# Exhibit 3

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

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| IN RE: ROUNDUP PRODUCTS LIABILITY LITIGATION, | ) | |
| | ) | MDL No. 2741 |
| This document relates to: | ) | Case No. 16-md-02741-VC |
| ALL ACTIONS | ) | |

VIDEO DEPOSITION OF
DENNIS WEISENBURGER, M.D.
MONROVIA, CALIFORNIA
MONDAY, JANUARY 22, 2018

REPORTED BY:
LISA MOSKOWITZ, CSR 10816, RPR, CRR, CLR,
NCRA REALTIME SYSTEMS ADMINISTRATOR
JOB NO. 136023

JANUARY 22, 2018
8:41 A.M.

VIDEO DEPOSITION OF DENNIS WEISENBURGER, M.D., held at Courtyard by Marriott, 700 West Huntington Drive, Monrovia, California, before Lisa Moskowitz, California CSR 10816, RPR, CRR, CLR, NCRA Realtime Systems Administrator.



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BY: ELYSE SHIMADA, ESQ.

ALSO PRESENT:
ANDREW TURNER, VIDEOGRAPHER



---------- I N D E X ----------



---------- E X H I B I T S ----------

QUESTIONS NOT ANSWERED

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LOS ANGELES, MONDAY, JANUARY 22, 2018.
8:41 A.M.

THE VIDEOGRAPHER: Good morning. This is the start of media labeled number 1 of the video-recorded deposition of Dennis Weisenburger in the matter of Roundup Products liability litigation in the court of the U.S. District Court, Northern District of California, case number 16-MD-02741-VC. This deposition is being held at the Courtyard Marriott, address 700 West Huntington Drive, Monrovia, California 91016 on January 22 at approximately 8:41 a.m.

My name is Andrew Turner. I am the legal video specialist from TSG Reporting, Incorporated, headquartered at 747 Third Avenue, New York, New York. The court reporter today is Lisa Moskowitz in association with TSG Reporting.

Counsel, will you please introduce yourselves.



MS. FORGIE: Kathryn Forgie for the plaintiffs.

MR. ESFANDIARY: Pedram Esfandiary for the plaintiffs.

MR. GRIFFIS: Kirby Griffis, Hollingsworth, LLP, for Monsanto.

MS. SHIMADA: Elyse Shimada, Hollingsworth, LLP, for Monsanto.

THE VIDEOGRAPHER: Thank you.

Will the court reporter please swear in the witness.

Dennis Weisenburger, MD,
called as a witness, having been duly sworn, was examined and testified as follows:

MS. FORGIE: I want to make a statement for the record.

This deposition is being taken pursuant to pre-trial order number 34. It is limited to the recent Agricultural Health Study publication. It is also limited to two-and-a-half hours of questioning.



EXAMINATION

BY MR. GRIFFIS:

Q. Good morning, Dr. Weisenburger.

A. Good morning.

Q. We met one time at a prior version of this deposition; is that right?

A. Yes.

Q. You formed your opinions about causation in this litigation, i.e., that glyphosate causes non-Hodgkin's lymphoma without any data from the Agricultural Health Study after the DeRoos 2005 publication; correct?

MS. FORGIE: Objection.

THE WITNESS: That's correct.

BY MR. GRIFFIS:

Q. At your deposition I showed you an unpublished draft of some data through 2013 from the AHS pool of data, and we discussed it. That was not included in your original report or in your original assessment of causation; right?

A. That's correct.

Q. And that data, additional data, has now been published in the 2018 publication

in the "Journal of the National Cancer Institute," and we're going to be talking about that today; right?
A. Yes.
Q. Now, you said in your supplemental -- well, let me say what I've marked prior to starting the deposition. Exhibit 1 is the original notice of deposition in this case. Exhibit 2 is a second notice of deposition with the time corrected because you asked to be deposed at 9 o'clock, rather than 1 o'clock, the original information we had. 3 is your supplemental expert report that's marked in front of you. 4 is an additional materials considered list that we received quite recently, and 5 is the National Cancer Institute 2018 study.
(Exhibit Numbers 31-1, 31-2, 31-3, 31-4, and 31-5 were marked for identification.)
BY MS. FORGIE:
Q. Correct, sir?
MS. FORGIE: I don't think we have all the copies here, additional copies.



MR. GRIFFIS: Do you need an additional copy of the notice of deposition?
MS. FORGIE: I just want to make sure I know what it is.
THE WITNESS: Everything is here.
MS. FORGIE: Yeah, but it's not here. Let me just look real quick.
Okay.
BY MR. GRIFFIS:
Q. In your supplemental expert report, sir, which is Exhibit 3, can you get that out, please. On the second page which is also the last page, last paragraph, the first sentence is "In conclusion, my opinion on the role of glyphosate as a cause of NHL has not changed based on the recently-published update of the AHS"; correct?
A. Yes.
Q. So you don't rely certainly on the NCI, National Cancer Institute 2018 study as proof that Roundup does cause NHL; right?
A. I do not.
Q. And what weight do you give it as



evidence that Roundup glyphosate-containing substances don't cause NHL?
A. Well, I give it some weight because it is now a published study in a reputable journal, but there are significant issues and flaws in the study which would lead me to not give it very much weight or to change my opinion.
Q. Does it weaken your conviction that Roundup or glyphosate-containing substances cause non-Hodgkin's lymphoma?
A. No.
MS. FORGIE: Object to the form.
THE WITNESS: No.
BY MR. GRIFFIS:
Q. If you give it some weight, sir, would you please explain how it is that it does not weaken your conclusion?
A. Well, the findings are basically the same as the original De Roos study. They added more cases. They added more follow-up time. They did a bit more sophisticated analysis, but the results are basically the same in all findings. So I don't give it really more -- any more weight



than I gave the original De Roos study.
Q. And that weight, the weight that the original De Roos study had, was built into your original evaluation and your original expert report, of course; correct?
A. Yes.
Q. Would you please comment on why you give it no more weight than you gave to the De Roos 2005 paper if it is, as you just said, larger and has more follow-up time and more sophisticated methods of analysis?
MS. FORGIE: Object to the form.
THE WITNESS: Well, as I mentioned, there are significant issues and flaws with the study that I think call into question the validity of the study in terms of a negative finding, and, you know, if one looks at all of the epidemiologic evidence, there are multiple case control studies which are positive. And there's one cohort study, the Agricultural Health study, which is negative. So you've got multiple positive studies, you've got one negative study which is questionable,

and so it really doesn't change my opinion to any degree.
BY MR. GRIFFIS:
Q. I don't want to misrepresent the methodology you applied, sir. You certainly don't just count up the positives and the negatives and compare them. You weigh the value?
A. Correct.
Q. And reliability of each study before you reach a conclusion. Fair?
A. Yes, that's correct.
Q. And one important factor in weighing the reliability and validity of studies is the size of the study, the number of exposed cases, the length of follow-up, the sophistication of the epidemiologic analysis, et cetera; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Right. You look at each of the studies individually. You draw some conclusions about whether they are acceptable studies or not, and then you weigh that evidence. And that's what I did.



BY MR. GRIFFIS:
Q. Is it fair to say that the -- you identified a number of what you consider to be flaws in the National Cancer Institute 2018 study in your supplemental expert report; right?
A. Yes.
Q. Is it fair to say that it is because of those flaws that you believe to exist in the study that you have given it no more weight than you originally gave to De Roos 2005?
A. Yes.
Q. You don't claim that recall bias is a flaw in the NCI 2018 study; right?
MS. FORGIE: Object to the form.
THE WITNESS: I don't claim that, no.
BY MR. GRIFFIS:
Q. Recall bias is a concern for case control studies but generally not a concern for cohort studies; is that fair?
MS. FORGIE: Object to the form.
THE WITNESS: That's true.
///



BY MR. GRIFFIS:
Q. And recall bias refers not to just mistakes people might make when asked to recall but differential recall based on whether you already have the condition that the study is looking at or don't have it; correct?
A. Yes.
Q. And that's why it tends to apply to case control and not as to cohort studies; right?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. If someone said recall bias happens any time you ask anyone to recall, they wouldn't understand what they were talking about epidemiologically speaking; right?
MS. FORGIE: Object to the form.
THE WITNESS: Well, in epidemiologic terms, you're right.
BY MR. GRIFFIS:
Q. Okay. Now, do you know, sir, that IARC found the AHS to be a highly informative study including their imputation



procedures?
MS. FORGIE: Object to the form.
THE WITNESS: I don't recall that.
BY MR. GRIFFIS:
Q. Have you been shown the malathion monograph, sir?
A. No.
Q. And you know what I mean when I refer to the malathion monograph?
A. I assume it's an IARC monograph on malathion.
Q. Do you know that when the glyphosate monograph was done, the same working groups were simultaneously working on other substances?
A. Yes.
Q. And actually dividing their time between glyphosate and other substances --
A. Yes.
Q. -- including malathion. You know that, sir?
A. I don't know what other pesticides they were considering but yes, they were considering other pesticides as part of their work.

Q. I'll show you the malathion monograph.

MS. FORGIE: I'm going to object to this. It's completely beyond the scope. It's not in his supplemental report and it's not about the AHS. Unless you can tie it pretty quickly to the AHS publication, the actual publication which was not published at the time -- the publication we're talking about which was not published at the time the malathion IARC monograph was, then I'm going to instruct him not to answer.

MR. GRIFFIS: I admonish counsel not to make speaking objections.

MS. FORGIE: That's not an objection. It's a statement as to what is going on here.

MR. GRIFFIS: I admonish counsel not to make speaking statements.

MS. FORGIE: I'll make whatever statements I can that are important.

(Exhibit Number 31-6 was marked for identification.)

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BY MR. GRIFFIS:

Q. Turn, sir, to what I've marked as Exhibit 6. It's the same day as the other monograms.

MS. FORGIE: 2015, three years before the publication.

MR. GRIFFIS: Counsel.

MS. FORGIE: I'm asking why are we talking about this when this --

MR. GRIFFIS: We're not going to have a debate on the record. He's not going to listen to your --

MS. FORGIE: I can make whatever statements I want. Unless you can tie this into his supplemental report or the AHS publication we're talking about, I'm going to instruct him not to answer. It's not appropriate.

MR. GRIFFIS: We'll be back.

MS. FORGIE: Fine. We've done that before.

BY MR. GRIFFIS:

Q. Counsel.

Turn to page 7?

A. I'd like to state I haven't



reviewed this document.

Q. Yes, sir. You did review the monograph for glyphosate; right?

A. I did.

Q. Take a look on page 7 under "Exposure assessment."

Do you see that?

A. Yes.

Q. Do you see it says, "This section summarizes the exposure assessment and assignment for epidemiological studies of cancer and exposure to the pesticides considered in the present volume."

MS. FORGIE: Don't answer that.

BY MR. GRIFFIS:

Q. And it lists multiple substances including glyphosate?

MS. FORGIE: Don't answer that, please.

This has nothing to do with what we're here for. I'm going to instruct him not to answer.

MR. GRIFFIS: This is about the AHS data.

MS. FORGIE: No, this is not about



the AHS publication. This was published three years before the publication, and he's already stated he hasn't reviewed it.

BY MR. GRIFFIS:

Q. Sir, you have a criticism of imputation; correct? Imputation as done in the NCI 2018?

A. I have a criticism of imputation as it was done with regard to glyphosate.

Q. And do you know that the IARC commented on that very imputation procedure?

A. No, I don't know that they --

Q. Turn to page 21, sir.

MS. FORGIE: No, don't answer that. Don't answer any questions about the malathion.

BY MR. GRIFFIS:

Q. Sir, you've said you haven't reviewed the malathion monograph. You also haven't reviewed the section that addresses IARC's assessment of epidemiology from the agriculture Health Study including glyphosate; is that right?

A. I'm sorry. Repeat -- would you

repeat the question?
Q. Yes, sir. You said you haven't reviewed the malathion monograph.
A. That's correct.
Q. You also haven't reviewed the section in the malathion monograph in which IARC addressed its view of the Agricultural Health Survey data including De Roos 2005 and multiple subsequent publications that they took into account in the glyphosate monograph and other monographs and gave its assessment of the quality of that data; right?
MS. FORGIE: Don't answer that. He's not going to answer questions about the malathion monograph.
BY MR. GRIFFIS:
Q. Do you agree with the working group that the AHS is a highly informative study?
MS. FORGIE: Could I have that read back, please.
BY MR. GRIFFIS:
Q. Do you agree with IARC that the AHS is a highly informative study?
MS. FORGIE: Object to the form.



