

Exhibit 11

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

IN RE: ROUNDUP)
PRODUCTS LIABILITY) MDL No. 2741
LITIGATION)
_____) Case No.
THIS DOCUMENT RELATES) 16-md-02741-VC
TO ALL CASES)

TUESDAY, JANUARY 23, 2018
CONFIDENTIAL - PURSUANT TO PROTECTIVE ORDER
- - -

VIDEOTAPED DEPOSITION of JENNIFER R.
RIDER, ScD, held at the offices of Cetrulo LLP,
2 Seaport Lane, Boston, Massachusetts,
commencing at 2:39 p.m., on the above date, before
Maureen O'Connor Pollard, Registered Merit
Reporter, Realtime Systems Administrator,
Certified Shorthand Reporter.

- - -
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1 PROCEEDINGS

2

3 THE VIDEOGRAPHER: We are now on the

4 record. My name is Chris Coughlin, and I'm a

5 videographer for Golkow Technologies. Today's

6 date is January 23, 2018, and the time is 2:39.

7 This video deposition is being held in

8 Boston, Massachusetts in the matter of Roundup

9 Products Liability Litigation, MDL Number 2741,

10 United States District Court, Northern District

11 of California, Case Number 16-md-02741-VC.

12 The deponent is Dr. Jennifer Rider.

13 Will counsel please identify

14 yourselves and state whom you represent.

15 MR. WOOL: David Wool from Andrus

16 Wagstaff for the plaintiffs.

17 MR. TRAVERS: Jeffrey Travers with The

18 Miller Firm for the plaintiffs.

19 MR. LASKER: Eric Lasker,

20 Hollingsworth LLP, for Monsanto.

21 MR. WOOL: The court reporter is

22 Maureen O'Connor, and she will now swear in the

23 witness.

24

25

Page 5

1 JENNIFER R. RIDER, ScD,

2 having been first duly identified and sworn, was

3 examined and testified as follows:

4 EXAMINATION

5 BY MR. WOOL:

6 Q. Good afternoon, Dr. Rider.

7 A. Hi.

8 Q. How are you doing?

9 A. Good. Thank you.

10 Q. So one, I know we haven't met before,

11 and I know that you've been through this process

12 before, but I can tell that you are somewhat

13 eager to give your answers, so if you'll just

14 give me a moment to finish my questions and let

15 counsel get in his objections where he wants to,

16 I think that will make the court reporter's job

17 a little bit easier.

18 A. Okay.

19 Q. Fair enough?

20 A. Mm-hmm.

21 Q. So I have marked as Exhibit 1 a copy

22 of your supplemental expert report.

23 A. Mm-hmm.

24 Q. Now, does that expert report, along

25 with the original expert report that you

Page 6

1 authored in this litigation, include all of your
 2 opinions for the Andreotti study?
 3 MR. LASKER: Objection to form.
 4 A. I can't say that it includes all of my
 5 opinions, but I felt like it covered the most
 6 important issues.
 7 BY MR. WOOL:
 8 Q. Since you authored that report, have
 9 you read anything that changes any of the
 10 opinions that are described in that report?
 11 A. No.
 12 Q. Now, in preparing that report, did
 13 anybody assist you in summarizing literature?
 14 A. No.
 15 Q. You wrote the report by yourself
 16 without the assistance of, say, a grad student
 17 or a teaching assistant?
 18 A. That is correct.
 19 Q. All right. And have you read any of
 20 the plaintiff expert reports that were submitted
 21 pursuant to Pretrial Order 34, which is the
 22 Order that required the supplemental reports?
 23 A. Yes, I have.
 24 Q. Which expert reports have you read, if
 25 you recall?

Page 7

1 A. Yes. I have read Dr. Ritz's report,
 2 and Dr. Neugut's report, and I believe I also
 3 took a quicker look at Dr. Portier's report.
 4 Q. All right. Do you believe that
 5 exposure is accurately assessed in the Andreotti
 6 study?
 7 A. So I think that the authors did a good
 8 job of making sure that even if there would be
 9 some imperfect measurement of exposure like we
 10 have in all epidemiologic studies, that it had
 11 very little impact on the findings.
 12 Q. So it's fair to say that all
 13 epidemiological studies have some degree of
 14 inaccuracy?
 15 A. Yes. I don't think we could find an
 16 example of an epidemiologic study where there's
 17 absolutely perfect reporting when you're talking
 18 about a long-term follow-up of participants.
 19 Q. Have you ever collected occupational
 20 exposure data for an epidemiological study?
 21 A. No. I don't do occupational
 22 epidemiology, but I certainly do epidemiology
 23 that deals with questionnaire data and cancer
 24 outcomes.
 25 Q. Now, have you ever designed a

Page 8

1 questionnaire for an occupational exposure
 2 study?
 3 MR. LASKER: Objection to form.
 4 A. Like I said, I don't do occupational
 5 epidemiology in my own research, so no, I
 6 wouldn't have designed those types of questions.
 7 But I have contributed to questions that have
 8 appeared on questionnaires for fairly high
 9 profile observational studies.
 10 BY MR. WOOL:
 11 Q. Just to make things easier for me, how
 12 does occupational exposure epidemiology differ
 13 from what you do?
 14 MR. LASKER: Objection to form.
 15 A. So in my view, I think occupational
 16 epidemiology is just looking specifically at
 17 exposures a person would encounter while they
 18 are working. But the -- how we handle these
 19 exposures in study design and analytics really
 20 isn't very different from looking at any other
 21 lifestyle exposure, which is something that I do
 22 in my own work.
 23 BY MR. WOOL:
 24 Q. And you've served as a peer review --
 25 strike that.

Page 9

1 You have served as a peer reviewer for
 2 various epidemiological journals, correct?
 3 A. That is correct.
 4 Q. And in your capacity as a peer
 5 reviewer, have you ever peer-reviewed any
 6 occupational exposure studies?
 7 A. I can't recall a specific example, but
 8 it wouldn't surprise me if I have.
 9 Q. So it's possible?
 10 A. It's very possible that I have. But I
 11 have peer-reviewed a lot of articles.
 12 Q. Fair enough.
 13 And the Andreotti study evaluated
 14 exposure data, correct?
 15 A. Well, they related GBH use to various
 16 cancer outcomes, yes.
 17 Q. Let's -- actually I'm just going to
 18 mark this as Exhibit 2, which is the Andreotti
 19 study.
 20 MR. WOOL: Here is a copy of it,
 21 Counsel.
 22 And I will mark as Exhibit 3 a copy of
 23 the enrollment questionnaire.
 24
 25

Page 10

1 (Whereupon, Exhibit Number 33-1,
 2 Supplemental Expert Report of Jennifer
 3 R. Rider, ScD, Number 33-2, Andreotti,
 4 et al article, Glyphosate Use and
 5 Cancer Incidence in the Agricultural
 6 Health Study, and Number 33-3,
 7 Agricultural Health Study, were marked
 8 for identification.)
 9 MR. LASKER: Which one?
 10 MR. WOOL: This is the private
 11 applicator questionnaire.
 12 BY MR. WOOL:
 13 Q. Now, have you seen this document
 14 before?
 15 A. The private applicator questionnaire,
 16 or this study? Sorry, which one are we talking
 17 about?
 18 Q. The private applicator questionnaire,
 19 Exhibit 33-3.
 20 A. I have gone online to the Agricultural
 21 Health Study website, but I believe I have spent
 22 more time looking at the commercial applicator
 23 questionnaire.
 24 Q. The commercial applicator enrollment
 25 questionnaire?

Page 11

1 A. Correct. Yes.
 2 Q. And the Andreotti study evaluated both
 3 private applicators and commercial applicators,
 4 correct?
 5 A. Yes. So they all were people who were
 6 enrolled while they were getting their pesticide
 7 license, their applicator license.
 8 Q. All right. So if you look at
 9 Exhibit 3, Page 10, at the very top you will see
 10 questions about Roundup, Jury, or glyphosate.
 11 Do you see that?
 12 A. I do.
 13 Q. And the questionnaire asked whether
 14 the cohort member has ever personally mixed or
 15 applied the herbicide, how many years they
 16 personally mixed or applied the herbicide, and
 17 an average how many days per year they used it
 18 along with when they first used the herbicide,
 19 correct?
 20 A. Mm-hmm.
 21 Q. All right. And this is the -- so the
 22 questions on Page 10 on, I believe, row H are
 23 the questions that form the baseline exposure
 24 assessment for the Andreotti study for private
 25 applicators, correct?

Page 12

1 MR. LASKER: Objection to form.
 2 A. I would have to look more carefully at
 3 this document to confirm that.
 4 (Witness reviewing document.)
 5 A. Yeah, I mean, it seems reasonable that
 6 this is the enrollment questionnaire and not the
 7 take-home questionnaire, which they also did.
 8 But I can't be sure just from looking at this,
 9 no.
 10 Q. Well, if you turn to the very first
 11 page, you will see --
 12 A. Enrollment questionnaire, yes. Thank
 13 you.
 14 Q. So we agree this is the enrollment
 15 questionnaire --
 16 A. Yes.
 17 Q. -- by private applicators.
 18 Now, cohort members were also asked
 19 about the use of protective equipment, correct?
 20 A. Correct.
 21 Q. And if you turn to Page 15, Question
 22 17 asks about the use of protective equipment,
 23 correct?
 24 A. That is correct.
 25 Q. And Question 17 is not specific to any

Page 13

1 herbicide, is it?
 2 A. It just says, "What type of protective
 3 equipment do you generally wear when you
 4 personally handle pesticides?" So that is
 5 correct.
 6 Q. And so if somebody used more than one
 7 pesticide and multiple types of protective
 8 equipment, this questionnaire would not
 9 distinguish which specific type of protective
 10 equipment applied to which pesticide, would it?
 11 A. It doesn't appear this questionnaire
 12 would. I believe if we looked at the commercial
 13 pesticide applicator questionnaire, that one
 14 distinguishes at least by different classes of
 15 pesticides.
 16 Q. Do you know approximately how many of
 17 the cohort members were commercial applicators
 18 versus private applicators?
 19 A. I would need to look back. I don't
 20 recall offhand, no.
 21 Q. I believe if you look at -- let's see.
 22 Well, we can go back to that actually.
 23 A. Okay.
 24 Q. Now, if you look at Question 16 still
 25 in the questionnaire, Page 15.

Page 14

1 A. Okay.

2 Q. Question 16 asks, "How do you

3 personally apply pesticides?" Correct?

4 A. Correct.

5 Q. And Question 16 does not ask cohort

6 members to describe the application method

7 specific to a pesticide, does it?

