Exhibit 2

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

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IN RE: ROUNDUP PRODUCTS LIABILITY LITIGATION

MDL No. 2741

Case No. 16-md-02741-VC

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This document relates to:

ALL ACTIONS

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DEPOSITION OF ALFRED I. NEUGUT, M.D. Ph.D.

New York, New York

January 3, 2018

Reported by:

MARY F. BOWMAN, RPR, CRR

JOB NO. 135741

January 3, 2018
10:09 a.m.

Deposition of ALFRED I. NEUGUT, M.D. Ph.D., Columbia Medical School, 722 West 168th St., New York, New York, before Mary F. Bowman, a Registered Professional Reporter, Certified Realtime Reporter, and Notary Public of the State of New Jersey.

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THE VIDEOGRAPHER: This the start of video number up with of Dr. Alfred Neugut, In re RoundUp Products Liability Litigation on January 3, 2018, at approximately 10:09 a.m.

My name is Manuel Garcia. I'm the legal video specialist for TSG Reporting Inc. The court reporter is Mary Bowman, in association with TSG Reporting.

Counsel, please introduce yourselves.

(Whereupon, counsel placed their appearances on the audio record)

THE VIDEOGRAPHER: Will the court reporter please swear in the witness.

ALFRED I. NEUGUT, M.D. Ph.D., called as a witness by the defendants, having been duly affirmed, testified as follows:

MS. WAGSTAFF: This is Aimee Wagstaff on behalf of the plaintiffs.

On November 11, 2017, MDL Judge Chhabria entered PTO 34, which ordered

that any expert wishing to testify about the study published on November 9, 2017, in the Journal of the National Cancer Institute is to submit a supplemental report and submit to a deposition not to exceed 2.5 hours.

Today, Dr. Neugut is appearing pursuant to PTO 34.

On December 21, 2017, Monsanto issued a Notice of Deposition with 12 requests for production of documents. It is my understanding you have received the documents that are responsive to that Notice of Deposition.

Did you receive documents from Mr. Travers?

MR. HOLLINGSWORTH: Yes.

MS. WAGSTAFF: Those are the only responsive documents to that Notice of Deposition.

Nonetheless, plaintiffs object to the scope of number 7, 8, 9, 10, 11, 1 and partially 2 based on the fact that they are beyond the scope of PTO 34.

MR. LASKER: OK, I don't remember what those numbers are, but I take your --

MS. WAGSTAFF: You haven't memorized them?

MR. LASKER: I will take your objection under consideration, but since, as I understand it, no documents were withheld on those grounds, it is a moot point, I guess.

EXAMINATION BY
MR. LASKER:

Q. Good morning, Dr. Neugut. I know you have been before this before and we have been before this before together. So I am just going to jump right in if that's OK with you.

A. Sure.

Q. Dr. Neugut, would you agree it is standard scientific methodology, when new scientific evidence emerges, to consider whether and how that new evidence impacts the scientific knowledge ab initio?

A. Yes.

Q. The evolution of knowledge

through new research and study is, in fact, integral to the scientific process, correct?
A. Yes.
Q. Since we last met for your first deposition, there has been a new epidemiologic study published that looks at whether there is an association between glyphosate product exposure and Non-Hodgkins lymphoma, correct?
A. Yes.
Q. And that is the study in -- and we'll mark this as the first exhibit in line.
MR. LASKER: And I don't know if it makes sense -- I didn't think about this beforehand, how we are going to formulate this because we have two different depositions. Let's make this --
MS. WAGSTAFF: Haven't we been doing them numbered 1, 2, 3?
MR. LASKER: Right, I know --
MS. WAGSTAFF: Let's make this --
MR. LASKER: I didn't know which

numbers we were at. Let's -- let's go off the record on second I'm sorry.
THE VIDEOGRAPHER: The time is 10:13. We are going off the record.
(Recess)
THE VIDEOGRAPHER: The time is 10:16. We are back on the record.
(Exhibit 26-1, document entitled "Glyphosate Use and Cancer Incidence in the Agricultural Health Study" marked for identification, as of this date.)
Q. So back on the record.
I have just marked as Deposition Exhibit 26-1 the new study from -- that we are discussing that had lead-off author of Dr. Andreotti, correct?
A. Yes.
Q. And this paper was authored by 12 scientists, if I count this correctly, who have affiliations in one way or another with the National Institutes of Health, correct?
A. Some of them do. Some of them have other affiliations, but wherever.
Q. And the publication is entitled,

"Glyphosate Use and Cancer Institute {sic} in the Agricultural Health Study had been published online, but it will be published in the national -- the Journal for the National Cancer Institute in this coming year of 2018, correct?
A. Yes.
Q. You have served as a peer reviewer for the Journal of National Cancer Institute, correct?
A. Yes.
Q. How many peer reviewers does the NCI Journal typically use to review manuscripts before it is accepted for publication?
A. Two or three.
Q. The Journal of the National Cancer Institute is a highly respected scientific journal, correct?
A. Yes.
Q. The Journal of the National Cancer Institute, in fact, is one of the most highly respected journals in the world, correct?
A. It is highly respected, yes.

Q. You are familiar with the rating scheme that ranks scientific journals based on their impact factor, correct?
A. Yes.
Q. What is an impact factor?
A. An impact factor is a measure of how often the papers that are published in the journal are cited by another in other publications.
Q. That would be other scientists who are citing to the publication, correct?
A. Correct.
Q. And let me show you and we will mark this as Exhibit 26-2.
(Exhibit 26-2, excerpt from "Oxford Academic" marked for identification, as of this date.)
Q. This is something that comes from the website for of the Journal of the National Cancer Institute and on the third page, you will see a listing of the journal's impact factors going back from between 2006 and 2016, correct?
A. Yes.
Q. The Journal of the National

Cancer Institute routinely ranks among the top 5 percent of all oncology journals in the world, correct?
A. Yes.
Q. The 2018 National Cancer Institute journal study that we have been talking about that has been marked as Exhibit 26-1 provides updated data for the agricultural study cohort based upon additional years of follow-up of 54,251 pesticide applicators, correct?
A. Yes.
Q. The study updated, and I think they say this in the abstract, the study updated the previous evaluation of the AHS cohort, previous evaluation of glyphosate with Cancer Institute incidence from residency linkage through 2012 for North Carolina and for 2013 in Iowa, correct?
A. Yes.
Q. The 2018 NCI Study, thus, had cancer institute for these 54,251 pesticide applicators extending nearly 40 years after the introduction of glyphosate on to the market, correct?

A. Yes.
MS. WAGSTAFF: Objection to form.
Q. There are in total 575 cases of Non-Hodgkins lymphoma among these pesticide applicators, some of whom have been exposed to glyphosate-based herbicides and some of whom have not been, correct?
A. Yes.
Q. The prior publication analyzed an AHS cohort which is the DeRoos 2005 study was based on 92 NHL cases, correct?
A. I don't recall.
MR. LASKER: Let's pull out Dr. Neugut's initial expert report.
MS. WAGSTAFF: Counsel, I'll let you ask a couple questions on this, but this deposition was not designed nor allowed to revisit his initial report and so he is prepared nor ready to talk about his initial report right now. So depending on how deep you go into his initial report, I may instruct him not to answer.
MR. LASKER: Not going very deep at all. Just a number of things.

MS. WAGSTAFF: All right.
Q. It is fair to say, Dr. Neugut, that the 2018 NCI study is significantly more powerful in looking to an association between glyphosate-based herbicides and Non-Hodgkins lymphoma than DeRoos 2005, correct?
MS. WAGSTAFF: Object to form.
A. Powerful in what sense?
Q. In the ability to detect statistical significance of an association?
A. Yes.
Q. With -- there are, in fact, significantly more -- let me just show you, Dr. Neugut, your initial expert report, and this is on page 12. We have a copy for you if you just want to look it. I won't mark it as an exhibit.
MS. WAGSTAFF: You can read as much as you want of the report.
Q. I am going to ask you to confirm the number --
A. What is this document?
Q. So this is your initial expert report?

MS. WAGSTAFF: Can I have a copy please?
A. You mean from some months ago?
Q. Yeah. And the only information on here is just to confirm your recollection, you're talking about the DeRoos 2005 study and there is -- you have indicated the number of NHL cases for Non-Hodgkins lymphoma and it is about midway through the first paragraph as being 92 cases of Non-Hodgkins lymphoma in the 2005 DeRoos study, correct?
MS. WAGSTAFF: Doctor, if you need to read the whole part about DeRoos 2005 to get your bearings, you certain can and I renew my previous objection.
Are you marking this as an exhibit?
A. I'm not seeing where -- I see, OK. Yes, it says 92 cases. Is that what you are referring to?
Q. Yes.
A. Um-hm, yes.
Q. So the 2018 NCI study with

respect to Non-Hodgkins lymphoma has roughly six times the number of NHL cases as the 2005 DeRoos study, correct?

MS. WAGSTAFF: Object to form.

A. That's correct.

MS. WAGSTAFF: You keep calling it the 2018 study. I don't know if you mean to be doing that.

MR. LASKER: It's going to be published in 2018, so.

Q. There are, in fact, significantly more NHL cases with exposure to glyphosate in the 2018 NCI study than there are in all of the case control studies of glyphosate in Non-Hodgkins lymphoma combined, correct?

A. I wouldn't know.

Q. Well, let's again, just to refresh your recollection and continue with your expert report, look at, for example, the DeRoos -- I'm sorry, the McDuffie study -- and that's on page 14 of your initial report. You can turn to page 14.

A. 14?

Q. The McDuffie paper, if you look, starting at line 5 of your description of

that report with respect to Non-Hodgkins lymphoma, McDuffie, the McDuffie study looked at 51 exposed cases with Non-Hodgkins lymphoma, correct?

A. Yes.

Q. And you would agree -- let me strike that.

For the 2018 NCI study, there were 440 cases of Non-Hodgkins lymphoma with exposures to glyphosate, correct?

A. You are talking about in the ever/never --

Q. Sure, if you can look on desk -- look at the 2018 study and particularly it at table 2, which is on page 5. There is the breakdown of Non-Hodgkins lymphoma for never exposure and the four quadrants of exposure, correct?

A. Yes.

Q. And we have 135 cases of Non-Hodgkins lymphoma out of the 575 that had no exposure, correct?

A. Yes.

Q. Which means we have 440 cases of Non-Hodgkins lymphoma with exposure to

glyphosate-based herbicides in that study, correct?

A. Yes.

Q. And you would agree that 440 exposed NHL cases provides enough power to address statistically the question whether glyphosate-based herbicide exposure is associated with Non-Hodgkins lymphoma, correct?

A. Can you state that question again?

Q. Sure. You would agree that with 440 exposed NHL cases, the 2018 NCI study has enough power, statistically, to address the question whether glyphosate exposure is associated with Non-Hodgkins lymphoma, correct?

A. I would not be able to know without doing a power analysis as to whether it could exclude a risk ratio of 1.3 or 1.4. So I don't have any sense of that.

Q. OK. Let's mark as 26-3, this is testimony that you provided in connection with the Actos litigation and I'll direct

to you certain page.

(Exhibit 26-3, Deposition Transcript of Alfred Neugut dated March 12, 2013 marked for identification, as of this date.).

Q. And if you look at the first page of this transcript, you will see this is testimony that you provided in court during the trial of Jack Cooper. Do you see that?

A. Yes.

Q. And on page 46, --

A. 41?

Q. 46. So there is four pages on a page, so it's actually on the top right of each of the four squares, you will see the number.

So if you go to page 46 of that testimony.

A. Yes.

Q. Here, you are answering questions from plaintiff's counsel who is also plaintiff's counsel in this litigation, Mr. Miller, correct?

A. Yes.

Q. And you are looking, talking

about a study, a cohort study that in this case was looking at bladder cancer and exposure to Actos, correct?

A. Yes. Yes.

Q. In that case you were talking about a study with 470 people with bladder cancer. And that, I take it, was either who had exposure to Actos or who did not, correct?

A. I don't recollect, but I assume it was talking about exposure to Actos, yes.

MS. WAGSTAFF: I will object to taking snippet of testimony out of context of the entire litigation.

Q. And with respect to the Actos litigation, in response to a question by plaintiff's counsel, you testified that 470 exposed cases gave you a reasonable shot of having statistical power to really address the question that we are all interested in, correct?

A. There, we were talking about -- I don't know what the risk ratios were that were being discussed in my recollection at

this time at the time.