THE WITNESS: In general, I would say yes.
BY MR. GRIFFIS:
Q. Do you consider it to be -- let's talk specifically about the NCI 2018 data. You know, sir, that there have been many, many publications from the AHS pool of data; right?
A. Yes.
Q. And they address many possible outcomes, not just non-Hodgkin's lymphoma and glyphosate; right?
A. Yes.
Q. Many, many substances and other exposures and other possible health risks have been compared to many, many outcomes, and there are multiple publications about that; right?
A. Yes.
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. Are you aware that there have been multiple publications using the same imputation method that was used in the NCI 2018 paper?



A. Yes, there have been others.
Q. And there have been multiple peer-reviewed papers applying that methodology; right?
A. Yes.
Q. And you didn't know before today that IARC had also looked at that same imputation procedure; right?
MS. FORGIE: Object to the form.
THE WITNESS: I did not.
BY MR. GRIFFIS:
Q. When you say that you agree with IARC that -- well, when you say that the NCI 2018 paper is highly reliable, what do you mean by that, sir?
MS. FORGIE: Object to the form.
THE WITNESS: I didn't make that statement.
BY MR. GRIFFIS:
Q. I'm sorry. Highly informative.
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. Let me ask it again cleanly --
A. Well, you know, it lays out in detail the follow-up that was done, the



methodology, and, you know, it is informative in the sense that it provides new information. But as I said before, I think that there are significant issues and flaws that really take away from the -- call the findings into question and take away from the validity of the study. And I'm speaking specifically about the glyphosate study.
Q. Had you reviewed the NCI 2018 paper, would you have recommended it for publication in the "Journal of the National Cancer Institute"?
A. I probably would have not.
Q. You disagree with the peer reviewers of the "Journal of the National Cancer Institute" as to the appropriateness of the publication?
MS. FORGIE: Object to the form.
THE WITNESS: I think the peer reviewers probably didn't address the issues and flaws in the study in an informative way and so didn't call into question the study. I mean, I don't know. The peer review is secret; so we

don't know who the peer reviewers were, and we don't know what they said or didn't say.
BY MR. GRIFFIS:
Q. Do you peer review for the "Journal of the National Cancer Institute"?
A. I don't remember if I have or not. Not commonly. Not usually, no.
Q. You can't remember if you have; is that right?
A. I can't remember off the top of my head if I have or not.
Q. Okay. Are there any -- what journals -- are there any epidemiology journals that you peer review for, sir?
A. I have done reviews for "Cancer Epidemiology, Biomarkers and Prevention." I may have done reviews for other epidemiology journals, but in general, I don't accept reviews from epidemiology journals.
Q. Why is that?
A. Well, because it's a lot of work, and I'm a busy man.
Q. Why is it a lot of work to do epidemiology reviews?



A. Well, any review is a lot of work. You have to read the paper critically. You have to read the literature around it. You have to understand the methodology. It can take you literally hours and hours to do a proper review of a complicated or difficult article and write a very, I would say, helpful and critical review of comments to the editor and to the authors. So it's a lot of work to do that, and, of course, it's done in my free time, my weekends, nights, and holidays. That's when I end up having to do it because I have a full-time job. So I don't do it very often. I very carefully pick the articles that I review, things that I'm interested in or things that I've done -- I have myself done research on usually.
Q. Take a look at Exhibit 5, the NCI 2018 paper, sir.
I'm going to start out in the abstract, the part marked "Conclusions. The author has concluded that in this large perspective cohort study, no association was apparent between glyphosate and any solid



tumors or lymphoid malignancies overall, including NHL and its subtypes."
Have I read that correctly?
A. Yes.
Q. And that accurately describes the findings of the study; right?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. In the discussion section, first paragraph of the discussion section on page 5 of 8, sir, the authors wrote, "In this updated evaluation of glyphosate use and cancer risk in a large perspective study of pesticide applicators, we observed no associations between glyphosate use and overall cancer risk or with total lymphohematopoietic cancers including NHL and multiple myeloma."
Have I read that right?
A. Yes.
Q. That's an accurate description of the finding in the study; right?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.



BY MR. GRIFFIS:
Q. On page 7 of 8, sir, in the right-hand column in the first full paragraph, the authors of the NCI 2018 study comment on the scope of this study compared to the De Roos 2005 publication, and they write, "In this perspective cohort study, we expanded a previous analysis of glyphosate use and cancer risk with more than eleven years of additional follow-up and more than four times the number of glyphosate-exposed cancer cases, n equals 5,779 compared with n equals 1,324."
Did I read that right?
A. Yes.
Q. That's an accurate comparison of this study to the De Roos 2005 study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. On the other -- in the left-hand column, sir, the first full paragraph, the authors repeat that they observed no associations between glyphosate use and NHL

overall or any of its subtypes. And then they say, "This lack of association was consistent for both exposure metrics, unlagged and lagged analyses, after further adjustment for pesticides linked to NHL in previous AHS analyses and when we excluded multiple myeloma from the NHL grouping."

Have I read that correctly?

MS. FORGIE: Object to the form.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. And that's accurate. They did all those adjustments and they still found no association; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. In Table 2, sir, Table 2 of the data table, these are their findings for all cancers, multiple and specific, solid and lymphohematopoietic cancers; correct?

A. Yes.

Q. For all cancers they found no association. All of the relative risks were right around one; correct?



MS. FORGIE: Object to the form.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. And when -- generally speaking, sir, when an epidemiology study investigates whether a particular exposure causes a particular outcome, it looks at a whole bunch of different outcomes and it finds relative risks a little bit above one, a little bit below one, consistently none of them are statistically significant, the confidence interval is always straddling the one, that's what you would expect to see when a substance does not cause cancer; right?

MS. FORGIE: Object to the form.

THE WITNESS: In general, yes.

BY MR. GRIFFIS:

Q. So, in general, and we'll talk about your specific criticisms of this in a moment, of course, sir, but, in general, this is the pattern of relative risks, point estimates, and confidence intervals you would expect to see in a large epidemiology study where there is, in fact, no



association between the substance being examined and the multiple cancers being examined; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. So we just talked about the all cancers finding. There are also multiple breakdown, oral cavity, colon, rectum, pancreas, lung, melanoma, prostate, testicular, bladder and kidney --

MS. FORGIE: Are you still on Table 2?

MR. GRIFFIS: Yes.

MS. FORGIE: Thank you.

BY MR. GRIFFIS:

Q. And those are all negative as well; correct?

A. I don't know. I didn't look carefully at them.

Q. Yes, sir.

A. Yes, I guess, they are all negative. That's true.

Q. So they're all very close to one, some of the values are above one, some of



the values are below one. All of them are non-significant and the P-trend, which is a way of looking at a group of relative risks and confidence intervals together for different exposure levels, those are all non-significant as well; correct?

A. Yes.

Q. And that was for the solid tumors to be clear.

Let's talk about the lymphohematopoietic cancers which would be the lymphomas -- correct? -- and leukemias?

A. Yes.

Q. The overall figure for lymphohematopoietic cancers is negative. Relative risks are all one or below. Confidence intervals all straddle the null, the one; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. And the subtypes, the Hodgkin lymphoma breakdown is also negative. The overall non-Hodgkin's lymphoma breakdown is negative; correct?

MS. FORGIE: Are you on Table 3 now or Table 2?
MR. GRIFFIS: Still on Table 2.
THE WITNESS: Second part of Table 2.
MS. FORGIE: Okay.
THE WITNESS: So both Hodgkin and non-Hodgkin show the same pattern.
BY MR. GRIFFIS:
Q. Right. I.e., no association; correct?
A. Correct.
Q. And then there's a breakdown for various subtypes of non-Hodgkin lymphoma; correct?
A. Yes.
Q. So for non-Hodgkin lymphoma B-cell, there's no association. For chronic lymphocytic lymphoma and small lymphocytic leukemia, there is no association; correct?
A. Correct.
Q. For diffuse large B-cell lymphoma, no association; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Correct.



BY MR. GRIFFIS:
Q. For marginal-zone lymphoma, no association; correct?
A. Correct.
Q. For follicular lymphoma, no association; correct?
A. Correct.
Q. For multiple myeloma, no association; correct?
A. Correct.
Q. For non-Hodgkin lymphoma T-cell, we have the smallest -- we have a very small exposed group so that they have to use moieties instead of breaking into three or four groups; right?
A. Right. They can only break them into two groups.
Q. Let's comment on that for a moment. When there was enough data, they broke it into four groups, into quartiles; right?
MS. FORGIE: Object to the form.
THE WITNESS: Tertiles or quartiles, yes.
BY MR. GRIFFIS:
Q. And when there was slightly less



data, they broke it into tertiles, and when there was the least amount of data, they broke it into moieties, into halves; right?
A. Correct.
Q. This is one of the ones for which they had the least data, and these values are above one, but they are not significant; correct?
A. Correct.
MS. FORGIE: Objection.
BY MR. GRIFFIS:
Q. So, again, there's no association for non-Hodgkin's lymphoma T-cell in this data; correct?
MS. FORGIE: Object to the form.
THE WITNESS: There's no significant association.
BY MR. GRIFFIS:
Q. The .31 is a measure of the P-trend -- correct? -- whether there's an association across the data?
A. .31 just looks at trend by comparing the different groups. So what the .31 is telling you is that the M2 group does not have a higher risk ratio than the M1; so



that's why it's not significant.
Q. This data would show -- you said there's an association but not a statistically significant one; right, sir? Is that what you said?
A. Right. So you can see in the M1 there's an over fourfold increase odds ratio for T-cell lymphoma, but since there's only six cases in the M2 group, there wasn't an increased -- there was a small increased odds ratio. So what this is telling you there isn't really what I would call a dose-response effect here, although it's a very crude analysis with very few cases and only two groups so . . .
Q. So the data shows no-dose response?
MS. FORGIE: Object to the form.
THE WITNESS: Well, the data is so small that it's hard to draw any conclusions from that.
MS. FORGIE: Counsel, when you get a chance, the reason I keep asking if we're still on Table 2 is maybe when you finish Table 2, we can take a break. I left my phone, I think, in the room so

when you get to a good breaking point. That's why I keep saying are you still on table 2.

MR. GRIFFIS: Okay. I'll stop when we're done with table 2.

MS. FORGIE: Okay, or if there's an earlier one, whatever is best for you.

BY MR. GRIFFIS:

Q. So the data for non-Hodgkin lymphoma T-cell is so small you can't draw a reasonable conclusion; is that --

MS. FORGIE: Object to the form.

THE WITNESS: I would say that is true.

BY MR. GRIFFIS:

Q. You made a distinction earlier, and I'm not talking about non-Hodgkin lymphoma T-cell in particular, I'm talking in general. You made a distinction between whether there's an association or not and whether that association is statistically significant; right?

A. Right.

Q. What does "statistically significant" mean in epidemiology, sir?



A. Well, it's a measure of the likelihood of -- that the association is due to chance. So if it is statistically significant, it's unlikely to be due to chance. It's very likely to be real.

Q. When we're looking at each of these point estimates like under follicular lymphoma, the point estimate for the first tertile is 0.89; correct?

A. Right.

Q. Where we looked to see if it's statistically significant is the confidence interval, the parenthetical afterwards and to see if that spans or does not span the 1, the null value; correct?

A. Yes.

Q. If somebody said statistically significant means greater than one, and that's all it means, they don't know what they're talking about; right?

MS. FORGIE: Well, object to the form.

THE WITNESS: Well, it depends where the one is.

///



BY MR. GRIFFIS:

Q. A point estimate of greater than one without regard to the confidence interval.

A. Yes, that's true.

MR. GRIFFIS: We can take a break.

MS. FORGIE: Thank you.

THE VIDEOGRAPHER: We are going off the record at 9:14 a.m.

(Recess taken from 9:14 a.m. to 9:24 a.m.)

THE VIDEOGRAPHER: This continues disk number 1. We are going back on the record. The time is 9:24 a.m.

BY MR. GRIFFIS:

Q. All right, Dr. Weisenburger, I'd like to go to Exhibit 3, which is your supplemental expert report.

You told me earlier that there are a number of what you consider to be errors or weaknesses or flaws in the NCI 2018 paper that caused you to give it no more weight than you gave to De Roos 2005. What I want to do first is just enumerate the flaws you see in the NCI 2018 paper. Let's get that



done first, and then we'll talk about them.

So I'll give you some guidance but tell me if I'm wrong about anything. It seems to me that the first one that you identified, sir, is a response rate one. This is in the first -- the second paragraph. You raised the issue of problems that could happen if response rates to follow-up surveys are low, and then you say, "Only 44 percent of enrolled applicators completed and returned a supplemental questionnaire"; correct?