8 A. That is correct. Again, I think this

9 is different than in the commercial

10 questionnaire. But on this one, that is

11 correct.

12 Q. So if somebody used multiple

13 pesticides, again we would have no way of

14 knowing which application method applied to

15 which pesticide, would we?

16 MR. LASKER: Objection to form.

17 A. That is correct. I mean, we would

18 know how frequently they used particular

19 pesticides, but not the application method

20 specifically for each one.

21 BY MR. WOOL:

22 Q. Okay. Now, if we look at the

23 Andreotti study, Table 1, I think there's a

24 breakdown of the percentage of private

25 applicators versus commercial applicators, if

Page 15

1 you go under "applicator type."

2 Do you see that?

3 A. Yes, I do.

4 Q. Okay. And at least for the kind of

5 ever-never -- or not never side. Okay.

6 And so in the first column we are

7 looking at -- sorry, strike that.

8 In the first column of Table 1 we are

9 looking at never used glyphosate, correct?

10 A. Correct.

11 Q. And the total number of private

12 applicators is 8,476?

13 MR. LASKER: Objection to form.

14 Mischaracterizes the document.

15 A. So there are 91 percent of those who

16 never used glyphosate were private applicators,

17 meaning that's the majority of glyphosate users

18 were commercial applicators.

19 BY MR. WOOL:

20 Q. Okay. And the cohort members were all

21 restricted use pesticide applicators, correct?

22 A. They all had to have their license.

23 That is how they were enrolled.

24 Q. What is a restricted use pesticide?

25 A. I'm not exactly sure what goes into

Page 16

1 the licensing requirements. I just know that

2 that is how they enrolled the cohort, so that in

3 many ways the cohort would be more able to give

4 good quality information on pesticide use.

5 Q. Is the use of personal protective

6 equipment something that could impact actual

7 exposure to glyphosate?

8 A. I mean, I think we have data from

9 several biomonitoring studies that suggest that

10 yes, it does.

11 Q. And in what way does the use of

12 personal protective equipment impact actual

13 exposure to glyphosate?

14 A. Well, I mean, I think it's reasonable

15 to think that if you are wearing personal

16 protective equipment, you might have a lower

17 internal dose of glyphosate exposure.

18 Q. And how did the authors in Andreotti

19 use the information about personal protective

20 equipment?

21 A. They used it in their intensity

22 measures. There's an algorithm for which they

23 calculated intensity of use, and personal

24 protective equipment was incorporated into that

25 algorithm.

Page 17

1 Q. Are you familiar with the term

2 exposure misclassification?

3 A. Yes, I am.

4 Q. What does that term mean to you?

5 MR. LASKER: Objection to form.

6 A. It means the degree to which you are

7 assigning a participant the wrong value for

8 exposure, and it can be either differential or

9 non-differential with respect to the outcome.

10 BY MR. WOOL:

11 Q. And what is the difference between

12 differential and non-differential just so we're

13 clear?

14 A. So non-differential -- if we're

15 talking about exposure misclassification,

16 non-differential exposure misclassification

17 would mean that you're providing the wrong

18 information on exposure equally as often in

19 those who do and do not go on to develop the

20 outcome of interest, whereas differential, there

21 would be some difference in that

22 misclassification according to disease status.

23 Q. And is non-differential exposure

24 misclassification a type of systematic error

25 that can occur in an epidemiological study?

Page 18

1 MR. LASKER: Objection to form.
 2 A. I guess it is a type of error that
 3 could create a bias, if that's what you mean by
 4 systematic error.
 5 BY MR. WOOL:
 6 Q. Have you heard the term systematic
 7 error before as it relates to epidemiological
 8 studies?
 9 A. Yes, some people use that term. But
 10 it's one of these terms that's used to mean very
 11 different things.
 12 Q. Just so I'm clear, if I use the term,
 13 what does the term mean to you?
 14 MR. LASKER: Objection to form.
 15 A. So I wouldn't really talk about
 16 systematic error. I would talk about the
 17 specific type of bias that we're talking about.
 18 BY MR. WOOL:
 19 Q. Okay. Do you believe that exposure
 20 misclassification can bias the results of an
 21 epidemiological study towards the null?
 22 MR. LASKER: Objection to form.
 23 A. So you're asking if non-differential
 24 misclassification can bias the results toward
 25 the null?

Page 19

1 BY MR. WOOL:
 2 Q. Yes.
 3 A. On average, that tends to be what
 4 happens, especially when we're looking about
 5 dichotomous exposures, but there's also random
 6 error. So you can't always expect that a point
 7 estimate will be biased towards the null in a
 8 given study.
 9 Q. And can exposure misclassification
 10 impact the relative risk of a study?
 11 MR. LASKER: Objection to form.
 12 A. So again, are you talking specifically
 13 about non-differential exposure?
 14 BY MR. WOOL:
 15 Q. Let me clarify my question.
 16 Can non-differential exposure
 17 misclassification impact the relative risk
 18 estimate in an epidemiological study?
 19 A. Yes, it can.
 20 Q. Can it have a substantial impact upon
 21 relative risk estimates?
 22 A. It depends on a number of factors. So
 23 again, if we're just talking about
 24 non-differential misclassification of exposure,
 25 you know, we need to know the degree to which

Page 20

1 the exposure is being misclassified. And then I
 2 also mentioned there's also this random error
 3 issue, and so, in general, that's less of a
 4 problem in larger studies.
 5 Q. And accurate exposure assessments are
 6 important in large cohort studies, correct?
 7 MR. LASKER: Objection to form.
 8 A. Well, yeah. I mean, I think our goal
 9 is to measure the exposure that we're thinking
 10 to -- that we're hoping to relate to a
 11 particular outcome. And so in my own work I
 12 want to get as close as I can to measuring that
 13 exposure correctly.
 14 BY MR. WOOL:
 15 Q. And do you believe the exposure
 16 assessment in the Andreotti study is accurate?
 17 A. So I think they did a number of things
 18 to ensure that they were getting very good
 19 exposure reporting. I think, you know, first of
 20 all, just including a cohort of licensed
 21 applicators, they were likely to get much better
 22 information than, say, in some of the
 23 case-control studies that had been conducted
 24 previously. And they also -- you know, they
 25 have the initial baseline exposure, they have

Page 21

1 follow-up exposure, they look at exposure
 2 classified in several different ways, so yeah,
 3 so I think they did a good job in measuring the
 4 exposure.
 5 Q. And what is selection bias, just so
 6 we're clear on that term?
 7 A. So the sort of structural definition
 8 of selection bias is when you're conditioning on
 9 an effect of both exposure and disease. So in
 10 other words, one example would be if -- you
 11 know, getting into the analysis of your study
 12 depends on both exposure and disease.
 13 Q. Now, if we turn to Page 7 of
 14 Exhibit 2, which is the Andreotti study.
 15 A. Okay.
 16 Q. If you look in the left-hand column.
 17 A. Sorry, we're on Page 7 you said?
 18 Q. Correct.
 19 A. Yes.
 20 Q. I mean, I'm sorry, not the left-hand
 21 column, the right-hand column.
 22 A. Okay.
 23 Q. Okay. At the top of the paragraph,
 24 second to the bottom, the authors state that
 25 "This evaluation has some limitations that

Page 22

1 should be acknowledged. First, despite the
 2 specific information provided by the applicators
 3 about use of glyphosate, some misclassification
 4 of exposure undoubtedly occurred."
 5 Do you agree with that statement?
 6 A. Like I said, I think we would be very
 7 hard-pressed to find an epidemiologic study
 8 where there was absolutely no misclassification
 9 of exposure, especially when we're dealing with
 10 lifestyle or occupational behaviors. So in that
 11 way, yes, I would agree.
 12 Q. And does misclassification always bias
 13 the results of a study in a particular
 14 direction; for example, towards the null or away
 15 from the null?
 16 MR. LASKER: Objection to form. Asked
 17 and answered.
 18 A. Yes, so I did -- this is what I stated
 19 previously. But in general, non-differential
 20 misclassification of exposure would bias the
 21 results towards the null, especially if you are
 22 just talking about a dichotomous exposure. But
 23 we have random error issues as well, and so the
 24 point estimate you obtain from a single study
 25 wouldn't always be necessarily closer to the

Page 23

1 null.
 2 BY MR. WOOL:
 3 Q. Now, if we go to -- back to your
 4 report --
 5 A. Okay.
 6 Q. -- to Page 4, I want to ask you about
 7 the last sentence of this top paragraph.
 8 MR. LASKER: I'm sorry. I was on
 9 Page 4, but the wrong document. So Page 4, yes.
 10 BY MR. WOOL:
 11 Q. Okay?
 12 A. Yes.
 13 Q. The last sentence you state that while
 14 -- sorry, strike that. You state, "While this
 15 theoretically could lead to a shift in the
 16 relative risk for any individual category in
 17 either direction, because the reported relative
 18 risk in all categories in Andreotti, et al
 19 results are below 1.0, it is impossible for
 20 non-differential exposure misclassification to
 21 conceal any positive associations in that data,"
 22 correct?
 23 A. Mm-hmm.
 24 Q. And so is it your opinion, as you sit
 25 here today, that it is impossible that exposure

Page 24

1 misclassification could have concealed a
 2 positive association in the Andreotti study?
 3 A. So I think you're taking that sentence
 4 a bit out of context, because I'm talking in
 5 this whole paragraph about a specific situation
 6 where you're looking at exposure in multiple
 7 categories, and you have exposure
 8 misclassification specifically between two of
 9 those categories, those would bias the results
 10 towards each other. So in that particular
 11 situation you could have the results for one
 12 category go towards the null and another
 13 category go away from the null.
 14 But here in the HS 2018 study that
 15 we're talking about, all of the results for
 16 every category are below 1, you know, except for
 17 the reference value, of course, which is 1, so
 18 there's no way for two categories to be biased
 19 towards each other and for one to be then away
 20 from the null.
 21 Q. Okay. So if I understand, and I'm not
 22 sure that I do, you're saying that it is
 23 impossible for the results of -- strike that.
 24 So because all the results are going
 25 away from the null, you're saying that it is

Page 25

1 impossible that exposure misclassification could
 2 lead to that result?
 3 MR. LASKER: Objection to form.
 4 BY MR. WOOL:
 5 Q. Did I get that?
 6 A. No, that's not what I said.
 7 Q. Okay. Sorry. I just want to make
 8 sure that I'm clear. This isn't a trick
 9 question or anything like that.
 10 A. It might be helpful to actually look
 11 at the results in Table 2.
 12 Q. Table 2 of Andreotti?
 13 A. Correct.
 14 So if we're looking at the results for
 15 NHL, you can see there's -- the reference group
 16 that's the no exposure category, and then all of
 17 the quartiles of exposure have relative risk
 18 estimates that are below 1. Right?
 19 Q. Correct.
 20 A. So it is impossible for this one
 21 specific situation that I'm describing where
 22 non-differential misclassification can actually
 23 in categorical exposure evaluations can drive
 24 the relative risk away from the null
 25 theoretically, but it can't happen here because

1 every single category has a relative risk below
2 1.