I mean, if one wants to know how much statistical power there is, one has to do a formal -- or one should do a formal statistical analysis to be able to determine that. The size of the cohort is really not the issue. 115,000 people is really irrelevant or whether it is 50,000 people.

You're correct in talking about the number of exposed cases. It's the end number of end points. But again, I can't ascertain -- and it also depends on the exposure -- on how many are -- how many unexposed there are, et cetera.

So I have no idea if we are talking about risk ratios of 1.3 or 1.4 or 1.5, I have no idea how many cases one would need to have enough statistical power to address the issue and whether the study was large enough to ascertain that.

Q. You had not done any analysis then to determine whether or not the 440 exposed NHL cases in the 2018 NCI Study provides power sufficient to detect a rate

ratio of 1.3, or 1.4?

A. So I did not do it up front and I don't know if the -- I don't know if the investigators did it either. I don't recall seeing it in the -- I don't recall seeing it in the publication. It's not mentioned, to my recollection.

You could look through the paper and see. I don't recall seeing it in -- usually it is put in the methods section if it's done and I don't recall seeing it in the methods section either.

Q. Have you done any power analyses for glyphosate epidemiology to determine the relative strength of studies with respect to power to detect increased or -- association?

A. Sure. And usually the -- OK. I'll let it go then.

Q. The -- I think, as you mentioned, the issue that you look at is the number of exposed cases with Non-Hodgkins lymphoma?

A. As compared to the controls. I mean both numbers are relevant.

Q. Now, the 12 investigators that

published the 2018 NCI study, in their abstract of the paper, conclude, in their conclusion statement, "In this large prospective cohort study, no association was apparent between glyphosate and any solid tumors or lymphoid malignancies overall including NHL and its subtypes."

Did I read that correctly?

A. Yes.

Q. And in the conclusion section in the text of their study, on page 712, the investigators state, "Again, in our study, we observe no associations between glyphosate use and NHL overall or any of its subtypes."

Correct?

A. I'm not seeing where you're reading, I'm sorry.

Q. It's up on the screen as well, but it's on page 7 and it is the first column. And the 12 investigators --

A. Oh, I see.

Q. -- in this paper state, "In our study, we observed no associations between glyphosate use and Non-Hodgkins lymphoma

overall or any of its subtypes." Correct?
A. Yes.
Q. They further state that this lack of association was consistent for both exposure metrics -- and that's intensity weighted, cumulative days of exposure, and separately, cumulative days of exposure, correct?
A. Yes.
Q. The lack of association was also consistent for unlagged and lagged analyses looking at different periods of time of exposure, correct?
A. Yes.
Q. And it was -- the lack of association was also consistent after -- consistent after further adjustments for pesticides linked to NHL in previous analyses, correct?
A. Yes.
Q. And the lack of association was also found when they excluded multiple myeloma from the Non-Hodgkins lymphoma grouping, correct?
A. Yes.

Q. This statement by the investigators accurately reports the reported findings of the 2018 NCI study with respect to glyphosate and Non-Hodgkins lymphoma, correct?
MS. WAGSTAFF: Object to form.
A. It reports what they reported.
Q. And this statement of the study findings was accepted by the Journal of National Cancer Institute after independent peer review, correct?
A. It's what was published. I don't believe the Journal of the National Cancer Institute would claim infallibility or that every study it publishes is totally accurate or correct.
Q. I understand. But the statement of the study's findings that there was no association between glyphosate-based herbicides and Non-Hodgkins lymphoma, looking at it from all these different angles, that statement was accepted by the Journal of National Cancer Institute to be published in its journal after independent peer review, correct?

MS. WAGSTAFF: Objection, asked and answered.
A. Yes.
Q. Let's look at the rate ratios that were reported in the study for Non-Hodgkins lymphoma and we will look back again to table 2, and this is on page 5. We can go down a little bit and look at this one a little closer.
Table 2 is setting forth a finding -- are you OK?
A. Sorry.
Q. Table 2 sets forth the findings from the 2018 NCI Study based upon intensity weighted cumulative days of exposure, correct?
A. Yes.
Q. And as you mentioned earlier, the first category, the "none" in this table would be "never" exposure, correct? For -- and we will look specifically -- there is a number of different cancers here, but let's look at Non-Hodgkins lymphoma.
So we have 135 cases which would be in the never exposure category, correct?

A. Um-hm, yes.
Q. And then we have four categories that would make up in aggregate those people who had exposure or were considered "ever" exposure to glyphosate, correct?
A. Yes.
Q. And the never/ever rate ratio for Non-Hodgkins lymphoma and glyphosate exposure in the 2018 study, NCI Study would be approximately 0.85, correct?
A. In that ballpark. I don't recall the exact number, but it was around that.
Q. The -- when we talk about intensity weighted exposure, let's define that or let's let the investigators of -- the NIH investigators explain clearly what that means.
On page 2 of the Andreotti study, they explained, and it is on the second column towards the top, they explain how the intensity score was derived for the purposes of their analysis, correct?
A. We are now on page 2 on the top of the second column?
Q. Yes, and you can see on the

screen where I'm pointing.
A. OK. Yes.
Q. And the intensity score was derived from an algorithm first based on literature-based measurement -- literature-based measurements, correct?
A. Yes.
Q. And also on information provided by the applicator, specifically whether the participant mixed or applied pesticides, correct?
A. Yes.
Q. Whether the applicator repaired pesticide-related equipment, correct?
A. Yes.
Q. Whether the applicator used personal protective equipment, correct?
A. Yes.
Q. And what application method was used by the applicator, correct?
A. Yes.
Q. And going back now to table 2, on page 5, and the findings for Non-Hodgkins lymphoma are in the 2018 NCI Study, the NIH scientists reported that there was a lower

incidence of Non-Hodgkins lymphoma in each of the four different levels of glyphosate exposure groups as compared to no exposure, correct?
MS. WAGSTAFF: Object to form.
A. Not a low incidence.
Q. I didn't say -- a lower incidence. Let me repeat the question.
The NHL scientists reported there was a lower incidence of Non-Hodgkins lymphoma in each of the glyphosate-exposed groups than there was in the group with no glyphosate exposure, correct?
A. Yes.
Q. Based upon -- OK. And the NCI Study also found no evidence of a dose response for glyphosate intensity-weighted days of exposure for Non-Hodgkins lymphoma or any Non-Hodgkins lymphoma subtype, correct?
A. Correct.
Q. The 2018 study also found no evidence of a dose response and this is in one of the supplemental tables, table 2, -- I'm sorry, table 1. So if we go to the

first supplemental table, it's in your --
A. Do I have that?
Q. Yes, keep turning the pages, you'll get past the references and then there will be a first supplemental table, table 1. Do you see that?
A. Yes.
Q. This is the second exposure method, correct? Cumulative days? This is measuring for cumulative days, correct?
A. Yes.
Q. And if you look at the dose response analysis for Non-Hodgkins lymphoma by the separate exposure metrics, again, there is no evidence of a dose response for glyphosate-based herbicide exposure and Non-Hodgkins lymphoma or any of its subtypes, correct?
MS. WAGSTAFF: Object to form.
A. Correct.
Q. And the 2018 NCI Study also found no evidence of an association between exposure to glyphosate-based herbicides and Non-Hodgkins lymphoma when they limited their analysis to different periods of time

of exposure, correct?
MS. WAGSTAFF: Object to form.
A. Can you clarify that?
Q. So -- sure. The NCI, the 2018 NCI Study conducted various lag analyses looking at exposures in different periods of time to glyphosate-based herbicides, correct?
A. Yes.
Q. And each of those time periods that they looked at for exposure, they did not find evidence of an association between glyphosate-based herbicides and Non-Hodgkins lymphoma, right?
A. Right.
MS. WAGSTAFF: Object to form.
Q. Some of these -- for example, the 12 NIH investigators looked to see whether there was any association between glyphosate-based herbicides and Non-Hodgkins lymphoma if they limited their analyses to exposures that occurred either 15 years before or 20 years before their diagnosis with Non-Hodgkins lymphoma, correct?

A. Can you repeat that question. I am sorry.
Q. Sure. The NIH scientists who conducted the 2018 NCI study looked to see if there was any association between glyphosate-based herbicides and Non-Hodgkins lymphoma if they limited their analyses to exposures that took place either 15 years before or 20 years before either the end of the follow-up period or the date of diagnosis, correct?
A. Yes.
Q. So each of those analyses look at exposures to glyphosate that date back before the introduction of RoundUp Ready crops, correct?
MS. WAGSTAFF: Object to form.
Answer if you know.
A. So the lagging took out the cases that occurred during specific time frames after the exposure was measured.
Q. So the lagging, if I understand correctly, and correct me if I am wrong, for the 15-year lag -- let's start the 20-year lag. It's easier math.

The 20-year lag, you are looking at the exposure that took place at least 20 years prior to the end of the follow-up period which is 2012 or 2013, correct?
A. I haven't thought about it in that way before, but let me think about it for a moment.
Yes.
Q. And then when the 2018 NCI Study looked at exposures dating back to that period prior to the introduction of RoundUp Ready crops, there was no evidence of an association from that glyphosate-based exposure and nonHodgkins lymphoma, correct?
MS. WAGSTAFF: Object to form.
Answer if you know.
A. Correct.
Q. The NIH scientists also looked to see if there was any association between glyphosate-based herbicides and Non-Hodgkins lymphoma if they included exposures that occurred either within five years or within ten years of the end of the study period of 2012, 2013, correct?
A. Yes.

Q. That analysis would then look at glyphosate-based herbicide exposure following the introduction of RoundUp Ready crops, correct?
A. Yes.
Q. There was no evidence, in the 2018 NCI Study, of an association between Non-Hodgkins lymphoma and glyphosate-based herbicide exposure subsequent to the introduction of RoundUp Ready crops, correct?
MS. WAGSTAFF: Object to form.
A. Yes.
Q. In fact, the rate ratios for Non-Hodgkins lymphoma for the highest dose of exposure were even lower when they included exposures that occurred during the period after the introduction of RoundUp Ready crops, correct?
A. I don't know offhand.
Q. If you look at, again, table -- why don't we look at table 3 in this analysis, and this is on page 6. You've reviewed all these tables, of course, before today, right?

A. Of course.
Q. So table 3 in the 2018 NCI Study has lag analyses that look at those two time periods, five-year lag, which would include exposures after the introduction of RoundUp Ready crops, and the 20-year lag, which would be limited to exposures prior to the introduction of RoundUp Ready crops and for Non-Hodgkins lymphoma, the incidence of glyphosate -- I'm sorry, the incidence of Non-Hodgkins lymphoma, the highest exposure level after the introduction of RoundUp Ready crops was even lower than it was prior to the introduction of RoundUp Ready crops, correct?
A. Which number are you referring to?
Q. So the highest exposure would be quadrant 4, correct?
A. You are talking about 0.87?
Q. 0.87, correct?
A. Yeah.
Q. In your supplemental expert report, you state that there is -- this is

at -- I guess we should mark this. We didn't mark this yet.

MS. WAGSTAFF: What table is that there?

MR. LASKER: Table 3.

MS. WAGSTAFF: Oh, from the supplemental.

Q. So let's mark your supplemental expert report as 26-4.

(Exhibit 26-4, Supplemental Expert Report of Alfred Neugut marked for identification, as of this date.)

Q. Dr. Neugut, at page 11 in your supplemental expert report, you discuss a relative risk, what you describe as a -- this is the bottom of the page, a modest relative risk of 1.3 to 1.4 for ever/never use of glyphosate. Do you see that?

A. Yes.

Q. And this modest relative risk of 1.3 to 1.4 is the number that you obtained from the metanalyses that were conducted of the glyphosate epidemiologic literature back in 2015, correct?

A. Yes.

Q. You would agree that an updated metanalysis of the current body of epidemiologic data on glyphosate and Non-Hodgkins lymphoma would result in a lower relative risk, correct?

MS. WAGSTAFF: Object to form.

A. No.

Q. The 2015 metanalysis included the DeRoos 2005 analysis of the Agricultural Health Study cohort, correct?

A. Yes.

Q. And that analysis, which was, as we already discussed, with a smaller number of cases reported an ever/never rate ratio of 1.1, correct?

A. I don't recall the figure, but I'll take your word for it.

Q. An updated metanalysis, if it were to include the 2018 NCI journal study, would substitute the 2005 analysis with a larger study that has a lower ever/never rate ratio, correct?

