sir. I will start over. "We
 20 conducted several sensitivity analyses." That's
 21 what we've been talking about --
 22 A. Yes, yes.
 23 Q. -- for a little while now. And the first
 24 one they describe is, "When restricted to exposure
 25 reported at enrollment" -- in other words, the data

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1 reported in the first questionnaire; correct?
 2 A. Yes.
 3 Q. -- "the patterns of risk were the same as
 4 analyses that considered glyphosate use reported at
 5 enrollment and follow-up."
 6 So they found the same patterns without
 7 imputation restricting to the first questionnaire as
 8 with imputation; correct?
 9 A. Yes.
 10 Q. And then they gave the data for that, which
 11 is a confidence interval straddling one and a point
 12 estimate of below one for non-Hodgkin lymphoma;
 13 correct?
 14 A. Yes.
 15 Q. And that reported data does not involve
 16 imputation; right?
 17 A. I don't think it does, no.
 18 Q. So your criticism of imputation doesn't
 19 apply to that piece of data; right?
 20 A. For this particular one, there was no
 21 imputation of the data, that's correct.
 22 Q. And, similarly, their second sensitivity
 23 analysis, sir, where they limited the analysis to
 24 the 34,698 participants who completed both
 25 questionnaires, again found glyphosate use to be not

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1 associated with non-Hodgkin lymphoma, point estimate
 2 below 1.0; correct?
 3 A. The confidence interval of 0.63 to 1.27.
 4 That's where you're reading?
 5 Q. Yes.
 6 A. Yes, I see that.
 7 Q. So, again, they found the same overall
 8 result of no association between
 9 glyphosate-containing substances and non-Hodgkin
 10 lymphoma and, again, without imputation; right?
 11 A. I see that.
 12 Q. So your imputation criticism doesn't apply
 13 to that point estimate either; right?
 14 A. Not for this one, no.
 15 Q. And for the third, when they truncated the
 16 follow-up period to 2005 to be concurrent with the
 17 latest exposure information, again, removing the
 18 need to do imputation, they found a relative risk
 19 again spanning one with a point estimate of 1.04;
 20 correct?
 21 A. 1.04, yes, I see that.
 22 Q. And the confidence interval was -- it was
 23 not significant; correct, sir?
 24 A. Crosses the one, yes.
 25 Q. Yes.

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1 So, again, we have the same overall outcome
 2 of no association between glyphosate-containing
 3 substances and non-Hodgkin lymphoma in this third
 4 way of looking at the data without imputation;
 5 right?
 6 A. As I said, this study has shown no
 7 association mirroring the conclusions from the
 8 DeRoos study in '05. I am --
 9 Q. So both with and without imputation, the
 10 NCI 2018 study shows no association between
 11 glyphosate-containing substances and non-Hodgkin
 12 lymphoma; right?
 13 A. The NCI study shows no association,
 14 correct.
 15 Q. That's with and without imputation; right?
 16 A. With and without amputation -- imputation,
 17 sorry.
 18 Q. Your expert -- I'm going to go back to your
 19 expert report, sir, and the first of your
 20 criticisms. We just talked at some length about the
 21 third of your criticisms, imputation.
 22 But the first criticism that you had of the
 23 study was that the study at its core was restricted
 24 to two states, North Carolina and Iowa; right?
 25 A. Yes.

1 Q. Do you believe that whether
2 glyphosate-containing substances caused NHL,
3 non-Hodgkin lymphoma, varies by region?

4 A. We don't know the answer to that.

5 Q. You think that it might vary by region?

6 A. We don't know the answer to that. What I
7 said is that, you know, you have a study that is
8 done at two states out of so many other states. So
9 it's -- I recognize the -- probably the prevalence
10 of farmers and so forth, and that's why probably
11 North Carolina and Iowa were selected. But it begs
12 the question, does this really represent everything
13 else across the U.S., and I don't believe we have an
14 answer to that.

15 Q. The criticism that it only -- that it's
16 restricted to two states, North Carolina and Iowa,
17 is a valid criticism only if, whether Roundup causes
18 non-Hodgkin lymphoma varies by region; is that fair?

19 A. It's fair. And I said I don't -- we don't
20 know the answer to that.

21 Q. Okay.

22 A. But I think it's -- it's, obviously, when
23 you have something that is very restricted to two
24 locations, you'll have to ask the question given the
25 ubiquitous use of glyphosate across the U.S., so

1 that whether glyphosate causes non-Hodgkin's
2 lymphoma varies by region?

3 A. It's not necessarily the region. It's
4 really the practice patterns and how people utilize
5 the compound that may vary by region. I think you
6 are mixing things.

7 So I don't know how farmers in Iowa are
8 using glyphosate compared to farmers in South
9 Carolina or in Florida or in Arkansas. So I think
10 the region is not necessarily just the fact, you
11 have a lot of issues that may vary by region. It
12 could be the training. It could be how people use
13 PPEs, could be how folks understand the compound.
14 That you can -- you don't know. And we really can't
15 control for.

16 So practice patterns of farmers and folks
17 and people who apply pesticides in North Carolina
18 and Iowa may not apply to what people do at other
19 states. And, hence, I don't know, you know, how
20 would you really make a conclusion based on the
21 study that just looks only at two states.

22 Q. Might the data from the Eriksson study in
23 Scandinavia be valid only in Scandinavia?

24 A. I think you always have to look and ask
25 yourself whether certain things that are done

1 that's really why you have to ask that question.

2 Q. Okay. I just --

3 A. It's not --

4 (Unreportable cross-talk.)

5 A. Glyphosate is -- glyphosate is not used
6 only in North Carolina and Iowa. So if you are
7 doing really a prospective study and you are looking
8 prospectively as to whether substance A causes
9 disease X, unless you have a reason that substance A
10 is only used in this particular location, why are we
11 restricting only in -- only in those two areas.

12 So, again, as somebody who is trying to
13 look at the entire body of evidence, I'm seeing here
14 that there is a substance that's being used across
15 all 50 states, but the study is only restricted to
16 two. So I need an explanation why only these two
17 and not others.

18 Q. The -- have you heard anyone suggest that
19 whether glyphosate causes non-Hodgkin lymphoma
20 varies by region?

21 A. Have I heard anyone say that?

22 Q. Yes.

23 A. No, I personally have not heard anyone say
24 that.

25 Q. Do you know of any reason why it might be

1 outside the U.S. apply to the U.S., if something
2 done in the U.S. that is applied to Europe. So you
3 look at the entire body of literature. And you
4 don't -- you can't take one study and just be
5 blinded to everything else. So I -- again, it's a
6 matter of looking at the entire body of literature,
7 not being selective at what type of literature we
8 look at.

9 Q. Do you know of anything about the
10 population that was being studied in North Carolina
11 and Iowa that would differ from other exposures in a
12 way that would invalidate the results of this study
13 as a general -- as reaching general conclusions
14 about glyphosate and non-Hodgkin's lymphoma?

