

EXHIBIT 50

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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)

FRIDAY, SEPTEMBER 22, 2017

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- - -

VIDEOTAPED DEPOSITION of LORELEI A.
MUCCI, ScD, held at the offices of Cetrulo LLP,
2 Seaport Lane, Boston, Massachusetts, commencing
at 8:05 a.m., on the above date, before
Maureen O'Connor Pollard, Registered Merit
Reporter, Realtime Systems Administrator,
Certified Shorthand Reporter.

- - -

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1 THE VIDEOGRAPHER: The court reporter
 2 is Maureen O'Connor, and she will now swear in
 3 the witness.
 4
 5 LORELEI A. MUCCI, ScD,
 6 having been first duly identified and sworn, was
 7 examined and testified as follows:
 8 EXAMINATION
 9 BY MR. MILLER:
 10 Q. Good morning.
 11 A. Good morning.
 12 MR. COPLE: I have a statement first.
 13 Dr. Mucci is being produced today for
 14 deposition pursuant to Pretrial Order No. 7 on
 15 the deposition protocol as a general causation
 16 expert for Monsanto. Monsanto marks the entire
 17 deposition, videography, and exhibits on a
 18 provisional basis as confidential pursuant to
 19 the MDL court's protective and confidentiality
 20 order.
 21 BY MR. MILLER:
 22 Q. How are you doing today?
 23 A. I'm fine, thank you.
 24 Q. Great.
 25 Please state your full name?

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1 PROCEEDINGS
 2
 3 THE VIDEOGRAPHER: We are now on
 4 record. My name is Chris Coughlin, and I'm a
 5 videographer at Golkow Technologies. Today's
 6 date is September 22, 2017, and the time is 8:05
 7 a.m.
 8 This video deposition is being held in
 9 Boston, Massachusetts, In Re: Roundup Products
 10 Liability Litigation, MDL No. 2741, for the U.S.
 11 District Court, Northern District of California.
 12 The deponent is Dr. Lorelei Mucci.
 13 Will counsel please identify
 14 yourselves and state whom you represent.
 15 MR. MILLER: Good morning. It's
 16 Michael and Nancy Miller who represent the
 17 plaintiffs.
 18 MR. COPLE: William Cople and Grant
 19 Hollingsworth, both of Hollingsworth LLP, for
 20 the Monsanto Company.
 21 THE VIDEOGRAPHER: And appearing by
 22 phone?
 23 MR. MILLER: Jeffrey?
 24 MR. TRAVERSE: Jeffrey Traverse from
 25 the Miller Firm.

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1 A. My name is Lorelei Ann Mucci.
 2 Q. May I call you Dr. Mucci?
 3 A. Yes.
 4 Q. Okay. And you are a doctor, in fact,
 5 and you're a professor here at Harvard
 6 University?
 7 A. I am.
 8 Q. Now, you're not a medical doctor, but
 9 what kind of doctor?
 10 A. I'm a -- I have a doctoral degree in
 11 epidemiology.
 12 Q. Okay. Very well.
 13 And have you testified as an expert
 14 before?
 15 A. No, I have not.
 16 Q. Okay. I'm going to ask you some
 17 questions today; all right?
 18 A. Yes.
 19 Q. Okay. And you've been named as an
 20 expert witness on behalf of Monsanto. You
 21 understand that; right?
 22 A. Yes.
 23 Q. So if you answer my questions, I'll
 24 assume you understood them and answered them
 25 truthfully and fully; is that fair?

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<p style="text-align: right;">Page 10</p> <p>1 A. Yes.</p> <p>2 Q. Okay. Very good.</p> <p>3 I will do my best to ask intellectual</p> <p>4 and honest questions, and I know you'll do your</p> <p>5 best to give me intellectual and honest answers.</p> <p>6 And I promise to do this, and I know we'll</p> <p>7 disagree, but without being disagreeable; all</p> <p>8 right? So -- and I promise not to interrupt</p> <p>9 you, and I know you'll extend me that courtesy.</p> <p>10 Is that fair?</p> <p>11 A. Yes.</p> <p>12 Q. Okay. And I just want to clear up,</p> <p>13 you never worked on, as an epidemiologist, on</p> <p>14 the issue of glyphosate and potential</p> <p>15 association with non-Hodgkin's lymphoma until</p> <p>16 you were retained as an expert by the</p> <p>17 Hollingsworth firm; true?</p> <p>18 A. Yes, I've not previously worked on</p> <p>19 these studies.</p> <p>20 Q. And it would also be true that you</p> <p>21 were -- or were not following the literature</p> <p>22 surrounding this issue -- when I say "this</p> <p>23 issue," I mean glyphosate non-Hodgkin's</p> <p>24 lymphoma -- that was occurring in the medical</p> <p>25 scientific literature until being asked to look</p>	<p style="text-align: right;">Page 12</p> <p>1 BY MR. MILLER:</p> <p>2 Q. You can answer.</p> <p>3 A. So while I did not apply a Bradford</p> <p>4 Hill approach, I used a standard epidemiological</p> <p>5 approach for critically reviewing the</p> <p>6 epidemiology studies each on their own, and came</p> <p>7 to my conclusion based on this complete review.</p> <p>8 Q. Sure.</p> <p>9 In your report you say the strongest</p> <p>10 evidence on this issue is the Agricultural</p> <p>11 Health Study; right?</p> <p>12 A. I agree, because the Agricultural</p> <p>13 Health Study is a prospective cohort study, and</p> <p>14 it avoids many of the biases inherent in</p> <p>15 case-control studies.</p> <p>16 Q. And prior to your becoming involved as</p> <p>17 an expert for Monsanto and the Hollingsworth</p> <p>18 firm, were you aware that other scientists of</p> <p>19 Harvard had looked at the Agricultural Health</p> <p>20 Study and analyzed its strengths and weaknesses</p> <p>21 in a publication?</p> <p>22 MR. COPLE: Objection. Vague, lacks</p> <p>23 foundation.</p> <p>24 A. No, I was not aware of that.</p> <p>25 BY MR. MILLER:</p>
<p style="text-align: right;">Page 11</p> <p>1 at this; is that fair?</p> <p>2 A. Yes. Although while that's fair, I</p> <p>3 think I'm competent to be able to review the</p> <p>4 epidemiology studies of glyphosate and</p> <p>5 non-Hodgkin's lymphoma.</p> <p>6 Q. Nor was I suggesting otherwise. I</p> <p>7 just wanted to get a time frame of when you</p> <p>8 first started doing that. And I'm not trying to</p> <p>9 put words in your mouth. I'm really just trying</p> <p>10 to get us, you know, down the road to where we</p> <p>11 can talk about specific issues.</p> <p>12 But fair to say clearly you don't</p> <p>13 believe there is an association between Roundup</p> <p>14 and non-Hodgkin's lymphoma, is that true?</p> <p>15 A. Based on my critical review of all of</p> <p>16 the epidemiology literature, I believe there's</p> <p>17 no causal association between glyphosate and NHL</p> <p>18 risk.</p> <p>19 Q. Right.</p> <p>20 But my understanding from your report,</p> <p>21 you did not do the Bradford Hill analysis; you</p> <p>22 looked at the studies, determined there was no</p> <p>23 real association, and that was the end of it?</p> <p>24 MR. COPLE: Objection. Lacks</p> <p>25 foundation. Object to the form of the question.</p>	<p style="text-align: right;">Page 13</p> <p>1 Q. And I'll hand it to you now.</p> <p>2 You were not provided this prior</p> <p>3 review of the Agricultural Health Study which</p> <p>4 we're marking as Exhibit 24-1.</p> <p>5 (Whereupon, Mucci Exhibit 24-1, Gray,</p> <p>6 et al article, The Federal</p> <p>7 Government's Agricultural Health</p> <p>8 Study, was marked for identification.)</p> <p>9 BY MR. MILLER:</p> <p>10 Q. I'd lose my head if it wasn't</p> <p>11 attached.</p> <p>12 Here it is, Doctor. I'm handing you</p> <p>13 what is a review of the Agricultural Health</p> <p>14 Study.</p> <p>15 MR. MILLER: I need that one back.</p> <p>16 Sorry.</p> <p>17 MS. MILLER: Sorry.</p> <p>18 BY MR. MILLER:</p> <p>19 Q. I'll put that one right here. You</p> <p>20 have not seen Exhibit 24-1, this review of the</p> <p>21 Agricultural Health Study prepared by Harvard</p> <p>22 University School of Public Health before,</p> <p>23 right, Doctor?</p> <p>24 MR. COPLE: Object to the form of the</p> <p>25 question.</p>

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1 A. I -- while I have not seen this
 2 report, I'd just like to clarify that there are
 3 actually multiple authors from many institutions
 4 in this study.
 5 BY MR. MILLER:
 6 Q. Yes, ma'am, that's absolutely true.
 7 Let's look at some of them.
 8 One of them is George Gray who is from
 9 the Center for Risk Analysis, Harvard School of
 10 Public Health.
 11 Do you see that?
 12 A. Yes.
 13 Q. And, of course, that is affiliated
 14 with Harvard University; right?
 15 A. Yes.
 16 Q. And do you know Dr. Gray?
 17 A. I do not.
 18 Q. And another scientist involved in this
 19 review is Elizabeth Delzell who is from the
 20 University of Alabama. She's an epidemiologist.
 21 Do you know her?
 22 A. I do not.
 23 Q. And Richard Monson, one of the authors
 24 of this scientific paper, is from the department
 25 of epidemiology, Harvard School of Public

Page 15

1 Health. Do you know him?
 2 A. I do know him.
 3 Q. How do you know Dr. Monson?
 4 A. Dr. Monson, I believe, actually is in
 5 the department of environmental health. He's a
 6 researcher and a professor at the university.
 7 Q. These scientists in this published
 8 article -- this is called Human and Ecological
 9 Risk Assessment Journal. Are you aware of that
 10 journal?
 11 A. No, I'm not.
 12 Q. Is it peer-reviewed?
 13 A. I don't -- I'm not sure. I'm not
 14 familiar with this journal --
 15 Q. Do you see --
 16 A. -- but I would assume it would be.
 17 Q. It's in year 2000. Do you see that?
 18 A. Yes.
 19 Q. And to put it in context, that's three
 20 years after the questionnaires had been
 21 completed for the first round of the
 22 Agricultural Health Study; right?
 23 A. On average, yes.
 24 Q. Okay. And what -- and we'll go
 25 through some of this, but in the Abstract

Page 16

1 section, these scientists from Harvard and other
 2 schools tell us that there are -- "Although the
 3 AHS was intended to be an integrated program of
 4 studies, some significant difficulties have
 5 emerged."
 6 Did I read that correctly?
 7 MR. COPLÉ: Objection. The document
 8 speaks for itself.
 9 A. Yes, while that's what the abstract
 10 says, I actually have not had a chance to read
 11 through this myself.
 12 BY MR. MILLER:
 13 Q. And it wasn't provided to you by the
 14 lawyers for Monsanto; right?
 15 A. It was not one of the ones that I
 16 remember reviewing.
 17 Q. And it says here in this abstract that
 18 there have been 90,000 applicators and their
 19 spouses enrolled in a number of studies to
 20 determine whether exposure to specific
 21 pesticides are associated with various cancers
 22 and other adverse health outcomes.
 23 Do you see that?
 24 MR. COPLÉ: Objection. Lacks
 25 foundation, the document speaks for itself.

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1 A. Yes, I see that, where it's written,
 2 yes.
 3 BY MR. MILLER:
 4 Q. In your --
 5 A. But, again, I haven't had a chance to
 6 read through this.
 7 Q. I understand. And it wasn't provided
 8 to you, ma'am. We'll go through it together.
 9 Here's my question.
 10 In your report you talk about a health
 11 study, Agricultural Health Study, with about
 12 some 50-some thousand people in it; right?
 13 A. Correct.
 14 Q. What happened to the other
 15 40,000 people?
 16 MR. COPLÉ: Objection. Argumentative,
 17 lacks foundation.
 18 BY MR. MILLER:
 19 Q. Do you know?
 20 A. As I said, I haven't had a chance to
 21 review through this, so I couldn't testify one
 22 way or the other what the difference is between
 23 the number presented here and the number in the
 24 report I reviewed.
 25 Q. I want to go over the limitations to

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1 the Agricultural Health Study that are
 2 articulated by the authors of this study from
 3 Harvard University. If you would go to Page 48,
 4 please. Do you see where it says "Important
 5 limitations"? That would be the first full
 6 paragraph. Do you see where I am, ma'am?
 7 A. Yes, I do.
 8 Q. It says, "low and variable rates of
 9 subject response to administrated surveys."
 10 Do you see that?
 11 MR. COPLE: Objection. The document
 12 speaks for itself.
 13 A. Yes, I see where it says this in this
 14 report.
 15 BY MR. MILLER:
 16 Q. That's a serious problem, isn't it?
 17 MR. COPLE: Objection. Argumentative,
 18 vague.
 19 A. Well, as I stated, I haven't had a
 20 chance to review this particular report, so I
 21 wouldn't be able to specifically comment on what
 22 the authors have said here in the abstract.
 23 BY MR. MILLER:
 24 Q. Well, do you know what they mean by
 25 "low and variable rates of subject response to

Page 19

1 administered surveys"?
 2 MR. COPLE: Objection. Asked and
 3 answered.
 4 A. Again, since I haven't had a chance to
 5 read through this particular document, I'm
 6 unable to comment on what they're referring to
 7 there.
 8 BY MR. MILLER:
 9 Q. As long as you don't comment at trial,
 10 that's fine.
 11 MR. COPLE: Objection. Argumentative.
 12 BY MR. MILLER:
 13 Q. So the other criticism -- one more of
 14 the criticisms in the limitations of the
 15 Agricultural Health Study as articulated by
 16 these experts from Harvard is "concerns about
 17 the validity of some self-reported non-cancer
 18 health outcomes."
 19 Do you see that, ma'am?
 20 A. Well, that may be what is written
 21 here. I'd like to clarify, the study we looked
 22 at was using cancer outcomes, and relying on
 23 state registry data which have been shown to
 24 have very high quality data and complete
 25 follow-up.

Page 20

1 Q. Ma'am, if -- in the study you looked
 2 at, they looked at potential confounders that
 3 were not cancer outcome; true?
 4 MR. COPLE: Objection. Lacks
 5 foundation.
 6 A. I'm sorry. I don't understand your
 7 question.
 8 BY MR. MILLER:
 9 Q. Were there potential confounders in
 10 the Agricultural Health Study?
 11 A. There the Agricultural Health Study
 12 did look at a number of potential confounders of
 13 the association.
 14 Q. Can you and I agree it would be
 15 important to have accurate information about
 16 those potential confounders?
 17 MR. COPLE: Objection. Lacks
 18 foundation, argumentative.
 19 A. While I would agree that it is, of
 20 course, important to have high quality data of
 21 confounders, I don't think that the discussion
 22 here about self-reported non-cancer health
 23 outcomes refers to that point of confounding.
 24 BY MR. MILLER:
 25 Q. But you don't know? You've not talked

Page 21

1 to these authors about this paper?
 2 A. I have not read through this paper.
 3 But having critically reviewed the Agricultural
 4 Health Study publications, I can say that the
 5 data that was included as potential confounders
 6 in a number of validation studies that have been
 7 performed by the Agricultural Health Study
 8 showed that the majority of factors were quite
 9 valid.
 10 Q. Let's take a look at what these
 11 scientists said from Harvard.
 12 So we've talked about the limitation
 13 of the Agricultural Health Study, number one,
 14 "low and variable rates of response"; two,
 15 "concerns about the validity of some
 16 self-reported non-cancer outcomes"; three,
 17 "limited understanding of the reliability and
 18 validity of self-reporting of chemical use."
 19 That's a problem, isn't it, ma'am?
 20 MR. COPLE: Objection. Argumentative,
 21 lacks foundation, asked and answered.
 22 A. And so as I said previously, because I
 23 haven't read through this report, I'm not
 24 specifically sure what they are referring to.
 25 However, I do know that the Agricultural Health