A. Yes.

Q. That 44 percent does not -- doesn't reflect a questionnaire that was actually used in the NCI 2018; right?

A. Oh, I'm sure data to perform that supplemental questionnaire was used.

MS. FORGIE: Object to the form.

BY MR. GRIFFIS:

Q. The two surveys that were used were the original one and the 1999 to 2005 one. You go on to describe 37 percent of applicators failing to respond to that one; correct?

A. Right.
Q. And the two that are described in the study and from which the data are pooled in the NCI 2018 study and the text of the study and the methods and analysis are the 1999 -- the original survey, 1993 to '97 and the '99 to 2005 one; right?
A. Well, the supplemental questionnaire in which only 40 percent of the applicators responded was a take-home questionnaire after they filled out the initial questionnaire for enrollment. Okay? And that data was used in many of the studies and was probably used in -- it was probably used in the analysis of the people who responded to the second questionnaire. And it was certainly used in the data from De Roos 2000 -- the first De Roos paper.
Q. 2005?
A. Yeah, so it's supplemental information that they had on a subset and they used that data. They didn't just discard that data.
Q. Okay. We'll come back to that.
A. They used what they had.



Q. The first error -- should I call them errors or biases or flaws or what?
A. I think they're flaws.
Q. The first flaw that you identified in your supplemental expert report is the non- -- the relatively high non-response rate. The non-response rate; correct?
A. In the follow-up and supplemental questionnaires, yes.
Q. Okay. And the way that was addressed you discuss at the bottom of the first page, the last paragraph there. The imputation method; right?
A. Right. The imputation methods were used to address the lack of response to the first follow-up survey.
Q. Okay. So it's kind of --
A. Not that it was used to address the lack of information from the supplemental survey done at the time of enrollment.
Q. These are kind of the same criticism. It's a lack of follow-up and then the imputation method that was used to address that you have critiques of; correct?
MS. FORGIE: Object to the form.



THE WITNESS: You have to repeat the question. I don't understand the question.
BY MR. GRIFFIS:
Q. I'm just trying to get a list right now so that we can go through and do them one by one, a list of what you perceive to be the flaws in the NCI 2018.
A. Okay.
Q. I'm trying to know whether the response rate one goes with the imputation one so we can address them together or if they're distinct facets of those.
A. So, yeah, the lack of response from 37 percent of the applicators, the authors of the paper tried to address using this imputation method. So they basically used their method to try and guess what the responses would have been for those 37 percent of people who didn't respond.
Q. Okay. So the next flaw that you identified is in the, if I'm reading it correctly, it's in the second paragraph at the end. You said that "For the responders, pesticide use data was only obtained for the



last year of farming prior to the follow-up survey"; right?
MS. FORGIE: Object to the form.
THE WITNESS: Let's see. Where is that?
BY MR. GRIFFIS:
Q. It's the second paragraph of your supplemental expert report at the end of that paragraph.
A. Yeah, so they only asked -- in this first follow-up questionnaire, they only -- which occurred anywhere from, I guess, probably 6 to 12 years after the initial questionnaire, they only asked for information on pesticide use for the last year of farming. So they didn't ask for any information in the period of time between the last year of farming and the last year that was included in the initial enrollment questionnaire.
Q. So that's a second flaw, the first one being the low response rate and the attempt to fix it with imputation which you feel was unsuccessful, and the second one was asking only for the last year of farming

in the follow-up survey.
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. Is that right, sir? Is that an accurate list so far?
A. Yes, that's true.
Q. And then the third that I see if I'm correct is that there was an increase in glyphosate use that you believe likely resulted in significant misclassification of some exposures; right?
A. Right.
Q. The next thing you write is imputation as we discussed. That kind of fits with the first criticism.
MS. FORGIE: Object to the form.
THE WITNESS: The third one that you mentioned, the dramatic increase, really reflects on how the cases were actually classified in the initial enrollment. It also complicates the attempt to impute or to guess what the -- what the exposure was for those that didn't respond. So these things are all tied together.



BY MR. GRIFFIS:
Q. Okay. The next one that I see -- and tell me if I've missed one -- is on page 2, the first full paragraph, and you make the point that there was a high -- high usage of glyphosate, and so that's not an optimal distribution among exposed and unexposed; correct?
A. That's correct, yes.
Q. Is that the next one, or did I miss one?
A. I think that's the next one.
Q. Okay. And then the next, and I think last -- but you'll correct me if I'm wrong -- is a latency issue. You said, "The median lifetime years of glyphosate use was only 8.5 years with a median follow-up time of only about 18 years which may not be enough exposure and/or follow-up time to demonstrate an effect," and you called the NCI 2018 at best an interim analysis?
A. Yeah, it's both an exposure and latency issue.
Q. To recap, and again what I'm trying to do is get a complete list before we start



digging in. The flaws that you identified are the relatively low response rate and the attempt to address that through imputation which you have criticisms of; two, the fact the pesticide use data was obtained on last year of farming in the second survey; three, that there were secular trends in the use of glyphosate that could affect exposure analysis and change the figures; four, that the relatively high frequency of exposure to glyphosate made the distribution among exposed and non-exposed non-optimal; and, five, that it's too short a study so far in terms of exposure and latency; is that correct?
MS. FORGIE: Object to the form.
THE WITNESS: I would agree. The last one is, you know, the median exposure was only 8.5 years which is really not a long period of exposure in a cohort study. And the follow-up probably needs to be even longer than it is in this most recent publication.
BY MR. GRIFFIS:
Q. Okay. But those are the five



flaws; right?
A. Yes.
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. And there weren't any flaws that I missed; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Those are the ones that I outlined in my report.
BY MR. GRIFFIS:
Q. Did you have any in mind that you didn't outline in your report?
A. No.
Q. All right. I'd like to start with flaw number 2, "Pesticide use data was only obtained for the last year of farming."
So tell me if I'm correct here. The concern is that someone may have started to use glyphosate after the first survey but continued to farm and not use glyphosate during their last year of farming and then reported no use of glyphosate in the second survey and thus been undercounted?
MS. FORGIE: Object to the form.
THE WITNESS: There are a whole

variety of errors that could have occurred there. That's one of them. For example, in the first survey they could have been a non-user of glyphosate, and in the second survey they could have become a user of glyphosate, but you wouldn't know when they started using glyphosate. Okay? There's no way to know that. The reverse is true too. So they may have not -- they may have been a user of glyphosate, and then they discontinued glyphosate, and you wouldn't know when they discontinued glyphosate. So there's no way to fill in the gap of the years between the first survey and the second survey. So I guess in the imputation you just guess what it was.

BY MR. GRIFFIS:

Q. The imputation does address those issues. We'll discuss your criticisms of imputation, but it does address those issues; right?

MS. FORGIE: Object to the form.

THE WITNESS: Well, it attempts to



address them.

BY MR. GRIFFIS:

Q. Okay. So it's one of the pieces of absent data that the imputation procedure is designed to address. That's fair?

MS. FORGIE: Object to the form.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. Do you have any evidence that there was error introduced by asking people to report on their last year of farming?

A. Well, the reported data probably was accurate because it's the most recent year of farming. So they should remember that pretty accurately. So with regard to that there probably was not a lot of error.

Q. And do you know whether it was the best procedure to follow, for example, to give people a shorter questionnaire to fill out and increase their likelihood of responding to it?

MS. FORGIE: Object to the form.

THE WITNESS: So that's true, but what happens then is you don't have the data you really need to answer the



question. This is a problem with cohort studies. They cut short to some extent on the way they gather the data, and they try to compensate it by having many, many more people in the study. But what it means is that the quality of the data is not as good as it should be. And had they taken more time in the follow-up questionnaire and asked the questions for each of the years, it wouldn't have added a lot of time to the question because the years were anywhere between maybe five and ten, maximum 12. So they could have asked three or four questions for each year and had all the data they needed to really do it properly.

BY MR. GRIFFIS:

Q. You say on page 2 --

A. So they have to actually impute the data for the respondents too because they don't know what they did in between. It's not just for the non-respondents, but it's also for the respondents.

Q. You say on page 2, sir, "Since all



of these various errors and exposure classification were non-differential." And I don't want to ask you about the whole sentence right now, but just tell me what you mean by non-differential.

MS. FORGIE: Object to the form.

THE WITNESS: Non-differential means that the errors were not linked specifically to the exposure or to the disease in question. They were random errors.

BY MR. GRIFFIS:

Q. Okay. So one person might slightly underreport glyphosate. One person might slightly overreport glyphosate, and there's no consistency in the lack of data or the missing data in association with either non-Hodgkin lymphoma or glyphosate exposure. That's what non-differential means?

MS. FORGIE: Object to the form.

THE WITNESS: Non-differential means that it's just as likely that -- well, it's just as -- it means that there's no direction in the bias, that the bias is going in both directions,

yes. I guess that's what you said.
BY MR. GRIFFIS:
Q. Okay. And if there are a whole bunch of little randomnesses, some of them would be pointing in one direction and some in the other, and they would kind of tend to cancel out; is that right?
MS. FORGIE: Object to the form.
THE WITNESS: That's true, but what would happen is it decreases the ability of the study to detect a true finding. It biases any of the results in general. It biases the results towards the null.
BY MR. GRIFFIS:
Q. And that was the rest of the sentence?
A. Right.
Q. "Since all of these various errors in exposure classification were non-differential, they would result in a bias toward the null and attenuate or obliterate any true positive effect."
So they wouldn't tend in any particular direction, but they would tend to obscure in the direction of the null towards



1.0?
A. Right.
Q. So that the outcome that you measured, you say I found such and such a relative risk, that would, in fact, be closer to the null than it should be; is that right?
A. Yeah, so if you have a true relative risk of say 3, and you have a significant amount of exposure misclassification, that could lower the risk from a significant 3 to a non-significant 2 or a non-significant 1.8 or 1.2. So that's, in general, the effect of non-differential misclassification.
Q. And bias towards the null when you have a point estimate that is below one suggests that the true point estimate would be even lower; right? It would be .5 instead of .7, for example?
MS. FORGIE: Object to the form.
THE WITNESS: That would be -- that would also happen, yes.
BY MR. GRIFFIS:
Q. Okay. So last year of farming.



You've also told us -- the very next thing you tell us is that there was a very major increase in glyphosate use after the introduction of glyphosate-resistant crops; right?
A. Yes.
Q. Glyphosate is used on -- tell me if you know. I don't know whether you do or not. Glyphosate is used on some of the most widely used crops in the country; right?
A. Yes.
Q. And there are glyphosate-resistant versions of those meaning -- you're talking about Roundup Ready; right?
A. Yes.
Q. So because of the introduction of Roundup Ready crops, lots of farmers were using glyphosate, and they were doing it consistently year after year; right?
MS. FORGIE: Object to the form.
THE WITNESS: Well, I would say, in general, that's true. Farmers do stop doing things. They don't continue to always do what they did before, but, in general, the use of these agents



increase dramatically because farmers found that they could increase their yields by doing it. So it was -- it had a huge effect on how they farmed for certain crops.
BY MR. GRIFFIS:
Q. So if a farmer told you -- for glyphosate. If a farmer told you for glyphosate the last year I was farming I didn't use glyphosate, they probably weren't using it before then either; right?
MS. FORGIE: Object to the form.
THE WITNESS: Probably that's true, although we don't really know.
BY MR. GRIFFIS:
Q. Okay.
A. There may have been another reason why they switched. They could have switched crops; right? They could have decided to plant something else in the field that year, rotate their crops.
Q. Sure. We could think of scenarios, but it's a relatively unlikely scenario that somebody was using glyphosate and then the last year they were farming they stopped

using glyphosate and then they stopped farming; right?
MS. FORGIE: Object to the form.
THE WITNESS: I don't know. I can't speculate.
BY MR. GRIFFIS:
Q. It also makes it pretty easy to impute and pretty easy to predict if you built that into the formula, glyphosate users are likely to continue to use glyphosate?
MS. FORGIE: Object to the form. Calls for speculation.
BY MR. GRIFFIS:
Q. Correct?
A. I can't answer that question either. I don't know whether it was easy or hard. The method they used is quite complicated. It may be easy to use, but I really -- there's no way to know how accurate it is or was.
Q. Well, it should be easier at least, in general, to predict glyphosate use and you project glyphosate use if glyphosate is a widely used crop year after year -- widely



used product year after year than if it's a relatively rarely used herbicide that someone might choose to use or not use; right?
MS. FORGIE: Object to the form. Asked and answered.
You can answer it again.
THE WITNESS: Well, it would -- I suppose it would make it easier to predict, but again, for example, if you had somebody in the first survey they weren't using glyphosate, and in the second survey they were using glyphosate, you really wouldn't know when they started using it. You would have a window of when they started, but you wouldn't know when they started and you wouldn't know how many days per year they started. You wouldn't know anything about the metrics of use during that gap period. And so, you know, so, again, you've got to use the imputation method to guess.
BY MR. GRIFFIS:
Q. We'll talk about imputation in a



minute, but at any point in using the imputation method, does any person sit there and make a guess, or do they apply a formula?
A. Well, the formula they use is, I would say, an educated guess. Okay?
Q. Have you ever designed an imputation formula yourself?
A. No.
Q. Would you be qualified to?
MS. FORGIE: Object to the form.
THE WITNESS: No.
BY MR. GRIFFIS:
Q. What kinds of people -- and I don't mean their personality traits but their qualifications and professional training would be qualified to generate an imputation formula?
MS. FORGIE: Object to the form.
THE WITNESS: Well, it would have to be -- it would have to be an epidemiologist or sophisticated biostatistician who understands the issues around what they're trying to impute.