MS. WAGSTAFF: Object to form.

A. I wouldn't necessarily concur that the JNCI study should be amalgamated

into a metanalysis.

Q. I understand that. Let me ask the question this way: If the 2018 NCI Journal of National Cancer Institute study was included in the metanalysis -- when we've discussed previously how that metanalysis -- the methodology that was used for that metanalysis, if the 2018 Journal of National Cancer Institute study was included in the metanalysis, the relative risk would be lower than reported in the 2015 metanalyses, correct?

MS. WAGSTAFF: Objection. The witness has stated that he does not believe it should be included.

A. So I mean, again, if -- the I mean, the first part in doing a metanalysis is to evaluate the quality of the study, and if I don't think the quality of the study merits inclusion, I wouldn't concur that it should be included.

If you want to include a study that I don't think should be included and get a result that I don't think is accurate, then you can get any conclusion

you like.

Q. I understand that. I want to separate this out though to make sure I understand the math.

If the 2018 NCI Study results are included in the metanalysis, that would result in a lower relative risk than is reported in the metanalyses that you rely upon, correct?

MS. WAGSTAFF: Objection, asked and answered three times.

THE WITNESS: Am I supposed to answer?

Q. Yes.

A. I wouldn't really know.

Q. So is it my understanding then that you cannot determine whether replacing a study that reported a 1.1 rate ratio with 92 cases with a study with 0.85 rate ratio with 575 cases, you're not able to determine, sitting here, whether that would lower the meta-relative risk?

MS. WAGSTAFF: Objection, asked and answered, and the doctor has said he does not believe it should be

included which is why he doesn't know.
Q. It is still a fairly simple mathematical issue thought, isn't it, Dr. Neugut?
MS. WAGSTAFF: Objection, argumentative.
Q. This is not complicated math, is it?
A. Clearly, if it were included, incorrectly included, it would give you an incorrect -- it would incorrectly obviate the elevated risk.
Q. The meta-relative risk would be lower, correct?
A. Yes.
Q. Let me show you an expert report that has been prepared by Monsanto's experts, supplemental report by Dr. Mucci.
MS. WAGSTAFF: Are you marking it as exhibit?
MR. LASKER: Yes.
MS. WAGSTAFF: So I think it is 26-5.
(Exhibit 26-5, Supplemental Expert Report of Lorelei Mucci marked

for identification, as of this date.)
Q. Dr. Mucci, in her expert report, provides her calculations of a meta-relative risk based on the current available epidemiologic data of glyphosate-based herbicides and Non-Hodgkins lymphoma.
Now, I understand that you have disagreements to which studies you would include in a metanalysis. But let me ask you first, Dr. Mucci, in her metanalysis of the epidemiologic literature, which includes the 2018 NCI Study, the North American Pooled Project, the Eriksson study and Orsi study, she calculates a meta-relative risk for glyphosate-based herbicide and Non-Hodgkins lymphoma of 0.9.
Did I read that correctly?
A. Yes.
Q. Do you have any reason to believe that Dr. Mucci, using the studies that she used, calculated this meta-relative risk figure 0.9 incorrectly?
A. I don't know Dr. Mucci, so I don't have any reason to believe or not

believe her.
Q. OK, well, you're looking at the data though. It is not really an issue of Dr. Mucci itself or herself or what you know about her.
But looking at Dr. Mucci's analyses, and again, do you have any reason to believe that the calculation of the meta-relative risk, the mathematical calculation of 0.9 is incorrect?
MS. WAGSTAFF: Objection, Dr. Neugut has already testified that he doesn't believe that the 2017 AHS study should be included in metanalysis?
A. I mean, actually, based on her analysis, we should all be taking RoundUp to protect us against Non-Hodgkins lymphoma.
Q. Is it your determination she decided there was a statistically significant decreased risk of Non-Hodgkins lymphoma?
MS. WAGSTAFF: Objection --
A. Just missing it.

Q. So do you have any reason to believe, looking at the numbers that Dr. Mucci reports for the four epidemiological studies that she used in her analysis -- again, the 2018NCI study, the North American Pooled Project study, the Eriksson study and the Orsi study -- do you have any reason to believe that her calculation of a meta-relative risk of 0.9 is incorrect?
A. No.
MS. WAGSTAFF: Objection, also, Dr. Neugut testified in his first deposition that he wasn't relying on the NAPP study.
MR. LASKER: OK. I'm going to give you some leeway with your objections, but these are not objections now. These are just testimony and that is not proper.
You can object to form, certainly, but objections that include substantive information is not appropriate for an objection.
MS. WAGSTAFF: I will remind

counsel that plaintiffs actually tried to get an order where we limited objections to form that was strenuously objected to by Monsanto. So -- and applied by the court so I will take heed to your request, and I think that everything I've said is completely appropriate.

Q. OK. Dr. Neugut --

A. I would say that I don't know the NAPP study. So if that's a significant part of this, I'm not testifying on the NAPP study or its inclusion or noninclusion. So if that's playing a significant role here, I'm not prepared or -- to talk about that.

Q. And I was going to get to this question later, but I'll ask you now, but I think it is clear from the record, am I correct in my understanding that you still have not reviewed the NAPP study?

A. It's not a peer-reviewed publication.

Q. OK, I need the record -- an answer for the record. Am I correct in my

understanding that you have not reviewed the NAPP study?

A. Correct.

Q. Dr. Neugut, do you believe that the 2018 NCI Study strengthens or weakens the epidemiological evidence in support of your opinion of an association between glyphosate-based herbicides and Non-Hodgkins lymphoma?

A. I think it is noncontributory.

Q. So am I correct in my understanding that you do not believe that the 2018 NCI Study provides evidence at all with respect to with whether there is an association between glyphosate-based herbicides and Non-Hodgkins lymphoma?

A. Yes.

Q. Now, in your initial report, -- and this is discussing the AHS cohort, so it is still part of this, the same cohort that we are studying, but I want to make sure I understand which of your opinions extend to the 2018 NCI Study. So let's look back -- we -- you still have a copy of your original expert report, correct?

A. I'm sorry, which exhibit?

Q. Your initial expert report. I don't know if we have marked it. We can if you want.

A. We are talking about my original report from way back when?

Q. Right.

A. Yup.

Q. So at page 12 of your initial expert report, you're talking about criticisms that you had of the previous published analysis of the AHS cohort which was the 2005 DeRoos publication, correct?

A. Yes.

Q. The first criticism you had of the DeRoos 2005 study which is, again, on page 12 of your initial expert report, you stated that the investigators would need to follow the AHS cohort for a much longer period of time in order to adequately evaluate cancer and specifically NHL risk from glyphosate exposure, correct?

A. Yes.

Q. The 2018 NCI Study includes either 11 or 12 more years of follow-up of

cancer outcomes in the AHS cohort, correct?

A. Yes.

Q. The second criticism that you made of the DeRoos 2005 study in your initial expert report was for its alleged failure to look at different dates of exposure to assess the disease latency period for Non-Hodgkins lymphoma, correct?

A. Yes.

Q. And as you have already testified -- as you have already testified today, the 2018 NCI Study does conduct analyses and provide rate ratios for different time periods or lagged periods of exposure to assess disease latency, correct?

A. Yes.

Q. The third criticism that you had of the 2005 AHS study dealt with the issue of potential confounding from other pesticides. And I -- I'm -- I think your testimony on that was pretty clear from the first deposition, so I'm going to jump over that one for now and talk about --

MS. WAGSTAFF: Object to form.

Q. The fourth criticism you had which is nondifferential exposure and misclassification, correct?
A. OK.
Q. That is the issue that you focus on in connection with your analysis also of the 2018 NCI Study, correct?
A. Yes.
Q. So let's talk about those criticisms and you can put away your old -- your prior expert report.
If I understand correctly, the focus of your criticisms of the 2018 National Cancer Institute is a possibility of misclassification of exposures, correct?
MS. WAGSTAFF: Object to form.
A. Yes.
Q. And you note in your supplemental expert report that the NIH investigators who conducted the 2018 NCI Study also note the possibility of exposure, misclassification bias in their publication, correct?
A. In which publication?
Q. In the 2018 NCI Study?

A. Actually, I reread it and I'm not sure that they do.
Q. Well, let's look at what you have stated in your expert report. And this, I believe, is on page 7 of your supplemental expert report.
A. My supplemental report?
Q. Yes. What is that, 26-4?
A. What page are we on?
Q. Page 7. And at the top of page 7 of your supplemental report, you quote -- and this is an accurate quote from the 2018 NCI journal article, "Despite the specific information provided by the applicators about use of glyphosate, some misclassification of exposure undoubtedly occurred." Correct?
A. Yes.
Q. And the NIH investigators further state, "Given the prospective design, however, any misclassification should be nondifferential and lead to attenuated risk estimates."
Correct?
A. Yes.

Q. And you, in your expert report, raise a number of criticisms of the study design that you believe could have led to such nondifferential exposure, misclassification and attenuation of risk estimates correct?
A. I think I misread the discussion.
Q. Yes.
A. I misread this quotation.
Q. I'm not sure I understand your answer then. In your expert report --
A. I put it in here and I -- rereading the paper, I think I misread what was -- what the paper says.
Q. So let me ask you --
A. So I --
Q. -- separate from the paper?
A. I think this quote -- I think my interpretation of this quote is in error.
Q. Let me ask you separate from the quote. In your expert report elsewhere, you talk about misclassification of exposure leading to attenuating risk estimates, correct?
A. Yes.

Q. And you would also agree that because the 2018 NCI Study is a cohort study in which exposure information was obtained prior to any disease outcome, that any potential exposure misclassification would be nondifferential with respect to disease outcome, correct?
A. So if by that you mean that it is unbiased, the answer is no, I wouldn't necessarily agree.
Q. No, that wasn't my question. Let me ask my question again. Because the 2018 NCI study --
A. Right, OK, it's nondifferential with regard to disease outcome. Certainly when the -- if by that you mean that when the exposure measurement was made, no one knew if they were going to get lymphoma --
Q. Right?
A. -- sure.
Q. So just so the record is clear, because I'm reading the question and answer, it's not quite.
Am I correct then that the 2018 NCI Study, the exposure classification or

any misclassification would be nondifferential with respect to disease outcome?

MS. WAGSTAFF: Objection, asked and answered.

A. I don't know what that means.

Q. OK.

A. That's a phrase that has no meaning to me.

Q. OK. So let me try and rephrase to make sure that you can -- that you understand the question.

In the 2018 NCI Study, to the extent that there was any exposure misclassification in that study, given the fact that exposure information was obtained prior to knowledge of disease outcome, that misclassification would be nondifferential with respect to disease outcome, correct?

A. You just repeated the question. Again, I don't know what that phrase means.

Q. There is -- do you have any basis to believe that there was any difference in exposure misclassification to the extent that there was exposure misclassification

that was also associated with whether or not the individual would subsequently get Non-Hodgkins lymphoma?

A. So I will agree that to the degree that when the farmers -- the applicators were answering the questions with regard to their exposures, that whatever biases or whatever errors they were making in terms of -- or whatever answers they were giving in terms of their exposures were independent or unbiased by their knowledge of whether they would subsequently develop cancer or lymphoma or whatever, that's the nature of a cohort study.

But that doesn't mean that their answers were unbiased. Their answers -- their exposure measurements would have been -- could have been and were likely biased anyway in other ways which would have then subsequently affected how the subsequent associations would have been determined with regard to their subsequent association with the outcomes.

I don't know if that makes sense.

Q. Let me start off, explore this and make sure that we can understand each other.

When we talk about, for example, recall bias in a case control study, that is --

A. I -- different.

Q. -- a situation where you have a potential misclassification that would lead to a -- that is associated both with exposure information and disease outcome. And that's what we referred to ultimately as a bias that would be differential; it would be pointed in one direction, correct?

A. Well, either direction, but yes.

Q. And that's because we have a situation where the exposure information is tied to the knowledge of the disease and the disease outcome, correct?

A. If it exists, if -- I mean, it doesn't always occur, but when it occurs, yes.

Q. In a cohort study -- and one of the strengths of a cohort study, and I think you mentioned this previously --

because the -- these subjects of the study do not know whether they're going to get Non-Hodgkins lymphoma downward or not, there is no basis for a -- if there is a misclassification of exposure, if there is an error, that's not going to be linked to whether or not those individuals also sometime in the future get Non-Hodgkins lymphoma, correct?

MS. WAGSTAFF: Object to form.