15 A. I don't know anything specific for the
16 farmers in North Carolina and Iowa. I explained to
17 you, hopefully, what my issue is. It's not
18 necessarily geography and so forth. It's what
19 others do there that may not apply to folks that do
20 at other states, because some of this may -- again,
21 related to training, to how you apply the pesticide,
22 to the PPEs, et cetera, but I don't know off
23 firsthand anything specific for the folks in those
24 two states that may be different or similar to other
25 states. I don't know.

1 Q. And you know that the AHS -- AHS refers to
2 a large group of studies that has been generated by
3 an ongoing research project? You understand that,
4 sir?

5 A. I do.

6 Q. And you know that there are multiple
7 publications from that group about the
8 characteristics of people in North Carolina and
9 people in Iowa and about how they controlled for
10 their exposures, their practices, their exposures to
11 other substances, their time spent on the farm,
12 their exposure to other animals, PPE, their exposure
13 to drift, et cetera, et cetera? Have you read those
14 papers, sir?

15 A. I have not seen all of these, no.

16 Q. Do you know whether the large body of
17 literature that's been generated about the AHS pool
18 of data suggests any flaws in relying on data from
19 two states, North Carolina and Iowa?

20 A. Not firsthand. I tried to explain, again,
21 you know, the issue that I have with this particular
22 comment. I think it's pretty clear --

23 Q. Okay.

24 A. -- what I said.

25 Q. So you're flagging it as a possible

1 that, please? What is the problem with the study
2 ending in 2001?

3 A. Well, if you look at the way the study is
4 designed, it's really designed based on
5 questionnaires with the first question -- with the
6 first questionnaire done when you actually enrolled
7 patients in ninety -- between '93 and '97, I
8 believe, and the first questionnaire looked at prior
9 exposure from decades before. These -- again,
10 something that you've been exposed to 20 years or 30
11 years ago and forth.

12 The subsequent questionnaire was done in
13 1999 to 2005, and if I read correctly, they actually
14 asked specifically at exposure the year before, not
15 necessarily for many times or 10 years or 15 years
16 prior to that.

17 So the -- the pattern, you know, how can
18 you control to how folks were exposed prospectively
19 to this substance? It's not really a constant. The
20 use of glyphosate has changed over the years. It
21 has increased significantly in the late '90s and
22 early 2000 and so forth. So there's really
23 incremental use of the compound over these years,
24 and this incremental use and changes in the way
25 people have been exposed to it is actually not

1 weakness in the study without knowing of anything
2 specific that bears out those concerns; is that
3 fair?

4 A. Of course, I don't have anything
5 specific --

6 MR. LITZENBURG: Object to form.

7 A. -- but this is something that you --
8 it's -- it's glaring at you as a peer reviewer, as
9 somebody who is looking at this, and it's hard to
10 dismiss without trying to ask these questions.

11 BY MR. GRIFFIS:

12 Q. You don't know if it's been addressed by,
13 for example, the statistical controls that were
14 applied to other factors and other exposures?

15 A. I have not seen --

16 MR. LITZENBURG: Object to form.

17 A. -- the particular remedy to these issues.

18 BY MR. GRIFFIS:

19 Q. Now, you said second, the second flaw that
20 you identified in the study is that you said the
21 study essentially ended in 2001, not accounting for
22 the more expanded and increased use of glyphosate
23 after that year; correct?

24 A. Yes.

25 Q. So would you -- would you elaborate on

1 factored in how the questionnaire is addressing
2 this.

3 So it's not constant. Everything is
4 actually changing, but you're really asking question
5 only for the year before -- and you are doing this
6 before the incremental -- the significant increase
7 in use of glyphosate.

8 Q. What's your understanding of when that
9 significant bulge in use occurred?

10 A. A lot has happened in the early 2000s in
11 terms of the increase in use.

12 Q. Okay. So your understanding --

13 A. So basically you're stopping -- you know,
14 you're stopping to look at what happened in terms of
15 exposure literally around almost the same time where
16 people are using -- are using it more.

17 Q. So 2000 -- the 2001 cutoff is right when
18 the bulge began; is that your view?

19 A. Well, there is no such a thing as right
20 where the bulge began. I think the early 2000s is
21 as accurate as you can get.

22 Q. Okay.

23 A. I mean, you can't say May 2000 versus
24 July 2001. Early 2000s where you -- late '90s and
25 early 2000s are where you really have seen

1 significant increase in the use of glyphosate across
 2 the country and in the world, and somehow you
 3 really -- your follow-up falls short of that in
 4 2001. And even the questionnaire is actually asking
 5 only exposure just one year before.

6 So if you had -- if you had a lot of
 7 exposure -- if you are asking somebody, you know, at
 8 a particular year, what was the exposure the year
 9 before, and they answer no, it doesn't account for
 10 the exposure from three years before. It's --
 11 it's -- the way the questions are being asked is --
 12 completely would miss the point of significant high
 13 exposure for some patients -- for some individuals,
 14 not patients.

15 Q. So I understand that there's not a
 16 particular month that you point to as suddenly a
 17 bulge occurs, but 2001, that was an important year.
 18 2002 was an important year, 2003? Is that what
 19 you're telling us?

20 A. I said the early 2000s.

21 Q. Okay. And what's your basis for that, sir?

22 A. It's my research. When you look -- I mean,
 23 again, a lot of this information, when you look to
 24 when the use of glyphosate and take a look on the
 25 worldwide web and try to understand when it's being

1 used, it's -- lots of this is public information.

2 Q. What resource did you rely on for this?

3 A. The worldwide web and what's going on in
 4 the literature and -- and the information that's
 5 been there in terms of when the use of
 6 glyphosate-containing compounds have increased.

7 Q. So you did a Google search and looked at
 8 one of the --

9 A. One of the searches --

10 Q. -- links?

11 A. One of the searches was Google searches,
 12 and there is also some literature that I looked at.
 13 And the previous deposition, but I wasn't sure -- I
 14 didn't bring it with me. I didn't think we were
 15 going to discuss that today.

16 Q. This is literature that you have provided
 17 to us, sir?

18 A. That is something that you have asked me
 19 about in the deposition that we had before.

20 Q. Is it literature that you have provided to
 21 us, sir?

22 A. I provide you with everything that I looked
 23 at, yes.

24 THE WITNESS: Can I take, like, a
 25 five-minute break in about ten minutes?

1 MR. GRIFFIS: Let's take it now.

2 THE WITNESS: I'm okay. I'm just trying to
 3 base my --

4 MR. GRIFFIS: Remind in ten minutes. We'll
 5 do it.

6 THE WITNESS: -- need for the bathroom.
 7 That's all.

8 BY MR. GRIFFIS:

9 Q. Take Exhibit 2, sir, the 2018 NCI study,
 10 and tell me where it says that the study essentially
 11 ended in 2001.

12 A. It's not the -- it's not ended. It's
 13 the -- the follow-up continues.

14 Q. Okay. I'm -- when I said "essentially
 15 ended," I'm just quoting you from your --

16 A. Yeah.

17 Q. -- supplemental expert report.

18 A. No, I think the follow-up -- the follow-up
 19 continues. And, again, I believe there would be
 20 additional follow-ups and future publications from
 21 the AHS study. This is not going to be the last
 22 one.