3 So if you were misclassifying two
4 categories, only two categories, it's possible
5 that they would be biased towards each other.
6 But here that towards each other would still
7 result in estimates below 1.

8 Q. And so is it your opinion that the
9 Andreotti study is a negative -- or produces a
10 negative result?

11 MR. LASKER: Objection to form.

12 A. So that is a term -- I don't know what
13 you mean by "a negative result."

14 BY MR. WOOL:

15 Q. So a result -- or a relative risk of 1
16 is a null result, correct?

17 A. That would be a null result, yes.

18 Q. And so, I believe you used the term
19 negative result in your original report, so my
20 apologies if you didn't.

21 But would a result less than 1
22 indicate that the substance at issue in this
23 case, glyphosate, has a protective effect?

24 A. So this is exactly why I think it's
25 very important to always look at the confidence

1 intervals and not just the point estimate, so
2 absolutely not. I would not regard this as a
3 protective association. I would call this
4 consistent with no association.

5 Q. And that's because 1 is within the
6 confidence intervals?

7 A. That is correct.

8 Q. All right. Did you do any research on
9 the potential effects of exposure
10 misclassification prior to writing your report?

11 MR. LASKER: Objection to form.

12 A. I guess I don't quite understand what
13 you mean. I mean, I think I evaluate all of my
14 own studies that I do in terms of exposure
15 misclassification, and I teach exposure
16 misclassification, but I don't think any of my
17 substantive research is on the issue of exposure
18 misclassification specifically.

19 BY MR. WOOL:

20 Q. Forgive me, this isn't on your
21 reliance list. Actually we can go back to that.

22 Have you heard the term baseline
23 misclassification before?

24 MR. LASKER: Object to the form.

25 A. No, I wouldn't know what you meant by

1 that term.

2 BY MR. WOOL:

3 Q. Okay. So let's just talk about
4 potential misclassification at enrollment.

5 A. Okay.

6 Q. Okay. So we have the enrollment form.
7 So is it correct that the cohort members were
8 asked to detail past pesticide use at
9 enrollment?

10 A. That is correct.

11 Q. And they were asked to recall several
12 different pesticides, correct?

13 A. I believe 50 pesticides.

14 Q. And they were asked to recall the
15 frequency of use for each of those pesticides,
16 correct?

17 A. That is correct.

18 Q. And they were asked to do that by
19 filling out a questionnaire?

20 A. The enrollment questionnaire, correct.

21 Q. And do you know -- strike that.

22 Were the cohort members able to
23 compare answers to their own records prior to
24 filling out the questionnaire?

25 A. What types of records do you mean?

1 Q. For example, purchase records.

2 A. I'm not sure actually if they were
3 able to do that.

4 Q. Do you know if they were permitted to
5 ask family members about their own use to, say,
6 corroborate their memory?

7 A. I'm not sure.

8 Q. Okay. And in the Andreotti study, the
9 relative risks were calculated by comparing the
10 exposed group to the unexposed group, correct?

11 MR. LASKER: Objection to form.

12 A. Yes, or in their primary analyses
13 every quartile of use was compared to no
14 exposure.

15 BY MR. WOOL:

16 Q. And in the De Roos 2005 paper, which I
17 believe you relied on for your original report,
18 correct?

19 A. Correct.

20 Q. The authors of that study looked at
21 the comparison between the upper quartiles and
22 the lowest quartile, correct?

23 MR. LASKER: Objection to form.

24 A. So in their dose-response analyses
25 that's correct, it was done slightly

Page 30

1 differently, and the reference group was the
 2 lowest exposed group, but they also provided
 3 ever-never analyses where they compared it to no
 4 exposure. So it was just presented slightly
 5 differently, but the same information was
 6 available.
 7 BY MR. WOOL:
 8 Q. And do you believe that one of those
 9 methods is more reliable than the other?
 10 A. So I mean, I think when we're
 11 interested in determining causal associations,
 12 what we're really interested in is the
 13 comparison of exposure and different levels of
 14 exposure to no exposure. So I think if you're
 15 looking to make sort of causal inferences from
 16 your study, I think in a lot of ways that makes
 17 sense.
 18 Q. Is it possible to accurately quantify
 19 exposure misclassification in the Andreotti
 20 study?
 21 MR. LASKER: Objection to form.
 22 A. So I think the authors did go through
 23 a number of different analyses, and there were
 24 also external studies that look at the degree to
 25 which exposure misclassification could be an

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1 issue, and I think those studies show that the
 2 determination of exposure is quite good, and
 3 certainly in line with other types of lifestyle
 4 exposures that we typically measure.
 5 BY MR. WOOL:
 6 Q. But I guess my question was a little
 7 bit different.
 8 Is it possible to measure -- to get a
 9 precise measurement, I should say, for exposure
 10 misclassification in the Andreotti study?
 11 A. Right. So we can do sensitivity
 12 analyses to determine the degree to which
 13 different levels of exposure misclassification
 14 could affect our results, but, you know, we can
 15 never definitively say that there is this
 16 certain degree of exposure misclassification in
 17 a particular study, because we would never have
 18 that information.
 19 But I think the important thing is
 20 that you look to see how much that would impact
 21 your findings, and then if it appears that it
 22 would have very little impact you can have
 23 confidence in your conclusions.
 24 Q. Okay. So let's go to Page 10 of your
 25 expert report.

Page 32

1 A. Okay.
 2 Q. I'm sorry. Strike that. We'll go
 3 back to that.
 4 Now, in the questionnaires, is it
 5 possible that some exposure misclassification
 6 occurred at enrollment?
 7 A. So you're asking is it possible that
 8 not every applicator correctly reported every
 9 single occurrence of every pesticide?
 10 Q. Correct.
 11 A. Yes, that is a possibility.
 12 Q. Okay. And what's the potential effect
 13 on Andreotti of misclassification at enrollment?
 14 A. Well, again, I mean, I think there is
 15 good data from several external studies that
 16 say, you know, they're in the Blair 2002 study,
 17 that agreement between pesticide reporting from
 18 one year to the next is actually very good. So
 19 if it's quite precise, we would expect that to
 20 have very minimal impact on the findings.
 21 Q. And so is it your opinion, as you sit
 22 here today, that pesticide applicators
 23 accurately report use year-over-year?
 24 MR. LASKER: Objection to form.
 25 A. Again, I think that there is always

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1 some degree of error in reporting of exposure.
 2 But, you know, here what we're really trying to
 3 do is put people into categories of exposure
 4 ranging from low use to high use. And if we can
 5 do a reasonable job in estimating their
 6 exposure, we can at least get them into the
 7 right category, and then our inferences will be
 8 valid.
 9 BY MR. WOOL:
 10 Q. And you just mentioned Blair 2002.
 11 Let's take a look at that, which I'll mark as
 12 Exhibit 33-4.
 13 (Whereupon, Exhibit Number 33-4,
 14 Blair, et al article, Reliability of
 15 Reporting on Life-Style and
 16 Agricultural Factors by a Sample of
 17 Participants in the Agricultural
 18 Health Study from Iowa, was marked for
 19 identification.)
 20 BY MR. WOOL:
 21 Q. And this is the study that you just
 22 described?
 23 A. That's correct.
 24 Q. All right. And how did Blair
 25 determine that pesticide applicators gave

Page 34

1 reliable reporting for pesticide use?
 2 A. So I agree -- well, they say here in
 3 the last sentence of the introduction, "We took
 4 advantage of a special situation in Iowa to
 5 assess the reporting consistency for
 6 agricultural and lifestyle factors on a sample
 7 of the cohort that completed two questionnaires
 8 approximately one year apart." So I think
 9 something happened in Iowa regarding licensing,
 10 and so they were able to obtain data on, I
 11 believe it's about 4,000 people twice. 2,895
 12 applicators, and a second group of 1,193.
 13 Q. Now, if we turn to Page 96 of the
 14 Blair study, look at Table 2. For the days per
 15 year mixed or applied statistic, what is the
 16 exact agreement for glyphosate?
 17 A. So that would be .71 with a confidence
 18 interval of .67 to .75.
 19 Q. Okay. And Blair reports 52 percent
 20 exact agreement for glyphosate for days per year
 21 mixed or applied, correct?
 22 A. Sorry, where are you getting that?
 23 Q. In Table 2, if you go down you'll see
 24 days per year mixed or applied on the far
 25 left-hand column.

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1 A. The exact agreement, yes, 52 percent
 2 with a kappa of .71, yes.
 3 Q. And that 52 percent is telling us that
 4 the categories are identical for 52 percent of
 5 the responders, correct?
 6 A. Well, that's true. But if you go down
 7 to the text below the table, they also say that
 8 agreement within one category of exact agreement
 9 was 98 and 99 percent, much higher than for any
 10 category.
 11 So this is actually the advantage of
 12 looking at the kappa statistic is the kappa
 13 statistic takes into account sort of chance
 14 agreement that can happen, but it can also tell
 15 you about how close you are to the correct
 16 answer, not just whether you're right or wrong.
 17 Q. And so what does that mean when the
 18 authors say agreement within one category of
 19 exact agreement was 98 and 99 percent?
 20 A. So I believe it means that, you know,
 21 if the person would have been classified in the
 22 second group -- hold on.
 23 So if the correct category was the
 24 second group, you know, 98 or 99 percent of
 25 people would have put themselves in the first

Page 36

1 group or the third group, just as an example of
 2 what that means by within one category, as an
 3 example.
 4 Q. Right. I think I was misunderstanding
 5 of your answer.
 6 A. Okay.
 7 Q. And again, the groups -- or strike
 8 that.
 9 The categories are less than 5, 5 to
 10 9 --
 11 MR. LASKER: You're talking about
 12 days?
 13 MR. WOOL: Sorry, the categories.
 14 MR. LASKER: Can you show us where you
 15 were.
 16 MR. WOOL: For days per year of use
 17 categories.
 18 MR. LASKER: So this is the footnote
 19 to Table 2?
 20 BY MR. WOOL:
 21 Q. Yes, the footnote to Table 2. The
 22 categories of less than 5, 5 to 9, 10 to 19, 20
 23 to 39, 40 to 59, 60 to 150, and more than 150?
 24 A. Correct.
 25 Q. And your testimony is that exact

Page 37

1 agreement was 98 and 99 percent within those
 2 categories, so 99 -- or 98 to 99 percent of the
 3 people who, say, reported as being within 10 to
 4 19 one year were in 20 to 39 the year before, is
 5 that right?
 6 A. As an example, correct, yes.
 7 Q. Okay. And so based on this result,
 8 which is, again, the days per year mixed or
 9 applied, do you believe that the mixed or
 10 applied data that's reported in Andreotti, et al
 11 is accurate?
 12 MR. LASKER: Objection to form.
 13 A. So as I've said before, I think this
 14 lends support to the fact that the relative
 15 risks that we're estimating are by and large
 16 capturing people with regard to whether they're,
 17 you know, low exposed or high exposed
 18 individuals and relating that to unexposed
 19 individuals. So while yes, some people may have
 20 been not perfectly classified, you would still
 21 be able to identify elevations in the relative
 22 risk across those categories.
 23 Q. Okay. Now, you talk about selection
 24 bias in your expert report.
 25 A. Okay.