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<p>1 Study has published some validation studies</p> <p>2 looking specifically at the quality of the</p> <p>3 pesticide data, including glyphosate, and showed</p> <p>4 high reliability of the self-reported data,</p> <p>5 including looking at biomarkers. So I'm not</p> <p>6 specifically sure what they're discussing here,</p> <p>7 because I have not read through this</p> <p>8 publication.</p> <p>9 BY MR. MILLER:</p> <p>10 Q. The fourth criticism on limitation by</p> <p>11 these Harvard authors was "an insufficient</p> <p>12 program of biological monitoring to validate the</p> <p>13 exposure surrogates employed in the AHS</p> <p>14 questionnaires."</p> <p>15 Is that a criticism that you also</p> <p>16 observed, or do you not agree with these folks?</p> <p>17 MR. COPLE: Objection. Argumentative,</p> <p>18 compound question, lacks foundation, and asked</p> <p>19 and answered.</p> <p>20 A. As I said previously, since I haven't</p> <p>21 read through this report I can't address</p> <p>22 specifically what they're talking about. But as</p> <p>23 I've just mentioned, the Agricultural Health</p> <p>24 Study has reported a number of validation</p> <p>25 studies showing high quality of the</p>	<p>1 study?</p> <p>2 MR. COPLE: Objection. Vague.</p> <p>3 A. I think I would want clarification</p> <p>4 specifically in what context you're asking that</p> <p>5 question.</p> <p>6 BY MR. MILLER:</p> <p>7 Q. You can't answer that without context?</p> <p>8 MR. COPLE: Objection. Argumentative,</p> <p>9 vague.</p> <p>10 A. As I said, I think in order to answer</p> <p>11 the question fully, I would need to understand</p> <p>12 the context in which you're asking it.</p> <p>13 BY MR. MILLER:</p> <p>14 Q. Let's look at it in the context of</p> <p>15 these Harvard professionals who are criticizing</p> <p>16 the limitations of the Agricultural Health</p> <p>17 Study. There are six --</p> <p>18 MR. COPLE: Objection. Misstates the</p> <p>19 authorship of the manuscript.</p> <p>20 BY MR. MILLER:</p> <p>21 Q. Their sixth limitation is, "and the</p> <p>22 absence of a detailed plan for data analysis and</p> <p>23 interpretation that includes explicit, a priori</p> <p>24 hypothesis."</p> <p>25 That's a pretty serious charge, isn't</p>
Page 23	Page 25
<p>1 self-reported data on pesticides as it relates</p> <p>2 to biomarkers of exposure.</p> <p>3 BY MR. MILLER:</p> <p>4 Q. The fifth criticism of these Harvard</p> <p>5 authors of the Agricultural Health Study is</p> <p>6 "possible confounding by unmeasured,</p> <p>7 non-chemical risk factors for disease."</p> <p>8 Is that a serious issue, ma'am?</p> <p>9 MR. COPLE: Objection. Vague,</p> <p>10 argumentative, lacks foundation, asked and</p> <p>11 answered.</p> <p>12 A. I mean, I think, again, it is</p> <p>13 challenging for me to comment specifically here</p> <p>14 since I have not read this particular</p> <p>15 manuscript. However, I think while we're often</p> <p>16 concerned about confounding, not only in the</p> <p>17 Agricultural Health Study but all of the</p> <p>18 case-control studies that were looked at as</p> <p>19 well, I think one important finding from several</p> <p>20 of the studies was the importance of adjusting</p> <p>21 for confounding by other pesticides which was</p> <p>22 done in the Agricultural Health Study.</p> <p>23 BY MR. MILLER:</p> <p>24 Q. Is it important to have a detailed</p> <p>25 plan for data analysis when you're doing a</p>	<p>1 it, ma'am?</p> <p>2 MR. COPLE: Objection. Argumentative,</p> <p>3 vague, lacks foundation, asked and answered.</p> <p>4 A. Again, as I said, I haven't read</p> <p>5 through this manuscript, so I couldn't comment</p> <p>6 specifically on that point. However, in the</p> <p>7 Agricultural Health Study publication of 2013,</p> <p>8 as well as 2005, there was a clear a priori</p> <p>9 specification of the hypothesis. So I'm not</p> <p>10 sure specifically what they're referring to here</p> <p>11 since I have not read this manuscript.</p> <p>12 Q. It's your testimony, ma'am, under oath</p> <p>13 that there was an a priori hypothesis for the</p> <p>14 2013 AHS study before the data was collected?</p> <p>15 MR. COPLE: Objection. Misstates the</p> <p>16 witness's testimony.</p> <p>17 A. That's not what I said actually.</p> <p>18 BY MR. MILLER:</p> <p>19 Q. Well, then let's clarify, because you</p> <p>20 and I are going to agree that there was -- first</p> <p>21 let's back up.</p> <p>22 For laypeople, what is an a priori</p> <p>23 hypothesis? How would you explain that in lay</p> <p>24 terms?</p> <p>25 A. I would say that an a priori</p>

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Page 26	<p>1 hypothesis is a hypothesis that's laid out at</p> <p>2 the initiation of a study or analysis within a</p> <p>3 project.</p> <p>4 BY MR. MILLER:</p> <p>5 Q. And that's important in epidemiology,</p> <p>6 isn't it?</p> <p>7 MR. COPLE: Objection. Vague,</p> <p>8 argumentative.</p> <p>9 A. I think it would be important to have</p> <p>10 some clarification about specifically what</p> <p>11 you're asking. Are you asking -- it would be</p> <p>12 helpful to have clarification on that.</p> <p>13 BY MR. MILLER:</p> <p>14 Q. Prior to me asking that question, have</p> <p>15 you written a textbook on epidemiology?</p> <p>16 A. I have written a -- been part of a</p> <p>17 textbook of cancer epidemiology, yes.</p> <p>18 Q. And did you write in that book how</p> <p>19 important it was to have an a priori hypothesis?</p> <p>20 MR. COPLE: Objection. Lacks</p> <p>21 foundation.</p> <p>22 A. I would -- I can't recall specifically</p> <p>23 one way or the other what was in a textbook of</p> <p>24 hundreds of pages.</p> <p>25 BY MR. MILLER:</p>	Page 28	<p>1 epidemiologists, one -- I'm going to ask if you</p> <p>2 agree or disagree with each one.</p> <p>3 One, "include low and variable rates</p> <p>4 of subject response to administered survey." Do</p> <p>5 you agree that's an important limitation, or</p> <p>6 not?</p> <p>7 A. As I stated, since I haven't read the</p> <p>8 specific manuscript, I couldn't comment on that</p> <p>9 specific statement there.</p> <p>10 Q. Okay. Two, do you agree, disagree, or</p> <p>11 have no comment about this limitation, "concerns</p> <p>12 about the validity of some self-reported</p> <p>13 non-cancer health outcomes"?</p> <p>14 A. As I stated, I haven't read this</p> <p>15 manuscript. I couldn't refer to specifically</p> <p>16 what they're asking. However, important note</p> <p>17 here is that in the study of non-Hodgkin's</p> <p>18 lymphoma, which is a cancer outcome, it uses</p> <p>19 data from the state registries which has a</p> <p>20 very -- has been shown to have very high quality</p> <p>21 and high follow-up.</p> <p>22 Q. Three, another limitation, "limited</p> <p>23 understanding of the reliability and validity of</p> <p>24 self-reporting of chemical use."</p> <p>25 Do you agree or disagree?</p>
Page 27	<p>1 Q. Well, if I was one of your epide- --</p> <p>2 right now do you teach epidemiology?</p> <p>3 A. I teach cancer epidemiology.</p> <p>4 Q. And if I was to raise my hand in your</p> <p>5 class -- as if Harvard would ever have me, but</p> <p>6 let's pretend I made it -- I'm in your class, I</p> <p>7 raise my hand, I say, "is it important,</p> <p>8 Dr. Mucci, to have an a priori hypothesis when I</p> <p>9 do a study," what would you tell me?</p> <p>10 MR. COPLE: Objection. Vague.</p> <p>11 A. As I stated previously, it actually</p> <p>12 depends on the study question. There are --</p> <p>13 while there are some times where you would have</p> <p>14 an a priori hypothesis, there's other examples</p> <p>15 in epidemiology where you wouldn't necessarily</p> <p>16 have an a priori hypothesis.</p> <p>17 BY MR. MILLER:</p> <p>18 Q. All right. So I'm going to write</p> <p>19 these down, just give me one second here, the</p> <p>20 six limitations. I could do this without</p> <p>21 writing it down, I guess. Let's go back,</p> <p>22 because I don't want to take too much time.</p> <p>23 So here's a question. Of these six</p> <p>24 important limitations as described by these</p> <p>25 authors, including these Harvard</p>	Page 29	<p>1 A. As I stated, since I haven't read this</p> <p>2 manuscript, I'm unable to comment specifically.</p> <p>3 However, there have been validation studies</p> <p>4 performed by the Agricultural Health Study that</p> <p>5 have shown high reliability and validity of the</p> <p>6 self-reported data.</p> <p>7 Q. Four, "an insufficient program of</p> <p>8 biological monitoring to validate the exposure</p> <p>9 surrogates employed in the AHS questionnaire."</p> <p>10 Do you agree with that limitation, or disagree?</p> <p>11 A. Since I haven't read through this</p> <p>12 manuscript, I'm unable to specifically comment</p> <p>13 on what's written here. However, as I just</p> <p>14 stated, there have been biological validation</p> <p>15 studies, including for glyphosate, in the</p> <p>16 Agricultural Health Study to show high validity.</p> <p>17 Q. The fifth limitation, do you agree or</p> <p>18 disagree, "possible confounding by unmeasured,</p> <p>19 non-chemical risk factors for disease"?</p> <p>20 A. I have not read through this, so I'm</p> <p>21 not sure specifically what they're referring to</p> <p>22 here. However, in all epidemiology studies,</p> <p>23 including the case-control studies that have</p> <p>24 looked at NHL and glyphosate, a measure</p> <p>25 confounding is an important consideration that</p>

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<p>1 we evaluate in looking through the epidemiology 2 literature. 3 Q. Six, the sixth limitation, the absence 4 of a detailed plan for data analysis, an 5 interpretation that included explicit a priori 6 hypothesis. Do you agree or disagree there was 7 no a priori hypothesis? 8 A. As I stated previously, since I 9 haven't read through this manuscript, I can't 10 say specifically what they were commenting on. 11 However, there are examples where, in 12 epidemiology, where you would want an a priori 13 hypothesis, and there are other examples where 14 you wouldn't necessarily have an a priori 15 hypothesis stated. 16 Q. All right. Would you please turn with 17 me to Page 52, this Harvard study. They talk 18 about in the first full paragraph -- I want to 19 ask you about it. "In the prospective cohort 20 study, low response rates to questionnaires 21 designed to obtain information on subject 22 identifiers, exposures, and baseline disease 23 status will clearly diminish statistical power 24 and may create bias." 25 It's true, isn't it, ma'am?</p>	<p>1 I can't say specifically what they're commenting 2 on here. 3 BY MR. MILLER: 4 Q. They're commenting on a concern about 5 loss to follow-up in the future surveys, and 6 that's what they're commenting on. 7 MR. COPLER: Objection. Argumentative, 8 the document speaks for itself, asked and 9 answered. 10 A. Yeah, it's challenging to really 11 understand fully what they're referring to here 12 since I have not had a chance to review this 13 document yet. So it's hard for me, without 14 specific context of what they were talking 15 about, to fully answer your question. 16 BY MR. MILLER: 17 Q. Well, you were provided the 18 Agricultural Health Study and call it the 19 strongest evidence in the case. So let me ask 20 you this. 21 Do you know what the loss of follow-up 22 was in the Agricultural Health Study number two 23 that you rely upon? 24 A. So I think what you're -- well, I'm 25 not exactly sure what you mean by "loss to</p>
Page 31	Page 33
<p>1 MR. COPLER: Objection. Argumentative, 2 mischaracterizes the study authors, lacks 3 foundation, asked and answered. 4 BY MR. MILLER: 5 Q. You can answer. 6 A. Since I haven't read through this 7 manuscript, I'm not sure what they're referring 8 to specifically, and would need greater context 9 about this. 10 Q. They go on to warn in the next 11 sentence, "The success of the cohort study also 12 depends upon acceptable response rates to future 13 follow-up surveys of the cohort." 14 That was a concern that Harvard 15 expressed in two -- in year 2000. That's called 16 loss to follow-up, isn't it? 17 MR. COPLER: Objection. Argumentative, 18 mischaracterizes both the study authors, as well 19 as that particular statement lacks foundation, 20 asked and answered. 21 A. While that may be an issue one would 22 want to be concerned about, I believe that the 23 specifics in the Agricultural Health Study 24 publication addresses issues around response 25 rates in a number of different ways. So -- but</p>	<p>1 follow-up" here. Could you -- it would be 2 helpful to have a clarification. 3 Q. Have you used the phrase "loss to 4 follow-up" before? 5 A. When I talk about loss to follow-up, 6 what I'm thinking about is not knowing what the 7 outcomes of study are. And we know by using the 8 state registry data that we have virtually 9 complete follow-up for cancer outcomes, 10 including non-Hodgkin lymphoma. 11 Q. Okay. So it's your testimony there is 12 no low -- there is no loss to follow-up in 13 Agricultural Health -- let me finish my 14 question -- in the Agricultural Health Study 15 number two, the unpublished study that you rely 16 upon? 17 MR. COPLER: Objection. Misstates the 18 prior testimony. 19 A. What I stated was when I, as an 20 epidemiologist, think about the concept of loss 21 to follow-up, we're concerned about whether or 22 not we know somebody has the outcome of 23 interest, which in this case would be 24 non-Hodgkin's lymphoma. Since the Agricultural 25 Health Study uses state registries to follow</p>

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<p>Page 34</p> <p>1 individuals, that follow-up for the endpoint of 2 non-Hodgkin's lymphoma was actually quite high. 3 And so in terms of the outcome, the loss to 4 follow-up in the Agricultural Health Study is 5 very, very low. 6 BY MR. MILLER: 7 Q. Did the state registries tell the 8 investigators whether these people were -- 9 started using Roundup? 10 MR. COPLÉ: Objection. Vague, lacks 11 foundation. 12 A. As I just mentioned, the use of the 13 term "loss to follow-up" in epidemiology usually 14 refers to the outcome, not to the exposure. 15 That's a different issue. 16 BY MR. MILLER: 17 Q. Is it important that 37 percent of the 18 participants in the first Agricultural Health 19 Study did not fill out the questionnaire for the 20 second Agricultural Health Study, or is that -- 21 it doesn't mean anything to you? 22 MR. COPLÉ: Objection. Vague, lacks 23 foundation, argumentative. 24 A. Could you clarify what you mean by 25 that, please?</p>	<p>Page 36</p> <p>1 Q. You need clarification on the 2 definition of the word "important"? 3 MR. COPLÉ: Objection. Argumentative. 4 A. If you could say specifically why -- 5 what you'd like me to talk about in terms of the 6 participation in the second wave of the 7 questionnaire in terms of potential bias, I'd 8 be -- if you could clarify that. 9 BY MR. MILLER: 10 Q. It may not have been important to you, 11 but it was important to these Harvard 12 scientists. 13 Let's look at -- 14 MR. COPLÉ: Objection. Argumentative, 15 mischaracterizes the study authors. 16 BY MR. MILLER: 17 Q. These scientists at Harvard not 18 retained by Monsanto say, "If low response rates 19 occur with follow-up questionnaires, the 20 potential for bias will increase, partly from 21 misclassification of subjects (and person-years) 22 with regard to chemical exposure and partly from 23 residual confounding stemming from inaccurate 24 measurement of risk factors other than 25 pesticides."</p>
<p>Page 35</p> <p>1 BY MR. MILLER: 2 Q. Let's read the question back and see 3 what needs clarifying. 4 (Whereupon, the reporter read back the 5 pending question.) 6 MR. COPLÉ: Same objections. 7 A. All right. So if you could clarify 8 what you mean by "important." 9 BY MR. MILLER: 10 Q. Have you ever used the word 11 "important" before? 12 MR. COPLÉ: Objection. Argumentative. 13 A. I can imagine many different 14 interpretations of the word important here. So 15 I guess if you could clarify specifically what 16 you mean by important in this context, that 17 would be helpful. 18 BY MR. MILLER: 19 Q. Tell me your interpretation of the 20 word important, and we'll get back to work. 21 MR. COPLÉ: Objection. Vague. 22 A. It has many interpretations. That's 23 why I'm asking for some clarification on this 24 question. 25 BY MR. MILLER:</p>	<p>Page 37</p> <p>1 Did I read that correctly? 2 MR. COPLÉ: Objection. The document 3 speaks for itself. 4 A. That is what is stated here in this 5 document. 6 BY MR. MILLER: 7 Q. Tell the jury what the problem is in 8 epidemiology with misclassification. What's 9 that mean? 10 MR. COPLÉ: Objection. Vague. 11 A. I'd like to read this again, because, 12 again, since I haven't had a chance to read this 13 document, I'm seeing this for the first time 14 here, so I'd just like to read it again. 15 (Witness reviewing document.) 16 A. I think what they're saying 17 specifically is a concern of misclassifying the 18 exposure which could result. However, I think 19 what's been shown in the Agricultural Health 20 Study publications is that although there was 21 some missing data in the second phase of the 22 questionnaire, they looked at this in many 23 different ways, all of which said basically the 24 same thing, that they were able to -- including 25 in a validation study, they could use all this</p>