A. So you don't have recall bias if that's what you're asking, but you have other biases.

Q. Is there any information that you can identify from the 2018 study whereby any misclassification of exposure to glyphosate-based herbicides would be associated with whether or not that individual in the future gets or does not get Non-Hodgkins lymphoma?

A. Repeat the question.

Q. Is there any information that you can identify from the 2018 NCI Study whereby any of the misclassifications of exposure that you discuss would be

associated with whether or not that individual in the future gets or does not get Non-Hodgkins lymphoma?

A. So you don't need -- there is undoubtedly misclassification error. Blair reported that at least for other pesticides. No one ever measured -- no one ever seriously measured it. So the fact that the investigators, the 12 investigators from NIH didn't measure it, or report it, is a limitation.

But it's -- there is no such thing as having exposure classification without having misclassification error and almost always, misclassification error is going to be biased by the nature of the beast.

When you ask someone how much broccoli do you eat, they give you the wrong answer in how much broccoli they eat. Everyone gives you the wrong answer in how much broccoli they eat.

When you ask 50,000 people how much broccoli they eat, you are going to get an error in the end of the day in the

measurement of broccoli and it's not going to be -- it's not going to average out to the correct answer. It's going to average out in one direction or the other. There will be a bias at the end of the day in broccoli. Maybe everyone will over-estimate how much broccoli they eat because they want to look healthy or there will be a bias one way or the other.

You don't need much bias -- you don't need much bias to obviate a modest risk ratio which is what we are talking about here. That's the problem when we are talking about glyphosate and NHL.

I don't need to know how it relates specifically to NHL because the risk -- the problem is you have a negative -- you have a null association. So when you have a null association, you can't assume -- if you had a positive association of 2 or 3, I mean, we live -- in epidemiology, we live in a world of error. We are very tolerant of error. We love error -- we don't love error. But we are comfortable with error. We live in a

world of error. But there is a limit to how much error you can tolerate when you're in a world of modest risk ratios, and even a small amount of misclassification error or modest or bias in misclassification error is going to eliminate a small risk ratio.

So when you get a null result, you have to be very skeptical of what you find. And that's where we are finding ourselves here. You have to be very skeptical of a null finding.

If you had a -- in fact, most of this Andreotti paper is actually totally focused on the one positive finding. I mean, half of the discussion or more is talking about the one positive finding that they have. Because that's where they are really comfortable talking about it.

But when you have a null finding, you have to assume that the -- even the smaller errors eliminated it. And that it's really due to the smaller errors. And all the manipulations in the world, all the sensitivity analyses and this and that

aren't going to make up for the error -- for the smaller errors, even the 10 percent, 15 percent errors, and that's what I think fundamentally is a problem in the AHS study, on top of all the other problems -- the AHS study has a lot of problems in it. Each one of which is tolerable.

Q. Dr. Neugut, we are way beyond any question and you actually haven't answered my question so I'm going to ask it again.

A. Please.

Q. The question I asked -- I don't know if you can turn to the question I asked -- was with respect to the exposure misclassification that you believe occurred in the 2018 NCI study, given the fact that that exposure information was obtained prior to the date in which any of the members of the cohort contracted Non-Hodgkins lymphoma or did not, whether or not there was misclassification is not associated with disease outcome, correct?

MS. WAGSTAFF: Objection, asked and answered.

A. It wasn't biased by their knowledge of whether they were going to get the disease or not, if that's what your question is.
Q. No, my question was any misclassification that occurred for exposure was nondifferential with respect to disease outcome, correct?
A. No.
MS. WAGSTAFF: Objection.
Q. Is there any reason to believe that individuals who claim that they had exposure to glyphosate were -- or incorrectly claimed that they had exposure to glyphosate were more likely or less likely to get Non-Hodgkins lymphoma than individuals who correctly answered the exposure question?
A. A bias that would have been introduced with regard to exposure classification would have led to some errors in how the association would have subsequently been observed with regard to an outcome.
If that's what you're asking,

then the answer is it would have been -- it would have led to an error in the assessment of the association with NHL.
Q. You understand -- and we talked about this, you talked about this in your expert report -- the issue of these misclassifications biasing and attenuating risk estimates towards the null?
A. I am sorry, you have to --
Q. You have discussed, in your expert report, the possibility of these type of misclassification errors biasing rate ratios towards the null. Correct?
A. Or beyond the null.
Q. Is there any exposure misclassification you believe occurred that you can explain would have resulted in a bias of the rate ratio away from the null? And if so, if you can explain how.
A. Beyond the null, you mean?
Q. No, away from null. More distant from the null.
A. You mean to make the rate ratio greater than 1?
Q. Farther from the null in either

direction.
A. So I don't specifically know the biases that were operating in the agricultural workers when they gave their responses in terms of exposure of their exposure.
So I can't specifically say how the errors that occurred in their exposure classification or in their exposure measurement would have affected the measurement of the association with NHL.
But biases could either attenuate towards the null, they could attenuate away from the null, or they could attenuate below the null.
Q. Can you identify or can you describe any hypothetical scenario, based upon your review of the 2018 NCI Study, how the exposure misclassification that you opine may have occurred could have biased the reported rate ratios away from the null?
MS. WAGSTAFF: Objection, calls for a hypothetical.
A. Can you define --

Q. Farther away from 1?
A. Made it greater than 1?
Q. Made it more distant from 1 in either direction.
A. So when you have the nonresponders, I don't know how the biases in nonresponders might -- who are not appropriately assessed might have biased it. So there that would have been -- that might have been associated with the occurrence of NHL and I don't know how that might have affected the risk, made it away from the null. But since here we are seeing -- I'm -- I'm assuming here the most of the errors biased towards the null or -- for the most part.
Q. OK.
In your expert report, your first criticism of the study was that the NCI Study obtained exposure information through self-reported answers on questionnaires, correct?
A. I'm sorry?
Q. Your first criticism of the NCI Study was in your supplemental expert

report and this is at page 6 in your report. Is that the NCI Study used -- obtained exposure information through self-reported questionnaires, correct?
A. Yes.
Q. Self-reported questionnaires or obtaining exposure information through self-reported questionnaires is a standard methodology in epidemiological research, correct?
A. Yes.
Q. And you agree that self-report can be reliable depending on the variable which is being evaluated, correct?
A. "Reliable" is a word that has a -- has -- varies in terms of how reliable reliable is.
As we were saying earlier, if you're 90 percent valid, you're 10 percent in error and how tolerable -- how tolerable we are to reliability is a question of -- is the whole issue in what we are talking about here.
Q. I'm sorry, Dr. Neugut. I was just quoting your expert report so I

thought that would be an easy question.
MS. WAGSTAFF: Objection, argumentative.
Q. You state in the indented paragraph, "Self-report can be reliable depending on the variable which is being evaluated." Correct?
A. Yes.
Q. And you have used self-reported questionnaire exposure data in a large number of your own published studies, correct?
A. Yes.
Q. You have used questionnaire data to examine associations between smoking and various types of cancer, correct?
A. Yes.
Q. And you've used self-reported -- strike that.
You believe that self-reported questionnaire data on smoking can be reliable for the purposes of epidemiologic research, correct?
A. It depends on the situation.
Q. Certainly for your studies, you

believed that that was a reliable basis for exposure information, correct?
MS. WAGSTAFF: Object to form.
A. Again, everything depends on the context.
Q. You have used questionnaire data to examine associations between various dietary factors in cancer, correct?
A. Yes.
Q. And you have published those studies in the peer-reviewed literature, correct?
A. Yes.
Q. And in publishing those studies, you believed that the self-reported data on dietary factors was sufficiently reliable for peer-reviewed publication for potential associations between those factors and cancer, correct?
A. Yes.
Q. The NIH scientists who have been examining the Agricultural Health Study have published a number of independent validation studies that sought to measure the reliability of the exposure information

provided in the questionnaires by the AHS cohort, correct?
A. Yes.
Q. Let me show you --
MS. WAGSTAFF: We should -- it hung up.
THE VIDEOGRAPHER: The time is 11:29, we are going off the record.
(Recess).
THE VIDEOGRAPHER: The time is 11:31.
MR. LASKER: Let's mark the next document in line, Exhibit 26-6, and the reason we have changed to 26 is we have been informed during the break that that should be the proper numbering scheme. So all the prior exhibits that had a "25" prefix should be changed to "26."
MS. WAGSTAFF: Yes, and we have asked the court reporter to go back to the record in the final transcript to reflect 26-1 through 5.
(Exhibit 26-6, document entitled, "Accuracy of Self-reported Pesticide

Use Duration Information from Licensed Pesticide Applicators in the Agricultural Health Study" marked for identification, as of this date.)

Q. Dr. Neugut, I have handed you as Exhibit 26-6, an article with the lead author of Jane Hoppin of the National Institute of Environmental Health Studies, entitled Accuracy of Self-reported Pesticide Use Duration Information from Licensed Pesticide Applicators in the Agricultural Health Study."

Have you seen this publication before?

A. I don't have a recollection of seeing this particular one, no.

Q. If I could direct you to page 2 -- I'm sorry, not page 2. Page 316, table 2.

A. Table 2?

Q. Yes.

A. And in this analysis, the NIH investigators looked at duration of use information and decade of first use information in the questionnaires for

various pesticides.

And with respect to glyphosate, which is separately listed on table 2, the NIH investigators found that only one to two percent of the AHS cohort respondents gave inaccurate information on duration of use or decade of first use of glyphosate-based herbicides, correct?

MS. WAGSTAFF: Objection. The witness has stated he doesn't remember seeing this before. This is a scientific article that he needs time to read the entire thing to give an accurate answer.

Q. Dr. Neugut, the NIH investigators report that there was either a 1 percent or a 2 percent error in the questionnaire responses for glyphosate exposure for duration of use or decade of first use information, correct?

MS. WAGSTAFF: Same objection.

A. I don't know.

Q. You didn't come across this study in your review of the literature?

A. I don't recall this one. I don't

think I cite it.

Q. Let me show you the final paragraph of this publication. It's on page 317 of the paper. Dr. Neugut?

A. Which page?

Q. 317. And the last paragraph starts, "The AHS cohort consists of certified pesticide applicators and their spouses. As certified pesticide applicators, these subjects are trained with regard to pesticide regulations and are responsible for the purchase and application of chemicals on their property."

Did I read that correctly?

A. Um-hm, yes.

Q. The NIH investigators continue to state, "This involvement with pesticide selection and use makes farmers a uniquely -- a unique occupationally-exposed population and suggests why studies of farmers' self-reports indicate the ability to provide high quality data regarding pesticide exposure."

Did I read that correctly?

MS. WAGSTAFF: Object to form.

A. Yes.

Q. And this is now -- strike that.

If you have not -- and I think we -- this publication also indicates that. You have not reviewed all of the publications that the NIH's investigators have that look at potential accuracy or potential errors in questionnaire responses with respect to glyphosate exposure in that cohort, correct?

MS. WAGSTAFF: Object to form.

This is a 2002 publication?

A. I guess I did not. I don't know -- I can't tell you what I missed.

Q. Given that fact that you don't know which of these publications and which of these analyses you have reviewed, you don't have a basis, sitting here today, to dispute the statement that the NIH investigators made with respect to their conclusions from their analyses as far as the accuracy of the exposure information from the AHS cohort?

MS. WAGSTAFF: Object to form.

A. I believe I cited in my report, reports that I read which cited error rates that I was familiar with or that I came across in my readings and I imagine there are other reports as well have shown misclassification in terms of glyphosate misrepresentation.

I mean, does it say -- that they had 99 percent accuracy in the study is -- I would need to really read this paper to believe that anyone seriously believes that they had 99 percent validity of measurement.

Q. Sitting here today, you're not in a position to discuss the various analyses that were conducted by the NHS investigators in totality to determine the accuracy of the questionnaire responses on exposure to glyphosate, correct?

A. No, but --

MS. WAGSTAFF: Object to form.

A. I would be highly skeptical if they're going to argue that the self-exposure measurements of glyphosate use was 99 percent accurate.

Q. It's, in fact, one of the reasons that the NIH investigators decided to use a cohort of farmers and pesticide applicators for the purposes of their analysis was because of the information they had that suggested that those individuals would be more likely to have accurate recall of pesticide exposures than individuals in the general population, correct?

A. Yes.

MS. WAGSTAFF: Objection, calls for speculation.