23 Q. Okay.

24 A. The follow -- I mean, you know --

25 Q. Show me -- show me what you see in this

1 study that made you say, "Second, the study
 2 essentially ended in 2001," in your supplemental
 3 expert report.

4 A. Yeah, I'll have to go in the -- I think on
 5 the NIH website and look at the AHS.

6 Can I take a look at that? Can I look at
 7 the -- that's where I found it.

8 Q. You may. I don't know how exactly.

9 A. That's fine. That's fine. I'll look at
 10 it.

11 Q. You didn't get that from this -- I mean,
 12 you told me what you looked at to get ready to
 13 generate your expert report.

14 A. I understand.

15 Q. And it didn't include that website. It was
 16 this paper. So I presumed you got it from this
 17 paper.

18 A. I'll get back to this. I'll look at it at
 19 the break, if that's okay. It's -- I don't want to
 20 read the entire paper right now and take about 10 or
 21 15 minutes.

22 Q. Is it -- is it the statement in the
 23 background, follow-up through 2001 in the abstract?

24 A. Follow-up through 2001. No, I think this
 25 was probably the older follow-up. This one is 2005.

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1 I'll have to make sure that this was -- was it a
 2 typo I said 2005 or 2001? Is it okay if I table
 3 this and just get back to you after the break?
 4 Q. Okay.
 5 A. I want to make sure I answer it for you.
 6 MR. GRIFFIS: Okay. Why don't we take a
 7 break then.
 8 THE WITNESS: Okay.
 9 VIDEOGRAPHER: Ending disc number one of
 10 the deposition of Dr. Chadi Nabhan. We are off
 11 the record at 10:17 A.M.
 12 (Recess taken from 10:17 A.M. to
 13 10:26 A.M.)
 14 VIDEOGRAPHER: And beginning disc number
 15 two of the deposition of Dr. Chadi Nabhan. We
 16 are back on the record at 10:26 A.M.
 17 BY MR. GRIFFIS:
 18 Q. Okay. Sir, you were going to look
 19 something up for me, the basis for your opinion
 20 that -- let me quote it correctly -- the basis for
 21 your opinion that the study, the NCI 2018 study
 22 essential ended in 2001.
 23 A. So, again, I didn't -- when I say "ended,"
 24 as I clarified earlier, the study is continuing, and
 25 as I said, you will have additional publications

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1 coming out, and the JNCI paper will not, in my
 2 opinion, be the last paper that comes from the AHS,
 3 because it is ongoing.
 4 I think what I meant by "ended" is that
 5 the -- when you look at the original paper, the
 6 DeRoos paper, when it's -- when it was originally
 7 published, they looked at -- I think the follow-up
 8 at that time was until 2001.
 9 The follow-up of this study is until 2005
 10 and the original questionnaire between 1993 to 1997
 11 was probably the only questionnaire that was filled
 12 by most -- by most participants.
 13 The 2001 here would more accurately
 14 reflected as 2005, because that's really the
 15 follow-up of this particular study, as opposed to
 16 2001.
 17 Q. And 2001 is incorrect, it reflects the --
 18 A. The DeRoos paper.
 19 Q. -- the follow-up date from the DeRoos 2005
 20 paper and not the NCI 2018 paper?
 21 A. That's correct.
 22 Q. The NCI 2018 paper, second questionnaire,
 23 went through 2005; right?
 24 A. Yes.
 25 Q. So they were collecting data well into the

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1 glyphosate bulge in the early 2000s that you were
 2 describing; right?
 3 A. They have collected data during some of
 4 this bulge, yes.
 5 Q. And do you know what impact it would have
 6 on the data to misallocate people's exposures based
 7 on increased glyphosate use later when you don't
 8 know whether someone is going to end up in the group
 9 of people who develop non-Hodgkin's lymphoma or not?
 10 A. I'm not sure I understand the question. If
 11 you don't mind just --
 12 Q. Yes, sir. It's an epidemio- --
 13 A. -- simplifying it or --
 14 Q. It's an epidemiology question.
 15 A. Okay. Go ahead.
 16 Q. You have a questionnaire that runs through
 17 2005, collecting data on exposures through 2005, and
 18 you're suggesting the possibility that people's
 19 exposures could shift after that date because of
 20 changes in glyphosate use.
 21 A. I mean, it always could shift throughout,
 22 right, yes.
 23 Q. But if it shifts in a way that's the same
 24 for the group of people who end up developing
 25 non-Hodgkin's lymphoma, as it does for the group of

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1 people who don't end of developing non-Hodgkin's
 2 lymphoma, then it would not alter the
 3 epidemiological results; correct?
 4 A. If the shift is similar, it probably would
 5 have less likelihood to alter the epidemiology
 6 results.
 7 Q. Do you know of any reason that the
 8 likelihood of someone using glyphosate in the future
 9 but not during the time of questionnaire two would
 10 be associated with whether or not they develop
 11 non-Hodgkin's lymphoma later?
 12 A. Well, it's a matter -- it's -- the
 13 fundamental issue here is how you are going to
 14 answer the questionnaire between 1999 and 2005.
 15 That's really the fundamental question.
 16 And I think, given the fact that you can't
 17 control how people are answering the questions,
 18 there's a lot of recall bias in answering these
 19 questions, and you're really answering the questions
 20 only for just the immediate past before answering.
 21 You're not answering for several years prior to
 22 that.
 23 So it's just how you answer the questions.
 24 It's very possible that some folks might answer
 25 differently based on what they are doing, if they

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1 have been -- if somebody is using a lot of other
 2 pesticides, not necessarily glyphosate, they may
 3 assume that they are using also glyphosate versus
 4 somebody who is not using anything.
 5 So I think that's really the issue. It's
 6 not about -- the follow-up is one possibility, but
 7 also the way folks answer the questions is
 8 inherently depending on some other biases that are
 9 present in them. So it's answering the questions
 10 that's really fundamentally issue -- fundamental
 11 issue here.
 12 Q. It sounds like you have identified a new
 13 potential flaw in this NCI 2018 study that isn't in
 14 your expert report, that people might fill out the
 15 questionnaires inconsistently?
 16 A. It's the recall bias, which is something we
 17 discussed about with the DeRoos study. It's -- it's
 18 inherent in -- in most of these trial -- most of
 19 these type of studies. It's difficult to -- to
 20 remedy, except, frankly, the only way to remedy
 21 something like this is by having more frequent
 22 questionnaires and just trying to either just
 23 have -- it requires a lot of resources to ask people
 24 to fill a lot of these questionnaires more
 25 consistently. But that's -- that's something that