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1 data, and that the misclassification was likely
 2 to be low.
 3 If I believe -- when this publication
 4 happened, it was well before the second wave or
 5 any validation studies that were done to assess
 6 the potential issues of misclassification, which
 7 do not seem to be apparent in the Agricultural
 8 Health Study.
 9 BY MR. MILLER:
 10 Q. What is the residual confounding? How
 11 would you explain to a lay -- a jury what
 12 residual confounding is?
 13 MR. COPLE: Objection. Vague.
 14 A. I would say that residual confounding
 15 occurs in -- when you haven't fully adjusted for
 16 factors that are both correlated with the
 17 exposure and also have an association with the
 18 outcome.
 19 BY MR. MILLER:
 20 Q. Please turn with me to Page 57.
 21 Before we talk about the particulars of Page 57,
 22 you understand that the Agricultural Health
 23 Study was done off of questionnaires that were
 24 filled out by people that were applying to
 25 become licensed pesticide commercial

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1 applicators?
 2 MR. COPLE: Objection. Lacks
 3 foundation.
 4 BY MR. MILLER:
 5 Q. You can answer.
 6 A. Could you repeat the question? Sorry.
 7 MR. MILLER: Ma'am, would you read
 8 that back?
 9 (Whereupon, the reporter read back the
 10 pending question.)
 11 MR. COPLE: Same objection.
 12 A. I know that questionnaires were filled
 13 out by the participants in the Agricultural
 14 Health Study. But in addition to that, there
 15 were also subsequently validation studies on
 16 select participants as well.
 17 BY MR. MILLER:
 18 Q. Do you understand that they were
 19 applying for license, commercial pesticide
 20 applicator licenses?
 21 A. I was not aware one way or the other
 22 if they were.
 23 Q. I understand.
 24 Let me look with you at Page 57. A
 25 concern raised by these scientists from Harvard

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1 and other institutions is -- and we're at the
 2 middle of the page, I'll highlight it -- "It is
 3 possible that those farmers who apply pesticides
 4 frequently and have done so for many years do so
 5 with particular experience and care, which might
 6 suggest that their absorbed dose per application
 7 is less than the exposure of farmers who apply
 8 chemicals less frequently or have fewer years of
 9 experience in farming."
 10 That's a fair concern, isn't it,
 11 ma'am?
 12 MR. COPLE: Objection. Argumentative,
 13 vague, lacks foundation.
 14 A. Again, since I'm just reading parts of
 15 this manuscript, now I'm not specifically sure
 16 what they're referring to. However, in the
 17 Agricultural Health Study publications, one way
 18 that they try to account for potential different
 19 use of protective gear, for example, was in
 20 their measure of one of their dose-response
 21 exposures to try to address and say what was the
 22 real dose-exposure.
 23 So I'm not sure specifically what
 24 they're referring to here, but it is the case
 25 that their dose-response analyses in both of the

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1 Agricultural Health Study publications did
 2 address this issue.
 3 BY MR. MILLER:
 4 Q. You said twice now "both of the
 5 Agricultural Health Study publications." But
 6 just to be clear, you and I agree the second
 7 Agricultural Health Study is not published?
 8 A. Parts of the second updated analysis
 9 was actually published in a peer-reviewed
 10 journal using very similar methodology to what
 11 we saw in the 2013 manuscript.
 12 Q. The part of the Agricultural Health
 13 Study that was done on glyphosate and its
 14 potential association with non-Hodgkin's
 15 lymphoma was not published, was it, ma'am?
 16 A. Well, it was not published in a
 17 journal to date. A huge amount of that data
 18 that was in that same publication using the same
 19 methodology has been published in 2014.
 20 Q. You're referring to the Alavanja paper
 21 on fungicide?
 22 A. Well, included many different
 23 compounds including fungicides, yes.
 24 Q. Okay. But we can agree that the
 25 second paper that you're referring to on

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<p>1 glyphosate non-Hodgkin's lymphoma has not been 2 published? 3 A. Correct. While it has not been 4 published, however, they used a very similar 5 methodology that I referred to that integrated 6 information on potential use of protective 7 equipment in order to try to get a true dose of 8 exposure. That was published in the 2014 9 publication. 10 Q. These scientists from Harvard and 11 other institutions raise another concern, "A 12 particular task, such as mixing, may lead to 13 much greater exposure than frequent application. 14 If rare but serious mishaps or spills have a 15 powerful influence on total lifetime exposure, 16 number of applications may be a poor surrogate 17 for total exposure." 18 That's an honest criticism and 19 concern, isn't it, Doctor? 20 MR. COPLE: Objection. Vague. 21 A. I'm not sure specifically what they're 22 referring to here. However, the validation 23 study that was done within the Agricultural 24 Health Study addresses some of the concerns 25 about the use of the questionnaire data and how</p>	<p>1 other institutions caution, "The United States 2 EPA study may not be large enough to detect 3 these rare yet serious incidents." 4 That's a legitimate concern, isn't it, 5 Doctor? 6 MR. COPLE: Objection. Vague. 7 A. I'm sorry, I don't know under -- I 8 don't know what the US EPA study is, and I don't 9 know what the context of this statement is. 10 BY MR. MILLER: 11 Q. They go on to caution, "Errors due to 12 misclassification can produce bias as towards 13 the null." 14 What does "bias towards the null" 15 mean? 16 A. In epidemiology, bias towards the null 17 can happen when you have an exposure that's 18 misclassified, and that misclassification is 19 either a yes or no category, and it's similar in 20 those who eventually get the disease and those 21 who do not get the disease. 22 Q. What is non-differential exposure 23 misclassification? 24 A. In epidemiology, non-differential 25 exposure misclassification, as I said just in my</p>
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<p>1 valid it was by looking at both the reliability 2 study as well as the biomarker study that was 3 done that both showed an association. 4 BY MR. MILLER: 5 Q. Are you aware, Dr. Mucci, that the 6 questionnaires did not deal with the issue of 7 whether or not the applicant had spills and 8 exposure from spills? 9 MR. COPLE: Objection. Lacks 10 foundation. 11 A. So I was not sure one way or the other 12 about that. However, I think the validation 13 study shows a high validity of the questionnaire 14 data with the glyphosate biomarker data. And 15 so, therefore, whether there were spills 16 integrated, they're not -- still shows the 17 questionnaire data are highly valid. 18 BY MR. MILLER: 19 Q. Is it your testimony the validation 20 study addresses the issue of spills? 21 A. As I said, I'm not sure one way or the 22 other how it integrated spills. However, it did 23 take into account other components of protective 24 gear and other factors. 25 Q. These scientists from Harvard and</p>	<p>1 last statement, refers to when the exposure is 2 misclassified, and that misclassification is 3 similar in terms of people who develop the 4 disease versus people who do not develop the 5 disease. 6 Q. Misclassification can reduce the power 7 of a study to detect a general cause/effect; 8 true? 9 A. Misclassification can result in bias. 10 I would think it's an issue of bias rather than 11 loss of power. 12 Q. You'll agree that it will affect the 13 power of the study to determine a general cause 14 and effect; true? 15 A. As I just said, my thought is it's 16 really an issue of bias and not statistical 17 power. 18 Q. Let's see what these scientists from 19 Harvard said on Page 58, ma'am. They say, 20 "Misclassification will reduce the power of the 21 study to detect any genuine cause-effect 22 relationship." 23 Did I read that correctly? 24 MR. COPLE: Objection. The document 25 speaks for itself, mischaracterizes the study</p>

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<p>1 authors.</p> <p>2 A. While that's what it says specifically</p> <p>3 here, I'm not sure how they're using the term</p> <p>4 "power" in this statement here.</p> <p>5 BY MR. MILLER:</p> <p>6 Q. They also say it "will also reduce the</p> <p>7 validity of findings."</p> <p>8 That's true, isn't it, Doctor?</p> <p>9 A. If there is misclassification in the</p> <p>10 study and it biases to the null, that can</p> <p>11 influence validity. One important feature,</p> <p>12 however, is not only whether there's</p> <p>13 misclassification present, but how large the</p> <p>14 misclassification is, and validation studies can</p> <p>15 help address the amount of misclassification</p> <p>16 that exists in the study.</p> <p>17 Q. There's a genuine and serious concern</p> <p>18 about recall bias in the Agricultural Health</p> <p>19 Study, isn't there, Doctor?</p> <p>20 MR. COPLE: Objection. Lacks</p> <p>21 foundation, vague.</p> <p>22 A. No, that is not correct. Recall bias</p> <p>23 does not occur in cohort studies like the</p> <p>24 Agricultural Health Study. Recall bias occurs,</p> <p>25 and I think there's many examples in several of</p>	<p>1 A. So I -- again, I have not read this</p> <p>2 particular manuscript, so I'm not sure what</p> <p>3 specifically they're referring to here.</p> <p>4 But just to your comment earlier,</p> <p>5 there's no -- recall bias is a very specific</p> <p>6 form of misclassification. It's a differential</p> <p>7 misclassification. This statement does not talk</p> <p>8 at all about recall bias. And as I had said,</p> <p>9 the Agricultural Health Study performed a number</p> <p>10 of validation studies with respect to the</p> <p>11 exposure.</p> <p>12 Q. These scientists from Harvard thought</p> <p>13 there was serious questions about the quality of</p> <p>14 the data being collected; true?</p> <p>15 MR. COPLE: Objection. Vague,</p> <p>16 argumentative, mischaracterizes the study</p> <p>17 authors.</p> <p>18 A. I couldn't say one way or the other</p> <p>19 specifically what these authors, which included</p> <p>20 some Harvard authors, but many other</p> <p>21 institutions as well, I can't say specifically</p> <p>22 what they were concerned about. But subsequent</p> <p>23 to this publication, a number of validation</p> <p>24 studies have been published on specifically</p> <p>25 glyphosate that showed high reliability of</p>
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<p>1 the case-control studies of glyphosate and NHL</p> <p>2 risk because you're asking about the exposure</p> <p>3 after the disease occurred.</p> <p>4 BY MR. MILLER:</p> <p>5 Q. Let's see what these scientists from</p> <p>6 Harvard say about whether the agricultural study</p> <p>7 is subject to recall bias. On Page 59, ma'am,</p> <p>8 at the bottom there, they say, "In order to</p> <p>9 answer these questions, respondents must</p> <p>10 remember with some accuracy when they first used</p> <p>11 products and their frequency...of each pesticide</p> <p>12 product, and they must be able to compute</p> <p>13 averages in their head involving multiple years</p> <p>14 of use. For older subjects who may have many</p> <p>15 years of farm experience, accurate responses</p> <p>16 will be difficult to supply. Moreover, some</p> <p>17 pesticides are sold and applied as mixtures and</p> <p>18 thus the exact ingredients may not be known to</p> <p>19 farmers. It can reasonably be expected there</p> <p>20 will be inaccuracies in these data."</p> <p>21 That was the concern of these Harvard</p> <p>22 scientists, wasn't it, Doctor?</p> <p>23 MR. COPLE: Objection.</p> <p>24 Mischaracterizes the study authors, lacks</p> <p>25 foundation, argumentative.</p>	<p>1 reporting.</p> <p>2 Q. I think we can clear that up. Let's</p> <p>3 see. This is on Page 58, from these authors,</p> <p>4 "However, there are still serious questions</p> <p>5 about the quality of the pesticide use data that</p> <p>6 are being collected in the Agricultural Health</p> <p>7 Study."</p> <p>8 A. I'm sorry, was there a question?</p> <p>9 Q. Did I read that correctly?</p> <p>10 MR. COPLE: Objection. The document</p> <p>11 speaks for itself.</p> <p>12 A. Those are the words that are written</p> <p>13 there.</p> <p>14 However, as I mentioned, after this</p> <p>15 was published in 2000, since that time frame,</p> <p>16 there have been different settings that have</p> <p>17 addressed specifically the issue of the validity</p> <p>18 of the self-reported data.</p> <p>19 BY MR. MILLER:</p> <p>20 Q. Do you know who Aaron Blair is?</p> <p>21 A. I know of Dr. Blair by name.</p> <p>22 Q. And is he the author of any of these</p> <p>23 studies?</p> <p>24 MR. COPLE: Objection. Vague.</p> <p>25 A. I'm sorry, could you clarify, any of</p>

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<p>1 what studies? 2 BY MR. MILLER: 3 Q. Is he an author of the Agricultural 4 Health Study? 5 A. Yes, he is an author in the 6 Agricultural Health Study. 7 Q. Is he an author -- or do you know what 8 the NAPP study is? 9 A. The North American Pooling Project. 10 Q. Is he an author of the NAPP? 11 A. I'd have to review the author list on 12 that to make sure. 13 Q. Did he help with this Harvard study, 14 do you know? 15 A. I don't know one way or the other. 16 Q. Let's take a look. Go with me, 17 please, to Page 69. In the Acknowledgment 18 section it tells us that "Preparation of this 19 report was a collaborative effort involving 20 Drs. John D. Graham and George M. Gray of 21 Harvard Center for Risk Analysis." 22 Do you see that, ma'am? 23 A. Yes. 24 Q. And "We are particularly thankful for 25 information and assistance provided by</p>	<p>1 forth between exhibits. Thank you. 2 You mention in your report the 3 Exponent meta-analysis. Are you familiar with 4 what I'm talking about there, ma'am? 5 A. Which specific report are you 6 referring to? 7 Q. Dr. Chang and others did a 8 meta-analysis of this issue. You mention it in 9 your report. It's not published. I'm sorry, to 10 be precise May 24, 2017. 11 A. May I look at my report to pull it up? 12 Q. Sure, I think you can find it on 13 Page 59, if that helps. 14 A. Page 60 refers to the technical 15 memorandum of 2017. 16 Q. Yes, ma'am. So I'll mark it as 24-2. 17 (Whereupon, Mucci Exhibit 24-2, 18 5/24/17 Exponent paper, Meta-Analysis 19 of Glyphosate Use and risk of 20 Non-Hodgkin Lymphoma, was marked for 21 identification.) 22 BY MR. MILLER: 23 Q. And this is what we're referring to 24 (handing). 25 MR. COPLE: Do you have a copy?</p>
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<p>1 Agricultural Health Study team members," lists 2 many of them, including Dr. Aaron Blair. Do you 3 see that? 4 A. Yes, I do. 5 Q. It also lists and thanks a Dr. John 6 Acquavella in helping with this report. 7 Do you know who Dr. John Acquavella 8 is? 9 A. I know him by name, yes. 10 Q. He's an epidemiologist that was a 11 full-time employee at one time for Monsanto. 12 You're aware of that, aren't you? 13 A. Yes. 14 Q. And you knew Dr. Acquavella prior to 15 being retained as an expert here by 16 Hollingsworth, right? 17 A. Did I know -- I've never met 18 Dr. Acquavella. 19 Q. You knew him by name and reputation 20 prior to that? 21 A. I knew of his name, yes. 22 Q. Okay. I'm going to move on to 23 something else. 24 Yes, ma'am. I think I'm going to 25 leave it in a pile there. We might go back and</p>	<p>1 MR. MILLER: I do, yes. I'm sorry 2 (handing). 3 BY MR. MILLER: 4 Q. All right. Ma'am, so this is the 5 Exponent report mentioned in your report? 6 A. Yes. 7 Q. And I want to get your understanding 8 for the jury. This draft in Footnote 1 of an 9 Agricultural Health Study 2013 article was sent 10 by a lawyer for Hollingsworth, Mr. Lasker, to 11 Exponent, and then they took it and did a 12 meta-analysis; right? 13 MR. COPLE: Objection. The document 14 speaks for itself. 15 A. Yeah, I'm not sure specifically. I 16 couldn't comment specifically on what was sent 17 to Exponent for this meta-analysis. 18 BY MR. MILLER: 19 Q. It says in footnote 1, ma'am, the 20 Alavanja draft, Lymphoma risk and pesticide use 21 in the Agricultural Health Study, March 15, 22 2013, and that was received by Exponent from 23 Mr. Eric G. Lasker, Hollingsworth, LLP. 24 Do you see that? 25 MR. COPLE: Objection. The document</p>