BY MR. GRIFFIS:
Q. So an epidemiologist or biostatistician?
A. Yes.
Q. The optimal distribution issue, sir -- and you remember what I mean by that? This is on page 2, your statement that since lots of people were using glyphosate, you don't have an optimal 50 percent, 50 percent distribution between exposed and unexposed?
A. Right. So yes.
Q. So you're referring to a general principle of epidemiology that you can best compare two groups if your numbers are divided evenly between those two groups; right?
A. Yes.
MS. FORGIE: Object to the form.
THE WITNESS: Yes. In fact, you know -- for example, in a case control study, you design the study to have a sometimes two- or three-to-one match of controls to cases. So you actually have more controls in the case control study than you do -- than you do cases. And

in this study, because so many of the applicators used glyphosate, you've got a balance going in the other direction where you've got four patients or four applicators who are exposed versus only one that's unexposed. So it's balanced in the wrong direction.

BY MR. GRIFFIS:

Q. The same math you're talking about that makes 50/50 distribution give you the cleanest numbers in your statistical analysis for ever, never use tell you that if you're dividing it into four exposed groups and one unexposed group, then a 20 percent, 20 percent, 20 percent, 20 percent, 20 percent distribution is optimal; right?

MS. FORGIE: Object to the form.

BY MR. GRIFFIS:

Q. Same numbers in each group?

MS. FORGIE: Object to the form.

THE WITNESS: In general, you want it to be 50/50; right? The fact you divide your cases with disease into sub-groups really -- I don't think --



you know, I think, in general, when you design the study, you want to have a 50/50 balance to get the best power to detect a difference.

BY MR. GRIFFIS:

Q. Okay. So as a biostats matter, biostatistics matter, do you know whether it's true or false that you get the most power in a division into four exposed groups and one unexposed group if your division is as close to 20, 20, 20, 20 as you can get?

MR. ESFANDIARY: Wait. Object to the form.

THE WITNESS: I don't know the answer to that. If I was to guess, I would say the power would be somewhat less if you did it that way.

BY MR. GRIFFIS:

Q. Less than what?

A. It's less because you have less people with disease in each group, not because you have too many controls.

Q. In the never ever, you can't do any sort of dose-response analysis, and in the group where you have four exposed groups at



different levels and an unexposed you can.

MS. FORGIE: Wait. Wait for a question.

Is there a question?

MR. GRIFFIS: You can; right? -- is the end of the question. You stepped on it.

MS. FORGIE: Object to the form.

THE WITNESS: So there are two different -- you're asking two different questions, and the answer is the same for both, that you want to have equal numbers of cases or diseased and non-diseased people in your comparative groups. But if you take your diseased group and you divide it into three or four sub-groups, then you're going to somewhat increase the power to detect significant changes. But it's not -- but it's because you divided your diseased group into three or four groups, okay, and decreased the numbers in each.

BY MR. GRIFFIS:

Q. If your intention is to look at



dose response by dividing into multiple exposed groups, a lower-exposed group, medium-exposed group, higher-exposed group or four such groups, quartile, then the optimum distribution in terms of power to demonstrate or fail to demonstrate a dose response would be an equal distribution into each group. Do you know whether that's true or false?

MS. FORGIE: Object to the form. Asked and answered.

You can answer it again.

THE WITNESS: I would say that -- again I would -- I'm not sure, but I think that the greater numbers in any of the groups would improve the power. Okay? So by decreasing the number of cases or diseased people in each group versus controls, if you decrease the number of controls, again, you decrease the power to detect anything. So the fact that you have more controls than cases helps you. It doesn't hurt you. Okay?

///

BY MR. GRIFFIS:
Q. And power is a --
MS. FORGIE: Were you finished?
THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. You listed this one under your sentence that since all of these various errors were non-differential which makes it not totally obvious to me --
MS. FORGIE: What page are you on?
MR. GRIFFIS: The second.
BY MR. GRIFFIS:
Q. Which makes me not know whether you mean to include this one in the list of the errors that are not differential, do you?
MS. FORGIE: Object to the form.
THE WITNESS: No. The issue we're talking about is -- has -- has nothing to do with classification differential or non-differential classification.
BY MR. GRIFFIS:
Q. Reducing the power of a study would just tend to make it less able to detect a variance from the null; correct?
MS. FORGIE: Object.



THE WITNESS: True variance from the null.
BY MR. GRIFFIS:
Q. Right. So the values that you find in the study, had you increased the power, you would tend to predict that that would be farther from the null?
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. Correct?
A. As you increase the numbers and you increase the power, you're likely to find a true and significant result increases.
Q. So the drift would be as you increase power, the drift would tend to be further from the null; correct?
MS. FORGIE: Object to the form. Asked and answered.
THE WITNESS: Not necessarily. But you're significant. You would be much more likely to show statistically significance. You can find the same number with small -- you can find the same result with smaller numbers, but it may not be statistically significant; so



you increase the numbers in the study to allow you to show statistical significance.
MR. GRIFFIS: I want to use the bathroom. Can we break for just five minutes? Not a long one.
MS. FORGIE: Can we make it ten so we can all get another cup of coffee?
MR. GRIFFIS: Ten is fine.
THE VIDEOGRAPHER: We are going off the record at 9:58 a.m.
(Recess taken from 9:58 a.m. to 10:11 a.m.)
THE VIDEOGRAPHER: This continues disk number 1. The time is 10:11 a.m. We are back on the record.
BY MR. GRIFFIS:
Q. So the fifth criticism we identified earlier that you have of the NCI 2018 study is what you've titled, I believe, exposure and latency. It's a reference to the median lifetime years of glyphosate use in the study 8.5 and the median follow-up time 18 years being too short; correct?
A. Yes.



Q. Let's talk about the 8.5 years, the median lifetime years of glyphosate use first. What is your view of how long a person needs to be exposed to glyphosate to contract non-Hodgkin lymphoma if they will?
A. Well, I don't think anybody knows the answer to that question. The longer, the better. So in typical cohort studies, the workers are exposed to a certain chemical during their careers, maybe 20, even 30 years of exposure with long follow-up. So in this situation, the exposure is a median of 8.5 years ranging from five or six years to 14 years is not a very long time of exposure for a cohort study.
Q. Are you talking about cohort studies of non-Hodgkin lymphoma?
A. I'm talking about cohort studies, in general.
Q. Your expert report -- in your expert report you claim to be a specialist in non-Hodgkin lymphoma, somebody who focuses on that.
A. Yes.

Q. And you've been involved in a number of epidemiology studies as the pathologist on the study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Actually not only the pathologist, I was in charge and ran the studies in Nebraska; so I was the PI on the studies.
BY MR. GRIFFIS:
Q. Do you have a view as to how much exposure a person needs to have for non-Hodgkin lymphoma to a suspect substance in order to detect any effect?
MS. FORGIE: Object to the form.
THE WITNESS: It would depend entirely on the substance, whether it was a strong carcinogen or a weak carcinogen. So it's highly dependent on the substance. There's no one number for -- there's no one generic number.
BY MR. GRIFFIS:
Q. So what is your basis for saying that for glyphosate and non-Hodgkin lymphoma, 8.5 median years of exposure is too short?



MS. FORGIE: Object to the form.
THE WITNESS: It's probably too short. I don't know that it's too short, but it's probably too short based on how other cohort studies have evaluated other chemicals. In other words, the longer the better. In this case, it's relatively short. You know, what it means is that half of the people had less than 8.5 years of exposure.
BY MR. GRIFFIS:
Q. Is it the case that the sole basis for saying 8.5 years is probably too short for glyphosate and non-Hodgkin lymphoma in the study your knowledge of other cohort studies of other substances and other disease outcomes?
A. I'm just making a general statement. If you read about cohort studies and how they're designed, you generally want a long period of exposure to really be sure that you have an adequate exposure to find a significant association. If you have short exposures or small exposures, your chances are much less defined in association than if



you have long exposures and high exposures.
Q. Okay. Other than those --
A. So it's a general statement.
Q. It's the general statement the longer the better for cohort studies; right?
A. Right.
MS. FORGIE: Object to the form. Asked and answered.
BY MR. GRIFFIS:
Q. And there's no specific thing about glyphosate and no specific thing about non-Hodgkin lymphoma that makes you say that 8.5 years median is not enough to detect an effect; right?
MS. FORGIE: Object to the form.
THE WITNESS: Correct.
BY MR. GRIFFIS:
Q. The 18 years median follow-up time, median follow-up is something we discussed in your prior deposition; right?
A. Correct.
Q. You said in your expert report, your original expert report -- I'll mark that so we can look at it. This is Exhibit 7.



(Exhibit Number 31-7 was marked for identification.)
BY MR. GRIFFIS:
Q. I'm on page 5, sir.
A. Okay.
Q. You said -- you're talking about the De Roos 2005 study in that paragraph; correct?
A. Yes.
Q. That first paragraph?
A. Yes.
Q. You see in the middle of the paragraph, "However, the median follow-up time in this study was only 6.7 years, too short a time to detect a meaningful increase in NHL or other cancers associated with glyphosate"; right?
A. Yes.
Q. And then at the deposition, sir, do you recall that I asked you for an association between a pesticide and non-Hodgkin lymphoma, "How long a period of time do you think you need between the exposures and the cancers that you're measuring?"

And you said, "The longer the better."
And I said, "Well, is ten years too short?"
And you said "No, probably not?"
MS. FORGIE: Object to the form. If you're going to ask him questions about his deposition, I think you have to show it to him.
BY MR. GRIFFIS:
Q. Do you recall that, sir?
MS. FORGIE: Object to the form.
THE WITNESS: I don't remember specifically, no.
BY MR. GRIFFIS:
Q. Do you recall me saying, "Okay, the longer the better, 6.7 is too short, 10 is probably long enough" and you couldn't be more specific between those two; is that fair?"
And you said, "Yes."
MS. FORGIE: Object to the form.
THE WITNESS: I don't remember.
BY MR. GRIFFIS:
Q. Do you agree with that testimony



today?
A. Well, I agree with the testimony that the longer would be the better. I think probably ten years is when you would begin to see cases that are associated with the chemical. So what would be the best latency period? Well, the best latency period would be long so you would want to follow locations for 30 or more years, okay? And the median latency of 20 years is probably a minimum where you would begin to see a significant number of cases so that you could actually demonstrate significant increased risk.
So the longer the better. Ten years might be the minimum where you would begin to see cases, an increase in cases. Actually, if you look at the Eriksson study, that's when they began to see statistically significantly increased cases after ten years.
Q. Sir, when the data before you was 6.7 years of follow-up in the De Roos 2005 and you said ten years was probably enough and now you have 18 years of follow-up and



you say 18 years isn't enough and the study is not done, you're moving the goalpost, aren't you?
MS. FORGIE: Object to the form. It's unfair. You're not showing him the deposition.
THE WITNESS: So 18 years is probably not enough. Okay? But it's interesting, if you look at Table 3 in the paper where they've got 20 years of follow-up, you begin to see elevated odds ratios for non-Hodgkin's lymphoma and its subtypes. So this sort of speaks to my point that you have to have a long period of follow-up after exposure to begin to see risk. In fact, if you look at Table 3, you see it.
BY MR. GRIFFIS:
Q. Is that because it takes a long time for non-Hodgkin lymphoma to show up after an exposure?
A. Yes.
Q. And is that because it takes a lot of exposure, like years and years of exposure, or is this in reference to your