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1 was present in DeRoos, still present here, because
 2 it's the same study. We talked about it before.
 3 Q. Can you explain what "recall bias" means to
 4 an epidemiologist?
 5 A. You mean to a layman person?
 6 Q. Tell me your definition of "recall bias."
 7 A. Well, you know, if you are being asked
 8 to -- to answer a question that -- about something
 9 that happened in the past, you may not have the most
 10 robust memory to remember all of the details of what
 11 happened a year before or even ten years before to
 12 provide the proper answers.
 13 If I asked you what you had for dinner ten
 14 days ago, you may not be able to answer that
 15 accurately, but your answer might be dependent on
 16 what you had dinner yesterday, and you may assume
 17 that this is very similar.
 18 So recall bias is basically not having the
 19 precise answer. You're dependent on your memory to
 20 answer a question, and you may be correct some of
 21 the times, and you may be wrong other times.
 22 Q. Okay. I'm going to suggest to you, sir,
 23 that that's wrong. Tell me if this rings a bell.
 24 A. Go ahead.
 25 Q. Recall bias is a differential bias in a

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1 study caused by the fact that people who are
 2 recalling -- one group of people who are recalling
 3 are in a different situation than another group of
 4 people who are recalling, the classic example of
 5 which is that when you are in a case-control study,
 6 people who have an illness that they believe may be
 7 associated with an exposure are much more likely to
 8 recall those exposures --
 9 A. That's correct.
 10 Q. -- than people who are just going about
 11 their lives without suffering from any particular
 12 malady.
 13 A. That is one way of recall bias, absolutely.
 14 So if you have a disease -- you know, if you have a
 15 disease in 2010 and you're being asked to remember
 16 if you got exposed to something, you are more likely
 17 to remember that versus somebody who did not have
 18 the disease. That is one way.
 19 And another way, in my opinion, is also
 20 trying to recall everything that actually has --
 21 have happened in the past that you may not remember.
 22 Q. The type of recall bias that I described is
 23 inherent to the same case-control studies that you
 24 rely on --
 25 A. Yes.

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1 Q. -- for your conclusions; right?
 2 A. I understand that.
 3 Q. In those case-control studies, like
 4 Eriksson, et cetera --
 5 A. Uh-hum.
 6 Q. -- in those case-control studies, people
 7 were asked about their exposures after they already
 8 had non-Hodgkin's lymphoma, and they would have been
 9 incentivized to remember better than the healthy
 10 people, the healthy controls who were asked to
 11 recall their exposure?
 12 A. In any case -- I think in any case-control
 13 studies, you will always have that possibility. I
 14 think we know that people who have a disease are
 15 more likely to remember something that has happened
 16 to them versus healthy volunteers. I think that's
 17 an inherent limitation to case-control studies.
 18 Q. Yes, sir.
 19 And cohort studies, like the NCI 2018 and
 20 the DeRoos 2005, don't have that particular problem
 21 because people are asked about their exposures
 22 before they develop any illness; correct?
 23 A. In the beginning, yes, but, again, in
 24 subsequent -- in this cohort study, you have
 25 subsequent questionnaires to see what happens in

1 that duration. And you're not accounting for that
2 gap between questionnaire A and questionnaire B as
3 to what happened in terms of pattern of exposure to
4 these individuals.

5 So, yes, in a cohort study that you are
6 looking at prospectively, you ask the individuals
7 who are participating a priori, you ask them before
8 it, what happened, and then you follow them
9 prospectively. But in order for you to get proper
10 conclusion, all of other factors for these
11 individuals have to be stable and constant. So
12 nothing really is changing to get these meaningful
13 conclusions.

14 And that's a big problem for epidemiology
15 study where you have a lot of exposures and external
16 factors because you can't really account for these
17 additional factors that folks are exposed to. And
18 in this situation you can't really tell somebody
19 that, now we ask you this question, no more exposure
20 to glyphosate whatsoever until we talk to you in ten
21 years from now. You can't control to that,
22 especially in pesticide applicators and farmers.

23 That's the big limitation when you are
24 talking to this cohort study, because you are unable
25 to tell these cohort of individuals that you are

1 studying that, from now on, after you've answered
2 this question, no incremental exposure is allowed,
3 and I'm going to follow you and see whether your
4 prior exposure has led to disease or not.

5 And that's not what happened in the AHS.
6 I'm not sure how you can do it, frankly. It's not
7 really an issue that you can do practically. It
8 requires a lot of money and resources. So it's
9 really very difficult.

10 But if you want to talk science, that's the
11 only way in a cohort study that you do it. At some
12 point in time, so in 1997 after you ask the first
13 questionnaire, these individuals that answered the
14 1993 to 1997 questionnaire, that's it, no more
15 exposure to anything after 1997. And now in 2018,
16 20 years later, you go and see, based on your prior
17 exposure, prior to 1997, what happened to you.

18 But we all know in this room between 1997
19 and 2005 a lot of things changed for these
20 individuals, and that's the problem.

21 Q. I want to get back to recall bias, because
22 that wasn't about recall bias.

23 A. But that answer --

24 Q. The other thing with recall bias --

25 A. -- I was answering your comment about the

1 AHS that doesn't have that limitation. So I was
2 describing to you the issue with the AHS that is
3 different -- it's not a case control, but it has a
4 different limitation as a cohort study.

5 Q. That's a totally different issue than
6 recall bias; right?

7 MR. LITZENBURG: Object to form.

8 A. Okay. Well, we can talk about recall bias
9 if you want.

10 BY MR. GRIFFIS:

11 Q. Let's finish talking about recall bias.
12 The other thing that you called "recall bias" --

13 A. You are the one who moved to the other one.

14 Q. The other thing that you called "recall
15 bias," sir, was people not remembering correctly
16 when they are given a questionnaire; right?

17 A. Well, I think that's important when I talk
18 to a layman -- when I talk to a patient and I talk
19 to -- and I asked you, actually, whether we are
20 describing to this a layman term. When I talk to a
21 patient and I see a patient and I say, you know,
22 have you been exposed to X, Y, and Z, from a patient
23 perspective, they need to tell me based on their
24 memory and their recollection.

25 When they fill a questionnaire, when they

1 come to the clinic and they are trying to fill a
2 questionnaire about their past history or past
3 occupational hazard or past exposure, they rely on
4 their memory. From a patient perspective, that's
5 actually a recall. And if they don't really
6 remember appropriately, then it might be an issue.

7 Q. Just not remembering well is an issue for
8 questionnaires asked in case-control and cohort
9 studies; right?

10 A. Absolutely.

11 Q. Have you read the literature in which the
12 AHS questionnaires were validated against objective
13 data to test how accurate the recall of those
14 pesticide applicators was about the pesticides that
15 they applied?

16 A. I have not seen that literature. I would
17 probably look it up.

18 Q. Now, on the new issue that I believe you
19 were identifying a moment ago that people's
20 exposures will not be -- remain fixed in between
21 questionnaires and so could vary from what they
22 reported at the time of the questionnaires, do you
23 understand that the authors of the NCI 2018 paper
24 took steps to adjust for and correct for that, sir?