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<p>1 speaks for itself.</p> <p>2 A. Yes, I see where it says this, but I</p> <p>3 couldn't comment specifically what materials</p> <p>4 were sent to them or what materials were not</p> <p>5 sent to them.</p> <p>6 BY MR. MILLER:</p> <p>7 Q. Well, you don't challenge this</p> <p>8 footnote 1 where it says that the draft of the</p> <p>9 AHS manuscript was sent to Exponent by the</p> <p>10 lawyer at Hollingsworth?</p> <p>11 A. I just couldn't comment one way or the</p> <p>12 other since I'm not familiar specifically what</p> <p>13 was sent to them for this meta-analysis.</p> <p>14 Q. Well, you can comment that</p> <p>15 Hollingsworth is the same law firm that has</p> <p>16 hired you; right?</p> <p>17 A. Correct.</p> <p>18 Q. Yeah, okay. So Hollingsworth has been</p> <p>19 retained by Monsanto. You've been retained by</p> <p>20 Monsanto.</p> <p>21 Are you aware that Exponent is being</p> <p>22 funded by Monsanto?</p> <p>23 A. I'm sorry, could you clarify</p> <p>24 specifically what you mean by "funded by</p> <p>25 Monsanto"? Was that for this particular study</p>	<p>1 Exponent is on Page 5. If you look at the top</p> <p>2 of the page. When Exponent looks at the De Roos</p> <p>3 2003 article -- you've looked at the De Roos</p> <p>4 2003 article; right?</p> <p>5 A. Yes.</p> <p>6 Q. And you remember there were two</p> <p>7 analyses; There was a logistical regression and</p> <p>8 a hierarchal regression model. Do you remember</p> <p>9 that?</p> <p>10 A. Yes.</p> <p>11 MR. COPLE: Objection. Lacks</p> <p>12 foundation.</p> <p>13 Q. They prioritized the results using the</p> <p>14 logistical regression model in the present</p> <p>15 analysis.</p> <p>16 Do you see that?</p> <p>17 MR. COPLE: Objection. Lacks</p> <p>18 foundation, the document speaks for itself.</p> <p>19 A. I can see -- I know from reading this</p> <p>20 technical memorandum that they actually</p> <p>21 considered multiple different models, as you can</p> <p>22 see in Table 1, one of which included using the</p> <p>23 logistic regression results.</p> <p>24 BY MR. MILLER:</p> <p>25 Q. And just one last thing before we</p>
Page 55	Page 57
<p>1 or...</p> <p>2 Q. Yes, for this particular study.</p> <p>3 MR. COPLE: Objection. Lacks</p> <p>4 foundation.</p> <p>5 A. I wasn't familiar one way or the other</p> <p>6 about who was funding this manuscript.</p> <p>7 BY MR. MILLER:</p> <p>8 Q. The other -- if you go, please, with</p> <p>9 me to footnote 7, here we have, "Other documents</p> <p>10 that we reviewed were unpublished draft</p> <p>11 manuscript," NAPP, received by Exponent from</p> <p>12 Mr. Lasker, Hollingsworth LLP.</p> <p>13 Do you see that, ma'am?</p> <p>14 MR. COPLE: Objection. The document</p> <p>15 speaks for itself.</p> <p>16 A. Yes, I can see where it says that in</p> <p>17 the document.</p> <p>18 BY MR. MILLER:</p> <p>19 Q. Have you met Mr. Lasker?</p> <p>20 A. Yes, I have.</p> <p>21 Q. When was the last time you saw</p> <p>22 Mr. Lasker?</p> <p>23 A. This week.</p> <p>24 Q. Okay. One of things I want to ask you</p> <p>25 about in this unpublished manuscript written by</p>	<p>1 leave this particular study. Page 7, they state</p> <p>2 they "cannot verify the accuracy of these</p> <p>3 results or the published results of any of</p> <p>4 the...studies included in this analysis," and</p> <p>5 it's signed by Dr. Chang; right?</p> <p>6 MR. COPLE: Objection. The document</p> <p>7 speaks for itself.</p> <p>8 A. That's what it says here, but I</p> <p>9 couldn't comment specifically about whether --</p> <p>10 what they were thinking with regard to the</p> <p>11 accuracy of this.</p> <p>12 BY MR. MILLER:</p> <p>13 Q. You know Dr. Chang, don't you?</p> <p>14 A. I do.</p> <p>15 Q. She's a friend of yours; right?</p> <p>16 A. She and I were doctoral students</p> <p>17 together.</p> <p>18 Q. You're still friends; right?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. All right. Is that how</p> <p>21 Hollingsworth found out about you, from</p> <p>22 Dr. Chang?</p> <p>23 A. I'm not familiar with how they found</p> <p>24 out about me.</p> <p>25 Q. Here's the Chang meta-analysis that</p>

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Page 58	<p>1 was published. I'd like to go over that with</p> <p>2 you. It's a 2016 document. We'll mark that as</p> <p>3 Exhibit 24-3.</p> <p>4 (Whereupon, Mucci Exhibit 24-3, Chang</p> <p>5 and Delzell paper, Systematic review</p> <p>6 and meta-analysis of glyphosate</p> <p>7 exposure and risk of</p> <p>8 lymphohematopoietic cancers, was</p> <p>9 marked for identification.)</p> <p>10 BY MR. MILLER:</p> <p>11 Q. You reviewed this as well, ma'am;</p> <p>12 right?</p> <p>13 A. Yes.</p> <p>14 Q. And this is on the issue, "Systematic</p> <p>15 review and meta-analysis of glyphosate exposure</p> <p>16 and the risk of lymphohematopoietic cancers";</p> <p>17 right?</p> <p>18 A. Yes.</p> <p>19 Q. And mouthful, but lymphohematopoietic</p> <p>20 cancers includes non-Hodgkin's lymphoma?</p> <p>21 A. Yes.</p> <p>22 Q. Systematic review means what?</p> <p>23 A. In this context, a systematic review</p> <p>24 was done to review all of the studies included</p> <p>25 in this analysis. The meta-analysis refers to a</p>	Page 60	<p>1 A. So while that is the relative risk</p> <p>2 estimate that is presented here, you can also</p> <p>3 see that there are a number of different</p> <p>4 meta-analysis results that are published, and</p> <p>5 the findings are sensitive to the specific</p> <p>6 studies that are included or not included.</p> <p>7 BY MR. MILLER:</p> <p>8 Q. Sure. And that's fair. And let's</p> <p>9 look at some other models that Dr. Chang does.</p> <p>10 She models in the next block a</p> <p>11 meta-analysis model for B-cell lymphoma, which I</p> <p>12 think you and I can agree is a form of</p> <p>13 non-Hodgkin's lymphoma; right?</p> <p>14 A. Yes.</p> <p>15 Q. Okay. And she shows a relative risk</p> <p>16 of 2, over a 100 increased risk, statistically</p> <p>17 significant; right?</p> <p>18 A. So again, while she did perform this</p> <p>19 meta-analysis, I think one important thing to</p> <p>20 remember is that meta-analysis addresses issues</p> <p>21 of precision. But if studies are inherently</p> <p>22 flawed, which we know there were flaws in these</p> <p>23 two studies included in these two particular</p> <p>24 analysis of B-cell lymphoma, then the relative</p> <p>25 risk estimate would be biased.</p>
Page 59	<p>1 very quantitative assessment of the individual</p> <p>2 studies.</p> <p>3 Q. Turn with me, please, to Page 416.</p> <p>4 Before we go, you agree this was done</p> <p>5 by Exponent; right?</p> <p>6 A. This study was done by Drs. Chang and</p> <p>7 Delzell, both of whom have an appointment at</p> <p>8 Exponent.</p> <p>9 Q. And Page 416. On Page 416, Dr. Chang</p> <p>10 and Exponent have selected estimates included in</p> <p>11 meta-analysis and calculated meta-analysis risk</p> <p>12 for the association of glyphosate and the risk</p> <p>13 of LHC, including non-Hodgkin's lymphoma,</p> <p>14 non-Hodgkin's lymphoma subtypes, Hodgkin's</p> <p>15 lymphoma, multiple myeloma, and leukemia; right?</p> <p>16 That's what they're talking about here?</p> <p>17 A. In Table 3 these are the selected</p> <p>18 estimates, yes.</p> <p>19 Q. Okay. And so in the top here, block,</p> <p>20 they talk about the meta-analysis model, and</p> <p>21 Model 4 here, they're looking at non-Hodgkin's</p> <p>22 lymphoma, and Dr. Chang gets an increased risk</p> <p>23 of 40 percent; right?</p> <p>24 MR. COPLER: Objection. The document</p> <p>25 speaks for itself.</p>	Page 61	<p>1 Q. That's the proverbial, I like to call</p> <p>2 it the royal "we." I mean, I don't want to -- I</p> <p>3 don't think so. You think there's a problem</p> <p>4 here; is that right?</p> <p>5 MR. COPLER: Objection. Argumentative.</p> <p>6 A. The reason that I would and most</p> <p>7 epidemiologists would -- or as it follows,</p> <p>8 first, the -- one of the two studies that</p> <p>9 included was based only on four cases and two</p> <p>10 controls in total, and so it's quite limited.</p> <p>11 Secondly, we know with the Eriksson</p> <p>12 study there's concerns of misclassification or</p> <p>13 confounding, actually, in the Eriksson study.</p> <p>14 So most epidemiologists would agree that while</p> <p>15 the meta-analysis relative risk, generated</p> <p>16 relative risk of 2, that should not be</p> <p>17 interpreted as a causal association. I think</p> <p>18 subsequently, as shown in the 2017 updated</p> <p>19 analysis, which was able to include data from</p> <p>20 the Agricultural Health Study, there was --</p> <p>21 essentially this odds ratio was attenuated</p> <p>22 substantially.</p> <p>23 MR. MILLER: Move to strike "most</p> <p>24 epidemiologists would agree."</p> <p>25 BY MR. MILLER:</p>

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<p>1 Q. We can only look at your opinions, and 2 we can look at the opinions of Dr. Chang here 3 who is also retained by Monsanto. And so let's 4 look at that. 5 MR. COPLÉ: Object to counsel's 6 statement. The witness's testimony will stand. 7 BY MR. MILLER: 8 Q. Let's go to models -- well, first of 9 all, you'll agree that multiple myeloma is a 10 form of non-Hodgkin's lymphoma; right? 11 A. In the updated definition, multiple 12 myeloma is included in the definition. 13 Q. And so here we have Dr. Chang in Model 14 5 of her meta-analysis, multiple myeloma, 15 showing a 50 percent increased risk of multiple 16 myeloma with exposure to glyphosate; right? 17 A. I'm sorry, could -- 18 MR. COPLÉ: Objection. The document 19 speaks for itself. 20 A. I'm sorry, I'm not sure where you're 21 looking at. 22 BY MR. MILLER: 23 Q. It's easier if you look up here, 24 ma'am. 25 A. So my specific report focused</p>	<p>1 from specific studies of glyphosate and NHL 2 risk. 3 Q. For the association between glyphosate 4 exposure and the risk of non-Hodgkin's lymphoma; 5 right? 6 A. Yes. 7 Q. Okay. And so for us lay folks, this 8 line where there's a 1, that vertical line, any 9 study that comes in on the right side of that 10 line is showing a risk, and any study comes in 11 on the left side is showing a protective effect; 12 right? 13 MR. COPLÉ: Objection. Vague. 14 A. That's not exactly correct actually. 15 Not only is it important to look at the relative 16 risk estimate, but also the 95 percent 17 confidence interval, because it gives a range of 18 values consistent with the estimate. And so 19 some of these estimates do -- while the point 20 estimate may be larger than 1, do not support a 21 positive association. 22 BY MR. MILLER: 23 Q. Which ones don't support it? 24 A. Well, it's really difficult to say one 25 way or the other with the Hardell 2002 given the</p>
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<p>1 specifically on non-Hodgkin's lymphoma, which 2 earlier on had not included this definition 3 multiple myeloma. So I did not review in detail 4 the study by Brown or Kachuri for this 5 particular systematic review expert report that 6 I put together of the epidemiology. 7 Q. So you have no opinion on that? 8 MR. COPLÉ: Objection. Misstates 9 testimony of the witness. 10 A. I haven't had a chance to review 11 thoroughly the studies by Brown and Kachuri 12 which would allow me to understand specifically 13 potential biases in these studies. 14 BY MR. MILLER: 15 Q. Let's go to Page 404. You know what a 16 forest plot is, right, Doctor? 17 MR. COPLÉ: Objection. Lacks 18 foundation. 19 A. I -- in -- I understand what a forest 20 plot is, but it can have different definitions 21 and different meaning in different settings. 22 BY MR. MILLER: 23 Q. What we're looking at here on Page 404 24 is a forest plot of relative risk; right? 25 A. These are relative risks that were</p>	<p>1 large width of the 95 percent confidence 2 intervals -- 3 Q. Have you -- 4 A. -- for example. 5 Q. I didn't mean to interrupt you. 6 Sorry. 7 Have you written before that it's 8 important to look at studies even if they don't 9 have a 95 percent confidence interval? 10 MR. COPLÉ: Objection. Lacks 11 foundation. 12 A. I'm sorry, I'm not sure what you're 13 referring to specifically. 14 BY MR. MILLER: 15 Q. We'll take a look at it in a minute. 16 So you agree that on this vertical 17 line, how many of the black boxes are on the 18 left side of 1? 19 A. As I've mentioned, we -- 20 epidemiologists wouldn't look at the data that 21 way. They would look not only at the point 22 estimate, which is the box, but also the 23 95 percent confidence interval, which is the 24 line. So both -- all of that taken together is 25 important.</p>

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<p>Page 66</p> <p>1 And as I mentioned previously, also, 2 it's really critical in looking at these data to 3 say can we exclude bias and confounding from 4 these individual studies, which you cannot 5 actually. And I think that's clearly shown in 6 the updated analysis of Chang and Delzell where, 7 for example, they use the data from De Roos 2003 8 and McDuffie 2001 in the North American Pooling 9 Project. If you take that data, appropriately 10 adjusting for residual confounding due to 11 concomitant use of other pesticides in dealing 12 with the issue of recall bias introduced by 13 proxies, actually the point estimate would be 14 quite different for the meta-analysis and its 15 95 percent confidence interval. 16 MR. COPLE: Before you move to 17 something else, we've been going for a little 18 more than an hour. How long do you plan to go 19 before the witness has a break? 20 THE WITNESS: Yeah, I was actually 21 going to just ask if we could take a break. 22 MR. COPLE: Sure. 23 THE WITNESS: Okay. Great. Thank 24 you. 25 THE VIDEOGRAPHER: Going off the</p>	<p>Page 68</p> <p>1 e-mail, ACQUAVELLAPROD00010118 through 2 120, was marked for identification.) 3 MR. MILLER: We'll mark it as 4 Exhibit 24-4. Copies for everyone (handing). 5 BY MR. MILLER: 6 Q. This is in June of 2015. Do you see 7 the date there, ma'am? 8 A. June of 2015. 9 MR. COPLE: Objection. Lacks 10 foundation, the document speaks for itself. 11 A. Yes, I can see that's what it says 12 here on this document. 13 BY MR. MILLER: 14 Q. From John Acquavella to Thomas 15 Sorahan. 16 Do you know Dr. Sorahan? 17 A. No, I don't. 18 Q. Whether he attended IARC Volume 112 on 19 behalf of Monsanto? 20 MR. COPLE: Objection. Lacks 21 foundation. 22 A. I don't know one way or the other. 23 BY MR. MILLER: 24 Q. Let me stop there. 25 Have you read the IARC monograph for</p>
<p>Page 67</p> <p>1 record. The time is 9:10. 2 (Whereupon, a recess was taken.) 3 THE VIDEOGRAPHER: Back on the record. 4 The time is 9:25. 5 BY MR. MILLER: 6 Q. What's Dr. Chang's first name? 7 A. Ellen. 8 Q. And Dr. Delzell is Elizabeth? 9 A. I don't know Dr. Delzell. I would 10 have to look it up. 11 Q. And you've not met a Dr. Acquavella 12 but know of him, I think, is where we were? 13 A. Correct. 14 Q. Okay. I didn't want to restate. 15 All right. Do you know if 16 Dr. Acquavella was involved in the search for 17 you as an expert? 18 MR. COPLE: Objection. Vague, lacks 19 foundation. 20 A. I don't know one way or the other. 21 BY MR. MILLER: 22 Q. Okay. I show you e-mail that we were 23 produced by Monsanto. 24 25 (Whereupon, Mucci Exhibit 24-4, 6/2/15</p>	<p>Page 69</p> <p>1 Roundup, Volume 112? 2 A. I have reviewed it, yes. 3 Q. Reviewed it, or did you -- skim it, or 4 did you read the entire thing? 5 A. It was one piece of many documents 6 that I read in putting together my expert 7 report. 8 Q. Read the entire thing? 9 A. I read the parts specifically related 10 to the epidemiology, and then read through less 11 diligently the other parts. 12 Q. Okay. Going back to her e-mail, John 13 Acquavella, Tom Sorahan, it says "Tom, I have 14 the highest regard for Elizabeth. She is" an 15 expert -- "she is as expert as any occupational 16 epidemiologist. Plus, she is a personal friend. 17 The major con with Elizabeth is that she works 18 for Exponent and would not be perceived as an 19 academic with no direct conflict of interest." 20 Do you see where I'm reading? 21 A. I get -- 22 MR. COPLE: Objection. The document 23 speaks for itself. 24 A. Well, I can see where you're reading. 25 I -- you know, again, I'm not familiar with</p>