earlier point about 8.5 years of use in the study, it takes a lot of years of exposure to a substance for it to produce non-Hodgkin's lymphoma?
MS. FORGIE: Object to the form.
THE WITNESS: In general, I would say yes. The more exposure, the more likely you are to find elevated risks that are significant.
BY MR. GRIFFIS:
Q. The charts you're talking about, sir, Table 3, tell me which one you're pointing me to.
A. Well, if you look at non-Hodgkin lymphoma as a group, you can see increased odds ratios in the higher-exposed group, 15 percent, 12 percent. The same for B-cell non-Hodgkin lymphoma. And then if you look at chronic lymphocytic leukemia, anywhere between 19 and 25 percent increase. If you look at diffuse large B-cell lymphoma, you see a 35 percent increase. For T-cell lymphomas, you actually have a threefold increase that's statistically significant. So you're beginning to see increased risk

ratios when you use a minimum of follow-up of 20 years. Okay?
Q. You don't claim, sir, that any of these findings show that glyphosate causes those subtypes or causes non-Hodgkin's lymphoma; correct? You're not relying on this in support of your claim that glyphosate --
(Simultaneous cross-talk interrupted by the reporter.)
BY MR. GRIFFIS:
Q. You're not relying on this for your claim that glyphosate causes non-Hodgkin lymphoma or its subtypes; right?
MS. FORGIE: Object to the form.
THE WITNESS: I'm not relying on it, but it is data that suggests that a longer follow-up is required to see increased risks. It's possible if we follow these patients another ten years with a 30-year lag, we'll have significantly increased risks. So this is why I say in my report that at best this is another interim analysis and to really know the results of the



agricultural health study, you'll need longer follow-up.
BY MR. GRIFFIS:
Q. After a mean of 8.5 years of exposure to glyphosate, it's going to take more than 20 years to find a doubling of the risk in these patients; correct?
MS. FORGIE: Object to the form. Mischaracterizes --
BY MR. GRIFFIS:
Q. If it happens?
MS. FORGIE: Object to the form. Mischaracterizes his testimony --
THE WITNESS: You'll need a longer --
MS. FORGIE: You have to wait until I get my --
THE WITNESS: I'm sorry.
So what I'm saying is we probably need more exposure and we probably need longer follow-up if the Agricultural Health Study is going to show significant increases in risk. The data here in Table 3 suggests that now the risks are increasing for non-Hodgkin's



lymphoma with longer follow-up.
BY MR. GRIFFIS:
Q. And there are no statistically significant associations at five years, 10 years, 15 years, or 20 years for non-Hodgkin lymphoma; correct? It's the third row of the -- data row of the chart; right?
A. There are increased risks, but they're not statistically significant.
Q. And you wouldn't say that a non-statistically significant increased risk shows causation; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Well, you would interpret it in the context of what you know about from other studies.
BY MR. GRIFFIS:
Q. There's no dose response even in the 20-year period for non-Hodgkin lymphoma; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Well, the numbers are very small, and, you know, so with small numbers of cases in the various



quartiles and tertiles, it's difficult to demonstrate. But you don't see a dose response here. It's true. You don't see a dose response.
BY MR. GRIFFIS:
Q. The least-exposed group has a higher point estimate than the most-exposed group; right?
MS. FORGIE: Object to the form.
THE WITNESS: In some of the categories that's true.
BY MR. GRIFFIS:
Q. For non-Hodgkin lymphoma overall that's true; right?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. And that's one of the things that goes into the P-trend analysis; right? Whether there's a dose response; correct?
A. Correct.
Q. These P trends are all -- what is a P-trend? What is a statistically P-trend? 0.05?
A. Or less than 0.05.

Q. And none of these P trends in Table 3 are below 0.05; right?
A. Well, not for non-Hodgkin's lymphoma. For acute myeloid leukemia there is a P-trend of 0.04.
Q. For the 20-year lag. That's the one we were just talking about --
A. Okay.
Q. -- that you were focusing me on?
A. Right.
Q. The P trends in Table 3 for a 20-year lag, what is the smallest P-trend in that?
A. For non-Hodgkin's lymphoma or for anything in the table?
Q. Anything in the table, 0.3 for lymphohematopoietic overall; right?
MS. FORGIE: Now you've got two questions pending. Which one do you want him to answer?
Object to the form.
THE WITNESS: So acute myeloid leukemia has a P-trend of 0.04 which is statistically significant.
///



BY MR. GRIFFIS:
Q. Do you believe that glyphosate causes AML?
MS. FORGIE: Object to the form. Beyond the scope of this report.
THE WITNESS: This data would suggest that it does, but there isn't other data out there to support it. So I would say we don't know the answer to that.
BY MR. GRIFFIS:
Q. So you're not going to give expert testimony unless there's more data that glyphosate causes AML; right?
A. Correct.
Q. That wouldn't be scientifically appropriate to do based on this data; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Based on this data alone, you're correct.
BY MR. GRIFFIS:
Q. Now, for the 20-year lag, the smallest P-trend on the chart in supplemental Table 3 is for



lymphohematopoietic overall 0.3; correct?
MS. FORGIE: Object to the form.
THE WITNESS: You're talking about the first item on Table 3, lymphohematopoietic neoplasms?
BY MR. GRIFFIS:
Q. Yeah. The question is is that the lowest P-trend in the 20-year lag column; right?
A. Correct. .37.
Q. Okay.
A. Actually that's .31.
Q. .37? What are you looking at, sir?
A. I'm reading you the P-trend for lymphohematopoietic neoplasms.
Q. In supplemental Table 3, 20-year lag?
A. In supplemental Table 3?
Q. Yeah.
MS. FORGIE: What table are you?
THE WITNESS: I don't have supplemental Table 3.
BY MR. GRIFFIS:
Q. You don't have the supplementary tables for this?



A. I have them at home. Have you attached them to the --
MS. FORGIE: I don't think they're attached to the exhibit -- oh, wait.
THE WITNESS: Maybe they are. I'm sorry. I was looking at Table 3. You're talking about supplemental Table 3?
BY MR. GRIFFIS:
Q. We don't need to. This one shows 5-year and 20-year lag and supplemental Table 3 shows five, ten, 15 and 20; right?
A. Right.
Q. So it just shows more columns. Table 3 works fine. It's the same data for the 20-year.
MS. FORGIE: There's no question pending.
BY MR. GRIFFIS:
Q. But -- okay.
At how many years of follow-up would you consider the AHS data to be complete, sir?
MS. FORGIE: Object to the form.
THE WITNESS: Well, you would want

to -- actually ideally, you would want to follow the people for 20 or 30 or 40 or more years until almost everyone or everyone is dead, and then you would have the ultimate database to do your final analysis of the data. So that's often the case in cohort studies. They go for 20, 30, 40 years.

BY MR. GRIFFIS:

Q. For the 8.5 years of exposure, sir, the exposure categories in the case control studies that you rely on are much, much, much lower than 8.5 years of exposure; correct?

MS. FORGIE: Object to the form. Do you want him to look at those studies?

THE WITNESS: I don't remember the details of those studies.

BY MR. GRIFFIS:

Q. Like Eriksson is greater or less than ten days; right?

MS. FORGIE: Object to the form.

BY MR. GRIFFIS:

Q. Do you remember that?



MS. FORGIE: Object to the form.

THE WITNESS: So in Eriksson they looked at risk by days of exposure, and you're right. If it was less than -- if it was greater than ten days of exposure, they had a significantly elevated risk. That's true.

BY MR. GRIFFIS:

Q. And is it your claim that in Eriksson the greater than ten days the mean was -- the mean of exposure in that was at or greater than 8.5 years?

MS. FORGIE: Object to the form.

THE WITNESS: Well, again, I don't remember the details of Eriksson. I think they also looked at the number of years of exposure, and they looked at the number of days of exposure. In that study, the number of days of exposure resulted in an increased risk for non-Hodgkin's lymphoma, right.

BY MR. GRIFFIS:

Q. Do you know -- sorry.

A. I don't have the study before me, and I don't remember the details -- I don't



remember the details about years of exposure.

Q. Let me just ask you this, sir, since you criticized the NCI 2018 study for 8.5 median years of exposure being too short. Do you know of any study on glyphosate and non-Hodgkin's lymphoma where people were exposed as a median longer?

MS. FORGIE: Object to the form. He doesn't have the studies in front of him.

THE WITNESS: Off the top of my head, I don't know. I'd have to go back and look at the studies to answer your question properly.

BY MR. GRIFFIS:

Q. Do you know of any study where the median follow-up which you say was too short at 18 years in the NCI 2018 study was longer than 18 years?

MS. FORGIE: Object to the form. Asked and answered.

THE WITNESS: This was the only cohort study; so that question doesn't really apply to the case-control



studies.

BY MR. GRIFFIS:

Q. Do you know of another study where the average time lapse between exposure and non-Hodgkin lymphoma was greater than 18 years?

MS. FORGIE: Object to the form.

THE WITNESS: What --

MS. FORGIE: Asked and answered.

THE WITNESS: Study of glyphosate.

BY MR. GRIFFIS:

Q. Yes. Glyphosate and non-Hodgkin lymphoma.

A. No. And, again, I don't have those studies before me, and I don't remember the details of those studies off the top of my head today.

Q. It could be that your criticisms of 8.5 years of exposure being too short and 18 years of follow-up being too short apply with even greater force to the case-control studies than which you relied; correct?

MS. FORGIE: Object to the form. Asked and answered, mischaracterizes the testimony.

THE WITNESS: I don't know the answer to that.
BY MR. GRIFFIS:
Q. Have you read Dr. Portier's deposition, sir?
A. Which deposition?
Q. His recent deposition. Did you read it?
A. Portier's deposition? No.
Q. Yes. Okay.
If he said in his deposition that the NCI 2018 study allowed for longer latency than any published study on glyphosate and non-Hodgkin lymphoma, do you have any basis to disagree with that?
MS. FORGIE: Object to the form.
THE WITNESS: I don't agree or disagree. I don't know the answer. That's his statement, not mine.
BY MR. GRIFFIS:
Q. As we discussed earlier, you have a criticism of the NCI 2018 study based on the follow-up rate and the imputation procedure used to address that; correct?
MS. FORGIE: Object to the form.



THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. And the AHS investigators published their imputation procedure; correct?
A. Yes, they published a paper on how they did it.
Q. That's the Heltshe paper which you reviewed for your expert report; right?
A. Yes.
Q. There are also published papers in which the investigators assessed -- took their exposure calculations and fact-checked them with biometric data from actual exposures; correct?
A. Yes.
Q. The AHS -- the NCI 2018 study is the only one out of all the epidemiology on glyphosate and non-Hodgkin lymphoma that does a weighted analysis that has been published and checked with biometrics; right?
MS. FORGIE: Object to the form.
THE WITNESS: That's correct.
BY MR. GRIFFIS:
Q. It's the only one that does any



kind of sophisticated weighted analysis at all; right?
MS. FORGIE: Object to the form.
THE WITNESS: That's correct. You only could do that kind of analysis in a cohort study.
BY MR. GRIFFIS:
Q. Being able to do that kind of analysis gives you better data than you could have otherwise; correct?
MS. FORGIE: Object to the form.
THE WITNESS: I'm not sure it gives you better data. It gives you some confidence, I guess, in the way you did your calculations, but the fact that correlations between biomonitoring and the algorithm that was used were quite different for different pesticides and different formulations and for some there was good correlation and in some there was poor correlation.
So one of the other criticisms of the study which I didn't use, although it also would result in exposure misclassification, is if you use the



same algorithm for every pesticide, you're going to have misclassification more or less for each pesticide.
BY MR. GRIFFIS:
Q. Do you know if that was done?
A. That's what was done, yes.
(Exhibit Numbers 31-8, 31-9 and 31-10 were marked for identification.)
BY MR. GRIFFIS:
Q. Sir, I've marked as Exhibits 8 through 10 published study by Bonner, et al., involving lung cancer from the Agricultural Health Study data, published study by Koutros, et al., on bladder cancer from the Agricultural Health Study, and a published study by Koutros, et al., on prostate cancer from the Agricultural Health Study. Correct, sir?
A. Yes.
Q. Have you seen those?
A. I have not.
Q. In the --
MS. FORGIE: I'm going to just put a general objection in here to 31-8, which talks about lung cancer which he

has not read or cited in his supplemental report. And I object to the use of 31-9 which he has not read or cited to in his supplemental report that talks about bladder cancer, and I object to 31-10 that talks about prostate cancer, which is also not addressed or referenced in his supplemental report. I'll decide later depending on the questions whether I decide to instruct him not to answer.