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1 Q. And this time we're going to stick on
 2 your expert report for a second. If you go to
 3 Page 4.
 4 A. Okay.
 5 Q. You had talked about some of the
 6 different strategies that have been used by the
 7 Andreotti authors to validate the results of the
 8 study a couple moments ago, and at kind of the
 9 bottom paragraph in the middle you begin talking
 10 about the Montgomery study, correct?
 11 A. Yes. I see that, yes.
 12 Q. And what is the pertinence of the
 13 Montgomery study?
 14 MR. LASKER: Objection to form.
 15 A. Well, the Montgomery study is one of
 16 the studies that looked at how likely or
 17 unlikely selection bias was to occur in the
 18 Agricultural Health Study.
 19 BY MR. WOOL:
 20 Q. And how did the authors of Montgomery
 21 do that?
 22 A. So they look at the differences in the
 23 population in terms of responders and
 24 non-responders to the follow-up questionnaire,
 25 and they find that even though there are some

Page 39

1 differences among non-responders in many
 2 variables that they measured, they do analyses
 3 to show that this really doesn't have a
 4 meaningful impact on the results.
 5 Q. Okay. And I've actually marked as
 6 33-5 the Montgomery study.
 7 (Whereupon, Exhibit Number 33-5,
 8 Montgomery, et al Author Manuscript,
 9 Characteristics of non-participation
 10 and potential for selection bias in a
 11 prospective cohort study, was marked
 12 for identification.)
 13 A. Okay.
 14 BY MR. WOOL:
 15 Q. And if you look at the conclusions in
 16 the abstract section on the first page, the
 17 authors note that "Differences between
 18 non-participants and participants in follow-up
 19 interview were generally small, and we did not
 20 find significant evidence of selection bias.
 21 However, the incidence of bias may depend on the
 22 specific exposure and outcome under study."
 23 Did I read that correctly?
 24 A. Yes, you did.
 25 Q. What do they mean by "the specific

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1 exposure and outcome under study"?)
 2 A. So they here in this study looked at
 3 specific exposures and outcomes, and selection
 4 bias phenomenon could -- you know, it's not
 5 general across a study population, you would
 6 need to take into account the specific exposure
 7 and disease outcome of interest.
 8 Q. And what exposures did they look at in
 9 Montgomery?
 10 A. Let's see. This is one, I believe,
 11 they looked at smoking.
 12 Q. I think if you look at the bottom of
 13 Page 2.
 14 A. Okay. They looked at chloro -- you're
 15 going to make me say that.
 16 Q. No, I won't make you say it.
 17 A. With prevalent depression, smoking
 18 with prevalent chronic lung disease, and smoking
 19 with incident cancer.
 20 Q. So they did not look at glyphosate and
 21 non-Hodgkin's lymphoma, correct?
 22 A. That is correct, they did not. Yes,
 23 they did not look at glyphosate and NHL
 24 specifically.
 25 Q. And would you view -- strike that.

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1 And is it possible that there are --
 2 actually, strike that.
 3 And in your expert report you note
 4 regarding Montgomery that these results provide
 5 evidence that selection bias due to follow-up,
 6 survey non-responses not necessarily a major
 7 concern, though this issue should also be
 8 considered with respect to GBH, which is
 9 glyphosate-based herbicides, and NHL
 10 specifically?
 11 A. Yes. And I think the authors did that
 12 in their sensitivity analyses.
 13 MR. LASKER: Just clarify, authors of
 14 what?
 15 BY MR. WOOL:
 16 Q. Go ahead. Yes, fair enough.
 17 A. Sorry. The Andreotti, et al authors
 18 in the most recent 2018 publication did several
 19 sensitivity analyses that addressed concerns
 20 about selection bias from non-response.
 21 Q. Okay. But to the extent that you rely
 22 upon Montgomery, this article assumes that
 23 glyphosate response patterns are the same as the
 24 other pesticides measured in this one, which is
 25 chlorpyrifos with a prevalent depression, for

Page 42

1 example?
 2 MR. LASKER: Objection to form.
 3 A. No, I wouldn't characterize it that
 4 way, because, again, the primary analysis that
 5 was done in the JNCI Andreotti study used
 6 multiple imputation, and so the patterns don't
 7 need to be exactly the same, you just need to
 8 have measured all of the variables which
 9 influence response. So they collected all of
 10 this other information on, you know, many, many
 11 covariates in this questionnaire, and then could
 12 use those to predict glyphosate use. So it
 13 doesn't necessitate that the patterns need to be
 14 the same.
 15 BY MR. WOOL:
 16 Q. Do you agree, though, that the extent
 17 of bias could be dependent upon the particular
 18 outcome, for example non-Hodgkin's lymphoma?
 19 MR. LASKER: Objection to form.
 20 A. So I think I would be much less
 21 concerned about in this study, because we have
 22 complete information on all of the outcomes
 23 through cancer registry, so this isn't a
 24 situation where loss to follow-up causes us to
 25 miss some of the cancer cases. So no, I

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1 wouldn't be concerned about that.
 2 BY MR. WOOL:
 3 Q. So let's talk about that for just a
 4 moment.
 5 How were the outcomes captured in the
 6 Andreotti study?
 7 A. They used linkage to cancer
 8 registries. So they're not relying solely on
 9 self-reported outcome data.
 10 Q. Which cancer registries?
 11 A. I believe the state cancer registries,
 12 but they also do a search of the death index.
 13 Q. Okay. So if somebody moved out of the
 14 state of North Carolina and then developed
 15 non-Hodgkin's lymphoma, would that be captured
 16 by the Andreotti study?
 17 A. If someone left the state prior to
 18 their cancer diagnosis, it is possible that you
 19 would miss that case, unless that person died of
 20 NHL, and then you would most likely capture them
 21 through the death registry.
 22 This is the same method we use in the
 23 cohorts that I work on. And like this study,
 24 you know, you can say that cancer outcomes are
 25 captured at least 98 percent of the time.

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1 Q. And the Andreotti study that's the
 2 subject of your supplemental report adjusts for
 3 the presence of confounders, correct?
 4 A. That is correct.
 5 Q. And some of the confounders that the
 6 study adjusted for are other pesticides,
 7 correct?
 8 A. Yes, they included other pesticides.
 9 Q. And, in fact, one of your opinions in
 10 this litigation is that plaintiffs' experts
 11 failed to properly adjust for confounders,
 12 correct?
 13 A. Could you provide a little more --
 14 that the plaintiffs experts failed to adjust?
 15 Q. Yes. I believe it is. Let's see, for
 16 example, on Page 10 of your supplemental report
 17 at the very bottom, there's a heading
 18 "Overadjustment for Other Pesticides."
 19 A. So that specifically was about an
 20 issue that Dr. Ritz raised in her deposition
 21 where she was saying that when you adjusted for
 22 other pesticides, you could over-adjust and
 23 would somehow wash out the effect of GBH and
 24 NHL. But I disagree with that. I think that,
 25 you know, the most important issue is to -- for

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1 your results to be internally valid is to make
 2 sure that you don't have a common cause of
 3 exposure and outcome. It's probably the most
 4 basic epidemiologic principle.
 5 It's interesting that in this
 6 particular study, the Andreotti JNCI study, the
 7 adjustment for those potential confounders
 8 didn't have any appreciable affect on the
 9 results. But that doesn't mean that those
 10 things they adjusted for couldn't be confounders
 11 in another study where the population was less
 12 homogenous.
 13 Q. So would it be fair to say that it
 14 would be improper to fail to adjust for a known
 15 confounder in an epidemiological study?
 16 A. I think if you know something that is
 17 a common cause of the exposure and the outcome,
 18 you would adjust for it, if what you're
 19 interested in is interpreting your results
 20 causally.
 21 Q. And if something is a potential
 22 confounder, is adjustment required for an
 23 epidemiological study to be reliable?
 24 A. I think in general if we don't know
 25 whether a variable is a confounder, and by that

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1 I specifically mean a variable that is a common
 2 cause of the exposure and the outcome, you first
 3 use your sort of biological knowledge about that
 4 variable and its relationship with exposure and
 5 disease to determine whether or not you should
 6 adjust for it.
 7 Q. So if I understand your answer
 8 correctly, sometimes yes, sometimes no, it's
 9 just something that requires kind of more
 10 granular focus depending on the substance, is
 11 that fair?
 12 A. Well, I think this is why
 13 epidemiologists need to know, you know,
 14 something about the relationship between the
 15 exposure and the outcome to determine what those
 16 potential confounders might be.
 17 The wrong approach is just simply, you
 18 know, throwing everything in a model. You have
 19 to think that that could actually be a common
 20 cause potentially of the exposure and the
 21 outcome.
 22 Q. So you must think that a substance is
 23 a common cause of both the exposure and the
 24 outcome to rule it in as a confounder?
 25 MR. LASKER: Objection to form.