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<p>1 Dr. Acquavella or his relationship with</p> <p>2 Elizabeth.</p> <p>3 BY MR. MILLER:</p> <p>4 Q. They go on to write, "My sense is that</p> <p>5 you are right, that it may be impossible to find</p> <p>6 a prominent EU" -- I assume that's means</p> <p>7 European Union -- "epidemiologist who will want</p> <p>8 to get in the middle of this."</p> <p>9 Do you know if Monsanto and</p> <p>10 Hollingsworth attempted to get other</p> <p>11 epidemiologists before you were retained?</p> <p>12 A. I'm not --</p> <p>13 MR. COPLE: Objection. Lacks</p> <p>14 foundation.</p> <p>15 A. I'm not familiar one way or the other.</p> <p>16 BY MR. MILLER:</p> <p>17 Q. Is it appropriate before a</p> <p>18 meta-analysis is released on a subject of</p> <p>19 potential exposure and its association with</p> <p>20 cancer to allow the company funding the process</p> <p>21 to review and edit the manuscript before it's</p> <p>22 published?</p> <p>23 MR. COPLE: Objection. Lacks</p> <p>24 foundation, vague.</p> <p>25 A. While there may be some examples where</p>	<p>1 chain, Bates ACQUAVELLAPROD02463444</p> <p>2 through 446, was marked for</p> <p>3 identification.)</p> <p>4 BY MR. MILLER:</p> <p>5 Q. You've not seen this e-mail before?</p> <p>6 MR. COPLE: Objection. Lacks</p> <p>7 foundation.</p> <p>8 A. I have not seen this e-mail before.</p> <p>9 BY MR. MILLER:</p> <p>10 Q. This is from Donna Farmer at Monsanto</p> <p>11 to Elizabeth Delzell, a copy, Ellen Chang, both</p> <p>12 at Exponent.</p> <p>13 Do you see that, ma'am?</p> <p>14 A. I can see where it says this on this</p> <p>15 document.</p> <p>16 Q. It's concerning a glyphosate draft,</p> <p>17 August 17, 2015.</p> <p>18 Do you see that?</p> <p>19 A. I can see where it says that in this</p> <p>20 document.</p> <p>21 Q. And Donna Farmer writes to Dr. Delzell</p> <p>22 and Chang, "Thank you for the opportunity to</p> <p>23 review the draft of the paper and please see our</p> <p>24 suggested comments in the attachment."</p> <p>25 Do you see that?</p>
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<p>1 that might not be the case, I can think of other</p> <p>2 examples where there -- that would be</p> <p>3 appropriate.</p> <p>4 BY MR. MILLER:</p> <p>5 Q. Was that done with the Chang</p> <p>6 manuscript?</p> <p>7 A. I couldn't tell you one way or the</p> <p>8 other who reviewed the document by Chang and</p> <p>9 Delzell.</p> <p>10 Q. So you had not been made aware that</p> <p>11 Donna Farmer, lead toxicologist for Monsanto,</p> <p>12 reviewed and edited the Chang meta-analysis</p> <p>13 before it was published?</p> <p>14 A. I --</p> <p>15 MR. COPLE: Objection. Objection.</p> <p>16 Lacks foundation, argumentative, vague.</p> <p>17 A. As I stated, I'm not sure one way or</p> <p>18 the other who reviewed this document.</p> <p>19 BY MR. MILLER:</p> <p>20 Q. I'm going to hand you what's been</p> <p>21 marked as 24-5, another series of e-mails</p> <p>22 provided to us by Monsanto.</p> <p>23</p> <p>24</p> <p>25 (Whereupon, Mucci Exhibit 24-5, E-mail</p>	<p>1 A. I can see where it says this on this.</p> <p>2 Q. And is it appropriate for employees of</p> <p>3 the company to review and edit an</p> <p>4 epidemiological draft in this context?</p> <p>5 MR. COPLE: Objection. Vague, lacks</p> <p>6 foundation, argumentative.</p> <p>7 A. Since I don't know the context for</p> <p>8 this e-mail, and I also don't know the context</p> <p>9 for what was specifically commented on, I</p> <p>10 couldn't say one way or the other whether it was</p> <p>11 appropriate.</p> <p>12 BY MR. MILLER:</p> <p>13 Q. Do you know whether the Exponent</p> <p>14 meta-analysis was rejected the first time they</p> <p>15 attempted to have it published?</p> <p>16 MR. COPLE: Objection. Lacks</p> <p>17 foundation.</p> <p>18 A. I'm not familiar one way or the other.</p> <p>19 BY MR. MILLER:</p> <p>20 Q. All right. Let's look at it.</p> <p>21 (Whereupon, Mucci Exhibit 24-6, E-mail</p> <p>22 chain with attachments, Bates</p> <p>23 ACQUAVELLAPROD00022326 through 334,</p> <p>24 was marked for identification.)</p> <p>25 BY MR. MILLER:</p>

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1 Q. Here's what we've marked as
 2 Exhibit 24-6, a series of e-mails and
 3 attachments produced to us by Monsanto
 4 (handing). I just want to go over a few things
 5 here.
 6 This is a series of e-mails between
 7 Donna Farmer from Monsanto, Dr. Chang and
 8 Dr. Delzell from Exponent.
 9 Do you see that, ma'am?
 10 MR. COPLE: Objection. Lacks
 11 foundation, the document speaks for itself.
 12 A. I can see where it says this on this
 13 document.
 14 BY MR. MILLER:
 15 Q. Let's go to Page 2. Ellen Chang is
 16 advising Monsanto employee Donna Farmer that
 17 "Dear Donna, Unfortunately, our manuscript on
 18 the meta-analysis and review of glyphosate and
 19 lymphohematopoietic cancers was rejected by the
 20 International Journal of Environmental Research
 21 and Public Health."
 22 Do you see that, ma'am?
 23 MR. COPLE: Objection. Lacks
 24 foundation, the document speaks for itself.
 25 A. Again, I haven't read -- I'm not

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1 familiar specifically with this set of e-mails,
 2 but I can see where it says this on this
 3 document here.
 4 BY MR. MILLER:
 5 Q. This e-mail chain was not provided to
 6 you by the lawyers for Monsanto; right?
 7 A. No, it was not.
 8 Q. And on the first page, Ellen Chang
 9 tells us that "They didn't explicitly state why,
 10 and one of the reviews was reasonably favorable.
 11 I suspect that the editors had concerns about
 12 bias and conflict of interest."
 13 Do you see that?
 14 MR. COPLE: Objection. Lacks
 15 foundation, the document speaks for itself.
 16 A. Yes. While I can see it, I couldn't
 17 really comment one way or the other specifically
 18 about the content of this e-mail.
 19 BY MR. MILLER:
 20 Q. Have you been a reviewer of journals?
 21 A. Yes, I have.
 22 Q. And reviewers of journals write their
 23 comments and criticisms when they reject a
 24 particular piece for a journal?
 25 MR. COPLE: Objection. Vague.

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1 A. It would depend on the journal. There
 2 may be different requirements that different
 3 journals have.
 4 BY MR. MILLER:
 5 Q. Let's take a look at what is Bates
 6 stamped 022329, and it's a reviewer's comment
 7 about the Chang meta-analysis. The bottom of
 8 the page there, pull that up so you can read it,
 9 "This paper seems like it is agenda-driven from
 10 the outset."
 11 Do you see that?
 12 MR. COPLE: Objection. Lacks
 13 foundation, the document speaks for itself.
 14 A. I can see where this particular
 15 document says that, yes.
 16 BY MR. MILLER:
 17 Q. What does it mean to be agenda-driven
 18 from the outset?
 19 MR. COPLE: Objection. Vague,
 20 argumentative.
 21 A. I couldn't say specifically. I'm just
 22 seeing this now. I couldn't say specifically
 23 what this review is speaking to.
 24 BY MR. MILLER:
 25 Q. "The authors set out to redo the

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1 meta-analysis of Schinasi and Leon" -- you've
 2 read that meta-analysis, haven't you, Doctor?
 3 A. I have --
 4 MR. COPLE: Objection. Lacks
 5 foundation, the document speaks for itself.
 6 BY MR. MILLER:
 7 Q. -- "using specific selection criteria
 8 for studies and by presenting multiple meta
 9 estimates for various combinations of risk from
 10 the studies."
 11 Do you see that?
 12 MR. COPLE: Objection. Lacks
 13 foundation, the document speaks for itself.
 14 A. Well, I can see that. And again,
 15 since I'm not familiar with this document, I'm
 16 not sure specifically what they are referring to
 17 in this case here.
 18 But I think one point that's important
 19 to make is that the Schinasi and Leon
 20 meta-analysis did not integrate the most fully
 21 adjusted estimates from some of the studies and,
 22 therefore, the Chang and Delzell analysis
 23 actually provided some additional information
 24 that was not available in Schinasi and Leon.
 25 BY MR. MILLER:

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<p>1 Q. Let's see what this reviewer for this 2 journal has to say. They have similar results 3 as Schinasi and Leon (meta relative risk, 4 30 percent) versus 50 percent for the risk of 5 NHL associated with ever versus never use of 6 glyphosate." That's what this reviewer 7 observed; right? 8 MR. COPLE: Objection. Lacks 9 foundation, the document speaks for itself. 10 A. I think one of -- again, I couldn't 11 say specifically what this reviewer was 12 commenting on. But I think one important 13 finding is that by integrating the studies which 14 had additional adjustment for confounders, you 15 can see the attenuation of the odds ratio that 16 was due, but still the meta-analysis in both of 17 these cases relied on some of the studies that 18 did not have fully adjusted odds ratio adjusting 19 for other pesticides or dealt with the issue of 20 recall bias from the proxy respondents. 21 BY MR. MILLER: 22 Q. In addition this reviewer says, "the 23 authors find a relative risk of 1.4 for the 24 association between multiple myeloma and the use 25 of glyphosate (a cancer type that had not been</p>	<p>1 causal association." 2 Do you see that, ma'am? 3 MR. COPLE: Objection. Lacks 4 foundation, the document speaks for itself. 5 A. Yes. While I can see that, I think, 6 as I've mentioned, the Chang and Delzell study 7 was able to integrate more fully adjusted 8 estimates into their meta-analysis, although 9 still even some of those studies they had to 10 rely on results that were not fully adjusted for 11 other pesticide use, so... 12 BY MR. MILLER: 13 Q. Another concern that this reviewer has 14 is that "The authors should clearly state (in 15 the text) which of the studies they cite were 16 funded (or partially funded) by Monsanto - such 17 as Mink 2012 and Sorahan 2015." 18 Do you see that, ma'am? 19 MR. COPLE: Objection. Lacks 20 foundation, the document speaks for itself. 21 A. Yes. While I can see what is written 22 here, I couldn't comment one way or the other 23 about what this reviewer was intending with this 24 comment. 25 BY MR. MILLER:</p>
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<p>1 examined by Schinasi & Leon) and had a 2 significantly increased meta relative risk for 3 B-cell lymphoma." 4 That's what the Chang study found, 5 isn't it? 6 MR. COPLE: Objection. Lacks 7 foundation, the document speaks for itself. 8 A. I couldn't comment again specifically 9 on what this reviewer was commenting on in this 10 review. And I've spoken previously about some 11 of the limitations with the meta-analysis 12 results for B-cell lymphoma, and more generally 13 just the concerns with this meta-analysis 14 because of the issues of bias and confounding 15 that were not fully addressed because of the 16 studies that went into the meta-analysis. 17 Q. This reviewer goes on to say, "Then, 18 despite the fact that the authors deemed the 19 meta-analysis worth conducting, the discussion 20 devolves into a laundry list of every possible 21 cause of bias and imprecision of estimates in 22 epidemiologic studies, as well as a review of 23 the Bradford Hill criteria to evaluate the 24 weight of the evidence for the association, from 25 which the authors conclude there is no basis for</p>	<p>1 Q. This reviewer says, "Relying on the 2 Agricultural Health Study as a Tier 1 study in 3 this setting is" dubious -- "is tenuous at 4 best." 5 Do you see that? 6 MR. COPLE: Objection. Lacks 7 foundation, the document speaks for itself. 8 A. Well, I can see what is written here. 9 I'm not sure what they're referring to with the 10 use of terminology of Tier 1. 11 BY MR. MILLER: 12 Q. Let's go to the Bates stamp 0022331, 13 it's about two pages back -- one page back. 14 This is more comments by the reviewer that's 15 rejecting this paper. I want to ask you about 16 his comment here. "The scientific review based 17 on Bradford Hill guidelines is sparse, 18 incomplete, and comes off as biased." 19 Pretty strong criticism, isn't it, 20 ma'am? 21 MR. COPLE: Objection. Argumentative, 22 vague, lacks foundation, the document speaks for 23 itself. 24 A. I can't really comment specifically on 25 what this reviewer is referring to one way or</p>

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<p>1 the other.</p> <p>2 BY MR. MILLER:</p> <p>3 Q. On the so-called concern for recall</p> <p>4 bias, this reviewer says, "Even though subjects</p> <p>5 were interviewed in case-control studies after</p> <p>6 diagnosis, people can generally remember whether</p> <p>7 their pesticide use was before diagnosis or</p> <p>8 not."</p> <p>9 That's true, isn't it?</p> <p>10 MR. COPLE: Objection. Argumentative,</p> <p>11 lacks foundation, document speaks for itself.</p> <p>12 A. Again, I couldn't specifically comment</p> <p>13 on what this reviewer was referring to.</p> <p>14 However, I think an important thing to remember</p> <p>15 actually is that we know from both the analysis</p> <p>16 of Pahwa, et al, as well as the Wadell</p> <p>17 publication that there is strong evidence of</p> <p>18 recall bias that was induced by the use of the</p> <p>19 high proportion of proxy respondents in several</p> <p>20 of the US, Canadian, and Swedish studies, and so</p> <p>21 that is an important feature there.</p> <p>22 BY MR. MILLER:</p> <p>23 Q. It's okay to use proxy responses in</p> <p>24 the Agricultural Health Study, but not okay to</p> <p>25 use proxy responses in the Hardell study?</p>	<p>1 actually by proxy respondents. And in the</p> <p>2 analysis by Pahwa, as well as the analysis by</p> <p>3 Wadell, both of those showed the impact of the</p> <p>4 recall bias associated with the use of proxy</p> <p>5 respondents.</p> <p>6 BY MR. MILLER:</p> <p>7 Q. These case-control studies show</p> <p>8 dose-response; true?</p> <p>9 MR. COPLE: Objection. Vague, lacks</p> <p>10 foundation.</p> <p>11 A. I'm not sure what studies you're</p> <p>12 referring to specifically. If you'd like to</p> <p>13 look at a specific study about dose-response,</p> <p>14 I'm happy to take a look at it.</p> <p>15 BY MR. MILLER:</p> <p>16 Q. The case-control studies, do any of</p> <p>17 the case-control studies show dose-response?</p> <p>18 A. I -- I --</p> <p>19 MR. COPLE: Objection. Asked and</p> <p>20 answered, lacks foundation, vague.</p> <p>21 A. If you'd like, we can walk through</p> <p>22 some specific studies and look through study by</p> <p>23 study and look at the association.</p> <p>24 BY MR. MILLER:</p> <p>25 Q. I'm entitled to do it my way. Can you</p>
Page 83	Page 85
<p>1 MR. COPLE: Objection. Lacks</p> <p>2 foundation, misstates witness's testimony.</p> <p>3 A. That statement regarding the</p> <p>4 Agricultural Health Study is not correct. They</p> <p>5 did not use proxy respondent data there.</p> <p>6 BY MR. MILLER:</p> <p>7 Q. They imputed the answers for 20,000</p> <p>8 missing people?</p> <p>9 A. That --</p> <p>10 MR. COPLE: Objection. Vague, lacks</p> <p>11 foundation.</p> <p>12 A. That is not proxy respondents that I'm</p> <p>13 referring to. That -- and actually I think the</p> <p>14 validation studies of the imputation method that</p> <p>15 was used in the Agricultural Health Study to</p> <p>16 address an issue of missing data done in many</p> <p>17 different ways showed that there was no bias</p> <p>18 that ensued because of any potential missing</p> <p>19 data.</p> <p>20 The issue that I'm talking about here</p> <p>21 specifically with respect to recall bias has</p> <p>22 resulted in several of the US, Canadian, and</p> <p>23 Swedish studies because more than 30 -- as many</p> <p>24 as 40 percent of the respondents' datas were</p> <p>25 completed not by the respondents themselves, but</p>	<p>1 answer that question or not?</p> <p>2 MR. COPLE: Objection. Asked and</p> <p>3 answered, argumentative.</p> <p>4 BY MR. MILLER:</p> <p>5 Q. If you can't, you can't.</p> <p>6 MR. COPLE: Objection. Arguing with</p> <p>7 the witness.</p> <p>8 A. If you'd like, I'd be happy to look at</p> <p>9 some of the specific studies, and we can walk</p> <p>10 through each of the studies here.</p> <p>11 BY MR. MILLER:</p> <p>12 Q. Well, although you can't answer that</p> <p>13 one, this reviewer did. Let's look at it,</p> <p>14 ma'am. He said that, "There is some evidence</p> <p>15 for dose-response from the studies of</p> <p>16 non-Hodgkin's lymphoma, and especially multiple</p> <p>17 myeloma."</p> <p>18 Do you see where I'm reading?</p> <p>19 MR. COPLE: Objection. Argumentative,</p> <p>20 misstates witness's testimony, lacks foundation,</p> <p>21 the document speaks for itself.</p> <p>22 A. And, again, I'm not specifically sure</p> <p>23 what that reviewer was commenting on with</p> <p>24 respect to the meta-analysis. And if you'd like</p> <p>25 to talk -- comment on some specific studies and</p>