BY MR. GRIFFIS:

Q. In the Bonner study, sir, on page 545, middle column, last full paragraph, do you see that they describe the multiple imputation with logistic regression procedure that was used in the AHS study?

MS. FORGIE: Take your time and read whatever you want.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. Similarly, sir, on the Koutros bladder cancer study, page 794, under "Exposure Assessment" towards the end of that first paragraph, do you see that they,



again, describe the imputation procedure?

A. Yes.

Q. The prostate cancer study, sir, on page 64, do you see that, again, the AHS imputation procedure is described? Page 64, first column.

MS. FORGIE: Are you talking about 31-10? Exhibit 31-10.

MR. GRIFFIS: Yeah, the one that's on prostate cancer.

MS. FORGIE: I object to him being asked questions about this.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. We talked in general earlier about the fact that there have been multiple publications from the AHS and multiple publications in which the AHS imputation procedure was discussed and went to peer review; correct?

A. Yes, these papers were peer-reviewed. The differences between these papers and the recent glyphosate paper is these papers are mainly looking at pesticides in -- which were used in distant



past or either discontinued or the use was pretty stable over time. In those kind of situations it's much more plausible to impute use. But for glyphosate, as you know, the use increased dramatically right in the middle of the enrollment period and continued to increase dramatically over time. It's impossible to capture that kind of information which is critical to a cohort study if you don't have adequate participation in the follow-up questionnaires. So that's one of the fatal flaws of the Agricultural Health Study. They don't have adequate follow-up participation in their follow-up questionnaires to get real data. So they guess what the data is going to be.

Q. So is your statement that is unique to glyphosate?

MS. FORGIE: Wait, wait. Were you finished with your answer?

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. Is your statement it's unique to glyphosate?



A. It's actually unique to glyphosate, yes.

Q. So the AHS study's imputation, not that it's fine --

MR. ESFANDIARY: Object to the form.

BY MR. GRIFFIS:

Q. -- works for everything else. It doesn't work for glyphosate. Is that your testimony?

MS. FORGIE: Object to the form.

THE WITNESS: I'm not sure it works or doesn't work. They used it for these other studies. It's an accepted method, in general, when you don't have data and you want to fill in blanks for data. But for glyphosate, it's particularly problematic in a situation where the use of the chemical is increasing dramatically over a relatively short period of time right in the middle of the enrollment period and right during the first follow-up questionnaire.

BY MR. GRIFFIS:

Q. Is your --

A. This is very different than it is for many of the other pesticides that have been studied in these others' papers. There's a big difference between what happened in the use of all these different pesticides compared to glyphosate.

BY MR. GRIFFIS:

Q. Okay. Is it your view that the imputation method used was scientifically acceptable for every other substance they examined except for glyphosate?

MS. FORGIE: Asked and answered. You can answer it again. Objection.

THE WITNESS: Well, it was acceptable -- I don't know whether it's acceptable or not. It was certainly acceptable to the people who did the studies and to the people who reviewed the studies. It's an acceptable method that epidemiologists use. I can't answer whether it's acceptable to me or not because I -- I suppose I would accept it. I don't know with what confidence one can accept this kind of methodology and particularly in the case



of glyphosate, I don't have a lot of confidence in it.

BY MR. GRIFFIS:

Q. Okay. I'm not asking you to speak for the peer reviewers of all these journals, sir, or for the authors of NCI 2018 but just for yourself. For yourself, is the scientific imputation procedure applied in the NCI 2018 paper scientifically acceptable for all those other substances but not for glyphosate?

MS. FORGIE: Objection. Asked and answered. He's answered it twice, and you're asking about articles he has not read and not cited.

You can answer the question in the same way.

THE WITNESS: I would just answer that for me it's not acceptable for glyphosate. I cannot comment on the others. I have not reviewed them. I would say, in general, it's probably acceptable although it's much less scientifically valid than actually gathering the data. Okay? Guessing the



data is not as valid as actually gathering the actual data.

BY MR. GRIFFIS:

Q. You would agree --

A. They didn't do that in this --

MS. FORGIE: Wait. Let him finish.

THE WITNESS: They didn't do that in this study, and it's a fatal flaw in this study particularly in regard to glyphosate.

BY MR. GRIFFIS:

Q. You would agree, sir, that not being able to gather all the data is an extremely common issue in cohort studies?

MS. FORGIE: Object to the form.

THE WITNESS: It is in some cohort studies like the Agricultural Health Study. It's less common in other studies. It depends entirely on the loyalty of the cohort and their willingness to participate.

BY MR. GRIFFIS:

Q. You agree that multiple imputation is a very standard epidemiological technique for dealing with absent data; correct?



MS. FORGIE: Object to the form.

THE WITNESS: Yes.

MS. FORGIE: Asked and answered three times. You're starting to badger the witness.

THE WITNESS: Yes.

BY MR. GRIFFIS:

Q. Do you believe that glyphosate was not involved in the Koutros study, the other Koutros study on prostate cancer and the Bonner study, Exhibits 8, 9, and 10?

MS. FORGIE: Object to the form. I'm not going to let him answer any more questions about these three studies, 31-8, 31-9, and 31-10 which he has not read, not cited, do not deal with NHL, until he's had a chance to sit here and read them. So if you want him to read them and answer your questions, he can.

MR. GRIFFIS: What I want to know is when he made the statements that he did about glyphosate and imputation, did you believe that glyphosate was not involved in these studies?

MS. FORGIE: My objection stands.

You can read them if you want before you answer those questions.
THE WITNESS: I don't know whether they evaluate glyphosate in these studies or not. I don't know whether they used the same method they used in the 2018 study and the data is highly questionable.
BY MR. GRIFFIS:
Q. The peer reviewers of "The American Journal of Epidemiology," "International Journal of Epidemiology," and the "Environmental Health Perspective" passed that procedure; right?
MS. FORGIE: Object to the form. Again, he hasn't looked at these. He's already stated he doesn't know what's in them. It's not fair. You're badgering him.
You can answer one more time.
THE WITNESS: They accepted the papers for publication but they -- it's unlikely that they understood the -- all the issues surrounding glyphosate and its use. And I . . .



(Exhibit Number 30-11 was marked for identification.)
BY MR. GRIFFIS:
Q. Exhibit 11 is the Heltshe Study which you cited in your expert report; correct?
A. Yes.
Q. And this is a paper in which the imputation procedure was tested; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. And it was tested by withdrawing a random sample of people who did respond to the second survey and pretending that they didn't respond and seeing how well the imputation procedure predicted the actual responses that those people gave; right?
A. Yes.
Q. So it compared imputation to real responses, data that was actually gathered; right?
A. Right.
Q. To see how well those two matched up.



In the introduction, sir, the left-hand column on the first page, it says halfway down first paragraph, "Multiple imputation has been widely accepted, and it's been used to account for missing data in large national surveys and studies," and it lists multiple studies including the Framingham Heart Study; right?
A. Yes.
Q. Do you have any criticism of the quality of the studies listed, NHANES III, National Assessment of Educational Progress, Children's Mental Health Initiative, and the Framingham Heart Study?
MS. FORGIE: Object to the form. This deposition is not about those studies. I'm going to let him answer that question.
THE WITNESS: I really don't know much about any of these studies.
BY MR. GRIFFIS:
Q. Are you able -- do you have the expertise and experience to be able to comment on whether multiple imputation is widely used in major national studies that



are well respected like the ones listed here?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: I would accept that statement.
BY MR. GRIFFIS:
Q. And the first sentence of the article, sir, "Missing data is a common problem in epidemiological studies and the statistical implications of ignoring missing data are well known, including loss of statistical power and potentially biased estimates of the association." And then they describe multiple imputation technique as one way to address that. Do you agree with that?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: I agree that imputation is one way to address this problem, yes.
///

BY MR. GRIFFIS:
Q. In the Heltshe --
MS. FORGIE: How much time is there, please.
THE VIDEOGRAPHER: Just for this tape.
BY MR. GRIFFIS:
Q. In the Heltshe study, sir, glyphosate was in the middle range for relative errors as calculated between the actual respondents and the imputed figures; correct?
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. I'm looking, for example, at Figure 2.
A. You're looking at Figure 2?
Q. Yes. You're welcome to look anywhere you like, but that's where I'm looking.
A. Yes, it's kind of at the lower edge, but it's close to the middle.
Q. Close to the middle. Looking at Table 3, sir, do you know -- do you know what a Brier skill score is and how to



assess it?
A. I don't.
Q. All right. Let's skip that then.
In the discussion section on page 413, sir, of the Heltshe Study, it says three sentences in, "In analyses, imputation is generally preferable to omitting individuals who did not complete phase 2, in our case, 37 percent of enrolled individuals, due to possible selection bias in the subset with complete data and decreased precision of parameters estimates using only a subset of data."
Do you see that, sir?
A. Yes.
Q. Do you agree that imputation is preferable to ignoring the data?
MS. FORGIE: Objection. Are you talking about in general or with glyphosate?
THE WITNESS: So -- yeah, so what they're saying here is that imputation is preferable to limiting the study to those with complete data.
///



BY MR. GRIFFIS:
Q. And you know that there were multiple sensitivity tests that were done in the NCI 2018 study to test the accuracy of its imputation procedure; right?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. GRIFFIS:
Q. None of those sensitivity tests itself relied on imputation; right? There are ways of checking the data without looking at it without imputation; right?
MS. FORGIE: Object to the form.
THE WITNESS: That's correct.
BY MR. GRIFFIS:
Q. And all three of those sensitivity checks came up with essentially the same result, i.e., no association between glyphosate and non-Hodgkin lymphoma; correct?
MS. FORGIE: Object to the form.
THE WITNESS: It's correct, but they all used the same basic flawed data due to exposure misclassification. So it's not surprising they came up with



the same result.
BY MR. GRIFFIS:
Q. They eliminated imputation entirely in those sensitivity analyses; right?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: In some of the analyses that's true. I don't know whether they did in all of them. We'd have to talk about them one at a time.
BY MR. GRIFFIS:
Q. Let's do. Page 4, first column.
MS. FORGIE: Are you back to the study?
MR. GRIFFIS: Yeah.
MS. FORGIE: That --
THE WITNESS: Page 4? Where are you?
BY MR. GRIFFIS:
Q. I'm in the first column, first full paragraph within the paragraph that starts in primary analyses, about three sentences in. And the first sensitivity test is described -- they say "We conducted several

sensitivity analyses."
Do you see that?
A. Right.
Q. Okay. So the first one was they restricted to exposure report at enrollment, in other words, the first questionnaire; correct?
A. Correct.
Q. So people that answered the first questionnaire, they just looked at that data and left out the second questionnaire; so they didn't need to impute any missing data; right?
A. Right.
Q. And when they did that, when they used only exposure information reported at enrollment, rate ratio in the highest exposed quartile was 0.82 percent and they report the confidence interval expands one.
So when they did the first sensitivity analysis leaving out imputation, there was, again, no association between glyphosate and non-Hodgkin lymphoma; correct?
MS. FORGIE: Object to the form and



asked and answered.
You can answer it again.
THE WITNESS: That's correct.
BY MR. GRIFFIS:
Q. Then they did a second sensitivity analysis a different way. "To evaluate the impact of using imputed exposure data for participants who did not complete the follow-up questionnaire, we limited the analysis to the 34,698 participants who completed both questionnaires." So if you didn't answer the second questionnaire, they left you out of this sensitivity test; right?
A. Correct.
Q. So, again, they didn't need to use imputation; right?
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. There was no imputation in this second sensitivity analysis?
A. Well, there may have been some imputation for the people who answered the questionnaire because they had to impute what their use was during that gap period we



talked about earlier. They had to do it. So they didn't include any imputation for the 37 percent who didn't complete the questionnaire, but they had to do some imputation for the people who did complete the questionnaire.
Q. So you believe the imputation procedure and not some other statistical control is how the gaps were addressed in people who answered the second questionnaire; is that right?
MS. FORGIE: Object to the form.
THE WITNESS: I don't know the answer, but I suspect that's how they did it.
BY MR. GRIFFIS:
Q. They didn't need --
A. They don't tell you how they did it.
Q. Yes, sir. The 37 percent -- for the 37 percent, the second sensitivity analysis leaves out that whole imputation procedure; correct?
A. Right, it leaves out all those people.