Q. Let me show you a different publication. And we will mark this as Exhibit 26-7.

(Exhibit 26-7 document entitled, "Reliability of Reporting on Lifestyle and Agricultural Factors by Sample of Participants in the Agricultural Health Study from Iowa" marked for identification, as of this date.)

Q. And Dr. Neugut, for the record, this is a publication, also in 2002 in the peer-reviewed literature, lead author, Dr. Blair, "Reliability of Reporting On Lifestyle and Agricultural Factors by a Sample of Participants In the Agricultural Health Study from Iowa," again published in 2002.

Are you familiar with this publication?

A. I believe this one, I do know.

Q. And in this study, the investigators compared information provided by over 4,000 members of the AHS cohort who provide exposure information in two separate questionnaires, one year apart, correct?

A. Yes.

Q. And the NIH investigators measured the reliability of the questionnaire responses for pesticide exposures by comparing the agreement in the answers from one questionnaire to the next. Correct?

A. Yes.

Q. For glyphosate specifically -- and they list this on table 1 on the second page of their publication. They found for ever/never use, that there was a 82 percent

correlation as far as accuracy or consistency in glyphosate exposure information, correct?

A. Yes.

Q. The investigators compared this with the consistency of findings with respect to responses concerning smoking, correct?

A. I don't know that. But --

Q. Well, if you look at page 96 of the publication, so it's the next page --

MS. WAGSTAFF: Dr. Neugut, if you need to read the entire publication please take the time to do so.

Q. If you look at the second column on 96 the first paragraph, full paragraph, "We also compared response to tobacco use"?

MS. WAGSTAFF: Do you need to take time to read it?

A. Where are you looking.

Q. On the second column in the text right next to table 2, there is the first indented paragraph starting, "We also compared responses..." Do you see that?

A. Yes.

Q. So the NIH investigators compared the consistency of response with respect to glyphosate use with a consistency of response with respect to tobacco use. Correct?
A. Yes.
Q. And the investigators found that that there was the information on ever/never glyphosate use was more consistent than the information on numbers of cigarettes smoked per day in these questionnaires, correct?
A. Yes.
Q. The investigators also found that the answers in the AHS questionnaires on ever/never use of glyphosate was more reliable than the data on alcoholic drinks per day, correct?
MS. WAGSTAFF: Objection, relevance. There is biases between reporting on cigarettes and alcohol.
MR. LASKER: There is no objection to relevance in a deposition.
MS. WAGSTAFF: I just objected to relevance, so actually there is

apparently.
MR. LASKER: They aren't proper. I should have stated that differently.
Q. Dr. Neugut, let me ask the question again.
The investigators found that the AHS questionnaire responses on ever/never use of glyphosate were more consistent than the answers provided with regard to alcoholic drinks per day, correct?
A. Yes.
Q. The investigators have found that the AHS questionnaire responses with respect to ever/never glyphosate use was almost twice as reliable as the data or the questionnaire responses for vegetable servings per day and fruit servings per day, correct?
A. I don't know if I would characterize it as twice, but it was more reliable.
Q. There was for -- if you go down to the bottom on page 96, with respect to vegetable servings per day and fruit servings per day, continue down that same

paragraph, there was agreement of 35 percent for vegetable servings per day and 40 percent for fruit servings per day as compared to 82 percent --
A. I'm sorry, I'm not seeing where you're reading.
Q. Page 96, the very last line of text in that page, second column, they provide the reliability data for vegetable servings per day and fruit servings per day?
A. Um-hm. Yes.
Q. The reliability of questionnaire responses with respect to vegetable servings per day and fruit servings per day, was less than half of the reliability of the answers with respect the glyphosate ever/never use, correct?
A. Yup.
Q. I'm sorry?
A. Yes.
Q. The two published analyses that we have looked at of the accuracy of the AHS cohort glyphosate exposure data was looking at information that was obtained

prior to the introduction of RoundUp Ready crops, correct?
And if you can look back at the abstract, this information is based on the first questionnaire and then one year apart from that. So again, the information on reliability here is based upon information provided prior to the introduction of RoundUp Ready crops, correct?
A. Reliability and accuracy are not the same thing.
Q. That -- my question is different.
The data that we have been looking at with respect to reliability of questionnaire responses was based upon information in the first questionnaire, provided in the first questionnaire prior to the introduction of RoundUp Ready crops, correct?
A. Yes.
Q. You would expect that the accuracy of glyphosate exposure data in the second AHS survey, after the introduction of RoundUp Ready crops, would be even more reliable, correct?

MS. WAGSTAFF: Object to form.
A. I'm sorry, I didn't follow the question.
Q. Once a farmer begins using RoundUp Ready crops, their ability to recall whether they use RoundUp is pretty straightforward, right? If they use RoundUp Ready crops, they know they use RoundUp?
A. I really have no basis on which to answer that question.
Q. Are you not aware of the fact that RoundUp Ready crops, if you use RoundUp Ready crops, you would need to use glyphosate on the crops?
A. I understand the concept, but I really have no knowledge of what a farmer does or what a farmer doesn't do and whether they -- what their knowledge or what their behavior would be with regard to knowing about glyphosate use or not. I would have no basis on which to answer that question.
Q. Do you have any knowledge with respect to the weed management guidelines

that farmers use if they're using -- growing RoundUp Ready crops?
A. No.
Q. Do you know whether, in fact, farmers who farm using RoundUp Ready crops follow guidelines that specify certain times in the year and numbers of times of the year that they should apply RoundUp?
A. I grew up in Brooklyn.
Q. You have no information on that one way or the other?
A. No.
Q. So you do not have any basis to know one way or the other whether individuals who -- farmers who grow RoundUp Ready crops would have more reliable recall with respect to whether they use RoundUp or how they use RoundUp than individuals who don't use RoundUp Ready crops?
A. I don't have any basis on which to -- I would assume that they're -- I mean my assumptions in my report have been simply that the glyphosate usage was altered subsequent to the introduction of these glyphosate-resistant crops.

But exactly what impact that would have had specifically on farmer practices or what that means in terms of agricultural practices specifically or how farmers react to that or what their psychological behavior is, I have no -- I would have no basis for knowing that or understanding that or appreciating that.
Q. Starting at the bottom of page 7 of your supplemental expert report and continuing through page 11 of your report, you're criticizing the 2018 NCI Study for what you believe is an exposure misclassification issue that arose with respect to the phase 2 questionnaire, correct?
A. You're here -- you're where?
Q. In your supplemental expert report, starting page 7, we are moving forward in your report now, on page 7 to page 11, you're discussing the issues of exposure misclassification that you believe may have occurred in connection with the second phase questionnaire. Correct?
A. Correct.

Q. And you raise two issues that you believe could lead to exposure misclassification during this period; the increase in glyphosate use after the introduction of RoundUp Ready crops and then the use of an imputation method to derive exposure information during this period for AHS participants who did not respond to the second survey, correct?
A. Yes.
Q. Are there any other issues that you believe led to exposure misclassification during this period?
A. Well, this is on top of the original sin?
Q. We already talked about your views of the questionnaire responses. But with respect to the issues beyond what we just discussed, dealing with the reliability of questionnaire data generally, are there any other issues besides the increase in glyphosate use after the introduction of RoundUp Ready crops and the use of the imputation method that you believe led to the exposure

misclassification and --
A. Off the top of my head, I'm not thinking of any.
Q. And you agree that for -- that there were 63 percent of the AHS cohort who provided information on glyphosate exposure both in the Phase 1 questionnaire and in the follow-up questionnaire, second phase questionnaire, correct?
A. Yes.
Q. And aside from the issues that you've raised generally that we've discussed with respect to questionnaires generally, you do not raise any issue with exposure misclassification for that 63 percent of the cohort, correct?
A. Again, you will have measured now -- the misclarification error that you had in the baseline questionnaire, you will now have duplicated in the second questionnaire.
Q. I understand and we have talked about the issue of questionnaires generally, but specific to --
A. No.

Q. -- your criticisms of the 2018 NCI Study --
A. Right.
Q. -- you agree that you don't have any concerns of exposure misclassification with respect to that 63 percent of the cohort, correct?
A. Correct.
Q. And the 2018 NCI Study separately analyzed the risk of Non-Hodgkins lymphoma and glyphosate exposure solely for the 34,700 cohort members who answered both the Phase 1 and Phase 2 survey, correct?
A. Yes.
Q. And that separate analysis still included 306 cases of Non-Hodgkins lymphoma, correct?
A. I don't know the number off the top of my head, but I believe you.
Q. And with 306 NHL cases, that analysis would have more than four times the number of NHL cases that were in the 2005 DeRoos publication, correct?
A. You mean the original 2005 --
Q. Yes.

A. Yes.
Q. There was no association in the 2018 NCI Study between exposure to glyphosate-based herbicide and Non-Hodgkins lymphoma in those 34,000 members of the cohort, correct?
A. Correct.
Q. And, in fact, for the highest exposure group, for -- that was 34,700 individuals, for glyphosate-based herbicides and Non-Hodgkins lymphoma, there was a rate ratio as compared to no exposure below 1.0 at 0.9, correct?
A. I don't know offhand, but again --
Q. If we can look, I don't want you to be guessing here, page 4, we will put that up, 4.
A. Right now, in the Andreotti study?
Q. Yes, the paper in the Journal of the National Cancer Institute, 2018, and if we are looking at page 4, they provide data for -- if we limit the analysis to 34,698 participants who completed both

questionnaires reducing the total number of cancer cases to 4,699.
A. Which table are you in?
Q. We are in the text on page 4.
A. Yeah.
Q. If you look up, you will see where I am. Towards the bottom of the column.
A. Oh, I'm sorry, OK. So --
Q. Right next to "testicular" on the chart. If you go over and look at the text.
The sentence begins, "To evaluate the impact of using imputed exposure data for participants who did not complete the follow-up questionnaire..." do you see that?
A. Yes.
Q. "We limited the analysis to 34,698 participants who completed both questionnaires reducing the total number of cancer cases to 4,699. Do you see that?
A. I didn't see the last part.
Q. "We limited the analysis to 34,698 participants who completed both

questionnaires" --
A. Yes.
Q. -- "reducing the total number of cancer cases to 4,699." Correct?
A. Reducing total to 4,699. Right, go ahead.
Q. Glyphosate use was not associated with Non-Hodgkins lymphoma, with 306 total cases and a rate ratio of 0.9 for the highest quartile, quartile 4, correct?
A. Yes.
Q. In your supplemental report at page 10, you discuss two publications that you rely upon as addressing differences between responders and nonresponders in the Phase 1 and Phase 2 survey, one by Montgomery and one by Dr. Rinsky and this is in your supplemental expert report at page 10.
A. Yes.
Q. And in fact, the Rinsky study does not address Phase 2 responders and nonresponders at all, does it?
A. What does it address?
Q. You read the publications. Is it

your understanding that the Rinsky paper addressed Phase 2 survey responses?
MS. WAGSTAFF: Do you have a copy of the article you can let him refresh his memory with?
MR. LASKER: After he answers the question, sure.
A. It was my impression that it did. So --
Q. Let's take a look at it. We will mark this as Exhibit 26-8.
(Exhibit 26-8, document entitled, "Assessing the Potential for Bias from Nonresponsive to a Study Follow-Up Interview" marked for identification, as of this date.)
Q. Dr. Neugut, if you look at the abstract, right up front, of the Rinsky publication, they very clearly state that they are looking at information or responses to questionnaires provided in the Phase 3 of the study between 2005 and 2010. Correct?
A. OK. True.
Q. This publication is irrelevant to

the 2018 NCI Study because it did not use Phase 3 questionnaire responses, correct?
MS. WAGSTAFF: Object to form.
A. I would not say it's irrelevant. I would say that while it doesn't directly relate to the 37 percent who didn't respond to the second interview, but the characterization of those who are nonresponders as compared to responders is still applicable.
Q. The data that you cite in your expert report with respect to differences in Phase 1, Phase 2 study responses from Rinsky is inaccurate, correct?
A. Is what?
Q. Is inaccurate?
MS. WAGSTAFF: Object to form.
Q. Your characterization of that data?
A. Made a mistake, I made a mistake. But the information is directly relevant to characterizing responders to questionnaires within the AHS study as compared to nonresponders.
While you're correct that I made

a mistake in -- it is really a third interview, but -- or third -- but the characterization of who responds and who doesn't respond is still going to be germane and I'm not -- I'm not directly making any statements or trying to make any points with regard to the specifics of who is a responder and whose not a responder.
I'm only giving information with regard to what are the characteristics of those who respond versus those who don't respond and how that may influence the associations that are subsequently observed.
Q. In the Rinsky publication, when they deal with the Phase 3 survey, at page 8 and I -- the NIH investigators who published this paper stated again in the second column of page 8 that applying pesticides at enrollment was not strongly associated with responses to the 2005, 2010 interview. That's your understanding of that paper result as well, correct?
A. Yes.
Q. And with respect to disease

outcomes, that would not be immediately apparent at the time of questionnaire responses, such as cancer, the NIH investigators also were of the view that those disease outcomes would not be associated with response or nonresponse to the questionnaire. Correct?