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Page 86	<p>1 evaluate them, I'm happy to look at those 2 individual studies. 3 BY MR. MILLER: 4 Q. Let's look at another reviewer that 5 rejected the study, and you can find that on 6 Page 022333. 7 A. I'm sorry, I don't know where you're 8 referring to in this. 9 Q. Page -- get to the page, and I will 10 point it out. 11 A. Why -- I don't know which page to go 12 to, actually, because I'm -- 13 MR. HOLLINGSWORTH: She's not familiar 14 with Bates numbers, I don't think. 15 MR. MILLER: Sure. 16 BY MR. MILLER: 17 Q. These long numbers on the bottom of 18 the page, and I'm looking at the one that says 19 0022333. 20 A. Okay. 21 Q. Okay? And I'm looking at the 22 reviewer's comment on the bottom half of the 23 page, and I want to ask you about this. "The 24 authors conclude that no valid association, 25 much" --</p>	Page 88	<p>1 support a causal association between glyphosate 2 and NHL risk. 3 BY MR. MILLER: 4 Q. Now, you know that -- have you ever 5 done any work for Exponent? 6 MR. COPLE: Objection. Vague. 7 A. I have not worked for Exponent. 8 BY MR. MILLER: 9 Q. Would it change your opinion if there 10 was a known proven mechanism of action for 11 glyphosate and non-Hodgkin's lymphoma? 12 MR. COPLE: Objection. Vague. 13 A. Specifically whether or not there's a 14 mechanism, I could comprehensively review the 15 body of epidemiology evidence, and based on that 16 analysis there's not sufficient evidence to 17 support a causal association between NHL and 18 glyphosate. 19 BY MR. MILLER: 20 Q. So it wouldn't change your mind? 21 MR. COPLE: Objection. Asked and 22 answered. 23 A. Again, it -- I -- specifically what I 24 did was to review the epidemiology evidence, and 25 whether there's a mechanism or not a mechanism,</p>
Page 87	<p>1 A. I'm sorry, I don't see where -- 2 Q. Yeah, it's up here, see, ma'am? 3 A. Yeah. 4 Q. Okay. "The authors conclude that no 5 valid association, much less a causal 6 relationship, has been established between 7 glyphosate exposure and the risk of LHC. This 8 is not supported by the results of the 9 meta-analysis, and the weight of the evidence 10 evaluation was not sufficient to make a 11 conclusion about causality." 12 Do you see that, ma'am? 13 MR. COPLE: Objection. Lacks 14 foundation, the document speaks for itself. 15 A. Yes, I can see specifically where this 16 statement is made in this document. I'm not 17 specifically sure what the reviewer is referring 18 to. 19 However, in my review of the 20 meta-analysis produced by Chang and Delzell, 21 including the updated analysis, I think, and 22 take -- in a systematic review of all of the 23 epidemiology studies, there are concerns about 24 bias and residual confounding in especially the 25 case-control studies, and taken together do not</p>	Page 89	<p>1 I came to my conclusion that there is no causal 2 association. 3 BY MR. MILLER: 4 Q. So fair to say you did not look at the 5 issue of whether there was a mechanism of 6 action; that's right? 7 MR. COPLE: Objection. Misstates 8 witness's testimony. 9 A. What I said specifically was that my 10 task in reviewing the epidemiology literature 11 was to assess each of the individual studies, to 12 think through them critically, evaluate the 13 strengths and weaknesses, and look at the body 14 of evidence as a totality, and come to an 15 assessment about whether the epidemiology 16 evidence supports a causal association. 17 BY MR. MILLER: 18 Q. Any such thing as a perfect 19 epidemiological study? 20 MR. COPLE: Objection. Vague. 21 A. I'm sorry, did -- could you repeat the 22 question? 23 BY MR. MILLER: 24 Q. Sure. 25 MR. MILLER: It was too fast I bet,</p>

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<p>1 but if you got it. 2 (Whereupon, the reporter read back the 3 pending question.) 4 MR. COPLE: Same objection. 5 A. I'm sorry, that's a -- I'm sorry, 6 that's a very general question. It would be 7 difficult to answer. 8 BY MR. MILLER: 9 Q. You can't answer general questions? 10 MR. COPLE: Objection. Argumentative. 11 A. That specific question is quite 12 general, so I'm not specifically sure what 13 you're asking here. 14 BY MR. MILLER: 15 Q. All studies have bias? 16 MR. COPLE: Objection. Vague. 17 A. It's important to consider all 18 epidemiological studies and look to evaluate 19 whether any associations that are observed, 20 whether there might be bias, confounding, or a 21 role of chance in any findings that are made. 22 BY MR. MILLER: 23 Q. Now, you took into account, we have 24 spoken about, the Exponent meta-analysis. Did 25 you ever review the Exponent's criticisms of the</p>	<p>1 MR. MILLER: On what grounds? 2 MR. COPLE: Communications, deposition 3 protocol, Pretrial Order 7. 4 BY MR. MILLER: 5 Q. Have you been provided 24-7, the 6 design of epidemiologic studies for health and 7 human risk assessment of pesticide exposure from 8 any source? 9 A. I don't believe so, no. 10 Q. Never reviewed it? 11 A. I don't believe so, no. 12 Q. Well, let's take a look at it. This 13 is from Exponent. That's the same organization 14 that did the meta-analysis that you looked at; 15 right? 16 A. If it's from Exponent, then, yes, the 17 two authors that were part of that Chang and 18 Delzell study are employees of Exponent. 19 Q. And it was prepared by an organization 20 called CropLife. Do you see that, ma'am, on 21 Page 2? 22 MR. COPLE: Objection. Lacks 23 foundation. 24 A. Yeah, I -- 25 MR. COPLE: The document speaks for</p>
Page 91	Page 93
<p>1 Agricultural Health Study that were prepared? 2 I'll give you a date here in a second. January 3 of 2016. 4 MR. COPLE: Objection. Vague, lacks 5 foundation. 6 A. Could I take a look at the document 7 you're referring to? 8 BY MR. MILLER: 9 Q. Sure. 10 (Whereupon, Mucci Exhibit 24-7, 11 Exponent document, Design of 12 Epidemiologic Studies for Human Health 13 Risk Assessment of Pesticide 14 Exposures, Bates MONGLY02314040 15 through 14079, was marked for 16 identification.) 17 BY MR. MILLER: 18 Q. Monsanto's lawyers show you this 19 document marked as Exhibit 24-7? 20 MR. COPLE: I'm going to object to the 21 phrasing of that question, and instruct the 22 witness not to answer. 23 MR. MILLER: Instruct the witness not 24 to answer the question? 25 MR. COPLE: Yes.</p>	<p>1 itself. 2 A. I see that it says that in the 3 document. I'm not familiar one way or the other 4 who it was prepared for. 5 BY MR. MILLER: 6 Q. Go with me, please, to Page 15. And 7 what Exponent says here in this 2016 report is 8 that there are "Strengths and limitations of 9 specific study design characteristics for" 10 health -- "human health risk assessment of 11 pesticide exposure can be illustrated through 12 examination of actual epidemiologic studies 13 described in detail in published papers." 14 Will you agree that there are 15 strengths and limitations of specific study 16 designs? 17 A. I -- there are strengths and 18 limitations of different epidemiological 19 approaches. Each study should be evaluated on 20 its own to assess the actual strengths and 21 limitations of that study. 22 Q. And what they talk about here is 23 they're going to talk about two studies that are 24 used as examples. In this section are a pair of 25 prospective cohort studies, the Agricultural</p>

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Page 94	<p>1 Health Study and another study that's not at 2 issue in our case. Do you see that, where I'm 3 reading that? 4 MR. COPLE: Objection. The document 5 speaks for itself. 6 A. I can see where the document says 7 this, yes. 8 BY MR. MILLER: 9 Q. Okay. They go on to discuss the 10 Agricultural Health Study questionnaire, and 11 they say, "highly detailed, thorough, and 12 thoughtfully designed. Few, if any, other 13 epidemiologic studies have conducted more 14 exhaustive questionnaire-based assessment of 15 pesticide exposure." 16 Do you see that, ma'am? 17 A. I can see where it says this in the 18 document. 19 Q. "Nevertheless, as discussed earlier, 20 self-reported pesticide use data have 21 substantial drawbacks." 22 That's true, isn't it? 23 A. While this is what it says in this 24 report, what I commented on earlier was the 25 specific validation studies and reliability</p>	Page 96	<p>1 A. While that is correct, they don't 2 specifically comment one way or the other about 3 glyphosate. 4 Q. They do comment that there's limited 5 accuracy and reliability of recollected detailed 6 exposures in the Agricultural Health Study; 7 true? 8 MR. COPLE: Objection. The document 9 speaks for itself. 10 A. I haven't had a chance to review this 11 entire document, so I'm not specifically sure 12 the details are going to go into and 13 specifically what pesticides they've looked at 14 in this particular article. 15 BY MR. MILLER: 16 Q. They critique -- they criticize for 17 having, "Crude summary measures of exposure that 18 fail to capture important" heterogeneity -- 19 "heterogeneity." 20 A. So since I haven't had a chance to 21 read through this document, I'm not specifically 22 sure what they're commenting on there. 23 What I can comment on, however, is 24 that with respect to glyphosate, the way the 25 Agricultural Health Study dealt with this in</p>
Page 95	<p>1 studies that have looked at this question 2 specifically within the Agricultural Health 3 Study. 4 Q. Well, in the study dated 2016, 5 Exponent says these limited accuracy -- "These 6 include limited accuracy and reliability of 7 recollected detailed exposures, crude summary 8 measures of exposure that fail to capture 9 important heterogeneity, and only modest 10 correspondence between self-reported exposures 11 and measured biomarker levels, as demonstrated 12 in validation studies conducted with this 13 cohort." 14 Do you see that, ma'am? 15 MR. COPLE: Objection. The document 16 speaks for itself. 17 A. While I can see what this is, what 18 they're saying specifically in this document, 19 I'm not sure specifically whether or not this 20 refers to the glyphosate data collected in the 21 Agricultural Health Study. 22 BY MR. MILLER: 23 Q. Ma'am, they're talking about the 24 Agricultural Health Study in this paragraph, 25 aren't they?</p>	Page 97	<p>1 terms of integrating both the intensity of 2 exposure as well as the cumulative exposure had 3 been shown in the reliability and validity 4 studies to have good reliability. 5 Q. Dr. Mucci, the truth is there was a 6 problem with selection bias in the Agricultural 7 Health Study; true? 8 MR. COPLE: Objection. Lacks 9 foundation, argumentative. 10 A. I would say that is not correct. 11 BY MR. MILLER: 12 Q. Let's see what Exponent says. Let's 13 look at Page 19. I'm looking at the section 14 that starts "Selection Bias." 15 Do you see where I am? 16 A. Yes. 17 Q. Okay. Over 80 percent of eligible 18 pesticide applicators, 75 percent of spouses 19 married to private applicators enrolled in the 20 AHS study during the initial recruitment phase, 21 which took place at licensing facilities for 22 application of restricted use pesticides. 23 Do you see that, ma'am? 24 MR. COPLE: Objection. The document 25 speaks for itself.</p>

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<p>1 A. I can see where the document says 2 this. 3 BY MR. MILLER: 4 Q. And under this section of "Selection 5 Bias," they say, "However, only 44 percent of 6 enrolled pesticide applicators completed the 7 detailed take-home questionnaire shortly after 8 enrollment." 9 That's a problem, isn't it? 10 MR. COPLÉ: Objection. Argumentative, 11 the document speaks for itself. 12 A. Again, I haven't had a chance to 13 thoroughly review this particular document or 14 read specifically about what their concerns are 15 regarding selection bias here. 16 BY MR. MILLER: 17 Q. Well, they go on to say that, 18 "participation in follow-up questionnaires was 19 highly incomplete." 20 Do you agree with that? 21 MR. COPLÉ: Objection. The document 22 speaks for itself. 23 A. While this is what this document says, 24 I believe I commented earlier specifically about 25 the phase 2 questionnaire and the different</p>	<p>1 to exposure and health status." 2 And they go on to say, "A formal 3 analysis of bias due to study dropout does not 4 appear to have been conducted." 5 That's true, it isn't? 6 MR. COPLÉ: Objection. Lacks 7 foundation, document speaks for itself. 8 A. Actually that may have been the case. 9 I couldn't say one way or the other since I 10 haven't reviewed this manuscript. However, 11 actually there has now been a publication 12 looking specifically at non-participation and 13 looking at a range of exposures as well as 14 health outcomes, and overall that -- that study 15 that has been published has shown that the -- 16 those who did participate in the second wave and 17 those who did not are very, very similar with 18 respect to a number of health outcomes, 19 including cancer outcomes, as well as a number 20 of the different demographic factors in the 21 study. 22 BY MR. MILLER: 23 Q. What study, and when was it published? 24 A. I'd have to look back. It was a study 25 actually I didn't refer to in my report. It's a</p>
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<p>1 strategies the Agricultural Health Study 2 evaluated to assess whether or not there might 3 be any bias induced by the fact that the second 4 phase of the questionnaire was not completed. 5 BY MR. MILLER: 6 Q. Only 64 percent of private 7 applicators, 59 percent of commercial 8 applicators, and 74 percent of spouses in phase 9 2. That's selection bias, isn't it? 10 MR. COPLÉ: Objection. Lacks 11 foundation, the document speaks for itself. 12 A. And actually that is not selection 13 bias. You can have examples where there is some 14 data that is missing in a -- follow-up 15 questionnaires. It doesn't -- some -- in some 16 cases it might induce a selection bias. In 17 other cases it may not. And I believe that I 18 commented earlier that there were several 19 approaches that were done to assess the 20 potential for bias to be induced by the missing 21 data issue. 22 BY MR. MILLER: 23 Q. Well, this -- Exponent authors said in 24 2016, "Thus, considerable selection bias could 25 have occurred if non-participation was related</p>	<p>1 study that I found just recently, but I would 2 have to go through my notes to call that study 3 up. 4 Q. Well, let's do it now. 5 A. Okay. I would have to get my computer 6 to get that -- to get that for -- 7 Q. Well, if we're going to do it at trial 8 or a Daubert hearing, we're going to have to do 9 it now. So let's take a break and do it. 10 A. Okay. 11 THE VIDEOGRAPHER: Going off the 12 record. The time is 10:04. 13 (Whereupon, a recess was taken.) 14 THE VIDEOGRAPHER: Back on the record. 15 The time is 10:21. 16 MR. COPLÉ: We have a statement. 17 Dr. Mucci has confirmed that since the time the 18 supplementary materials considered list was 19 provided to plaintiffs in the MDL that she has 20 considered a further article. The article has 21 been provided to counsel. 22 MR. MILLER: Let me be clear. We 23 won't be waiving any objections to that late 24 notice, but let's go on. 25 BY MR. MILLER:</p>