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1 A. As a potential confounder, correct.
 2 So just to clarify, we wouldn't want
 3 to put in our model anything that we thought was
 4 an intermediate between our exposure and our
 5 outcome, because if you adjust on an
 6 intermediate it may take away some of the real
 7 causal effect of that exposure on the outcome,
 8 but your statistical model can't tell you the
 9 difference between the situation where that
 10 variable is a confounder and the situation where
 11 it's an intermediate. You have to use your own
 12 biological knowledge of the relationship between
 13 the exposure and disease to determine that.
 14 BY MR. WOOL:
 15 Q. What about when a substance is not a
 16 confounder, in that it has no association with
 17 the disease, is it proper to adjust for
 18 something that is not a confounder?
 19 MR. LASKER: Objection to form.
 20 A. So there are -- in epidemiology I
 21 would say age is the most frequently considered
 22 potential confounder. We often adjust for age
 23 in our analyses, even if age has no appreciable
 24 impact on the relative risk that we see, just
 25 because it's known to be an important

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1 confounder.
 2 BY MR. WOOL:
 3 Q. So I'm asking a slightly different
 4 question. What I'm curious about is something
 5 that you can definitively say is not a
 6 confounder. Let's say that there are 1,000
 7 great cohort prospective studies that show that
 8 smoking just doesn't have any effect one way or
 9 the other on non-Hodgkin's lymphoma, if that
 10 were the case would it be proper to adjust for
 11 cigarette smoking as an example?
 12 A. I think it's, you know, rare that we
 13 ever feel confident enough that smoking wouldn't
 14 cause an outcome that you wouldn't at least try
 15 to look at it as a potential confounder.
 16 Q. Okay. Smoking was probably a bad
 17 example. Let's say Smart Water, for example.
 18 If there were a bunch of studies that just said
 19 that Smart Water has no effect one way or the
 20 other on non-Hodgkin's lymphoma, would it be
 21 proper to adjust for the use of Smart Water in
 22 an epidemiological study?
 23 A. I think, again, you would only include
 24 it if you thought that it could be a common
 25 cause of exposure and your outcome. If you

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1 didn't have a reason to believe that that was
 2 true, then no, it would be fine not to include
 3 it.
 4 Q. And if you could definitively rule it
 5 out, it would be fine not to include it as a
 6 confounder?
 7 A. If you could definitively rule it out,
 8 yes. But I think, again, there are few
 9 situations where we feel comfortable doing that.
 10 I think erring on the side of being conservative
 11 and adjusting is usually how we would proceed.
 12 MR. WOOL: Do you guys want to take a
 13 quick break?
 14 MR. LASKER: Sure.
 15 THE VIDEOGRAPHER: Going off the
 16 record. The time is 3:34.
 17 (Whereupon, a recess was taken.)
 18 THE VIDEOGRAPHER: Back on the record.
 19 The time is 3:45.
 20 BY MR. WOOL:
 21 Q. Dr. Rider, 37 percent of the
 22 Andreotti, et al cohort was lost to follow-up,
 23 correct?
 24 MR. LASKER: Objection to form.
 25 A. That's not how I would characterize

Page 50

1 it, because, again, they did have information on
 2 outcomes, so they weren't completely lost to
 3 follow-up. But it is true that 37 percent
 4 didn't respond to the follow-up questionnaire.
 5 BY MR. WOOL:
 6 Q. Right.
 7 You mentioned imputation. And to deal
 8 with that percentage of people who did not
 9 answer the follow-up questionnaire, the authors
 10 performed an imputation, correct?
 11 A. Yes, multiple imputation.
 12 MR. WOOL: I'm going to mark as
 13 Exhibit 33-6 the Heltshe article.
 14 (Whereupon, Exhibit Number 33-6,
 15 Heltshe, et al article, Using multiple
 16 imputation to assign pesticide use for
 17 non-responders in the follow-up
 18 questionnaire in the Agricultural
 19 Health Study, was marked for
 20 identification.)
 21 BY MR. WOOL:
 22 Q. You've seen this article before?
 23 A. Yes, I have.
 24 Q. Does this article describe the
 25 multiple imputation that the authors performed?

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1 A. Yes, it does. It goes through the
 2 imputation method, and then evaluates it for a
 3 number of different pesticides.
 4 Q. Now, if you turn to Page 410, which is
 5 the second page of the article, under Materials
 6 and Methods the authors state that, "Our
 7 specific multiple imputation" --
 8 MR. LASKER: Where are you?
 9 MR. WOOL: Sorry, under Materials and
 10 Methods, I believe the third full sentence.
 11 MR. LASKER: Okay.
 12 MR. WOOL: Do you see it?
 13 MR. LASKER: Yes.
 14 BY MR. WOOL:
 15 Q. The authors state, "Our specific
 16 multiple imputation procedure imputes four
 17 primary AHS exposure metric variables of
 18 interest," and then a colon, "(1) use (yes/no)
 19 of any pesticide in the interim period between
 20 Phase 1 and 2; (2) use (yes/no) of 50 specific
 21 pesticides in the interim period," which is
 22 referenced in Table 1. "(3) number of days of
 23 use for a specific pesticide during Phase 2; and
 24 (4) last year of application of any pesticides
 25 within the 5-year period between Phase 1 and 2,"

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1 correct?
 2 A. Correct.
 3 Q. And so am I correct that the
 4 imputation performed by the Andreotti, et al
 5 authors derived these four metrics that are
 6 listed here?
 7 MR. LASKER: Objection to form.
 8 What do you mean by "the Andreotti
 9 authors"?
 10 MR. WOOL: Strike that. I agree that
 11 was a confusing question.
 12 BY MR. WOOL:
 13 Q. So the imputation was used to discern
 14 these four metrics that are listed here,
 15 correct?
 16 A. That is correct. They were looking at
 17 four -- they used models to predict these four
 18 different outcomes. They were exposures, but
 19 they were the outcomes of the imputation models,
 20 correct.
 21 Q. How was number of days of use for a
 22 specific pesticide during Phase 2 calculated?
 23 A. The number of days of use of any
 24 pesticide?
 25 Q. Yes. Strike that. I should have

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1 clarified.
 2 So for the -- in the original study
 3 for the responders, how did they calculate that
 4 figure, the number of days of use for a specific
 5 pesticide?
 6 MR. LASKER: Objection to form.
 7 I'm sorry, which study?
 8 BY MR. WOOL:
 9 Q. The Andreotti study.
 10 A. Could I ask you --
 11 Q. Let me clarify.
 12 In the Andreotti study, how did they
 13 calculate the number of days of use for a
 14 specific pesticide between the original
 15 questionnaire and follow-up questionnaire?
 16 MR. LASKER: Objection to form.
 17 A. I apologize, I still don't understand
 18 the question. I don't know whether you're
 19 talking about responders or non-responders.
 20 BY MR. WOOL:
 21 Q. Okay. We're talking about responders
 22 here. So let's go back to the Andreotti study,
 23 actually, at the top of Page 2.
 24 A. Okay.
 25 Q. Are you there?

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1 A. Yep.

2 Q. Okay. So looking at the top

3 right-hand column --

4 MR. LASKER: I'm sorry, right hand on

5 Page 2?

6 A. Of the Andreotti study.

7 MR. WOOL: Of Andreotti.

8 MR. LASKER: Sorry.

9 BY MR. WOOL:

10 Q. This will make it easier.

11 MR. LASKER: What column are we under?

12 MR. WOOL: The right.

13 BY MR. WOOL:

14 Q. And it states that, "At enrollment

15 applicators reported a number of years and days

16 per year each pesticide was used, while at

17 follow-up applicators reported the number of

18 days each pesticide was used in the most recent

19 year farmed." Correct?

20 A. That's correct.

21 Q. So am I correct that the authors used

22 the most recent year farmed as one of the

23 metrics to determine the -- what did they call

24 it -- the intensity weighted lifetime days of

25 use?

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1 MR. LASKER: Objection to form.

2 A. So in the Andreotti, et al article,

3 their primary analysis used information from the

4 baseline questionnaire where they had asked

5 about the number of years and days per year of

6 use for each pesticide, as well as information

7 from the follow-up questionnaire where they

8 asked just about pesticide use in the most

9 recent year farmed.

10 BY MR. WOOL:

11 Q. Okay. And the number of days of use

12 for a specific pesticide during Phase 1 and 2

13 for responders was calculated using the number

14 reported for the most recent year farmed,

15 correct?

16 MR. LASKER: Objection to form.

17 A. So the, like I said, the authors used

18 all of the information that they gathered on

19 exposure in terms of number of years of use and

20 days of use for each pesticide from enrollment,

21 and then they distributed a follow-up

22 questionnaire roughly five years later, and that

23 questionnaire included questions about the

24 number of days of use for each pesticide within

25 the most recent year farmed.

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1 BY MR. WOOL:

2 Q. Okay. And to clarify, so between

3 enrollment and follow-up, that figure was the

4 only metric that was gathered for days per year

5 of use, that answer for the most previous

6 calendar year, correct?

7 A. Right. So the authors state that

8 there's an approximately five year period

9 between enrollment and the follow-up

10 questionnaire, and at the time of the follow-up

11 questionnaire the questionnaire included

12 questions just on the most recent year farmed,

13 not on every year, that is correct.

14 Q. Okay. Now you can go back to Heltshe.

15 A. Okay.

16 Q. Sorry, that was more complicated than

17 it should have been. And again, we're on

18 Page 410.

19 A. Okay.

20 Q. So if we go back to where we were,

21 number 3, the number of days of use for a

22 specific pesticide during Phase 2 refers to --

23 actually, strike that.

24 Okay. So Heltshe, kind of at a

25 10,000-foot level, used the information of

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1 responders to impute what non-responders would

2 have answered had they responded to the

3 questionnaires, correct?

4 MR. LASKER: Objection to form.

5 A. The goal of the imputation procedure

6 is to be able to use data from the whole cohort

7 even if participants had not responded to the

8 follow-up questionnaire, so they're using this

9 method to predict what a person's exposure would

10 have been at that particular time period.

11 BY MR. WOOL:

12 Q. And so if responders' use data was

13 inaccurate, then that would decrease the

14 reliability of the imputed results, correct?

15 MR. LASKER: Objection to form.

16 A. So the information that's used in the

17 imputation it takes into account, of course, the

18 responders' data, but all of -- but also all of

19 the other variables and information that they

20 have for the entire cohort. So they're using

21 every variable that could predict exposure to

22 predict particular exposure values.