25 A. I think we -- together we read a lot of the

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1 statistical and sensitivity analysis that they did
 2 and so forth, and I think you have to try to adjust
 3 for it. It just doesn't take away from the
 4 limitation of it. I mean, and, again, this is not
 5 just an AHS specific limitation. This is really any
 6 prospective cohort limitation.
 7 Q. And like some of the other biases that
 8 we've been discussing today, it would only affect
 9 the results if people's exposures after filling out
 10 the questionnaire were correlated with the
 11 particular -- a particular health outcome and not a
 12 different particular health outcome?
 13 A. Yes, of course. I mean, if it changed in a
 14 way that affects the health outcome and so forth,
 15 but -- but, again, as I said, this is not a
 16 limitation just for the AHS study. This is a
 17 limitation for a lot of these epidemiologic
 18 prospective cohort studies because you follow these
 19 individuals prospectively asking one question, but
 20 you are unable to stop that additional exposure from
 21 happening moving forward. It's impossible, given
 22 the fact that these are farmers and pesticide
 23 applicators. That's what they do.
 24 Q. Do you know -- never mind that question.
 25 Do you know the difference between

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1 differential bias and nondifferential bias, sir?
 2 A. I think you just described it to me. The
 3 nondifferential, again, is if you -- if it's not
 4 going to affect the health outcome and the bias is
 5 almost equally distributed, then that's
 6 nondifferential bias.
 7 Q. And people who are doing cohort studies
 8 have ways to assess whether they have differential
 9 biases and control for those; correct?
 10 A. I think there are lots of statistical
 11 methods in an attempt to control for some of these
 12 things, yes.
 13 Q. And do you know which ones were used in the
 14 NCI 2018 study?
 15 A. They --
 16 Q. How effective they were?
 17 A. They did the sensitivity analysis that we
 18 talked about. They also looked at some of the
 19 patients that answered only both questionnaires in
 20 an attempt to get the information only from the
 21 folks who answered the questions.
 22 Q. The fourth weakness that you -- the flaw
 23 you identified in the NCI 2018 study is that it
 24 relied on self-reporting; correct?
 25 A. Yes.

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1 Q. Now, I take it that at least part of the
 2 reason that you think that's a problem is because
 3 of, people might not recall correctly?
 4 A. Yes. That's what we talked about.
 5 Q. Is that right?
 6 Okay. Is there anything else about it
 7 other than that people might not recall correctly?
 8 A. No.
 9 Q. And all of the epidemiology studies that
 10 you rely on for your opinion that
 11 glyphosate-containing substances can cause
 12 non-Hodgkin's lymphoma, involved self-reporting;
 13 right?
 14 A. Yes.
 15 Q. So to the extent that that's a flaw in the
 16 NCI 2018 study, it's also a flaw in those studies;
 17 right?
 18 A. I think it's a flaw for most of the
 19 epidemiology studies. It's very difficult to have
 20 an epidemiologic study without problems with
 21 self-reporting. That's the field of epidemiology.
 22 MR. GRIFFIS: Exhibit 4.
 23 (Exhibit 29-4 marked for identification.)
 24 BY MR. GRIFFIS:
 25 Q. Sir, I've marked as Exhibit 4 the IARC

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1 Working Group 122 -- 112, rather, Monograph on
 2 Malathion.
 3 MR. LITZENBURG: He's not answering any
 4 questions about that.
 5 A. Why are we talking about malathion?
 6 BY MR. GRIFFIS:
 7 Q. Sir, you understand that the IARC Working
 8 Group 112, when it did its analysis of glyphosate
 9 that you relied on in part for your conclusions,
 10 also did analyses of some other pesticides,
 11 including malathion?
 12 A. I understand that they looked at other
 13 compounds as well as glyphosate, yes.
 14 Q. And did you understand that they put some
 15 of their global analyses into the malathion
 16 monograph and said so in their overview publications
 17 rather than repeating them over and over again in
 18 each monograph?
 19 MR. LITZENBURG: You don't have to answer
 20 any questions about this, especially if you
 21 haven't read it.
 22 A. I really don't remember.
 23 BY MR. GRIFFIS:
 24 Q. Turn to Page 9, sir.
 25 A. This is a 124-page document I haven't read

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1 before.
 2 Q. Yes, sir.
 3 Turn to Page 9 where they discuss the
 4 Agricultural Health Study.
 5 A. Sure.
 6 Q. Do you see that they said, "Great efforts
 7 were made in the Agricultural Health Study to assess
 8 exposure among agricultural pesticide applicators
 9 and their spouses. These questionnaires and
 10 algorithms have been extensively described and have
 11 undergone several tests for reliability and accuracy
 12 that have provided considerable insight into the
 13 quality of this exposure assessment"?
 14 A. I read that.
 15 Q. Do you disagree with IARC's assessment
 16 there, sir?
 17 MR. LITZENBURG: Object to form.
 18 THE WITNESS: Sorry.
 19 MR. LITZENBURG: I was just objecting again
 20 to a document that had nothing to do with the
 21 topic at hand.
 22 A. I don't necessarily disagree, but I have
 23 not seen what type of these tests that were -- that
 24 were applied, and that particular paragraph is not
 25 referenced. There is no reference. But I'm

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1 assuming they are going to expand on this in
 2 subsequent paragraphs.
 3 BY MR. GRIFFIS:
 4 Q. Yes --
 5 A. So I have no reason to doubt this
 6 statement.
 7 Q. Okay. Well, you do know, because we
 8 discussed it, that there are -- there were internal
 9 checks, the sensitivity analyses that were described
 10 within the NCI 2018 paper; correct?
 11 A. Yes.
 12 Q. And you also know that there are a large
 13 body, or a body anyway, of separate articles testing
 14 various aspects of the AHS model, their algorithms,
 15 their exposure assessments, et cetera, and that's a
 16 body of literature that you have seen referenced
 17 from time to time but haven't yourself read; is that
 18 right?
 19 A. I have not read, yes, correct.
 20 Q. Okay.
 21 A. But I have seen it referenced.
 22 Q. On Page 11, sir, do you see at the bottom
 23 of the first column, this is a section entitled
 24 "Other Epidemiologic Studies," B, "Other
 25 Epidemiological Studies." A was "The AHS

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1 Epidemiological Body of Data."
 2 A. Okay. I see that.
 3 Q. "All of the studies" -- I'm in the second
 4 paragraph, "All of the studies addressed historical
 5 exposure to pesticides. Therefore, the use of
 6 biomarkers or monitoring data was not feasible at
 7 the individual subject level. Almost all of the
 8 studies relied on self-reported data which, as
 9 discussed above, is reasonably reliable and valid
 10 when applicators were reporting their own use, but
 11 may not be suitable for spouses or other farm
 12 workers, particularly those exposed by reentry."
 13 Do you see that, sir?
 14 A. I see that.
 15 Q. And you agree with me that pretty much all
 16 of the epidemiology studies that we have discussed
 17 together at any time concerning glyphosate and
 18 non-Hodgkin's lymphoma rely on self-reported data;
 19 right?
 20 A. Yes, it does.
 21 Q. Do you agree with the IARC that such data
 22 is reasonably reliable and valid when applicators
 23 were reporting their own use but might not be
 24 suitable for others, as described here?
 25 A. I mean, for the most part, yeah. I mean,

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1 to the extent possible, you probably would remember
 2 more than the spouses would remember, but I think
 3 there were still some limitations that we talked
 4 about.
 5 Q. Okay. In the case of the NCI 2018 data,
 6 that would be applicators reporting their own use;
 7 right?
 8 A. That's correct.
 9 Q. The next -- the top of the next column, it
 10 says, "Apart from the AHS," that's the dataset from
 11 which NCI 2018 is drawn, "Apart from the AHS, few of
 12 the studies included expert review of the data or
 13 performed validity or reliability studies." Right?
 14 A. I read that.
 15 Q. Do you know if any of the epidemiology
 16 studies that you rely on that included expert review
 17 of the data were validity or reliability studies?
 18 A. I think the IARC, the IARC has done an
 19 extensive work and they had working groups and they
 20 looked at the body of literature and genotoxicity
 21 and everything to come up with the conclusion.
 22 Q. Okay. What they are talking about -- what
 23 the IARC is talking about here is not themselves,
 24 because this was something that hadn't been
 25 published yet, but the epidemiology studies; right?