Q. And when they're left out, again, there's no statistically significant association, no association at all between glyphosate and non-Hodgkin lymphoma; correct?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: That's correct.
BY MR. GRIFFIS:
Q. Now, the third sensitivity test they truncated the follow-up period to 2005 so that their latest exposure information that they had which was 2005 they stopped follow-up there; so if they had mistakenly imputed any exposures or non-exposures, that wouldn't matter because they wouldn't be looking into the future at those cancers; right?
MS. FORGIE: Object to the form.
THE WITNESS: So -- yeah. So they imputed it for everyone, but they stopped the follow-up at 2005. So presumably any exposure misclassification that occurred after

that is not part of the issue.
BY MR. GRIFFIS:
Q. Right. It takes out that exposure misclassification issue --
A. Right.
Q. -- as a sensitivity test; right?
A. Right.
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. And once again there is no association in the resulting figures; right?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: Right, but, again, it's not surprising because the underlying data and the extent of the exposure misclassifications that occurred even at the time of enrollment you wouldn't see anything. So with each of these sensitivity analyses, there are still major issues and flaws just as there is in the overall analysis.
BY MR. GRIFFIS:
Q. Okay. Let's get the imputation



addressed first. As far as the imputation procedure goes, the imputation procedure that was used to address the 37 percent non-respondents in the second questionnaire, the NCI 2018 investigators did three separate sensitivity analyses that didn't rely on that imputation and came up with the same lack of association between glyphosate and non-Hodgkin lymphoma; correct?
MS. FORGIE: Wait. Object to the form. You've now asked him this four times. He can answer it one more time, but you're badgering the witness.
You can answer it again.
THE WITNESS: I believe the third one did include imputation up to 2005.
BY MR. GRIFFIS:
Q. Okay. Left out a big piece of imputation?
MS. FORGIE: Object to the form.
THE WITNESS: No, it included imputation up to 2005.
BY MR. GRIFFIS:
Q. And it left out a big piece of imputation as well; correct? -- in your



view?
MS. FORGIE: Object to the form. Asked and answered.
You can answer it again.
THE WITNESS: I don't know. I'd have to go back and look at that carefully but -- I'd have to go back and look at it carefully. I thought it did include imputation up to 2005.
BY MR. GRIFFIS:
Q. You're not sure?
MS. FORGIE: Object to the form. Asked and answered.
THE WITNESS: Let me look at it. I'm unclear on the last one whether the imputation was included or not.
BY MR. GRIFFIS:
Q. Okay.
A. I'd have to go back and review the methods.
Q. Okay.
MS. FORGIE: Do you want him to do that?
BY MR. GRIFFIS:
Q. Since you're not clear about the



third one, let's ask about the first two. They did two at least sensitivity tests that omitted the imputation procedure. Are we --
THE VIDEOGRAPHER: I should switch.
BY MR. GRIFFIS:
Q. That omitted the imputation procedure and came up with the same lack of association between glyphosate and NHL; correct?
MS. FORGIE: Object to the form. Asked and answered like five times.
You can answer it again.
THE WITNESS: I'm sorry. Ask the question again.
MR. GRIFFIS: Switch tapes, and we'll ask it again.
THE VIDEOGRAPHER: This will complete disk number 1. We're going off the record at 11:06 a.m.
(Recess taken from 11:06 a.m. to 11:16 a.m.)
THE VIDEOGRAPHER: This is the beginning of disk number 2. We are going back on the record. The time is 11:16 a.m.

THE WITNESS: So I'd just like to correct myself. For the last sensitivity analysis, they didn't use imputed data for any of the 37 percent who didn't complete the second questionnaire.

BY MR. GRIFFIS:

Q. For the last one, the third one that we were talking about, the truncated follow-up period --

A. Yes.

Q. -- to 2005, they didn't use any imputed data?

A. Not for the 37 percent.

Q. Okay. And the purpose of these three sensitivity tests was to test how reliable imputation was in this study; right?

MS. FORGIE: Object to the form.

THE WITNESS: Well, they're comparing different types of analysis to see whether there's any difference, and there wasn't any difference. So they're assuming that this confirms their imputation calculations, but all this --



all the analyses are using the same flawed data; so it's not surprising that the results are not different.

BY MR. GRIFFIS:

Q. Well, let's talk about imputation first, not the same flawed data point which we'll discuss with the imputation point.

As far as imputation goes, these are three sensitivity tests that were done to set aside imputation and see if similar results were reached, and the answer was yes. We get similar results without using imputation; right?

MS. FORGIE: Objection. Asked and answered. It mischaracterizes his answer.

THE WITNESS: So, yes, you get similar results, but there's a real selection bias that occurs here because you're only analyzing data on people who actually answered the two parts of the questionnaire. If you look at, you know, are the people who didn't respond to the second phase of the questionnaire different than the ones who did respond,



they're actually very different. So this is the problem with just using this kind of data because there's a selection bias for people who actually answered the questionnaire. And those people are very different actually than people who didn't answer the second phase of the questionnaire; so you're trying to guess what the people who didn't answer the second phase of the questionnaire -- you're trying to guess what exposure they had when, in fact, they're very different than the group that you used to train your imputation.

BY MR. GRIFFIS:

Q. First of all, you said that you're relying on people who answered the second questionnaire being similar to people who didn't answer the second questionnaire; correct?

A. Yes.

MS. FORGIE: Objection --

THE WITNESS: But they aren't -- they're very different.

///



BY MR. GRIFFIS:

Q. As to the first sensitivity analysis, that's not an accurate criticism because that was restricted to data from the first questionnaire; right?

MS. FORGIE: Objection. Asked and answered.

You can answer it again.

THE WITNESS: Right. So in the first -- so in the first sensitivity analysis, you just use the initial data, right.

BY MR. GRIFFIS:

Q. Okay. And you said that we know that the people who responded to the second questionnaire were different than the people who didn't respond to it.

A. Yes.

Q. What's the evidence for that?

A. Well, there's a paper by Montgomery which I didn't cite, but there's a paper by Rinsky which I did cite which also references the paper by Montgomery, and both those papers showed that the people who answered the second questionnaire were

actually very different than the people who didn't answer the second questionnaire.

MR. GRIFFIS: Let's mark Rinsky and Montgomery.

(Exhibit Numbers 30-12 and 30-13 were marked for identification.)

BY MR. GRIFFIS:

Q. Which one is Exhibit 12, sir?

MS. SHIMADA: Montgomery.

THE WITNESS: I'm sorry?

BY MR. GRIFFIS:

Q. Montgomery is 12?

A. Yes.

Q. In Montgomery, they looked at the difference between the people who responded to the second questionnaire and the people who didn't respond to it; right?

A. Right. They compared the two groups.

Q. In the abstract under "Conclusions," they said "Differences between non-participants and participants in the follow-up interview were generally small, and we did not find significant



evidence of selection bias"; right?

MS. FORGIE: Object to the form.

THE WITNESS: That's what they say.

BY MR. GRIFFIS:

Q. In the Rinsky paper, sir, 13, this is a comparison of people who did and didn't respond to a third interview; right?

A. Right. Response was even worse in the third questionnaire.

Q. And the third interview doesn't have anything to do with NCI 2018; right?

MS. FORGIE: Object to the form.

THE WITNESS: It doesn't, but it shows you that there are going to be even more problems in future analyses if they're ever done.

BY MR. GRIFFIS:

Q. As far as the critique of the non-responders to the second questionnaire in NCI 2018, Rinsky doesn't speak to that; right?

A. No, Montgomery does, but the findings are the same. And Rinsky references Montgomery.

Q. You've said several times during



this deposition that glyphosate is uniquely problematic for the NCI 2018 study and for the AHS dataset, in general, and that imputation will be biased with regard to it and that the basic data collection will be wrong with regard to it; correct?

MS. FORGIE: Object to the form. Mischaracterizes his testimony.

THE WITNESS: I think the marked change in the use of glyphosate right during the time of the enrollment and during the period after the enrollment has resulted in a significant amount of exposure misclassification, which is a problem for the study because this exposure misclassification is non-differential, and it biases any potential real findings to the null. So it gives you a negative study, and this is one reason why one in general has less confidence in negative studies than positive studies because when risk ratios are not high, they can just disappear with this kind of -- with this level of misclassification.



BY MR. GRIFFIS:

Q. And you have a hypothesis that changes in glyphosate use caused non-differential misclassification. Do you have any evidence that that is true?

MS. FORGIE: Object to the form.

THE WITNESS: No, but if you look at how the study was done and constructed, you'd know that there was significant amounts of exposure misclassification just by understanding the nature of how the study was done.

BY MR. GRIFFIS:

Q. Yes, sir. You have a hypothesis, but you don't have any evidence for it; right?

MS. FORGIE: Objection. Mischaracterizes his testimony, asked and answered.

You can answer it again.

THE WITNESS: Well, I'm not part of the study; so how can I develop evidence? I don't have -- I don't have access to the raw data to develop evidence. How could I develop evidence?

BY MR. GRIFFIS:
Q. Well, for example, sir, the NCI 2018 paper and the AHS pool of data, in general, has all sorts of supporting studies validating all sorts of different aspects of it, which is something the case-control studies don't have; right?
MS. FORGIE: Object to the form.
THE WITNESS: And many of those studies raised the issue of exposure misclassification and how it could be a major problem in the Agriculture Health Study.
BY MR. GRIFFIS:
Q. And none of them detected any exposure misclassification with regard to the glyphosate; correct?
MS. FORGIE: Object to the form.
THE WITNESS: The studies didn't necessarily focus on glyphosate.
BY MR. GRIFFIS:
Q. To close the loop, you can't point us to any evidence as opposed to your hypothesis that the glyphosate data incorporates differential misclassification;



right?
MS. FORGIE: Object to the form. Asked and answered.
You can answer it again.
THE WITNESS: So if you understand how the study was done, you know there was a significant amount of exposure misclassification, and basically the study does not address that issue. Okay? The study does not address that issue, and it should have been addressed.
BY MR. GRIFFIS:
Q. And imputation is designed to address the problem of exposure misclassification?
MS. FORGIE: Objection.
THE WITNESS: No, it's designed to fill in the gaps in information, but it can be also influenced by the initial exposure misclassification which occurred because that data is used as part of imputation method.
BY MR. GRIFFIS:
Q. And, again, so that the jury is



clear, when you say "the exposure misclassification that occurred," it is the exposure misclassification that you hypothesized by looking at the study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: I think it's pretty commonly -- if one studies the way the study was done, if one studies the methodology carefully, one can see that there's a significant likelihood of exposure misclassification which can't be addressed -- which can't be addressed and probably can't be measured because of the way the study was done.
BY MR. GRIFFIS:
Q. And there are no data or figures that you can point to for that?
MS. FORGIE: Object to the form. Asked and answered.
You can answer it again.
THE WITNESS: No, other than the whole body of information that we know about the agricultural health study.
///



BY MR. GRIFFIS:
Q. All of the flaws or errors, whatever term you like to use, that you've discussed today and that you believe exist with regard to this study, those are non-differential, not differential; correct?
MS. FORGIE: Object to the form. Mischaracterizes his testimony.
THE WITNESS: Yes, I think they're non-differential.
BY MR. GRIFFIS:
Q. Okay.
A. The other problem with the sensitivity analyses is that they're focusing only on people who actually responded to the questionnaires. So there's a selection bias in just analyzing that data, and the study doesn't recommend doing that because of the selection bias. That's why they decided to use the imputation data. Okay?
Q. Because it was better; right?
MS. FORGIE: Object to the form.
THE WITNESS: Because they thought it would be better.