23 BY MR. WOOL:

24 Q. Is it possible for statistical

25 analysis to correct for exposure

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1 misclassification?
 2 MR. LASKER: Objection to form.
 3 A. There are a number of methods actually
 4 that do corrections for exposure
 5 misclassification, yes.
 6 BY MR. WOOL:
 7 Q. Now, if the imputation model was
 8 systematically biased to imputing no exposure,
 9 would that diminish the power of the Andreotti
 10 study?
 11 MR. LASKER: Objection to form.
 12 A. Would you mind just restating the
 13 question one more time?
 14 BY MR. WOOL:
 15 Q. Yes.
 16 If the imputation model was
 17 systematically biased to imputing no exposure,
 18 would that reduce the power of the Andreotti
 19 study?
 20 MR. LASKER: Same objection.
 21 A. So I think, first of all, I just want
 22 to point that that their primary analysis wasn't
 23 ever exposure versus no exposure, it was levels
 24 of exposure compared to no exposure. So I guess
 25 I'm not sure how there would be a systematic

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1 bias towards imputing no exposure.
 2 BY MR. WOOL:
 3 Q. Now, have you used imputation in any
 4 of your epidemiological publications?
 5 A. I do not -- well, I can't say
 6 definitively that any of my papers does not
 7 include imputation, but at the same time I can't
 8 come up with an example right now that does.
 9 Q. So let's see. You might have used
 10 multiple imputation, you might not have, you
 11 just don't know sitting here?
 12 A. Yes, there's a possibility on a paper
 13 for which I'm a co-author that multiple
 14 imputation was used when there was missing data.
 15 Q. Okay. So is it your opinion that the
 16 imputation method utilized in the Andreotti
 17 study has general acceptance within the
 18 epidemiological community?
 19 A. Well, I think that it's well-suited
 20 for certain situations when the data are missing
 21 at random. So I think when you're deciding
 22 which method for strategy for handling missing
 23 data you're going to use, you consider why the
 24 data are missing. And when they're missing at
 25 random, multiple imputation is preferable to

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1 other approaches like, say, the complete case
 2 analysis.
 3 Q. And in Andreotti the imputation was
 4 performed using answers from the entire cohort
 5 that answered Phase 2 questionnaires corrected,
 6 and it -- strike that. Let me just ask that
 7 first.
 8 MR. LASKER: Objection to form.
 9 A. So could you just ask the question?
 10 BY MR. WOOL:
 11 Q. Yes.
 12 So I guess what I'm getting at is that
 13 the imputation that was performed did not look
 14 at whether the non-responders were from North
 15 Carolina or from Iowa, correct?
 16 MR. LASKER: Objection to form.
 17 A. I completely disagree. The imputation
 18 procedure takes into account all types of
 19 information that's available on all of the
 20 applicators, so that's how they build their
 21 imputation model. And that's even described in
 22 Heltshe.
 23 BY MR. WOOL:
 24 Q. Okay. So help me out here, I guess.
 25 So the authors did take into account whether the

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1 responder was in -- strike that.
 2 The authors did take into account
 3 whether the non-responder was in North Carolina
 4 or Iowa?
 5 A. I mean, I would need to look at the
 6 Heltshe paper to recall exactly what variables
 7 they ended up including in their imputation, but
 8 they used a strategy where all of the variables
 9 that most strongly predicted response were
 10 included. So again, I would have to review to
 11 see whether state was one of those. But if it
 12 wasn't included, it was because it didn't affect
 13 response -- I mean, it didn't affect the
 14 exposure value. Sorry.
 15 Q. Okay. Now, if you turn to Page 413 of
 16 Heltshe, and to Table 3.
 17 A. Okay.
 18 Q. And Table 3 provides metrics for
 19 reference Brier scores, Brier score, and skill
 20 Brier score, correct? Table 3 on 414.
 21 A. Here we are. Thanks. Yes.
 22 Q. Okay. Did you hear my question?
 23 A. That this table contains scores for
 24 reference Brier, Brier score, Brier skill score.
 25 Q. Now, what is a Brier score?

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1 A. A Brier score is just a statistic that
 2 is used to measure the accuracy of a prediction
 3 that's in discrete categories.
 4 Q. Have you ever used a Brier score in
 5 your own research?
 6 A. No. I, in fact, I think they're
 7 fairly uncommonly used in epidemiology overall.
 8 Sorry. I mean, I think they're often used in
 9 weather forecasting.
 10 MR. LASKER: Just for clarification,
 11 did you say that Brier score is used to measure
 12 the accuracy of a prediction that's in those
 13 three categories?
 14 A. No, in discrete categories.
 15 MR. WOOL: Good catch.
 16 BY MR. WOOL:
 17 Q. And so based on that answer, it would
 18 be fair to say that you have not calculated a
 19 Brier score before?
 20 A. I have never personally calculated a
 21 Brier score, correct.
 22 Q. But you had heard the term Brier score
 23 before reading the Heltshe paper, correct?
 24 A. I actually had not encountered Brier
 25 scores before.

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1 Q. So this paper was the first time that
 2 you had encountered them as an epidemiologist?
 3 A. That is correct. Like I said, I think
 4 that I've never seen one in all of the papers
 5 that I've reviewed, so I had to do some reading
 6 on them.
 7 Q. What is the cutoff point at which you
 8 believe a Brier score indicates accuracy that
 9 would make the imputation methodology reliable?
 10 MR. LASKER: Objection to form.
 11 A. There is no such cutpoint that exists.
 12 And, in fact, even for statistics that we use
 13 very commonly in epidemiology, like sensitivity
 14 and specificity, there's no cutpoint at which
 15 you would say this is a good value or this is a
 16 bad value, because it very much relates to what
 17 you're trying to predict.
 18 BY MR. WOOL:
 19 Q. So whether a Brier score indicates
 20 that accuracy is unreliable -- strike that.
 21 Within the field of epidemiology, is
 22 there any sort of general consensus as to what
 23 an acceptable Brier score is before, say,
 24 accuracy is deemed unreliable?
 25 MR. LASKER: Objection to form.

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1 A. I wouldn't be aware of that, but it
 2 would surprise me because, like I said, we tend
 3 to not utilize cutpoints like that because it's
 4 very situation-specific.
 5 BY MR. WOOL:
 6 Q. So it would depend on the situation,
 7 correct?
 8 A. Yes, that's what -- I'm saying for
 9 different measures that I am familiar with, like
 10 sensitivity and specificity, you judge those
 11 measures in context.
 12 Q. So how would you go about evaluating
 13 an opinion that a Brier score was, I guess, you
 14 know, too low to be deemed reliable? I guess,
 15 if I wanted to -- you know, if I was looking at
 16 a paper and I saw a Brier score, I guess what
 17 I'm trying to get at is how I would go about
 18 evaluating, oh, this Brier score is way out
 19 there or, you know, or is within a range that
 20 would be considered acceptable?
 21 MR. LASKER: Objection to form.
 22 A. So like I said, I'm not -- I don't use
 23 Brier scores, I hadn't been familiar with them,
 24 so I think there are a number of other results
 25 provided in this paper that are actually much

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1 more useful to me than the Brier score, which
 2 you can see corresponds very tightly with the
 3 prevalence of the particular pesticide, which
 4 could be problematic.
 5 So, you know, if you go to the next
 6 page, for instance, they talk about the relative
 7 errors, and that to me has more meaning than the
 8 Brier score.
 9 BY MR. WOOL:
 10 Q. Okay. But generally am I correct that
 11 the smaller the Brier score, the more accurate
 12 the prediction?
 13 MR. LASKER: Objection to form.
 14 A. That is how a Brier score is
 15 calculated. 0 would be perfect prediction.
 16 BY MR. WOOL:
 17 Q. And how does a Brier skill score, how
 18 is that different than just a Brier score?
 19 A. So they're comparing the Brier score
 20 to some naive reference prediction. In this
 21 particular case they used the prevalence of
 22 pesticide use in the 80 percent of the cohort,
 23 you know, without the cohort that they held out
 24 to do the imputation. So they're basically
 25 subtracting the reference Brier from the Brier

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1 score to get the Brier skill score. So in the
 2 skill score, you know, those could range between
 3 negative 1 and 1, I believe.
 4 Q. Now, if you turn the page to Page 414,
 5 I believe you said that that Figure 2 was more
 6 important to you in determining the accuracy of
 7 the imputation. Did I hear that correctly?
 8 A. Well, I just -- I mean, this has
 9 information that's more meaningful to me
 10 because, again, the relative errors of the
 11 imputed prevalence, you know, tell you something
 12 about the error, taking into account how common
 13 that particular pesticide is in the cohort.
 14 Q. Okay. Sorry, did I interrupt you?
 15 A. No. Thank you.
 16 Q. What is Figure 2 telling us with
 17 respect to glyphosate?
 18 A. It's about in the middle of the pack.
 19 Q. And what does that mean?
 20 A. That there are pesticides with much
 21 higher relative error than glyphosate. And it's
 22 also interesting that this relative error
 23 doesn't relate at all to the Brier scores in
 24 Table 2. So you can find examples of pesticides
 25 with very high relative errors like

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1 methylbromide, but that have the lowest of the
 2 Brier scores.
 3 Q. And what does a negative relative
 4 error indicate to you?
 5 A. Well, it's just that it's
 6 underreporting the prevalence.
 7 Q. Right.
 8 Now, still on Page 414, if you look at
 9 the right-hand column, the first full paragraph,
 10 the authors state, "A key assumption of any
 11 imputation is that missingness is independent of
 12 the unobserved outcome of interest or
 13 unobservable confounders."
 14 Do you agree with that statement?
 15 A. Yes, I do.
 16 Q. They go on to say, "The reduction of
 17 bias and increase in precision from multiple
 18 imputations is dependent on the covariates
 19 associated with both non-response and the
 20 endpoint variable, and factors associated with
 21 non-participation which were included and are in
 22 our imputation model."
 23 Do you agree with that statement?
 24 A. Yes.
 25 Q. And they go on to say, "For our

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1 imputation analysis, the outcome of interest is
 2 the missing pesticide use itself. Montgomery,
 3 et al showed there's little evidence for
 4 selection bias in Phase 2 of the AHS, however
 5 missing at random is an untestable assumption
 6 without additional data, thus it is possible
 7 that non-responders differ from responders in
 8 variables we have not measured."
 9 Do you agree with that statement?
 10 A. I mean, this is always the case in
 11 epidemiologic studies. The mechanism of
 12 missingness is always untestable, but you're in
 13 a much better position in a cohort study like
 14 this where they have measured many, many
 15 variables that could be used to predict exposure
 16 levels.
 17 Q. So it would be fair to say that you do
 18 agree with that statement?
 19 MR. LASKER: Objection to form. Asked
 20 and answered.
 21 A. So do I agree -- do I agree with the
 22 statement that it's an untestable assumption
 23 without additional data?
 24 BY MR. WOOL:
 25 Q. Yes.