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1 That's what the header says there.
 2 MR. LITZENBURG: You are not suggesting
 3 this is about glyphosate; right? We are still
 4 looking at the malathion document.
 5 MR. GRIFFIS: Sir, this is about
 6 everything.
 7 MR. LITZENBURG: You are suggesting this is
 8 about glyphosate?
 9 MR. GRIFFIS: Yes. The malathion was where
 10 they collected general conclusions and general
 11 analyses information.
 12 MR. LITZENBURG: So your suggestion when it
 13 says "other epidemiological studies," that's
 14 referring to glyphosate? In this Exhibit 4?
 15 MR. GRIFFIS: I've given you my answer.
 16 I'm not going to discuss it further with you.
 17 MR. LITZENBURG: Okay. Again, object, and
 18 you don't have to answer any questions about
 19 malathion or IARC's assessment of it.
 20 BY MR. GRIFFIS:
 21 Q. I won't ask you a single question about
 22 malathion, apart from the AHS. So do you know if
 23 any of the epidemiology studies that you relied on,
 24 sir, any of the epidemiology studies that included
 25 expert review of the data or included validity or

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1 reliability studies in support of themselves?
 2 A. I am not aware of -- of the expert's review
 3 or reliability studies, but have not looked
 4 specifically at that. And, again, this document
 5 that you provided looks like it's discussing
 6 specifically malathion, to my -- at least that's
 7 what it says, unless I'm confused. The entire
 8 document is malathion.
 9 MR. LITZENBURG: Do you have any more
 10 questions about Andreotti? Otherwise, I would
 11 say we ought to just shut it down.
 12 MR. GRIFFIS: These are questions about
 13 Andreotti.
 14 BY MR. GRIFFIS:
 15 Q. On Page 21, sir -- this is the last page
 16 I'm going to direct you to in this document -- in
 17 the left-hand column, the first column, in the
 18 middle, I'm at a sentence starting "methodological
 19 studies were completed."
 20 Do you see that?
 21 A. One second.
 22 Q. Sure.
 23 A. In the left column, you said?
 24 Q. Left column, that -- in the first paragraph
 25 there, in the first -- well, not the -- not the

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1 paragraph stub, but the first full paragraph there,
 2 about right in the middle of it, there's a sentence
 3 that says "methodological studies."
 4 A. Yep, I see it.
 5 Q. Okay. "Methodological studies were
 6 completed to assess the reliability and validity of
 7 the pesticide information provided by the
 8 applicators." Again, we are talking about the AHS
 9 data, and they cite a couple of them there. Do you
 10 see that, sir?
 11 A. I see that.
 12 Q. So these are some of the outside studies,
 13 not contained internally to NCI 2018, but some of
 14 the outside studies that supported the data
 15 analyses; right?
 16 A. I -- you know, I have to read the entire
 17 124 -- I can't -- you can't just give me one small,
 18 little three lines in one page in a document I
 19 haven't read and expect me to comment. I have no
 20 comment on that.
 21 Q. The imputation method for the AHS is
 22 discussed at the bottom of Page 21; right?
 23 A. I see the word "imputation method," yes.
 24 Q. And at the very end of this section, sir,
 25 it says, "The working group considered the AHS to be

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1 a highly informative study." Right?
 2 A. Yes, it's highly informative.
 3 Q. And you agree with them?
 4 A. It is informative, yes.
 5 Q. Do you agree with them that it's highly
 6 informative?
 7 A. It is informative. I've answered that.
 8 Q. Okay. Do you disagree that it's highly
 9 informative?
 10 A. It is informative.
 11 Q. Is it not highly informative?
 12 A. Define "highly informative" to me.
 13 Q. You have --
 14 A. What's the difference between informative
 15 and highly informative?
 16 Q. Well, you wouldn't go along with "highly
 17 informative," sir, so what is the difference to you?
 18 A. Just -- to me, informative is the proper
 19 way of saying something informative. I don't like
 20 using superlatives.
 21 Q. Do you understand, sir, that IARC
 22 classifies the evidence that they rely on, including
 23 into the category of highly informative?
 24 A. I do.
 25 Q. Did you review the IARC -- the preamble to

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1 the IARC Monograph, sir?

2 A. You are talking the monograph that we

3 discussed last deposition?

4 Q. Yeah, and I'm not talking about the one

5 labeled "Glyphosate," but the preamble that applies

6 to every monograph that they do.

7 A. I have reviewed the one that we discussed

8 at the last deposition. I didn't review it for

9 today, but I reviewed it for the last deposition.

10 Q. Okay. Do you recall classification of --

11 A. It was classified --

12 Q. -- things into various -- no. Do you

13 recall classification of pieces of evidence into

14 categories --

15 A. Yes.

16 Q. -- as to informativeness?

17 A. Yes.

18 Q. And that highly informative is their top

19 category?

20 A. I -- I -- you asked me. I said I don't

21 usually -- I mean, we have a lot -- in the

22 literature, sometimes you have to divide the

23 evidence based on certain categories based on

24 highly, less, and so forth. You asked my opinion,

25 did I -- personally, Chadi Nabhan does not like to

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1 use superlatives. That's all.

2 Q. Right. So --

3 A. That's all I said.

4 Q. And I'm trying to help you not need to.

5 I'm just reminding you about this fact about IARC,

6 that they do use that superlative for their highest

7 level of evidence that they rely on.

8 A. I'm aware.

9 Q. So would you -- without using the word

10 "highly," would you put the NCI 2018 study into your

11 top category, your most influential category, as a

12 piece of evidence like IARC did?

13 A. So, personally, I would not, because it's a

14 follow-up study to a previously reported study. I

15 mean, I think I've said that probably about ten

16 times so far. This is a follow-up study with longer

17 follow-up on a previously reported study.

18 So it's hard for me to put this at the

19 highest evidence. It's not reporting any new

20 evidence. It's not a new study. It doesn't really

21 add anything except giving me additional years of

22 follow-up and additional cases. So I'm not really

23 sure why I would give it the highest category

24 possible.

25 Q. What about DeRoos 2005? Would you put that

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1 in the highest category?