A. I'm -- I'm not -- I didn't follow that last point.

Q. OK. Page 8, the investigators, page 8 of the study, Rinsky and the other NIH investigators concluded that outcomes -- and this is in the second column of the text -- the findings reported here, the first paragraph, about two-thirds of the way down --

MS. WAGSTAFF: What page are you on?

MR. LASKER: Page 8.

Q. The investigators concluded that outcomes that did not have high rates of rapid mortality or disability soon after diagnosis also should not be strongly associated with whether or not there was a response or nonresponse to the

questionnaire. Correct?

A. Yes, but that's not germane to our situation.

Q. So is it your testimony that Non-Hodgkins lymphoma has a high rate of mortality and disability soon after diagnosis?

A. What?

Q. Is it your opinion that Non-Hodgkins lymphoma has a high rate of rapid mortality or disability soon after diagnosis?

A. No, but they're looking at lung cancer and bladder cancer where the risk ratios are like 2 and 3 and 4. We are talking about risk ratios of 1.3 and 1.4. So --

Q. I'm not even sure I'm following what you're saying. But that is not germane to my question.

A. If they're saying that the degree of bias that's introduced by the nonresponses in this context are not going to have a major influence on the risk ratios, but they're looking at risk ratios

that are high, not risk ratios that are small.

Q. The Rinsky -- the NIH investigators in their statement, without mention of the issues that you just discussed, because it is not mentioned in their publication, state that selection bias should not strongly influence estimates of the association between farming exposures and many of the self-reported outcomes when analysis was limited to the 2005-2010 interview respondents, correct?

A. Yes.

Q. Now, let's look at the Montgomery paper.

(Exhibit 26-9, document entitled "Effects of Self-reported Health Conditions and Pesticide Exposures on a Probability of Follow-up in a Prospective Cohort Study" marked for identification, as of this date.)

Q. This is the second --

MS. WAGSTAFF: What's the time?

Q. Dr. Neugut, this is second

article that you cite in your supplemental expert report, correct?

This is the paper you cite in your expert report?

Is this the paper that you cite in your expert report, the Montgomery paper?

A. Oh, yes.

Q. In the abstract in their paper, the Montgomery paper, the NIH investigators in this peer-reviewed publication, state the, "Differences between nonparticipants and participants in the follow-up interviews, the second phase interview were generally small."

Did I read that correctly?

A. Yes.

Q. And the NIH investigators further state that, "We did not find significant evidence of selection bias." Correct?

A. Yes.

Q. And in your expert report --

MS. WAGSTAFF: Objection to completeness. There is another sentence in the conclusion.

Q. -- you disagree with the NIH investigators in their analysis of their findings in the Montgomery paper, correct?
A. Do I?
Q. That's my question. Let me ask you this: Do you disagree with the conclusions of the NIH investigators that differences between nonparticipants and participants in the follow-up second phase interview were generally small and that there was not -- they did not find significant evidence of selection bias?
MS. WAGSTAFF: Objection, there is another sentence in the conclusion that should be read for completeness into the record please.
MR. LASKER: If you want to read that in your redirect, that's fine. I'm asking a question about this sentence in the conclusion.
A. I would have to take a look at this for a moment to reorient myself to the paper. I haven't seen it in a while.
MS. WAGSTAFF: I would request that the full conclusion be read, if

you are going to ask questions about piecemeal to get sound bites.
Q. Dr. Neugut, the record will reflect that you have been looking at the Montgomery paper now that you cite in your expert report as evidence of what you state are differences in Phase 1 and Phase 2 responses, that you have been reading that paper now for three minutes or actually more than that, four minutes of the deposition time. I asked a simple question.
A. I would say that --
MS. WAGSTAFF: Objection to asking a simple question.
A. -- explicitly mixing or applying pesticides was significantly associated with participation at follow-up with an OR of 0.52. And it says explicitly, "Characteristics associated with follow-up among applicators." That's, it lists here those things that were associated with response and nonresponse which is what I alluded to now --
Q. I will reask my question, because

I still don't have an answer to that.
A. What is your question?
Q. My question is the investigators, the NIH investigators who conducted this analysis, they stated in their conclusions that differences between nonparticipants and participants in the follow-up interview, "The second phase AHS interview were generally small and we did not general significant evidence of selection bias."
My question to you is whether you agree or disagree with the NIH investigators?
A. I think --
MS. WAGSTAFF: Object to form.
A. For the associations that they looked at, that is correct. But they did not look at glyphosate and NHL.
Q. Then, Dr. Montgomery and his associates, if you look at page 492 of the paper, in the text in the first column, the bottom of the page, states that the incident cancers cases -- that is, cancer cases that developed subsequent to questionnaire responses -- were not

significantly different from noncancer cases in their probability of follow-up at interview, correct?
A. Yes.
Q. And again, we discussed that before, but that again indicates that there is no bias with respect to responding or nonresponding to the questionnaire that would be associated with cancer outcomes, correct?
A. That is only for what they specifically looked at in this paper, not with regard to either glyphosate and NHL and not specifically in the context of small risk ratios.
Q. Again, that's not really the question I was asking about. The issue that they raise is that there was no difference with respect to whether a cohort member would respond or not respond to Phase 2 based upon whether or not that individual developed cancer, correct?
A. Yes.
Q. So the question of any differences between whether you respond or

not respond was not associated with cancer outcomes, correct?
A. Yes.
Q. In fact, if you talk about glyphosate-based herbicide exposure and Non-Hodgkins lymphoma, we know from the analysis we just looked at in the 2018 --
A. I am sorry, you have to talk louder.
Q. We know from the analysis we just looked at in the 2018 NCI Study, only looking at the individuals who responded to Phase 2 and Phase 1, if you recall, they had a 0.9 rate ratio for highest exposure for glyphosate-based herbicides and Non-Hodgkins lymphoma, correct?
A. Yes.
Q. And so we know from that analysis in the 2018 NCI Study, that there was no difference in the rate ratio for Non-Hodgkins lymphoma if we look at individuals who responded to the Phase 2 questionnaire versus individuals who did not respond to the Phase 2 questionnaire, correct?

MS. WAGSTAFF: Objection, misstates.
A. I don't know that I would characterize it that way.
Q. There was no difference in the findings when they looked at individuals who responded to both Phase 1 and Phase 2 as compared to when they looked at the total cohort, correct?
MS. WAGSTAFF: Same objection.
A. You get the same risk ratio.
Q. In your supplemental expert report at page 10, if you raise the possibility of a cohort member who begins using glyphosate after responding to the first question -- this is the first full paragraph on page 10, you raise the possibility of a cohort member who begins using glyphosate after responding to the first questionnaire and does not respond to the second questionnaire and then develops Non-Hodgkins lymphoma, correct? You discussed that hypothetical situation?
A. Yes.
Q. And you state that this

individual would be considered an unexposed Non-Hodgkins lymphoma case in the 2018 NCI Study, correct?
A. Yes.
Q. That's not correct, is it?
A. Because --
Q. The NIH investigators actually used an imputation methodology to determine exposure for -- in Phase 2 nonresponders, didn't they?
A. How would they know that he used it?
Q. Let's take a look at the Heltshe publication, and this is Exhibit 26-10.
(Exhibit 26-10, document entitled, "Using Multiple Imputation to Assign Pesticide Use for Nonresponders in the Follow-Up Questionnaire" marked for identification, as of this date.)
Q. And you cited the Heltshe publication in your supplemental expert report, correct?
A. Yes.
Q. You're familiar with this paper?
A. Yes.

Q. If you look at page 410, the second page of the publication. The first full paragraph on the left, column starting, "When using pesticide exposure in an analysis, there are several ways to handle missing Phase 2 information."
Do you see that?
A. Yes.
Q. And they talk about the possibility of ignoring nonresponse in Phase 2 and implicitly assuming zero pesticide exposure after Phase 1 which would be erroneous for most participants who did not complete the Phase 2 questionnaire, correct?
A. Yes.
Q. And that's the scenario, the hypothetical that you were raising in your expert report, correct?
A. Yes.
Q. The whole reason that the NIH investigators instead, using an imputation methodology, was to avoid that outcome, correct?
A. Yes.

Q. And you agree that in using the imputation methodology, there was -- strike that.

You agree, and I think you state this in your supplemental report -- you do, at page 11 -- that imputation is frequently used in epidemiologic research for dealing precisely with this same problem in similar circumstances, correct?

A. Yes.

MS. WAGSTAFF: Object to form.

Q. And when -- just to explain how this imputation works, the NIH investigators analyze a wide array of demographic and lifestyle and occupational factors collected in the first questionnaire and they determined which of those factors were associated with glyphosate use during the later time period among the 34,700 cohort members who responded to the second questionnaire. Correct?

A. Yes.

Q. And they then looked at those same variables, demographic, lifestyle and

occupation in the first questionnaire responses for those individuals who did not respond to Phase 2, correct?

A. I'm sorry, say the last question again.

Q. The NIH investigators then looked at those same variables, demographic, lifestyle and occupational in the Phase 1 questionnaire responses for the individuals who did not respond to Phase 2, correct?

A. Yes.

Q. And that is the method of imputation is that they use all the information that they actually obtained in the Phase 1 questionnaires and in the Phase 2 questionnaires that responded to be able to derive information as to whether or not the nonresponders did or did not use glyphosate during that time period, correct?

A. Yes.

Q. There would, through that imputation process for -- for example, individuals -- I'm sorry, strike that.

In the individuals who responded

to Phase 1 and Phase 2, that 34,700 members of the cohort, there were individuals who had not used glyphosate in Phase 1 who began using glyphosate in Phase 2, correct?

A. Yes.

Q. And through the imputation methodology, the NIH investigators were able to analyze all the various demographic factors that was related with that change in use pattern, correct?

MS. WAGSTAFF: Object to form.

A. Yes.

Q. And they used that imputation method also with respect to the nonresponders so that a nonresponder who did not use glyphosate during the Phase 1 period but had the similar demographic and lifestyle and occupational variables would be imputed to have used glyphosate in Phase 2, correct?

A. Yes.

Q. And in the Heltshe study, the investigators in the very beginning at page 409, in the left-hand column, state, and I'm quoting, starting about ten lines down

from the top, Introduction, "Multiple imputation was been widely accepted and used to account for missing data in large national surveys and studies including NHANES III, National Assessment of Educational Progress, Children's Mental Health Initiative and the Framingham Heart Study, correct?

A. Yes.

Q. And you agree with that, correct?

A. Yes.

Q. The Heltshe validation study at page 414, in the text in this 2012 publication, if you look at the second column in the text about halfway down that column, you see there referencing the Montgomery paper, correct?

A. Yes.

Q. And that's the Montgomery paper we were just discussing, correct?

A. Yes.

MS. WAGSTAFF: Where are you --

Q. Halfway down --

MS. WAGSTAFF: Got it.

Q. And the NIH investigators in the

Heltshe paper state that Montgomery, et al., show there is little evidence for selection bias in Phase 2 of the AHS, correct?

A. Yes.

MS. WAGSTAFF: Objection. Can you read the rest of the sentence please.

MR. LASKER: You can read that in your --

MS. WAGSTAFF: "However, missing at random is an untestable assumption without additional data."

Q. Well, let me ask you that question. Are you aware of any information, any data that you can point to, that states that any miss -- any of the information in the -- with respect to nonresponse in Phase 2 was missing not at random?

A. Was what?

Q. Missing not at random?

A. Missing --

Q. Not at random?

MS. WAGSTAFF: While he is

thinking about that, I would like to read the rest of the sentence.

MR. LASKER: No, no, he can answer the question and then you can do whatever you want.

A. How could there possibly be such evidence? I mean, since it's not collected.

Q. Are you -- can you point to any information that says if there is any data that's -- with respect to the Phase 2 questionnaire nonresponse that's not missing at random?