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1 A. Yes, it is almost always the case that
 2 in an actual epidemiologic study, not some sort
 3 of simulation, that that is an untestable
 4 assumption.
 5 Q. What is selection bias?
 6 A. I believe I've already answered this
 7 question earlier, but --
 8 Q. I'm sorry. Go ahead.
 9 A. I can answer it again.
 10 Q. If you don't mind.
 11 A. So if you're thinking about it
 12 structurally, it's when you're conditioning on a
 13 factor that is an effect of both the exposure
 14 and the outcome.
 15 Q. Do you believe that maintaining a high
 16 rate of follow-up in a cohort study is integral
 17 to ensuring validity?
 18 MR. LASKER: Objection to form.
 19 A. That is a very general question. I
 20 think that if you're talking about outcome data,
 21 that's one particular issue. So, as I mentioned
 22 before, the AHS is in a good position because
 23 they obtained outcome data on all or virtually
 24 all of the participants in terms of NHL through
 25 cancer registries, so in that place, and, you

1 know, I think that that is an integral aspect of
 2 the validity of the study.
 3 BY MR. WOOL:
 4 Q. Is there any agreement within the
 5 field of epidemiology as to what constitutes a
 6 high rate of follow-up?
 7 MR. LASKER: Objection to form.
 8 A. No, because, again, I think it really
 9 depends on the particular situation in the
 10 study, and how long you're following people, and
 11 is this a chronic disease that you're looking at
 12 or some short-term outcome. So it's very hard
 13 to provide a number of what's acceptable.
 14 BY MR. WOOL:
 15 Q. Would it be reasonable for an
 16 epidemiologist to put less weight on a study due
 17 to a 37 percent loss in follow-up?
 18 MR. LASKER: Objection to form.
 19 Are you talking about in general, or
 20 in the Andreotti study?
 21 MR. WOOL: In general.
 22 A. I mean, I think if I was reviewing a
 23 study and there was 37 percent of, again, not
 24 lost to follow-up of the whole cohort, but we're
 25 talking about missing follow-up data, I would

1 want to know that they thought carefully about
 2 how they were going to handle that missing data
 3 in their analysis, and that that was -- and that
 4 the assumptions that they were making about why
 5 that data were missing seemed appropriate.
 6 BY MR. WOOL:
 7 Q. With respect to the Andreotti study,
 8 would it be reasonable for an epidemiologist to
 9 put less weight on that study due to the lost to
 10 follow-up?
 11 MR. LASKER: Objection to form.
 12 A. So I think I already answered this. I
 13 can't speak for epidemiologists in general, but
 14 I know that my own approach would be to try to
 15 determine if the ways that they handled that
 16 missing data was appropriate given why the data
 17 were missing.
 18 BY MR. WOOL:
 19 Q. Well, say, for example, with the
 20 Andreotti study, if they got complete responses
 21 from every participant, would the study be more
 22 powerful in your mind?
 23 MR. LASKER: Objection to form.
 24 A. I mean, it's hard to speculate because
 25 that's not the case. And I think that, you

1 know, the sensitivity analyses that they did
 2 show us that regardless of how they handle that
 3 missing data, they're really coming up with the
 4 same conclusions. They get very, very similar
 5 results. And so in that way it seems like the
 6 missing data isn't having a large impact on the
 7 findings, so in that way I think it would be
 8 inappropriate not to consider this study.
 9 BY MR. WOOL:
 10 Q. So I'm not talking about whether to
 11 consider it or not. I'm talking about the
 12 amount of weight that you would afford to the
 13 study. Do you understand the distinction?
 14 A. So I mean, I know how I would weight
 15 it in terms of all of these studies that
 16 currently exist on GBH use and NHL. I think
 17 that even with 37 percent missing data on a
 18 follow-up questionnaire, you know, incomplete
 19 data, in essence, on the enrollment
 20 questionnaire, and follow-up for decades, and
 21 much more information on co-variates that can be
 22 adjusted for as confounders, and not having
 23 concerns about the impact of recall bias or
 24 selection bias from improper selection of
 25 controls, I think all of those things lead me to

1 weight this study, to rank it highest among all
 2 of the data that's currently available.
 3 Q. Have you ever published a study where
 4 37 percent of the population was lost to
 5 follow-up?
 6 A. So again, you know, you keep saying
 7 lost to follow-up, and that's not really how I
 8 would characterize it here, because they're just
 9 missing data on exposure on one questionnaire.
 10 They're not lost because we have their outcome
 11 data, so that's not how I would describe it.
 12 So I think in cohorts that I've worked
 13 on where they have done repeated exposure
 14 measurements in questionnaires, you know, over,
 15 say, four year intervals in the health
 16 professionals follow-up study it is not at all
 17 uncommon for a given exposure to be missing on,
 18 you know, a third of the cohort for a given
 19 survey cycle, so I can imagine that it wouldn't
 20 be that difficult for me to find an example
 21 where that was the case on a study that I'd
 22 worked on.
 23 Q. Fair enough.
 24 Have you done any research on changing
 25 use patterns of glyphosate following the advent

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1 of Roundup Ready crops?
 2 MR. LASKER: Objection to form.
 3 A. So you asked if I had done any
 4 research on it?
 5 BY MR. WOOL:
 6 Q. Yes. I don't think that -- I could be
 7 mistaken, but I don't think that your expert
 8 reports contains the Benbrook article.
 9 A. I don't believe I cited the Benbrook
 10 article, but I have read that article.
 11 Q. You have read the article?
 12 A. Yes.
 13 Q. Okay. So fair to ask you some
 14 questions about it?
 15 A. Sure.
 16 Q. Thanks.
 17 MR. WOOL: I'm going to mark the
 18 Benbrook article as Exhibit 33-7.
 19 (Whereupon, Exhibit Number 33-7,
 20 Benbrook article, Trends in glyphosate
 21 herbicide use in the United States and
 22 globally, was marked for
 23 identification.)
 24 MR. LASKER: You gave me two.
 25 MR. WOOL: Christmas came early.

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1 MR. LASKER: 33-7?
 2 MR. WOOL: Yes.
 3 BY MR. WOOL:
 4 Q. And you have reviewed this article?
 5 A. I have, yes.
 6 Q. All right. Now, if you look at the
 7 abstract box, the second sentence, the authors
 8 note that, "Globally, glyphosate use has risen
 9 almost 15-fold since so-called 'Roundup Ready,'
 10 genetically engineered glyphosate" --
 11 MR. LASKER: Where are you reading?
 12 MR. WOOL: The second sentence of
 13 Results.
 14 BY MR. WOOL:
 15 Q. I'll start from the beginning.
 16 "Globally, glyphosate use has risen
 17 almost 15-fold since so-called 'Roundup Ready'
 18 genetically engineered glyphosate-tolerant crops
 19 were introduced in 1996. Two-thirds of the
 20 total volume of glyphosate applied in the US
 21 from 1974 to 2014 has been sprayed in just the
 22 last 10 years."
 23 Did I read that correctly?
 24 A. Yes.
 25 Q. So meaning that approximately

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1 two-thirds of the total amount of glyphosate
 2 sprayed in the United States occurred between
 3 1974 and 2014, is that what that sentence means?
 4 A. Yes, I think so.
 5 Q. All right. And if I'm not mistaken,
 6 2005 was the last year of follow-up in the
 7 Andreotti study, correct?
 8 A. For -- well, it was the last time that
 9 they collected data from the follow-up
 10 questionnaire on exposure.
 11 Q. So 2004 was the last year that
 12 follow-up data from the questionnaire was
 13 collected in Andreotti?
 14 A. You said 2005, and then 2004. So the
 15 follow-up questionnaire period occurred between
 16 '99 to 2005.
 17 Q. So I think here's where the confusion
 18 lies. The question -- or the responses in 2005
 19 dealt with the 2004 calendar year, correct?
 20 MR. LASKER: Objection to form.
 21 A. Yes, I believe that that's correct.
 22 BY MR. WOOL:
 23 Q. All right. So if you will turn with
 24 me to Page 15 of the Benbrook article.
 25 MR. LASKER: 15?

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1 BY MR. WOOL:
 2 Q. Sorry, 515.
 3 A. Okay.
 4 Q. And I'll ask you to look at Table 1.
 5 A. Mm-hmm.
 6 Q. Okay. So in -- and they give figures
 7 in thousand kilograms, and then in thousands of
 8 pounds.
 9 A. Mm-hmm.
 10 Q. Since we're in the United States, I'll
 11 ask you about the pounds.
 12 A. Okay.
 13 Q. Now, for glyphosate agricultural use,
 14 in 1990 the authors report 7,400 thousand pounds
 15 of glyphosate use?
 16 A. Correct, 7,400 in 1990 pounds, yes,
 17 correct.
 18 Q. And then 27,500 in 1995?
 19 A. Correct.
 20 Q. And then 78,750 in 2000?
 21 A. Mm-hmm.
 22 Q. And then 157,500 in 2005?
 23 A. Yes.
 24 Q. And then the figure goes up to 235,814
 25 in 2010?

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1 A. Mm-hmm.
 2 Q. Correct?
 3 And then it looks like it sort of
 4 levels off a little bit, it goes up to 236,318
 5 in 2012, correct?
 6 A. Correct.
 7 Q. And then it goes to 249,906 in 2014?
 8 A. That is what it says, yes.
 9 Q. And the Andreotti study -- strike
 10 that.
 11 So would it be fair to say that use of
 12 glyphosate changed pretty dramatically over the
 13 years that the Andreotti study was collecting
 14 follow-up data?
 15 MR. LASKER: Objection to form.
 16 A. So here in this table they report
 17 glyphosate use in pounds, and you can see that
 18 there is an increase between 2000 and 2005,
 19 which would be the follow-up questionnaire
 20 period.
 21 But what's interesting about this
 22 article is that it shows how that's really
 23 related to the availability of Roundup Ready
 24 crops, and in many ways you can predict that
 25 increased use if you know what farmers are

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1 farming.
 2 BY MR. WOOL:
 3 Q. So do you recall if the follow-up
 4 questionnaire for Andreotti asked participants
 5 about the specific crops they were farming?
 6 A. Well, that is available in the
 7 publication, another HS publication, so they did
 8 ask for that information. It was in, I think,
 9 Alavanja 2006 they describe what types of crops
 10 the farmers farm.
 11 Q. So if a cohort member had reported no
 12 use of glyphosate at enrollment, but then began
 13 using Roundup Ready crops, say, in 2004, if they
 14 responded in 1999 to the questionnaire, the
 15 questionnaire would not capture their glyphosate
 16 use, correct?
 17 MR. LASKER: Objection to form.
 18 A. So just one clarification. In the
 19 Andreotti JNCI paper they talked about how the
 20 follow-up questionnaire is approximately five
 21 years after enrollment for the participant, so
 22 we don't really have a reason to believe that
 23 someone who answered on the earlier end of the
 24 enrollment questionnaire would then, you know,
 25 answer more than five years later on the

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1 follow-up questionnaire.
 2 And that situation you described, yes,
 3 certainly in some cases that could have
 4 happened, but that would have a relatively small
 5 effect on, you know, the total impact of
 6 exposure measurement in the entire cohort.
 7 So yes, for some people it will not be
 8 imperfect -- it will be imperfectly captured,
 9 but it's unlikely to have a meaningful impact on
 10 the results given how much information they did
 11 collect.
 12 BY MR. WOOL:
 13 Q. Well, using the results of Andreotti,
 14 is it possible to measure the frequency that
 15 that particular scenario would have played out?
 16 A. I don't think it's possible directly
 17 in the Andreotti paper, but I think there are a
 18 number of pieces of information in this Benbrook
 19 article that are actually really helpful in
 20 terms of the increase in use between that period
 21 that you're talking about. It's actually -- it
 22 doesn't really increase that much in that
 23 period.
 24 Q. So what pieces of information, I
 25 guess, would you point me to to establish that?