2 A. I think that, frankly, would have more

3 weight in my mind just -- well, more weight, in

4 essence, that it was the first time it was reported

5 in a peer-reviewed literature. This one has the

6 more weight, it has more cases, and it's longer

7 follow-up. But the first time you report ever on a

8 particular study is really when people are more

9 interested in trying to understand what's the output

10 of that -- of that particular research.

11 Q. So DeRoos 2005 would be in your top

12 category because it's first?

13 A. Because it's the first time, but this one

14 has, again, longer follow-up as well as more cases,

15 so you can't really dismiss that. It's very

16 important.

17 Q. The last flaw that you identified in your

18 supplemental expert report is -- and we agreed that

19 it wasn't a flaw so much as a point that you were

20 making.

21 A. Yes.

22 Q. -- that there was an increased risk of

23 multiple myeloma with glyphosate exposure?

24 A. And acute leukemia that the authors talk

25 about.

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1 Q. Would you show me where the increased risk

2 of multiple myeloma in that statement is?

3 A. I think the authors talked about two

4 diseases. One is acute myeloid leukemia, and one is

5 multiple myeloma. I will try to research that for

6 you.

7 So I think under -- in Page 3/8 under the

8 results, they go over the various type of diseases

9 that they actually have, and they talk about -- let

10 me just read that for you. One second. Where is

11 the -- I think they add -- they add non-Hodgkin

12 lymphoma -- there was also no evidence for

13 association with NHL or any NHL subtypes, the rate

14 ratio in the top exposure quartile was 0.87 for NHL

15 and 0.87 for myeloma.

16 And then the association for NHL was not

17 meaningfully changed where multiple myeloma was

18 excluded, and then they talk about acute myeloid

19 leukemia. They do acknowledge it was not

20 statistically significant, but they observed an

21 increased risk of acute myeloid leukemia among

22 applicators in the highest quartile of

23 intensity-weighted glyphosate use compared to never

24 users.

25 Q. So there was not an increased risk of

<p style="text-align: right;">Page 106</p> <p>1 multiple myeloma with glyphosate --</p> <p>2 A. It's acute myeloid leukemia.</p> <p>3 Q. Okay. You were wrong about the multiple</p> <p>4 myeloma in the NCI 2018?</p> <p>5 A. I think I meant to said "acute myeloid</p> <p>6 leukemia." I'm sorry.</p> <p>7 Q. Okay. Do you claim that glyphosate causes</p> <p>8 acute myeloid leukemia?</p> <p>9 A. No, I don't think you can claim that. I</p> <p>10 think you could say -- you could say that there was</p> <p>11 a trend for increased acute myeloid leukemia,</p> <p>12 although that trend was not statistically</p> <p>13 significant. So it's -- I think additional studies</p> <p>14 might be needed just to better understand whether</p> <p>15 there is really increases for acute myeloid</p> <p>16 leukemia, but this -- the NCI study is not</p> <p>17 conclusive about the association between glyphosate</p> <p>18 and acute myeloid leukemia.</p> <p>19 Q. On Table 2, sir --</p> <p>20 A. Of -- of the study?</p> <p>21 Q. Of Exhibit 2, yes, the NCI 2018.</p> <p>22 A. Okay.</p> <p>23 Q. Table 2 is one of the tables giving the</p> <p>24 results in numerical form; correct?</p> <p>25 A. I see that, yeah.</p>	<p style="text-align: right;">Page 108</p> <p>1 A. Yes.</p> <p>2 Q. And for four quartiles it shows the point</p> <p>3 estimates and confidence intervals, for quartiles 1</p> <p>4 through 3, their point estimates are below 1, and</p> <p>5 it's exactly 1 for the fourth quartile, and all of</p> <p>6 it is not significant; right?</p> <p>7 A. That's correct.</p> <p>8 Q. And the similar pattern of spanning the</p> <p>9 confidence interval and showing no significant</p> <p>10 association with most of the point estimates being</p> <p>11 below 1.0 applies to Hodgkin lymphoma, non-Hodgkin</p> <p>12 lymphoma in general, B-cell non-Hodgkin lymphoma,</p> <p>13 chronic lymphocytic lymphoma, diffuse large B-cell</p> <p>14 lymphoma, marginal-zone lymphoma, follicular</p> <p>15 lymphoma, and multiple myeloma; right?</p> <p>16 A. Yes.</p> <p>17 Q. The non-Hodgkin lymphoma T-cell is also not</p> <p>18 significant with a P trend of .31, although there</p> <p>19 the point estimates are -- vary from the previous</p> <p>20 set, they are above 1; right?</p> <p>21 A. Say again the last.</p> <p>22 Q. Yes.</p> <p>23 The non-Hodgkin lymphoma T-cell --</p> <p>24 A. Uh-huh.</p> <p>25 Q. First of all, there is not very many cases</p>
<p style="text-align: right;">Page 107</p> <p>1 Q. For all cancers, there was no association,</p> <p>2 P values were just above and just below 1.0 for all</p> <p>3 quartiles, and the P trend was .91; correct?</p> <p>4 A. Yes, the risk ratio was -- yeah, I see</p> <p>5 that.</p> <p>6 Q. Okay. So it showed no association -- the</p> <p>7 NCI 2018 showed no association for all cancers</p> <p>8 grouped together; right?</p> <p>9 A. Yes.</p> <p>10 Q. And what is a P trend?</p> <p>11 A. It's just how the P is changing compared to</p> <p>12 the quartiles.</p> <p>13 Q. And it's a way of measuring multiple</p> <p>14 confidence intervals at once, to put it in simple</p> <p>15 terms; right?</p> <p>16 A. Sure, right.</p> <p>17 Q. And it needs to be .05 to be considered</p> <p>18 statistically significant; right?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. Let's skip over a bunch of solid</p> <p>21 tumors here and go to lymphohematopoietic cancer.</p> <p>22 It's on the next page.</p> <p>23 A. Okay.</p> <p>24 Q. So the lymphohematopoietic groups together</p> <p>25 the subgroups that appear below it; correct?</p>	<p style="text-align: right;">Page 109</p> <p>1 for non-Hodgkin lymphoma T-cell compared to some of</p> <p>2 these others; right?</p> <p>3 A. Right, there is nothing.</p> <p>4 Q. And the P trend is .31, showing no</p> <p>5 significant trend; correct?</p> <p>6 A. Correct.</p> <p>7 Q. And the confidence -- the point estimates</p> <p>8 here are 1 for no exposure for the first M, which is</p> <p>9 the first half of the data -- they had to use halves</p> <p>10 because there was so little data -- the point</p> <p>11 estimate is 4.25, the confidence interval spans 1,</p> <p>12 and the point estimate goes down for the higher</p> <p>13 exposed group to 1.53, and, again, the confidence</p> <p>14 interval spans 1. That's a nonsignificant finding;</p> <p>15 right?</p> <p>16 A. Correct.</p> <p>17 Q. And that one is not broken down further</p> <p>18 into further subtypes of T-cell lymphomas; right?</p> <p>19 A. There's not enough cases.</p> <p>20 Q. Yeah.</p> <p>21 Acute myeloid leukemia, as we discussed, is</p> <p>22 not a significant finding, but they suggested that</p> <p>23 it was a possible trend to be looked at in future</p> <p>24 studies, and you agreed with that; is that correct?</p> <p>25 A. I agree.</p>