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<p>1 Q. All right, Doctor, we have in front of</p> <p>2 us, and I've marked my copy, you have a copy</p> <p>3 just handed to me by counsel, the Montgomery</p> <p>4 article, Characteristics of non-participation.</p> <p>5 MR. COPLE: The witness does not --</p> <p>6 A. I don't have a copy.</p> <p>7 MR. MILLER: Oh, I'm sorry.</p> <p>8 MR. COPLE: I gave two to you. All</p> <p>9 right. Well --</p> <p>10 MS. MILLER: Was that at the same</p> <p>11 time? Unless you want to go ahead and mark it</p> <p>12 and we'll talk about it later.</p> <p>13 MR. MILLER: Yeah. So let's hand it</p> <p>14 to the doctor.</p> <p>15 MS. MILLER: Are you going to talk</p> <p>16 about it now? Can we read it? Thank you so</p> <p>17 much.</p> <p>18 MR. MILLER: Well, I just want to talk</p> <p>19 about it a little bit.</p> <p>20 BY MR. MILLER:</p> <p>21 Q. We might talk about it more later, but</p> <p>22 here, Doctor, that's 24-8.</p> <p>23</p> <p>24</p> <p>25</p>	<p>1 Q. Okay.</p> <p>2 A. This is the study I was thinking</p> <p>3 about, and I wanted to make sure I had the right</p> <p>4 author on.</p> <p>5 Q. All right. I think we're back on</p> <p>6 track.</p> <p>7 Now, just to be clear, though, 24-7,</p> <p>8 this study by Exponent that has the criticism</p> <p>9 that I was referencing on the selection bias</p> <p>10 section, was written in 2016. Do you remember</p> <p>11 that?</p> <p>12 A. So I can see here where they comment</p> <p>13 on the topic of selection bias, and so what I</p> <p>14 was -- since I haven't read their manuscript in</p> <p>15 detail, what I was referring to was a study by</p> <p>16 Montgomery, et al, which shows in general</p> <p>17 differences between those who did and did not</p> <p>18 participate in the follow-up interview were</p> <p>19 generally very small differences.</p> <p>20 In addition, there was the study by</p> <p>21 Rinsky in 2017 that was just published that</p> <p>22 actually carried this even further to evaluate</p> <p>23 potential selection bias, which seemed to be</p> <p>24 small.</p> <p>25 Q. All right. I want to break that down.</p>
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<p>1 (Whereupon, Mucci Exhibit 24-8,</p> <p>2 Montgomery, et al article,</p> <p>3 Characteristics of non-participation</p> <p>4 and potential for selection bias in a</p> <p>5 prospective cohort study, was marked</p> <p>6 for identification.)</p> <p>7 BY MR. MILLER:</p> <p>8 Q. This is the article that after the</p> <p>9 break counsel handed me. And I think to put it</p> <p>10 in context, before the break we were talking</p> <p>11 about this Exponent article and the subject and</p> <p>12 the section on selection bias in the</p> <p>13 Agricultural Health Study. You, I think,</p> <p>14 generally told me that there was a study that</p> <p>15 had recently explained that there was -- this</p> <p>16 problem did not exist generally. Is that what</p> <p>17 you're -- the general line of -- let's just --</p> <p>18 you don't have to say yes or no. That's our</p> <p>19 general backdrop.</p> <p>20 So question, is this study, 24-8, the</p> <p>21 study that you went to get in response to that</p> <p>22 line of questions?</p> <p>23 A. I'm sorry, is this 24-8?</p> <p>24 Q. It is.</p> <p>25 A. Okay.</p>	<p>1 That's a mouthful.</p> <p>2 You just mentioned another study from</p> <p>3 2017, Winsky?</p> <p>4 A. Rinsky.</p> <p>5 Q. Spell, please.</p> <p>6 A. R-I-N-S-K-Y.</p> <p>7 Q. And was that in your materials that</p> <p>8 you -- list of materials that you provided?</p> <p>9 A. Yes.</p> <p>10 Q. Okay. It's a 2017 article. All</p> <p>11 right.</p> <p>12 But the article that you provided me</p> <p>13 after the break, the Montgomery article, that</p> <p>14 was written in 2010; right?</p> <p>15 A. Yes.</p> <p>16 Q. Okay. And so let's go back and look</p> <p>17 at the 2016 criticisms. Can you assume that</p> <p>18 they would have been -- the 2010 article of</p> <p>19 Montgomery would have been available to Exponent</p> <p>20 in 2016?</p> <p>21 A. Well, since I haven't reviewed this</p> <p>22 document by Exponent, I couldn't say one way or</p> <p>23 the other if they reviewed this, if they</p> <p>24 considered it. I couldn't say one way or the</p> <p>25 other what they considered in this description</p>

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<p>1 of the selection bias.</p> <p>2 Q. Well, they considered one Montgomery</p> <p>3 article from 2008. Do you see that on --</p> <p>4 A. Well, I can see that on this document.</p> <p>5 It is not the article I was referring to.</p> <p>6 Q. That is true. Let's go back and see</p> <p>7 what these authors from Exponent say about</p> <p>8 selection bias and follow that discussion.</p> <p>9 We were talking about the, "Thus,</p> <p>10 considerable selection bias could have occurred</p> <p>11 if non-participation was related to exposure and</p> <p>12 health status. A formal analysis of bias due to</p> <p>13 study dropout does not appear to have been</p> <p>14 conducted."</p> <p>15 And my question is, are you of the</p> <p>16 opinion that the Montgomery study is a formal</p> <p>17 analysis of bias due to study dropout?</p> <p>18 A. It is one of the two -- at least two</p> <p>19 analyses that have been conducted within the</p> <p>20 Agricultural Health Study to evaluate potential</p> <p>21 for selection bias because of the proportion of</p> <p>22 people who did not respond to the second wave.</p> <p>23 Q. Well, what they say in the Montgomery</p> <p>24 study is in the conclusion, they say,</p> <p>25 "Differences between non-participants and</p>	<p>1 In addition, the article by Rinsky, et</p> <p>2 al, specifically looks at several aspects of</p> <p>3 pesticide exposure and cancer risk. And, again,</p> <p>4 although there is some missing data, it does not</p> <p>5 appear to be leading to a selection bias.</p> <p>6 BY MR. MILLER:</p> <p>7 Q. Show me the page in the Montgomery</p> <p>8 article where they study the specific exposure</p> <p>9 and outcome of non-Hodgkin's lymphoma.</p> <p>10 A. So if you look on Table 2, you can</p> <p>11 look at the --</p> <p>12 Q. I haven't found Table 2 yet. All</p> <p>13 right. Here. Okay. Now I have Table 2. All</p> <p>14 right. Sure, go ahead.</p> <p>15 A. So you can -- here is where they</p> <p>16 compare health conditions reported at enrollment</p> <p>17 and participation in follow-up questionnaires.</p> <p>18 Q. And you're saying between participants</p> <p>19 and non-participants we have the same result?</p> <p>20 A. I'm saying that based on this, they're</p> <p>21 quite similar, and it wouldn't lead you to</p> <p>22 concerns about differential misclassification.</p> <p>23 Q. To put a sharper number on it there,</p> <p>24 .09 for non-participants and .2 for</p> <p>25 participants; right?</p>
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<p>1 participants in the follow-up interview were</p> <p>2 generally small, and we did not find significant</p> <p>3 evidence of selection bias. However, the extent</p> <p>4 of bias may depend on the specific exposure and</p> <p>5 outcome under study"; right?</p> <p>6 MR. COPLE: For the record,</p> <p>7 plaintiffs' counsel is marking the exhibit.</p> <p>8 This highlighting was not previously there.</p> <p>9 BY MR. MILLER:</p> <p>10 Q. You can answer.</p> <p>11 A. I'm sorry, could you repeat the</p> <p>12 question?</p> <p>13 MR. MILLER: If you could read it</p> <p>14 back, please.</p> <p>15 (Whereupon, the reporter read back the</p> <p>16 pending question.)</p> <p>17 A. Well, that is what the last statement</p> <p>18 in the conclusions does say. In fact, they</p> <p>19 actually look specifically at the topic of</p> <p>20 cancer here and the -- those who did and did not</p> <p>21 respond to the second questionnaire, there was a</p> <p>22 similar incidence of cancer. Also,</p> <p>23 non-Hodgkin's lymphoma they looked at</p> <p>24 specifically. So I think they partially</p> <p>25 addressed that here.</p>	<p>1 A. What we're talking about is a</p> <p>2 difference between -- on an absolute scale it's</p> <p>3 quite a small difference. And when we look at</p> <p>4 cancer incidence overall, there as well we're</p> <p>5 seeing very small differences in the percent of</p> <p>6 people who have cancer and those who did and did</p> <p>7 not respond. So it's very small.</p> <p>8 Q. The adjusted odds ratio is 67 percent?</p> <p>9 A. But actually if you look at the</p> <p>10 confidence intervals, because the numbers are</p> <p>11 quite small, you can see .1 percent versus</p> <p>12 .2 percent. Confidence intervals are quite</p> <p>13 wide. These are very similar numbers, not a big</p> <p>14 concern for bias.</p> <p>15 Q. And Exponent would go on to say in</p> <p>16 2016, "An analysis of bias due to missing data,</p> <p>17 another form of selection bias" -- well, let's</p> <p>18 stop there.</p> <p>19 You can agree that missing data is</p> <p>20 another form of selection bias?</p> <p>21 A. In some settings in the case of</p> <p>22 missing data, if the missing data is not random,</p> <p>23 there may be concerns that's selection bias.</p> <p>24 But it's not always the case if you have missing</p> <p>25 data that you can result in selection bias.</p>

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<p>1 Q. And what they go on to say in this</p> <p>2 case that it revealed that, "subjects with</p> <p>3 complete covariate data were substantially</p> <p>4 different from those with missing data," and</p> <p>5 they cite the Lash study of 2007; right?</p> <p>6 MR. COPLE: Objection. Lacks</p> <p>7 foundation, the document speaks for itself.</p> <p>8 A. Well, that is exactly what that says.</p> <p>9 The Lash study was not a study per se, but</p> <p>10 rather a letter to the editor commenting on this</p> <p>11 as a potential issue.</p> <p>12 BY MR. MILLER:</p> <p>13 Q. And they conclude in their paragraph</p> <p>14 on selection bias, "Thus, an analysis relying on</p> <p>15 follow-up questionnaires or relying on</p> <p>16 covariates with a high degree of missing data,</p> <p>17 selection bias is a major concern in the</p> <p>18 Agricultural Health Study."</p> <p>19 That's true, isn't it?</p> <p>20 MR. COPLE: Objection. Vague, lacks</p> <p>21 foundation, document speaks for itself.</p> <p>22 A. So as I stated, you know, if there is</p> <p>23 some missing data, there can be a concern of</p> <p>24 selection bias. But there was the publication</p> <p>25 by Rinsky, et al which actually showed that it</p>	<p>1 read this document, I'm not sure what the basis</p> <p>2 is for that particular statement.</p> <p>3 Q. Go if you would to Page 23, please.</p> <p>4 A. May I add to that statement?</p> <p>5 Q. Sure. What's that?</p> <p>6 A. I just -- just to add to that, in --</p> <p>7 in -- there are many, many examples where you</p> <p>8 can generalize studies from one population to</p> <p>9 the other. The question is, is any underlying</p> <p>10 biology of an association going to differ</p> <p>11 between populations.</p> <p>12 In this case with respect to</p> <p>13 glyphosate and NHL risk, it would seem hard to</p> <p>14 think about why you couldn't generalize the</p> <p>15 findings from the Agricultural Health Study to</p> <p>16 another population.</p> <p>17 Q. Let's take a look at Page 23. "The</p> <p>18 guidelines put forth by Sir Austin Bradford Hill</p> <p>19 in 1965 for evaluating the causality of</p> <p>20 exposure-outcome association are commonly cited</p> <p>21 and implemented in epidemiology."</p> <p>22 That's true, isn't it?</p> <p>23 A. That's what this particular report</p> <p>24 states. Bradford Hill is really more of a set</p> <p>25 of guidelines that is used, but the real</p>
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<p>1 wasn't -- it didn't appear to be a huge issue of</p> <p>2 selection bias. It is a concern potentially, a</p> <p>3 small concern, and I think a large concern that</p> <p>4 Rinsky's study shows evidence not to be the</p> <p>5 case.</p> <p>6 BY MR. MILLER:</p> <p>7 Q. Turn with me to Page 20. This is</p> <p>8 Exponent 2016 on the Agricultural Health Study,</p> <p>9 and they go on to say about generalizability.</p> <p>10 And generalizability means can we take the study</p> <p>11 of findings for a particular group and</p> <p>12 generalize it to larger groups of population.</p> <p>13 Is that fair, or no?</p> <p>14 A. Yes. It -- and just an added level of</p> <p>15 that, generalizability can be assessed only once</p> <p>16 we're sure that there's internal validity of the</p> <p>17 study.</p> <p>18 Q. Yes, ma'am.</p> <p>19 And here the Exponent experts say,</p> <p>20 "Results also cannot reliably be generalized to</p> <p>21 other subpopulations not represented by the</p> <p>22 study subjects."</p> <p>23 Do you see that, ma'am?</p> <p>24 A. While -- while I can see that they</p> <p>25 have stated this, I'm not -- since I haven't</p>	<p>1 approach to evaluating causality is much more --</p> <p>2 is not exactly only relying on Bradford Hill.</p> <p>3 Q. What else is it relying on?</p> <p>4 A. It relies on a systematic and</p> <p>5 thoughtful evaluation of each of the individual</p> <p>6 studies, and assessment of the role of potential</p> <p>7 bias or confounding or chance in the explanation</p> <p>8 of those findings. So I think the Bradford Hill</p> <p>9 criteria are a set of guidelines. They're not</p> <p>10 taken necessarily as fact per se.</p> <p>11 Q. You have to look at the quality of the</p> <p>12 study; right?</p> <p>13 A. It's important to look at the quality</p> <p>14 of all of the studies before making the</p> <p>15 assessment.</p> <p>16 Q. As these authors say here, "For</p> <p>17 example, if a prospective cohort study has</p> <p>18 substantial loss to follow-up, the risk of</p> <p>19 selection bias will high" --</p> <p>20 A. I'm sorry, I don't see where you're</p> <p>21 highlighting.</p> <p>22 Q. I apologize. Let me move. See me</p> <p>23 now?</p> <p>24 "For example, if a prospective cohort</p> <p>25 study has substantial loss to follow-up, the</p>

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<p>1 risk of selection bias" -- should be "will be 2 high," but it says -- "will high regardless of 3 whether the loss to follow-up is clearly 4 described." 5 That's true, isn't it? 6 A. The -- I'm not specific -- since I 7 haven't read this document, I'm not specifically 8 sure what they're referring to. As I've 9 mentioned earlier today, the main issue with 10 loss to follow-up is whether or not you know the 11 outcomes that have happened in the study. 12 In this particular literature on 13 non-Hodgkin's lymphoma, the loss to follow-up 14 for outcome is actually very, very low because 15 the quality of the registry data, the cancer 16 registry is quite high in capturing the outcome 17 of these participants. 18 Q. Last point I'd like to go over with 19 you on this study, ma'am, this Exponent study, 20 2016, it's a simple general statement, perhaps 21 you agree. On Page 25, "In epidemiology, there 22 is no universal ideal study design." 23 We can agree on that, can't we? 24 MR. COPLER: Objection. Vague. 25 A. In epidemiology, I think what we can</p>	<p>1 that -- between the Hollingsworth firm and you. 2 This is marked 24-9. Okay? 3 (Whereupon, Mucci Exhibit 24-9, 4 1/28/16 retention letter, was marked 5 for identification.) 6 MR. COPLER: Do you have a copy? 7 MR. MILLER: Yes, of course (handing). 8 BY MR. MILLER: 9 Q. You've seen this before; right? 10 A. Yes. 11 Q. Okay. This was sent to you 12 January 28, 2016; right? 13 A. Yes. 14 Q. And had you worked with the firm 15 before that? 16 A. No. 17 Q. Did any work for Monsanto before that? 18 A. No. 19 Q. And you have never been an expert 20 before; right? 21 A. I've never served as an expert 22 report -- expert before. 23 Q. This letter sent to you from the 24 Hollingsworth firm, Mr. -- Ms., excuse me, 25 Heather Pigman; right?</p>
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<p>1 agree on is that a cohort study is a higher 2 level of validity than a case-control study. 3 BY MR. MILLER: 4 Q. Can you agree that there is no 5 universal ideal study design? 6 MR. COPLER: Objection. Asked and 7 answered. 8 A. I couldn't -- I -- again, as I said, 9 you know, a cohort study is a higher level of 10 evidence than the case-control study. 11 BY MR. MILLER: 12 Q. Okay. We're going to move off that 13 document and on to something else. 14 Your job when hired by Monsanto's 15 lawyers was to assist their lawyers in the case; 16 right? 17 MR. COPLER: Objection. Vague. 18 A. No, that's not correct. My role was 19 to critically review all of the epidemiology 20 studies that have looked at the association 21 between glyphosate and NHL risk and come to an 22 assessment of whether they supported a causal 23 association or not. 24 BY MR. MILLER: 25 Q. And let's look at the retention letter</p>	<p>1 A. Yes. 2 Q. Okay. It says that, "This letter 3 confirms that Hollingsworth LLP, on behalf of 4 Monsanto Company, has retained you to provide 5 expert consulting services...for the purposes of 6 assisting Hollingsworth in representing Monsanto 7 in connection with potential or actual 8 litigation against Monsanto involving injuries 9 allegedly caused by Roundup or glyphosate"; 10 right? 11 A. That is what the document says. 12 Q. Okay. Let's look at -- now, how many 13 hours have you billed to date, ma'am? 14 A. I don't recall the specific total at 15 this point. 16 Q. Can you give me an estimate? 17 MR. COPLER: Objection. Asked and 18 answered. 19 A. I couldn't -- I know I provided that 20 information. I just -- I'm not sure of the 21 exact number of hours. 22 BY MR. MILLER: 23 Q. The last bill I have is June 21st, 24 2016. Have you submitted a bill since then? 25 A. You should have all the bills that</p>