BY MR. GRIFFIS:
Q. They thought it would be better, and there are studies on whether it's better like the Heltshe Study, and you can't point anywhere where they found that it's worse; correct?
MS. FORGIE: Object to the form.
THE WITNESS: It's not a matter of whether it's worse or not. It's do you use the data, or do you not -- do you just drop out the people who didn't respond, and I think for most of the analysis they did the imputation data is acceptable. But for glyphosate because of the special circumstances, it is highly questionable.
BY MR. GRIFFIS:
Q. All three of the sensitivity tests that were done would, if they were published as a standalone study, would be the biggest study out there other than NCI 2018 itself on the subject of glyphosate and non-Hodgkin's lymphoma; correct?
MS. FORGIE: Object to the form.
THE WITNESS: It's true, but they



would never be able to publish them that way because of the tremendous dropout of information and the selection bias that would have been introduced; so that's why they didn't do it.
BY MR. GRIFFIS:
Q. And in order for the dropout to matter, it would have to be differential; correct? It would have to -- people would have to not respond to the second questionnaire in a way that is correlated with their propensity to be exposed to glyphosate and contract non-Hodgkin's lymphoma from their exposure to glyphosate; correct?
MS. FORGIE: Object to the form.
THE WITNESS: We can't really know what the effect of having those 37 percent of people respond. We can't really know what that is. We can only guess, and that's what they did. The fact is that the group that didn't respond to the second questionnaire was very different from the group that did, and so it's very likely that the



imputation is flawed because of that because they used a group of people who were very different to impute the data to people who -- to another group of people.
BY MR. GRIFFIS:
Q. Montgomery says "Differences between non-participants and participants in the follow-up interview were generally small and we did not find significant evidence of selection bias"; right?
MS. FORGIE: Are you asking him whether you're reading a section correctly?
MR. GRIFFIS: I'm asking whether that was their conclusion.
MS. FORGIE: Object to the form.
THE WITNESS: That's what they say. That's what they say. If you look at the details, the group that didn't respond to the questionnaire were younger. They were less educated. They were more likely non-whites. They had poor health habits. They smoked more. They drank more. They ate -- had diets



that weren't as good. They were less likely to use pesticides, to mix and apply pesticides; so there were all kinds of differences between the non-responders and the responders that call into question the whole imputation process.
BY MR. GRIFFIS:
Q. What evidence is there that any of those factors is correlated with being exposed to glyphosate and contracting non-Hodgkin's lymphoma?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: We don't know the answer to that because they never gathered the data.
BY MR. GRIFFIS:
Q. Take a look, sir, again, at Table 2 in Exhibit 5, the NCI 2018.
A. Table 2?
Q. Yes. Let's just look at the data for lymphohematopoietic -- no, let's do non-Hodgkin's lymphoma. Are you there?

A. Your Table 2 of Andreotti?
Q. Yes.
A. Yes.
Q. Table 2, Exhibit 5, the NCI 2018. So we have here data for people who were unexposed and people in four different quartiles of exposure, Q1 being lowest, Q4 being highest; correct?
A. Yes.
MS. FORGIE: Object to the form.
BY MR. GRIFFIS:
Q. The relative risk pointed out to Mr. Gibbons 0.83, 0.83, 0.88, and 0.87. Those are the respective relative risks for quartiles 1 through 4; correct?
A. Correct.
Q. If there was non-differential classification in this study that biased results toward the null, then the true relative risks that you would get for non-Hodgkin lymphoma if you corrected for those would be figures smaller than 0.83, 0.83, 0.88, and 0.87; correct?
MS. FORGIE: Object to the form.
THE WITNESS: If the data is



correct, that's true. But there's no obvious reason to be able to understand why the risk ratios are lower than one. Okay? So if there's no risk -- right? -- if there's no risk, they should be about one. So the fact that they're, you know, almost 20 percent lower for some categories tells you that there are also some methodologic issues in the study which we don't understand. Either the control group is very unlike the group that got diseased or there's some random error. There is some other issues here which is hard to understand, why would the odds ratios actually be lower than one? We don't really believe glyphosate is protective for disease; right.
BY MR. GRIFFIS:
Q. You testified earlier, sir, that this pattern, a pattern for all cancers, for oral cavity, colon, rectum, pancreas, lung, melanoma, prostate, et cetera, is exactly what you would expect to see in a substance that does not cause cancer, i.e., point



value is somewhat higher than one, point value somewhat lower than one, all clustered tightly around one, all not significant, except possibly with some multiple comparison outliers here and there.
A. You have --
MS. FORGIE: Wait. Objection. Mischaracterizes his testimony.
THE WITNESS: If you look at the data for most of these other cancers, the numbers are clustered around one. For non-Hodgkin lymphoma, there's significant -- they're lower than one, consistently lower than one. So what that tells you is there's something different here, and we don't understand why that is. Okay? So the questions about non-differential misclassification actually changing a value below one is nonsensical to me. It makes no sense. Okay?
BY MR. GRIFFIS:
Q. So in your epidemiologic view, bias towards the null only applies to increasing P values -- increasing relative risks that



start out above one?
MS. FORGIE: Object to the form.
THE WITNESS: Well, if -- if they start out above one, it will decrease it towards the null. If they truly start below one, it will increase it towards the null, but there's no reason to believe that glyphosate actually prevents non-Hodgkin lymphoma, is there? No, there's not. So it's sort of nonsensical to make the argument below one. Okay?
BY MR. GRIFFIS:
Q. Okay. All of your points about non-differential bias, they wouldn't take something like the results that we see for lymphohematopoietic and move it towards one and beyond one and yield a statistically significant positive association because that would be the wrong direction for non-differential bias; right?
MS. FORGIE: Object to the form.
THE WITNESS: So if it was lower than one?
///

BY MR. GRIFFIS:
Q. Yeah, you're not going to get .87 ticking up towards one and beyond it by correcting for non-differential bias by definition; right?
MS. FORGIE: Object to the form.
THE WITNESS: No, but that's why I say that the fact that the odds ratios are lower -- consistently lower than one, there must be another explanation for that. Okay? Other than the fact that glyphosate is protective of non-Hodgkin's lymphoma. That doesn't make any sense either.
BY MR. GRIFFIS:
Q. What is it?
A. Uh-huh?
Q. What is the other explanation?
A. I don't know what the other explanation is. Either the control group is so different from the cases that it doesn't allow us to do a valid evaluation, or there's some random error. I don't know. My guess is that there -- my guess is that the control group is probably not a very



good group to use because they're very different from the cases, and actually that's the reason in the De Roos -- the first De Roos paper that they did an analysis of the low exposed to the high exposed instead of using -- doing the analysis of the high exposed versus the controls. And, in fact, it would have been interesting for these folks to do the same thing just to see if there's a difference. Okay?
My guess is that these risk ratios that are below one would have come much closer and clustered around one. So that's another issue with this study. The control group that they used probably isn't a very representative control group comparing the controls to the cases.
Q. Sir, to be fair, I've got five minutes left. You're supposed to be giving expert testimony here. None of this is in your expert report.
A. I'm answering your question.
MS. FORGIE: Wait, wait, wait.
///



BY MR. GRIFFIS:
Q. Are you testifying to a reasonable degree of medical certainty that these figures represent a difference in the control group from the composed group, and that's the reason for this, and that's an additional source of error in the data? Is that your testimony to a reasonable degree of medical certainty?
A. I'm suggesting that that may be an explanation for the lower than one odds ratios for non-Hodgkin's lymphoma. I'm suggesting that.
Q. That's a speculation?
MS. FORGIE: No. Objection.
THE WITNESS: It is speculation because no one has explained why they are not clustering around one, why they're all low. There's some methodologic issue here that is not addressed in the paper.
MR. GRIFFIS: Pass the witness.
MS. FORGIE: Okay. We'll take a break.
THE VIDEOGRAPHER: Going off the



record at 11:41 a.m.
(Recess taken from 11:41 a.m. to 11:55 a.m.)
THE VIDEOGRAPHER: This is continuing disk number 2. The time is 11:55. We are going back on the record.

EXAMINATION
BY MS. FORGIE:
Q. Doctor, you were asked a series of questions about your opinions about misclassification flaws in the AHS publication. Do you remember those questions?
A. Yes.
Q. And do some of those misclassification flaws apply to the 63 percent that answered the second questionnaire?
A. Yes, they do.
Q. So it's not just the 37 percent that did not answer the second question that those misclassification flaws applied to; correct?
A. Yes.

Q. You were also asked a series of questions with regard to the 37 percent and the questionnaires in there. You were asked a series of questions with regards to the statement at that follow-up, applicators reported the number of days each pesticide was used in the most recent year farm. Do you remember those questions?
A. Yes.
Q. With regard to the other years for which they did not answer that question, what information, if any, do we have about pesticide they were using?
A. We don't have any -- we don't know. We don't know what they were using. We don't know.
Q. How many years were involved in the period which we don't know what they were using and how long they were using it?
A. Somewhere between six and 12 years.
Q. And all that data is not in the study; correct?
A. We don't know that data for any of them.
Q. You mentioned that you've never



used an imputation formula in any of your publications. Do you remember that testimony?
A. Yes.
Q. And you mentioned that you don't know exactly how you would use an imputation method, but would you have access as chairman of the department of pathology here at a large cancer center, City of Hope, would you have access to people who are qualified to prepare an imputation process if you needed it?
A. Yeah. So the studies I was involved in remain case control studies where we gathered nearly complete data on all of the cases and controls so we didn't have a need for imputation. So I never needed to use imputation to create data for any of my studies. But, you know, if there had been a need, I would have engaged the epidemiologists that I collaborated with to do that.
Q. But if you have the data, you don't need to use an imputation process?
A. Right.



Q. If you collect the data, you don't need to use an imputation process; correct?
A. Right. You want to use real data whenever possible.
Q. And they could have -- the authors of the AHS study could have gotten that data if they had asked those questions; is that correct?
A. They could have, yes.
Q. Are you aware of any peer-reviewed publications that discuss the misclassification flaws in the AHS publication that you've addressed today?
A. Well, yes, there's the article by Gray that I reference in my report that talks about the fact that, you know, if you don't gather data in the follow-up studies, that there's a significant potential for exposure misclassification. And then there's the study by Acquavella and another study by Blair where they did some biomonitoring, and they both discuss the issue of exposure misclassification in the Agricultural Health Study and how it could be a significant factor.



Q. So the exposure misclassification flaws in the AHS publication that you've discussed today are also mentioned in peer-reviewed publications, and you just named three of those; correct?
MR. GRIFFIS: Objection. Leading.
THE WITNESS: Yes.
BY MS. FORGIE:
Q. You were asked several questions about how long it takes to develop non-Hodgkin's lymphoma after the use of Roundup. Do you remember those questions?
A. Yes.
Q. Is it possible to develop non-Hodgkin's lymphoma in one or two years?
A. It is possible after a short exposure, but it would be quite unlikely. But it's possible.
Q. And with regard to the answers that you were giving, you were giving answers about what you would want in an epidemiological study as compared to what would be exposure required in an individual; is that correct?
A. Well, we were talking about median

times of exposure or median times of follow-up. So, you know, as I said before, the more exposure and the longer follow-up, the better.

Q. For purposes of an epidemiological study; correct?

A. Yes.

Q. Oh, one more question. You were asked a question -- is the AHS publication a prospective study or retrospective study?

A. It's actually both because it's retrospective from the time of enrollment because that data is all gathered prior to enrollment. And then it is prospective in the sense that as you go forward, they will have additional follow-up questionnaires to try to update the data and have a complete and accurate database.

Q. Do you agree that the imputation error with regard to no differential misclassification of exposure is only asking about the last year of pesticide use compounds or makes the flaws in the AHS publication more severe than in any of the case-control studies?



MR. GRIFFIS: Objection. Leading.

MS. FORGIE: I'll withdraw it. I don't have anything else.

FURTHER EXAMINATION

BY MR. GRIFFIS:

Q. Sir, you said that it's possible to develop non-Hodgkin lymphoma in one to two years. What's your evidence for that?

A. No, what I said is it's possible that an exposure could cause non-Hodgkin's lymphoma after a short period of time. There's some evidence for that in studies of chemotherapy, high-dose chemotherapy, that when you use some high-dose chemotherapy that you can develop non-Hodgkin's lymphoma as a result of that, using it for another purpose like for breast cancer or testicular cancer or acute leukemia. But generally those are using very toxic agents at high doses. You could have a very short latency in that kind of a situation. I discussed that in my article that is referenced in my first report.

MR. GRIFFIS: No further questions.



MS. FORGIE: Thank you.

THE VIDEOGRAPHER: We are going off the record at 12:03 p.m. This will complete disk number 2 and complete today's deposition.

(Time noted: 12:03 p.m.)

_____

Dennis Weisenburger, M.D.

Subscribed and sworn to before me this day of , 2018.

_____

(Notary Public)

My Commission expires: _____



C E R T I F I C A T E

STATE OF CALIFORNIA:

I, LISA MOSKOWITZ, CSR, RPR, CRR, CLR, NCRA Realtime Systems Administrator, Certified Shorthand Reporter, do hereby certify:

That the witness whose deposition is hereinbefore set forth was duly sworn, and that such deposition is a true record of the testimony given by such witness.

I further certify that I am not related to any of the parties to this action by blood or marriage, and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 22nd day of January, 2018.

_____

LISA MOSKOWITZ, CSR 10816, RPR, CRR, CLR
NCRA Realtime Systems Administrator

NAME OF CASE: Roundup Products Liability Litigation
DATE OF DEPOSITION: January 22, 2018
DEPONENT: DENNIS WEISENBURGER, M.D.

1. To clarify the record.
2. To conform to the facts.
3. To correct transcription error.

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