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1 Q. You have claimed, sir, that -- since we're
 2 looking at this subtype breakdown here on Table 2,
 3 and you, of course, are claiming to be an expert on
 4 non-Hodgkin lymphoma, you've even been designated in
 5 a letter naming your area of expertise as
 6 non-Hodgkin lymphoma in this case. Do you claim to
 7 be an expert on any particular subtype of
 8 non-Hodgkin lymphoma?
 9 A. All of them.
 10 Q. And you know that there are people -- there
 11 are oncologists who treat non-Hodgkin lymphoma who
 12 specialize in particular subtypes; correct?
 13 A. Very rare. Very rare. Some folks just do
 14 T-cells, some folks do B-cells. But for the most
 15 part, if you are going to do non-Hodgkin lymphoma,
 16 you do non-Hodgkin and Hodgkin, otherwise you can't
 17 have a practice.
 18 Q. Okay. So your practice is non-Hodgkin plus
 19 Hodgkin?
 20 A. Lymphoma.
 21 Q. And all subtypes?
 22 A. Both of them are lymphomas.
 23 Q. And there are people who specialize in just
 24 marginal-zone lymphoma or something, but they
 25 would --

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1 A. Very, very, very rare.
 2 Q. You would find them at a major university
 3 or referral center?
 4 A. Extremely -- I mean, and they will have to
 5 have a lot of funding to be able to do that, because
 6 there's not enough cases to have a practice.
 7 MR. GRIFFIS: Okay. Give me two minutes to
 8 see if that's it. I'm either done or almost
 9 done.
 10 VIDEOGRAPHER: Going off the record at
 11 11:04 A.M.
 12 (Recess taken from 11:04 P.M. to
 13 11:05 P.M.)
 14 VIDEOGRAPHER: We are -- we are back on the
 15 record at 11:05 A.M.
 16 MR. GRIFFIS: All right. Thank you for
 17 your time, Dr. Nabhan. I pass the witness.
 18 EXAMINATION
 19 BY MR. LITZENBURG:
 20 Q. I just have a couple questions about this
 21 monograph about malathion.
 22 Have you ever seen this before today?
 23 A. No, I have not.
 24 Q. Okay. Nonetheless, would you turn to
 25 Page 107 of the packet.

Page 112

1 A. Page 7?
 2 Q. 107.
 3 A. Oh, 107.
 4 Q. Sorry.
 5 A. Okay.
 6 Q. And can you tell us what IARC's assessment
 7 overall of malathion was in Section 6.3?
 8 A. "Malathion is probably carcinogenic to
 9 humans (Group 2A)."
 10 Q. Okay. And that is the assessment that
 11 glyphosate received as well; is that correct?
 12 A. It is.
 13 Q. Okay. And then if you look a couple pages
 14 back, let's start on Page 103.
 15 A. Okay.
 16 Q. Now, this document was given to you today,
 17 and counsel for Monsanto showed you some -- showed
 18 you some positive comments about the AHS; would you
 19 say that's fair?
 20 A. Yes.
 21 Q. Okay. And then Page 103, it says that the
 22 AHS did not find an increase in the relative risk of
 23 non-Hodgkin lymphoma forever versus never use of
 24 malathion, the second-to-last paragraph.
 25 Do you see that?

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1 A. I see that.
 2 Q. Flipping it over to Page 104, the last
 3 sentence before Section 5.2.2, it says, no excess
 4 occurred in the Agricultural Health Study cohort; is
 5 that right?
 6 A. Yes.
 7 Q. And, nonetheless, IARC saw fit to call this
 8 pesticide a probable human carcinogen; right?
 9 A. Yes.
 10 MR. LITZENBURG: Okay. Nothing further,
 11 thanks.
 12 MR. GRIFFIS: Okay.
 13 FURTHER EXAMINATION
 14 BY MR. GRIFFIS:
 15 Q. Malathion, Page 7, sir.
 16 A. Okay.
 17 Q. Do you see that's headed Section 1.4.2,
 18 "Exposure Assessment"?
 19 A. Yes, I see that.
 20 Q. And it reads, "This section summarizes the
 21 exposure assessment and assignment for
 22 epidemiological studies of cancer and exposure to
 23 the pesticides considered in the present volume
 24 (diazinon, malathion, glyphosate, tetrachlorvinphos
 25 and parathion)"?

1 A. I see that.
2 MR. GRIFFIS: No further questions.
3 MR. LITZENBURG: Okay. None.
4 VIDEOGRAPHER: This concludes the
5 deposition of Dr. Chadi Nabhan. We are off the
6 record at 11:08 A.M.
7 (Time noted: 11:08 A.M.)
8
9

10 _____
11 DR. CHADI NABHAN

12 SUBSCRIBED TO AND SWORN BEFORE ME
13 THIS ____ DAY OF _____, 20__.

14 _____
15 (Notary Public) MY COMMISSION EXPIRES: _____
16
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25

1 ERRATA SHEET FOR THE TRANSCRIPT OF:
2 CASE NAME: In re: Roundup Products Liability
3 DEPOSITION DATE: January 15, 2018
4 WITNESS NAME: Dr. Chadi Nabhan

5 Reason codes:
6 1. To clarify the record.
7 2. To conform to the facts.
8 3. To correct transcription errors.
9 Page ____ Line ____ Reason ____
10 From _____ to _____
11 Page ____ Line ____ Reason ____
12 From _____ to _____
13 Page ____ Line ____ Reason ____
14 From _____ to _____
15 Page ____ Line ____ Reason ____
16 From _____ to _____
17 Page ____ Line ____ Reason ____
18 From _____ to _____
19 Page ____ Line ____ Reason ____
20 From _____ to _____

21 _____
22 DR. CHADI NABHAN
23 SUBSCRIBED TO AND SWORN BEFORE ME
24 THIS ____ DAY OF _____, 20__.

25 _____
(Notary Public) MY COMMISSION EXPIRES: _____

1 CERTIFICATE

2 I, Paula Campbell, CSR, RDR, CRR, CRC, do
3 hereby certify that on Monday, January 15, 2018
4 appeared before me, DR. CHADI NABHAN.

5 I further certify that the said witness was
6 first duly sworn to testify to the truth in the
7 cause aforesaid.

8 I further certify that the signature of the
9 witness to the foregoing deposition was not
10 specified by counsel.

11 I further certify that I am not counsel for
12 nor in any way related to any of the parties to
13 this suit, nor financially interested in the
14 action.

15 IN TESTIMONY WHEREOF, I have hereunto set my
16 hand on this 15th day of January, 2018.
17
18

19 _____
20 Paula Campbell, CSR, RDR, CRR, CRC
21 Certified Shorthand Reporter
22 Registered Diplomat Reporter
23 Certified Realtime Reporter
24 Certified Realtime Captioner
25 Illinois C.S.R. No. 084-003481

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