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1 A. So, for instance, if you look at
 2 figure 1.
 3 Q. In what?
 4 A. In the Benbrook paper. So this is
 5 specifically for soybeans. We know that in
 6 Iowa 80, percent of the farmers are soybean
 7 farmers. So if you look in that period, what
 8 we're using between, you know, '90 --
 9 Q. During the follow-up period is what I
 10 was asking about.
 11 A. Yes, so during '99 and 2005, you know,
 12 you can see how much use increased during that
 13 period. So a lot of the increases would have
 14 been -- would have been captured in that interim
 15 period.
 16 Q. Do you know if any of the other
 17 pesticides and herbicides that were surveyed in
 18 the Andreotti study, if any of those had
 19 increases in use that compared to glyphosate?
 20 A. Could you ask the question one more
 21 time?
 22 Q. Yes. I don't think I phrased it very
 23 well.
 24 Did any other pesticide or herbicide
 25 surveyed in Andreotti, et al increase -- or did

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1 the use of that pesticide or herbicide increase
 2 to the extent that glyphosate did during the
 3 follow-up period?
 4 MR. LASKER: Objection to form.
 5 A. Again, I'm not an expert on the use of
 6 -- glyphosate use patterns, but from reading of
 7 this -- of the Benbrook article, and also there
 8 was another paper I'm not recalling now on
 9 trends, I think we know that because of Roundup
 10 Ready crops, glyphosate has increased more
 11 dramatically.
 12 But in some ways when you're trying to
 13 predict people's patterns of exposure, the
 14 availability of Roundup Ready crops is really
 15 helpful, because then those patterns of exposure
 16 become determined by farming those particular
 17 crops, and there's are much more specific
 18 regimen for application. So that information
 19 can actually be helpful.
 20 BY MR. WOOL:
 21 Q. So I guess due to the increase in use
 22 of glyphosate, would it be fair to expect fewer
 23 never responses in, say, 2000 as opposed to
 24 earlier in the follow-up period?
 25 MR. LASKER: Objection to form.

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1 BY MR. WOOL:
 2 Q. Do you think that, say, people who at
 3 enrollment had never used glyphosate, that as we
 4 continue from 1997 to 2005 that the frequency of
 5 never use responses is likely to decrease?
 6 MR. LASKER: Objection to form.
 7 A. I mean, we know that glyphosate use
 8 increased, particularly among certain types of
 9 farmers, right. So you can see in this paper
 10 that, you know, it's really due to three crops.
 11 Right? So there were definitely increases in
 12 glyphosate use. Whether that resulted in fewer
 13 never users or just a greater degree of use, I
 14 don't really know. But again, you can predict
 15 those patterns to a large degree by just knowing
 16 what products -- what people are farming.
 17 BY MR. WOOL:
 18 Q. All right. Let me just ask a couple
 19 more questions, and then I think we can wrap
 20 things up. I know that I've asked this at the
 21 beginning, so my apologies if you've answered.
 22 MR. LASKER: Objection. Asked and
 23 answered. Sorry.
 24 MR. WOOL: I knew it was coming.
 25 BY MR. WOOL:

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1 Q. Did you have a chance to review any of
 2 the plaintiffs' deposition transcripts before
 3 today?
 4 A. For the most recent depositions?
 5 Q. Yes, for depositions conducted
 6 pursuant to Pretrial Order 34.
 7 A. Yes, I have.
 8 Q. Okay. And which experts?
 9 A. I have reviewed Dr. Neugut's
 10 deposition, Dr. Ritz, and Dr. Portier's
 11 deposition.
 12 MR. WOOL: Okay. Let me take a quick
 13 break. I'll chat with Jeff, and maybe we can
 14 wrap this up.
 15 THE VIDEOGRAPHER: Going off the
 16 record. The time is 4:27.
 17 (Whereupon, a recess was taken.)
 18 THE VIDEOGRAPHER: Back on the record.
 19 The time is 4:34.
 20 BY MR. WOOL:
 21 Q. Now, we spoke about this briefly, but
 22 one of the reasons for which you believe that
 23 misclassification could not account for the --
 24 or exposure, non-differential exposure
 25 misclassification could not account for the

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1 results in Andreotti is because the relative
 2 risks in all categories of the Andreotti study
 3 are below 1.0, correct?
 4 MR. LASKER: Objection to form.
 5 A. So I explained earlier that, you know,
 6 we usually say that on average -- that doesn't
 7 mean in every study, single study all the time,
 8 but on average non-differential exposure
 9 misclassification would bias the results to the
 10 null. That's true for ever-never -- dichotomous
 11 exposures when you just have yes versus no.
 12 But when you start looking at exposure
 13 in more than two categories, you can have the
 14 situation where if you're just misclassifying
 15 between two categories, those relative risk
 16 estimates would be biased towards each other, so
 17 you could actually get, for one of those
 18 categories, bias away from the null.
 19 So what I'm talking about in my report
 20 is how that particular situation can't explain
 21 -- can't be happening in the Andreotti, et al
 22 2018 study because all of the relative risk
 23 estimates for all of the categories are below 1.
 24 BY MR. WOOL:
 25 Q. And one of the things that the authors

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1 did in an attempt to minimize non-differential
 2 exposure misclassification was to perform some
 3 sensitivity analyses?
 4 A. Yes. That's correct.
 5 MR. LASKER: Objection to form.
 6 BY MR. WOOL:
 7 Q. And if you turn to Page 5 of your
 8 report.
 9 A. Okay. All right.
 10 Q. In the final paragraph on Page 5, you
 11 describe one of these sensitivity analysis that
 12 sort of truncated the results of 2005.
 13 A. That is correct, that's one of the
 14 analyses they conducted.
 15 Q. Okay. And why did they truncate the
 16 results of 2005?
 17 A. Because the follow-up questionnaire
 18 period ended at 2005, and so ending follow-up at
 19 2005 wouldn't make any assumptions about a
 20 person's exposure after 2005.
 21 Q. Okay. And in this particular
 22 instance, you say that the risk ratio comparing
 23 the highest quartile of intensity weighted
 24 exposure to no exposure in analysis, the
 25 truncated follow-up in 2005 was 1.04, which is

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1 also consistent with the primary analysis,
 2 correct?
 3 A. Yes. I also report the 95 percent
 4 confidence interval around that estimate, which
 5 is from .7 to 1.57.
 6 Q. Okay. And so when the analysis was
 7 truncated, that resulted in the risk ratio of
 8 the highest exposure group going up, correct?
 9 MR. LASKER: Objection to form.
 10 A. Well, the confidence intervals for
 11 this estimate and the estimate of the primary
 12 analysis and the results of the two other
 13 sensitivity analyses all overlap and they all
 14 contain the null value. And so, you know, I
 15 think I mentioned earlier on, you know, we don't
 16 dwell too closely on this point estimate because
 17 it is, you know, subject to random error. The
 18 confidence interval takes that into account.
 19 So I would interpret this result of
 20 1.04 the same way that I would interpret the
 21 result in the primary analysis of -- there's
 22 NHL, for the highest quartile to no exposure of
 23 0.87 in exactly the same way, and that's being
 24 consistent with no association.
 25 MR. WOOL: That's it. I don't have

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1 any other questions.
 2 A. Okay.
 3 MR. LASKER: No questions.
 4 THE VIDEOGRAPHER: This concludes the
 5 January 23, 2018 deposition of Dr. Jennifer
 6 Rider. Going off the record. The time is 4:39.
 7 (Whereupon, the deposition was
 8 concluded.)
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1 COMMONWEALTH OF MASSACHUSETTS)
 2 SUFFOLK, SS.)
 3 I, MAUREEN O'CONNOR POLLARD, RMR, CLR,
 4 and Notary Public in and for the Commonwealth of
 5 Massachusetts, do certify that on the 23rd day
 6 of January, 2018, at 2:39 o'clock, the person
 7 above-named was duly sworn to testify to the
 8 truth of their knowledge, and examined, and such
 9 examination reduced to typewriting under my
 10 direction, and is a true record of the testimony
 11 given by the witness. I further certify that I
 12 am neither attorney, related or employed by any
 13 of the parties to this action, and that I am not
 14 a relative or employee of any attorney employed
 15 by the parties hereto, or financially interested
 16 in the action.
 17 In witness whereof, I have hereunto
 18 set my hand this 5th day of February, 2018.
 19
 20 _____
 21 MAUREEN O'CONNOR POLLARD, NOTARY PUBLIC
 22 Realtime Systems Administrator
 23 CSR #149108
 24
 25

INSTRUCTIONS TO WITNESS

1 INSTRUCTIONS TO WITNESS
2
3 Please read your deposition over
4 carefully and make any necessary corrections.
5 You should state the reason in the appropriate
6 space on the errata sheet for any corrections
7 that are made.
8 After doing so, please sign the
9 errata sheet and date it. It will be attached
10 to your deposition.
11 It is imperative that you return
12 the original errata sheet to the deposing
13 attorney within thirty (30) days of receipt of
14 the deposition transcript by you. If you fail
15 to do so, the deposition transcript may be
16 deemed to be accurate and may be used in court.
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ACKNOWLEDGMENT OF DEPONENT

1 ACKNOWLEDGMENT OF DEPONENT
2
3
4 I, _____, do
5 Hereby certify that I have read the foregoing
6 pages, and that the same is a correct
7 transcription of the answers given by me to the
8 questions therein propounded, except for the
9 corrections or changes in form or substance, if
10 any, noted in the attached Errata Sheet.
11
12 _____
13 JENNIFER R. RIDER, ScD DATE
14
15
16 Subscribed and sworn
17 To before me this
18 _____ day of _____, 20____.
19 My commission expires: _____
20
21 _____
22 Notary Public
23
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ERRATA

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LAWYER'S NOTES

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