A. No.

MS. WAGSTAFF: I would like, for the completeness of the record, it says, "Thus, it is possible that nonresponders differed from responders in variables we have not yet measured."

Q. The NIH investigators state -- and I believe this is, again, in the abstract of the front of the paper, that the last line -- well, let me see here for a second. I don't want to direct you to -- OK.

Actually, let's look at the very end of the paper, page 415, the conclusion. The last sentence of the publication, Heltshe publication, "The NIH investigators conclude that this multiple imputation will allow for bias reduction and improved efficiency in future analyses of the AHS cohort." Correct?

A. Yes.

Q. And you agree with that, correct?

A. Yes.

MS. WAGSTAFF: Can you tell me where you were reading that?

MR. LASKER: Sorry, the last sentence of the paper.

Q. The NIH investigators also found from their analysis in the Heltshe paper -- and just to explain, the way that the Heltshe paper worked is they took the individuals who responded to the first phase questionnaire and then they pulled out 20 percent of those individuals, sort of pretended they hadn't responded, used the imputation methodology to predict what the answers should be, and then compared it

to their actual responses, correct?

A. Yes.

Q. And the NIH investigators found when they did this analysis, that the observed and imputed prevalence of pesticide use in the hold-out data set were 85.7 percent and 85.3 percent respectfully {sic}, correct?

A. Do I have that written in my report?

Q. I don't think you do, but it is mentioned in the abstract of the Heltshe paper that you are relying upon. It's right in the abstract. If you look at the front of the paper or you can try and find it in the paper, but it's in the body of the abstract.

A. They have all sorts of different numbers in the paper itself. So --

Q. Are you aware of, sitting here today, whether or not, in fact, the Heltshe investigators found that their observed imputed prevalence of pesticide use in the hold-out data set was 85.7 percent and 85.3 percent respectfully -- respectively?

A. I didn't -- no, I'm seeing it now.
Q. OK. So I'm not sure I understand now. Am I correct that the NIH -- strike that.
The NIH investigators concluded that the observed and imputed prevalence of pesticide use in the hold-out data set were 85.7 percent and 85.3 percent respectfully, correct -- respectively?
A. Yes.
MS. WAGSTAFF: Are you talking about glyphosate or mixed load?
MR. LASKER: I'm talking about pesticide and it's right in the abstract. I'll ask the question again.
A. That's for any pesticide use, right.
Q. Just so we are clear, when the investigators use their imputation methodology, they calculated 85.3 percent use of pesticides and then when they looked back at the actual responses in the hold-out set, they found the actual number was 85.7 percent, correct?

A. Yes, for pesticides, correct.
Q. And based upon, if you can look at page 412. On the left-hand column --
A. 412?
Q. 412. And this is how -- under results, imputation assessment, and roughly --
A. I'm sorry, we are in the first column.
Q. First column. They discuss the fact that in their view, the total pesticide and the reference is total pesticide imputation results indicates that the logistic regression model underpinning the multiple imputation procedure did indeed preserve essential features of the data, correct?
A. I'm not seeing where you're reading.
Q. If you look under imputation assessment, and about eight lines down they state --
A. "This indicates..."
Q. "This indicates that the logistic regression model underpinning the multiple

imputation feature, did, indeed, preserve essential features of the data."
I read that correctly?
A. Um-hm. Yes.
Q. And the N -- if you go back to the abstract, in the front of the paper, right after the discussion of total pesticide use of 85.7 and 85.3 percent respectfully -- respectively, the NIH investigators further state that the distribution of prevalence and days per year of use for specific pesticides were similar across observed and imputed in the hold-out sample, correct?
A. Yes.
Q. And then the investigators in this paper calculated a relative error for the imputed ever/never use of 38 specific pesticides, correct?
A. Well, I don't know how many pesticides there were, but many pesticides.
Q. Going back to page 412, in the right column, right above the very bottom of the right column, right above, "Days per year use of specific pesticides." They

state that for only a few -- you see where I am, about five lines up from the bottom?
A. Yes.
Q. "For only a few of the rare pesticides used in Phase 2, does the imputed prevalence differ from the true prevalence by more than 20 percent?"
And they identify some pesticides that belong to that category, correct?
A. Yes.
Q. And glyphosate did not differ by more than 20 percent, correct?
A. No.
Q. And then they present that data in figure 2 of their paper which is on page 414, and this lists all of the different pesticides that we looked at, correct?
A. Yes.
Q. And the relative error, whether it's more than 20 percent or less than 20 percent for all the different pesticides, correct?
A. Yes.
Q. And there are some five pesticides that overstated exposure by

maybe four of them by over 20 percent, correct?
A. Yes.
Q. And with respect to glyphosate, and the accuracy of the imputation methodology, glyphosate fell basically in the middle of the pack with respect to how well the imputation methodology worked for individual pesticides, correct?
MS. WAGSTAFF: Object to form, characterization of evidence.
A. I don't know. I don't know if it's in the middle of the pack. It is where it is.
Q. Well, there were roughly as many pesticides that had a larger relative error for the imputation methodology as there were pesticides that had a lower relative error, correct?
MS. WAGSTAFF: Same objection.
A. I don't know.
Q. Well, you are looking at the table here.
All the pesticides below glyphosate have a greater relative risk,

correct?
A. Which is about I'd say about 10.
Q. And the pesticides, again, in the top had a higher relative risk or higher -- I'm sorry, relative error than glyphosate, correct?
A. Had a better relative error.
Q. No, they were off by more because they are now going in the other direction but the error is greater, correct?
A. I see. OK.
Q. So glyphosate fell about in the middle of the pack with respect to the accuracy of the imputation methodology for individual pesticides, correct?
A. Yes.
Q. And the NIH investigators for the Agricultural Health Study have used the same imputation methodology for every paper that they published that has included data for the Phase 2 questionnaire, correct?
A. Yes.
MS. WAGSTAFF: Object to form.
Q. And there have been -- using the same imputation methodology used in the

2018 NCI study -- maybe a dozen or more studies in a peer-reviewed publication -- peer-reviewed literature coming out of the Agricultural Health Study, correct?
A. I don't know specifically, but I wouldn't be surprised.
Q. And that same imputation methodology has been used in other peer-reviewed publications looking at potential associations with pesticides for which the imputation methodology resulted in greater relative error than glyphosate, correct?
A. I don't know.
Q. Well, for example, if you can look at lindane, on figure 2. In the Heltshe paper, lindane is the fourth pesticide from the bottom in that figure?
A. Yes.
Q. So for lindane, there was a greater error rate in the imputation methodology than glyphosate, correct?
A. Yes.
Q. In your expert report, you cite to the AHS findings in the 2014 paper that

uses imputation methodology for lindane, correct?
A. Yes.
Q. So we know at least one situation where peer-reviewed literature has been published using imputation methodology with pesticides where the imputation methodology did not work as well as it did for glyphosate, correct?
MS. WAGSTAFF: Object to form.
A. Yes.
Q. Outside of this -- well, first of all, are you aware of a single published paper anywhere in the literature arguing that the findings in all of these published studies of the AHS cohort that have used this imputation methodology are not reliable because of their use of the imputation methodology?
MS. WAGSTAFF: Objection. This paper just came out five weeks ago, six weeks ago.
Q. Strike that.
So it is clear we just talked about a number of papers that used that

imputation methodology, not just the 2017 NCI Study. We know the 2014 paper looking at insecticides, fungicides used that same imputation methodology, correct?

MS. WAGSTAFF: Same objection.

A. I'm sorry, repeat the question.

Q. You know that the 2014 publication that looked at insecticides and fungicides for the AHS cohort for different pesticides used the same imputation methodology, correct?

A. Yes.

Q. Lots of other publications, as we just discussed from the AHS, have been using that same imputation methodology that's used in the 2018 NCI paper?

A. Yes.

Q. So the 2018 paper is not new in its use of the imputation methodology for the AHS, correct?

A. Correct.

Q. Outside -- strike that.

Are you aware of a single published paper anywhere in the literature arguing that the findings in any of these

studies of the AHS cohort, using this imputation methodology, are not reliable because of their use of the imputation methodology?

A. No.

Q. Outside of this litigation, are you aware of any anyone who has argued in any forum that the use of this imputation methodology makes the findings of these Agricultural Health cohort studies unreliable?

A. No.

MS. WAGSTAFF: Objection, again, this paper came out five weeks ago, so there may be some criticism in the future of it.

MR. LASKER: The question and answer will stand.

MS. WAGSTAFF: OK.

Q. In your expert report, you suggest that differences in the responders and nonresponders in the Phase 2 questionnaire could have concealed an actual increased risk of Non-Hodgkins lymphoma with glyphosate exposure in the

2018 NCI study, correct?

A. Yes.

Q. In other words, you believe that there were biases in the 2018 NCI study that led to the reported rate ratio of about 0.85 for ever/never use and -- but without those biases, the 2018 NCI Study would have reported a statistically significant increased rate ratio above 1.0, is that correct?

A. I don't know what it would have reported. I mean, again, with the problems that it has -- I don't know what the -- what it should have or could have or might have reported.

Q. Could you point to any data that would indicate that if those biases had not occurred, that you state occurred or the misclassifications had not occurred that you state occurred, that the reported rate ratio of 0.85 would have, in fact, been increased to a statistically significant rate ratio above 1.0?

MS. WAGSTAFF: Objection, same as I said before.

A. No, I just believe that the flaws in the study make it impossible to interpret the reported finding.

Q. And based upon the actual exposure data from the Phase 1 questionnaire, you would agree that there is no suggestion that the 20,000 cohort members who did not respond to the second questionnaire were at increased risk of NHL based upon their glyphosate exposures prior to 1997, correct?

A. I'm not able to answer that question as I sit here.

Q. Let's look at page -- this will be the last line of questions -- page 4, again, of the 2018 NCI Study.

A. Which study am I looking at?

Q. 2018 NCI Study by Andreotti. If you look at page 4, we are talking about the study by Andreotti, the main study here we are talking about.

Page 4 of that study, again, in the column of text, halfway down, there is a paragraph that starts, "In primary analysis...," do you see that?

A. Yes.
Q. And then about ten lines down, they talk about an another analysis they did when using only exposure information reported at enrollment, correct?
A. Yes.
Q. So this is using the actual questionnaire responses for the Phase 1 questionnaire, correct?
A. Yes.
Q. When using only exposure information reported at enrollment, the rate ratio and the highest exposure quartile was 0.82 for Non-Hodgkins lymphoma, correct?
A. Yes.
Q. And so based upon the actual exposure data from the Phase 1 questionnaire, there is no suggestion that the 20,000 cohort members who did not respond to the second questionnaire were at any increased risk of Non-Hodgkins lymphoma based upon glyphosate exposures prior to 1997, correct?
A. The upper limit of the 95 percent

confidence interval is 1.80. So I would say that that easily encompasses the risk ratios we have been talking about. So in fact, you could encompass a much higher relative risk.
Q. So am I understanding correctly then, your analysis of the epidemiology in determining whether or not there would be an association between glyphosate-based herbicide exposure pre 1997 and Non-Hodgkins lymphoma, your methodology is to look at the highest edge of the 95 percent confidence interval to determine whether or not there may be an association?
MS. WAGSTAFF: Objection, misstates testimony.
A. I'm saying when you have a null association. You can't interpret or you can't exclude what might be a positive association and that further, in the context of what we talked about earlier in terms of misclassification error, again, we talked earlier, our initial discussion was about the misclassification error that was even inherent in the original baseline,

baseline interview, and even a misclassification error in that baseline interview, which I'm sure there was, would have been enough to introduce enough error so that it would have obviated the ability to assess or might have eliminated a positive association.
My whole point here has been when you don't see a positive association, you have to be very conservative and very skeptical about the interpretation of a null finding, particularly when you have such a high upper limit. You can't -- you can't be willy-nilly about it.
Q. Just so I understand, this is the same issue you discussed, again, about the nondifferential, misclassification error that you believe could have biased the rate ratio towards the null, is that correct?
A. Not just towards the null, but even in this instance apparently possibly below the null. I mean -- yes.
Q. And it's your understanding that the nondifferential misclassification can bias the rate ratio past the null in the

other direction, is that correct?
A. Yes.
MR. LASKER: OK. No further questions.
MS. WAGSTAFF: We -- we can go off the record.
THE VIDEOGRAPHER: The time is 12:45. We are going off the record.
(Luncheon recess)
THE VIDEOGRAPHER: The time is 1:18. We are back on the record.
EXAMINATION BY
MS. WAGSTAFF:
Q. Dr. Neugut, I have a couple of follow-up questions based on Mr. Lasker's questioning of you this morning.
At the beginning of his questions to you, there were a lot of questions that related to the "power" -- "statistical power" of certain studies. Do you remember that line of questioning?
A. Yes.
Q. Is "power" a technical term used in -- by epidemiologists?
A. Yes.

Q. Can you please describe for the judge and jury your meaning as an epidemiologist of the term "power"?

A. Power is whether a study is large enough or has enough subjects to be able to detect a given relative risk basically, so it depends on what you think the relative risk is going to be for a given association between an exposure and an outcome.

So if you have a very large relative risk, you can get by with a smaller study. If you have a -- if you are looking for a modest relative risk, you need a larger sample, sample size. So given that -- at least in our context with glyphosate and NHL, we are talking about a modest relative risk, so you would need a fairly large study to be confident or to be confident you would be able to, with a given study, to be able to find the relative risk, if it was there. If it's truly there.

Q. So is it fair to say that "power" in the epidemiology world relates to the size of the study?

A. Yes.

Q. Is it possible to have a study that is so powerful that it overcomes particular flaws?

Stated another way, is power -- is the power of the study the most important aspect of the study?

A. No. I mean, you can be under-powered. I mean, so if you -- again, if you were looking for a modest risk and you had a small study, then you would be -- you would have a poor study because you wouldn't be able to find a small relative risk.

But the real issue in a study is its quality. If a study sucks, it doesn't matter how big the study is. It -- the quality of the study is what's paramount.

Even if the study is small, the quality is what's most important in the study.

Q. So you could have a study that had a million participants, but if it's done poorly or the quality is bad, it's not that helpful, is that correct?

A. Sure.

MR. LASKER: Objection to form.

Q. I believe I wrote down when Mr. Lasker asked you a question about the 2018 AHS study, I believe that the words that you used were that that 2018 AHS study was not contributory to your expert opinion in this matter. Is that the words that you used?

A. Yes.

Q. Can you tell the judge and jury what you mean by this study being noncontributory to your opinion?

A. So it my point was it was neither positive nor negative or null. The study had so many flaws in my view that the results are just not reliable enough to contribute in a meaningful way to either deciding that AHS -- that glyphosate and NHL are either associated or not associated.

Specifically, the discussion that we had about misclassification error in the first place about the way the self-reporting was collected in the first

place and then the problem of the change, the dramatic change in exposure to glyphosate that took place after the initial cohort was collected, so that exacerbated the problem of exposure assessment and then when the cohort had to be reassessed because of that, then the extreme loss to follow-up in the reassessment of the cohort, 37 percent loss of follow-up in a cohort study is a very dramatic loss to follow-up you don't see very often nowadays in a major cohort study. And that's a truly dramatic flaw in the study.

And then the fact that we are dealing with a modest association in the first place which makes all of this a problem. If we were dealing with a relative risk of 10, we could tolerate all of these flaws and problems and all of that.

As I said in my discussion, epidemiology is very tolerant of error, but if you combine all these errors and with a modest association, together, the

cumulative effect is really to make really to make the study fatally flawed and really irreparable and that's why I think the combination of all of these problems together really makes the study uninterpretable, particularly because it's null.

When you get a positive association, then you can be more -- particularly a strong association, then you can be more confident about what you're finding. But a null finding is really very much uninterpretable.

And that's why I think if you actually read the paper, the authors are totally focused on their one positive finding, much more so, almost -- much more so than on the null findings for all the other cancers. They're almost exclusive -- to a large part the paper focuses on their one positive finding which who even knows if it is, but that's what they really talk about mostly.

Q. So I think I just heard you say that you -- it's your opinion that the

flaws that you've identified, which I believe what you just said were a modest risk ratio, the loss to follow-up, coupled with the imputation, the change in glyphosate use, and the misclassification renders, combined, this paper to be fatally flawed, is that what you said?

MR. LASKER: Objection to form. Objection to counsel giving testimony.

A. Right, I mean, again, I don't have a problem with imputation. Imputation is a way to -- is a common method of dealing with loss to follow-up or other problems of this sort. But again, it's a means of repairing a problem which we use all the time.

It's just in combination with all the other problems, it doesn't fully correct -- it can't fully correct a flawed study, and while I'm sure the authors are going to use it or do use it for multiple and will use it for multiple studies and should, in the particular instance of glyphosate and NHL, it's not going to be -- it's not adequate to fully compensate for

all the flaws that we just discussed.

Q. OK, and Mr. Lasker, throughout your deposition this morning, asked you questions about the different tables in Exhibit 25.1 which is the 2008 AHS study.

MR. LASKER: I'm sorry, I made a --

MS. WAGSTAFF: I'm not going to ask him anything specific.

Q. Do you remember Mr. Lasker asking you about the tables and the supplemental tables that were printed online?

A. Yes.

Q. And the data in those tables, is the data in those tables subject to the same fatal flaws that you just described?

A. Of course.

Q. Mr. Lasker asked you if you would turn to page 6 of your supplemental report. Tell me when you're there.

MR. LASKER: I've got it.

Q. The bottom, the last sentence, Mr. Lasker asked you about your cite to the modest relative risk of 1.3 to 1.4 for ever/never use. Do you remember that line

of questioning by Mr. Lasker?

A. Yes. Yes.

Q. Is a relative risk ratio of 1.3 to 1.4 an important risk?

MR. LASKER: Objection to form.

A. It can be, yes.

Q. And in your scientific opinion, does a relative risk of 1.3 to 1.4 support a finding of causation?

MR. LASKER: Objection to form.

A. Yes.

MS. WAGSTAFF: What was wrong with that question?

MR. LASKER: There is no discussion of statistical significance, confidence intervals, and it assumes the relative risk of 1.3 to 1.4 that doesn't exist.

MS. WAGSTAFF: So I'm fine with that.

Q. Next, it talks about in that sentence the ever/never use, do you see that? In page 6, the last words, page 6. And just so the judge and the jury understand a little bit about what that

means, when somebody does an ever/never study, it the participants are grouped into two categories, exposed and unexposed, is that correct?
A. Yes.
Q. And am I correct in -- that somebody who has been exposed for one day to glyphosate is lumped in the same category as someone who has been exposed every single day, is that correct?
A. Yes.
Q. So the denominator in an ever/never use for the exposed group includes people that have been exposed one day to glyphosate, is that right?
MR. LASKER: Objection to form.
A. I don't know if I used the word "denominator," but the exposed group includes people who have been exposed for one day or more.
Q. And in theory, in theory, that might dilute the exposed group's risk ratio, is that right?
MR. LASKER: Objection to form.
A. It would, in theory, yes. It

would do that, yes.
Q. And in fact, in an ever/never analysis in the exposed group, due to this dilution, one might miss an effect that is truly there, is that correct?
MR. LASKER: Last objection to form.
A. Theoretically, that's possible.
Q. Earlier today, Mr. Lasker asked a series of questions where he said, "'There was no evidence' of dose response," or "'No evidence' of an association between glyphosate-based herbicides and NHL with respect to the 2018 AHS study."
Do you remember that line of questioning?
A. Yes.
Q. And your response was based on the 2018 article, correct?
MR. LASKER: Objection to form.
A. Yes.
Q. And the data contained within that article, correct?
A. Sure.
Q. And we just described that the

data in that article is subject to the same fatal flaws that you have previously testified to and that are in your report, right?
MR. LASKER: Objection to form.
A. Correct.
Q. Let's bring up the last report, last study that Mr. Lasker showed to you, the Heltshe -- how do you pronounce that name?
A. Heltshe.
Q. Heltshe, bring up the Heltshe study.
And Monsanto's attorney spent a lot of time on this journal, asking you questions. Do you remember those questions?
MR. LASKER: Objection to form.
A. Some of them.
Q. So if you turn to page 410, table 1, Monsanto asked you to -- about the numbers of the "mixed any pesticides" at the top of the table. Do you remember that?
MR. LASKER: Objection to form.

A. Yes.
MR. LASKER: OK. I didn't ask about those numbers, but OK.
Q. The 8.-- 85.2 and the 82.82, do you remember him asking you those questions?
A. He actually asked about the numbers in the abstract.
Q. OK. But what he didn't ask about was the specific glyphosate numbers, correct?
A. Correct.
MR. LASKER: Objection to form.
Q. And what are the specific -- actually, tell me the importance of looking specifically at the glyphosate numbers with respect to making a determination of causation?
MR. LASKER: I will object to the entire line of questions with respect to table 1.
A. We are talking about glyphosate and NHL. So obviously what we should be addressing is glyphosate, not all pesticides.

MS. WAGSTAFF: Why are you objecting?
MR. LASKER: You are looking at the wrong table.
MS. WAGSTAFF: I know, but you brought this article in and asked him questions, so why are you objecting?
MR. LASKER: I know. The questions were premised on my questioning regarding table 1. I didn't ask any questions about table 1.
Q. So again, what is the importance of when there is data available for glyphosate specifically, what is the importance of considering that glyphosate-specific data versus data relating to all pesticides?
A. Because we are talking about glyphosate. So obviously what's -- glyphosate is what's relevant, not all pesticides.
Q. So when you were asked questions about the -- this article, you were not asked about the glyphosate specific numbers, is that correct?

A. Right.
MR. LASKER: Object to form. Misstates the testimony.
Q. And just to be clear, you're not attacking the use of self-reporting or imputation in general; rather, it's specific to the facts of this case. Do I understand you correctly?
MR. LASKER: Objection to form.
A. Yes. As Mr. Lasker said, both self-reported questionnaires and imputation are standard methodologies that are used by all epidemiologists including myself in most studies, many studies in epidemiology.
It's just that they have their limitations, and in the proper context, one has to be careful with their use. And in the particular context of this study, with the, as I described earlier, with the several flaws or problems here, the problems become a cumulatively and overwhelming issue and create what I consider to be fatal flaws in our interpretation of the outcomes of the study. So as to make it a basically an uninterpretable study for the purposes of this litigation.

Q. So I understand and the judge and jury understands correctly as well, if you look at page 410, Mr. Lasker mentioned that 63 percent of the participants responded to the first and second questionnaires. Do you remember that line of questioning?
A. I guess, yes.
Q. So said another way, 37 percent did not respond. Is that --
A. Yes.
Q. And it looks like in the first full paragraph on page 410 on the text on the left, I've got it highlighted right here if you want to just see where it is. It states that 37 percent in this particular study equates to 20,968 people. Is that correct?
A. Yes.
Q. So the authors were making educated guesses on almost 21,000 people, is that correct?
MR. LASKER: Objection to form.
A. Yes.

Q. And they were making those guesses during a time in which the glyphosate use changed dramatically, is that correct?
MR. LASKER: Objection to form.
A. Yes.
Q. And has anything that you heard today from Mr. Lasker changed your opinion that you provided in your expert -- your supplemental expert report?
A. No. I mean, the only thing I would say is I did make an error in the month -- my interpretation of the Montgomery paper. I didn't realize it was the Phase 3 interview rather than the Phase 2, but it doesn't change the substance of my -- what I was trying to elicit from that paper which was that -- what were the factors that predicted response or nonresponse.
They are basically -- what I was trying to get at in the Montgomery paper was just to describe some factors which predict response or nonresponse and the fact that they were described for a

subsequent interview or survey is not, to me, germane or critical.

MS. WAGSTAFF: Thank you, Doctor. No more questions.

THE WITNESS: Thank you.

THE VIDEOGRAPHER: The time is 1:38. This is the conclusion of today's deposition, January 3, 2018.

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ALFRED I. NEUGUT

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

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CERTIFICATE

STATE OF NEW JERSEY)
)ss:
COUNTY OF UNION)

I, MARY F. BOWMAN, a Registered Professional Reporter, Certified Realtime Reporter, and Notary Public within and for the State of New Jersey, do hereby certify:

That ALFRED I. NEUGUT, the witness whose deposition is hereinbefore set forth, was duly sworn by me 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 3rd day of January, 2018.

____
MARY F. BOWMAN, RPR, CRR

* * *ERRATA SHEET* * *

NAME OF CASE: In Re: RoundUp
DATE OF DEPOSITION: 1/3/18
NAME OF WITNESS: ALFRED I. NEUGUT
Reason codes:
1. To clarify the record.
2. To conform to the facts.
3. To correct transcription errors.

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