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<p>1 were submitted to date.</p> <p>2 Q. Okay. You don't think you submitted a</p> <p>3 bill since June?</p> <p>4 MR. COPLE: Objection. Asked and</p> <p>5 answered.</p> <p>6 BY MR. MILLER:</p> <p>7 Q. You can answer.</p> <p>8 A. Yeah, I just -- I can't -- I turned</p> <p>9 over all of my invoices to Hollingsworth.</p> <p>10 Q. The money that is earned, does it go</p> <p>11 to you directly or to Harvard, or how does that</p> <p>12 work?</p> <p>13 A. The money, it's for me for work as an</p> <p>14 independent outside my activities at Harvard.</p> <p>15 Q. Do you know Dr. Dimitrios</p> <p>16 Trichopoulos?</p> <p>17 A. Yes.</p> <p>18 Q. And he was a mentor of yours?</p> <p>19 A. Yes.</p> <p>20 Q. And then you spent a year in Sweden</p> <p>21 working under the mentorship of Hans-Olov Adami?</p> <p>22 A. Yes.</p> <p>23 Q. Okay. And you still work closely with</p> <p>24 him now?</p> <p>25 A. Yes.</p>	<p>1 Q. -- "were good friends with</p> <p>2 John Acquavella. We worked with them a lot when</p> <p>3 John was here."</p> <p>4 When you took the assignment of</p> <p>5 assisting Hans with this case, did you know that</p> <p>6 Dr. Olav and Dr. Dimitrios had also worked with</p> <p>7 Monsanto?</p> <p>8 MR. COPLE: Objection. Lacks</p> <p>9 foundation, document speaks for itself.</p> <p>10 A. I'm sorry. Could you repeat what you</p> <p>11 just said?</p> <p>12 BY MR. MILLER:</p> <p>13 Q. When you agreed to assist</p> <p>14 Hollingsworth in this case, did you know that</p> <p>15 Dr. Olav and Dr. Dimitrios had worked for</p> <p>16 Monsanto?</p> <p>17 MR. COPLE: Same objection.</p> <p>18 A. No, I was not aware one way or the</p> <p>19 other.</p> <p>20 BY MR. MILLER:</p> <p>21 Q. Do you know if that's how</p> <p>22 Hollingsworth was able to contact you?</p> <p>23 A. I don't know one way or the other.</p> <p>24 Q. Fair to say you would have been the</p> <p>25 mentor of Dr. Rider?</p>
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<p>1 Q. Okay. Are you aware that they're both</p> <p>2 good friends of Dr. Acquavella, a full-time</p> <p>3 employee epidemiologist at Monsanto?</p> <p>4 MR. COPLE: Objection. Lacks</p> <p>5 foundation, vague.</p> <p>6 A. No, I was not aware.</p> <p>7 BY MR. MILLER:</p> <p>8 Q. This is a document produced to us by</p> <p>9 Monsanto, we've marked as Exhibit 24-10.</p> <p>10 MR. MILLER: I have a copy for</p> <p>11 counsel.</p> <p>12 (Whereupon, Mucci Exhibit 24-10,</p> <p>13 E-mail chain, Bates MONGLY01204377 and</p> <p>14 4378, was marked for identification.)</p> <p>15 BY MR. MILLER:</p> <p>16 Q. I'm looking, ma'am, at the first page,</p> <p>17 an e-mail by Donna Farmer, employee of Monsanto,</p> <p>18 and she states in pertinent part here,</p> <p>19 "Hans-Olov and Dimitrios" -- these are the two</p> <p>20 gentlemen we were just talking about?</p> <p>21 MR. COPLE: Objection. The document</p> <p>22 speaks for itself, lacks foundation.</p> <p>23 A. It looks like from the document,</p> <p>24 that's what it says, yes.</p> <p>25 BY MR. MILLER:</p>	<p>1 MR. COPLE: Objection. Lacks</p> <p>2 foundation.</p> <p>3 A. I was a mentor to Dr. Rider. We are</p> <p>4 now colleagues.</p> <p>5 BY MR. MILLER:</p> <p>6 Q. Sure.</p> <p>7 Were you able to listen in on</p> <p>8 Dr. Rider's deposition yesterday?</p> <p>9 A. No, I did not.</p> <p>10 Q. Did you talk to her about it?</p> <p>11 A. No, I did not.</p> <p>12 Q. Have a chance to read any of it?</p> <p>13 A. No, I did not.</p> <p>14 Q. Are you aware that Dr. Olov and</p> <p>15 Dr. Dimitrios have been helping Monsanto defend</p> <p>16 glyphosate since 1999?</p> <p>17 MR. COPLE: Objection. Lacks</p> <p>18 foundation, vague.</p> <p>19 A. I am not familiar with any</p> <p>20 relationship one way or the other with</p> <p>21 Dr. Trichopoulos or Dr. Adami.</p> <p>22 BY MR. MILLER:</p> <p>23 Q. This is an e-mail produced to us by</p> <p>24 Monsanto we've marked as 24-11, 1999.</p> <p>25</p>

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<p>1 (Whereupon, Mucci Exhibit 24-11, 2 E-mail chain, Bates MONGLY00878065 3 through 67, was marked for 4 identification.) 5 BY MR. MILLER: 6 Q. And I just want to draw your attention 7 to the -- this is an e-mail chain in 1999 from, 8 again, Donna Farmer. Do you see that on the 9 first page, June, 1999? And it's -- if you go 10 to Page 2, this is regarding what they call the 11 Hardell situation. 12 Hardell, of course, is an author of an 13 article on the association between glyphosate 14 and Roundup, isn't he? 15 MR. COPLE: Objection. Lacks 16 foundation, the document speaks for itself. 17 A. Yeah. I'm sorry, I was reading 18 through this. Could you repeat the question? 19 BY MR. MILLER: 20 Q. Hardell is an author of a study on the 21 association between glyphosate and non-Hodgkin's 22 lymphoma, isn't he? 23 MR. COPLE: Same objections. 24 A. Dr. Hardell is a co-author on several 25 publications that emanated from two case-control</p>	<p>1 assist us in defending glyphosate." 2 Do you see that? 3 MR. COPLE: Objection. Lacks 4 foundation, the document speaks for itself. 5 A. Yeah, while I can see that's what it 6 says, I have no information to share with you 7 one way or the other regarding Dr. Adami or 8 Dr. Trichopoulos on this. 9 BY MR. MILLER: 10 Q. How many years did you study under 11 these gentlemen? 12 A. Dr. Trichopoulos, I was his doctoral 13 student starting in 19 -- I can't remember 14 exactly the start date, but it was in the late 15 1990s, early 2000s. I also started working 16 around the same time with Dr. Adami. 17 Q. And you did not participate in helping 18 him defend glyphosate at that time? 19 MR. COPLE: Objection. Asked and 20 answered. 21 A. I don't recall any work that we did 22 one way or the other. 23 BY MR. MILLER: 24 Q. The latency period for non-Hodgkin's 25 lymphoma, you would agree, would be more</p>
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<p>1 studies. 2 BY MR. MILLER: 3 Q. And this is an update on the Hardell 4 situation. Let me get up here so you can see 5 that. Can you see that, ma'am? 6 MR. COPLE: Objection. Lacks 7 foundation, the document speaks for itself, 8 vague. 9 A. I haven't had a chance to review this 10 set of e-mails. I'm not sure what it's 11 referring to. 12 BY MR. MILLER: 13 Q. Well, let's look at Page 2. 14 Ms. Farmer goes on to say, "What have we done to 15 defend glyphosate?" It says, "We are creating a 16 scientific outreach network of prominent 17 epidemiologists in Europe and in the US, 18 including Dimitrios Trichopoulos" -- that's your 19 mentor, right, that we talked about earlier? 20 MR. COPLE: Objection. Lacks 21 foundation, the document speaks for itself, 22 asked and answered. 23 A. Dr. Trichopoulos was my mentor, yes. 24 BY MR. MILLER: 25 Q. -- "and Hans-Olov Adami, who will</p>	<p>1 appropriately left for oncologists who study 2 non-Hodgkin's lymphoma? 3 MR. COPLE: Objection. Vague, lacks 4 foundation. 5 A. Could you clarify what you mean by 6 that comment? 7 BY MR. MILLER: 8 Q. Let me see. What was the question? 9 Let's see. It's marked here as an answer, not 10 marked as a question. I'm not sure. 11 The latency period for non-Hodgkin's 12 lymphoma, you would agree, would be more 13 appropriately left for oncologists who study 14 non-Hodgkin's lymphoma? 15 MR. COPLE: Same objection. 16 A. I would actually disagree. An 17 oncologist's role is to treat non-Hodgkin's 18 lymphoma. Indeed, oftentimes epidemiology 19 studies are quite useful in defining a latency 20 period for a specific exposure and the risk of a 21 new disease. 22 BY MR. MILLER: 23 Q. Would epidemiologists who were also 24 medical doctors and oncologists then be in the 25 best spot to tell us about latency?</p>

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Page 126 1 MR. COPLE: Objection. Vague. 2 A. Not necessarily. 3 BY MR. MILLER: 4 Q. We can agree you're not an oncologist? 5 A. I'm an epidemiologist, a cancer 6 epidemiologist. 7 Q. So we can agree you're not an 8 oncologist? 9 MR. COPLE: Objection. Answered. 10 A. I'm a cancer epidemiologist. I'm not 11 an oncologist. 12 BY MR. MILLER: 13 Q. You're not a medical doctor? 14 A. I'm a cancer -- 15 MR. COPLE: Objection. Asked and 16 answered. 17 A. I'm a cancer epidemiologist, and in 18 many of my epidemiology studies we look at 19 specific latency periods using lagged analysis 20 and other approaches to understand the latency 21 between a specific exposure and a specific 22 disease. 23 BY MR. MILLER: 24 Q. How many papers have you written on 25 the latency period for non-Hodgkin's lymphoma?	Page 128 1 not a decade, between when an exposure happens 2 and when the actual outcome is diagnosed. 3 Q. Fair to say that that blood cancers 4 develop quicker than solid tumors? 5 MR. COPLE: Objection. Vague. 6 A. That is -- may be the case in some 7 circumstances, but is actually not always the 8 case. 9 BY MR. MILLER: 10 Q. Have you done any work with the 9/11 11 program in New York for the injuries sustained 12 from the destruction of the twin towers? 13 MR. COPLE: Objection. Vague. 14 A. I have not done any work with an 15 organization such as that. 16 BY MR. MILLER: 17 Q. Are you aware that non-Hodgkin's 18 lymphoma is a compensable injury under the 9/11 19 Fund? 20 A. I'm not -- 21 MR. COPLE: Objection to the extent it 22 calls for a legal opinion. 23 A. I'm not familiar with this program. 24 BY MR. MILLER: 25 Q. Do you know Dr. Chen at Harvard?
Page 127 1 A. I have published some studies on 2 non-Hodgkin's lymphoma, although it is not my 3 area currently of research. However, I'm still, 4 given my skills as a cancer epidemiologist, able 5 to not only review existing literature on this 6 topic, but also to think about issues that may 7 not be related to a disease I study often. 8 Q. So I'm clear then, you have written 9 papers on the issue of latency for non-Hodgkin's 10 lymphoma? 11 A. The studies, I would want to look back 12 specifically on my studies of non-Hodgkin's 13 lymphoma that I've performed, these were several 14 years ago, before I said one way or the other. 15 Q. What is the latency period for 16 non-Hodgkin's lymphoma? 17 A. That -- the issue of latency is 18 actually more complicated. There's not 19 necessarily one average time period for a 20 disease. It may vary depending on specific risk 21 factors. But generally for a disease like 22 non-Hodgkin's lymphoma, and given 23 epidemiological studies that have looked at a 24 range of risk factors, it would be reasonable to 25 think about in the order of several years, if	Page 129 1 A. What is Dr. Chen's first name? 2 Q. Mei, M-E-I. 3 A. No. 4 Q. Let's look at the study real quick. 5 All right. 24-12. This is a study, 6 "Residential Exposure to Pesticide During 7 Childhood and Childhood Cancers: A 8 Meta-Analysis" performed, I believe, at Harvard. 9 Let's take a look. 10 (Whereupon, Mucci Exhibit 24-12, Chen, 11 et al study, Residential Exposure to 12 Pesticide During Childhood and 13 Childhood Cancers: A Meta-Analysis, 14 was marked for identification.) 15 BY MR. MILLER: 16 Q. Have you seen this before? 17 A. No, I have not. 18 Q. Looking at the names of the scientists 19 involved, do you know any of them? 20 A. I do not. 21 Q. It says they are from the department 22 of environmental health, Harvard. That's the 23 same Harvard that you're at, right? 24 A. The Harvard T.H. Chen School of Public 25 Health, yes.

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<p>1 Q. Yes, ma'am. All right. And they say 2 that "There is an increasing concern about 3 chronic low-level pesticide exposure during 4 childhood and its influence on childhood 5 cancers." Right? 6 MR. COPLE: Objection. Lacks 7 foundation, the document speaks for itself. 8 A. Yes. While that is what it says in 9 the abstract, just to clarify, I have not 10 reviewed any studies that relate to glyphosate 11 and risk of cancer in children, just to clarify 12 that. 13 BY MR. MILLER: 14 Q. Let's see what these authors conclude 15 at Harvard, that "Conclusions: Results from 16 this meta-analysis indicated that children 17 exposed to indoor insecticides would have a 18 higher risk of childhood hematopoietic cancers." 19 Do you see that, ma'am? 20 MR. COPLE: Objection. Lacks 21 foundation, the document speaks for itself. 22 A. Yes, while I can see that the authors 23 have written this, I haven't reviewed this 24 article before, so I haven't reviewed the 25 studies themselves.</p>	<p>1 A. I have a degree equivalent to a Ph.D. 2 that's what Harvard confers. 3 Q. Oh, I don't doubt that. I'm not 4 suggesting otherwise. Some people also have 5 Ph.Ds who are epidemiologists, and I'm asking if 6 you're one of them. That's all. 7 A. I'm sorry. I don't understand the 8 question. 9 Q. A Ph.D. Do you know a Ph.D is? 10 MR. COPLE: Objection. Asked and 11 answered, argumentative. 12 A. Yeah, I guess I don't understand what 13 you're asking specifically with your question. 14 BY MR. MILLER: 15 Q. Well, let me be more specific. 16 Like Dr. Neugut, he's got -- he's an 17 epidemiologist, but he also has a Ph.D in 18 molecular biology and a medical degree. 19 A. I have a doctoral degree in 20 epidemiology. I have a master's of public 21 health. 22 Q. And I respect all that. I guess the 23 answer is you don't have a Ph.D as well -- 24 MR. COPLE: Objection. 25 BY MR. MILLER:</p>
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<p>1 I think it's also important to note 2 that the etiology of childhood cancers is quite 3 different than the etiology of those same 4 cancers in adults. 5 It's also important to note that for 6 non-Hodgkin's lymphoma, 95 of the cases of 7 non-Hodgkin's lymphoma occur in adults, and that 8 the etiology of that disease can be quite 9 different than that in children. 10 BY MR. MILLER: 11 Q. How is that? How is it different? 12 A. We could spend a long time discussing 13 this, but the way in which cancer may be forming 14 in the growth patterns of children, the types of 15 hormones they're exposed to, the underlying 16 genetic -- somatic genetics of these diseases 17 can be quite different, and so it's almost 18 impossible to extrapolate findings from studies 19 within children, childhood cancers, to that of 20 adults. 21 Q. Do you have a Ph.D in any -- I 22 apologize, let me pull out -- we have your CV. 23 Do you have a Ph.D, I guess I'm asking. 24 A. Do I have a Ph.D? 25 Q. Yes.</p>	<p>1 Q. -- in addition thereto? 2 MR. COPLE: Objection. Asked and 3 answered. 4 MR. MILLER: I'm just asking. 5 A. I just -- I'm -- 6 MR. COPLE: Asked and answered, 7 argumentative. 8 THE REPORTER: I'm sorry. One at a 9 time, please. 10 MR. COPLE: Objection. Asked and 11 answered, argumentative. 12 BY MR. MILLER: 13 Q. I wasn't trying to get anybody upset. 14 I just asked. 15 A. Well, I've stated what's on my CV. 16 Q. Okay. 17 A. But I also have broader knowledge 18 about biology and have been a cancer 19 epidemiologist for a number of years, and I 20 actually know a fair bit about childhood cancers 21 in addition to adult cancers. I know a fair bit 22 about the underlying somatic genetics of 23 childhood cancers versus adult cancers. 24 So just to clarify, I think that I can 25 say with high confidence that the etiology of</p>

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<p>1 non-Hodgkin's lymphoma in children is quite 2 different than that in adults. 3 Q. Would it be fair to say that the 4 predominant interest of yours is prostate 5 cancer? 6 A. Prostate cancer, yes. 7 Q. Yes. How do you pronounce it? 8 A. Prostate. 9 Q. Prostate cancer. Excuse me. 10 What percentage of your professional 11 time is within that sphere vis-à-vis other types 12 of cancer? 13 A. Currently? 14 Q. Yes. 15 A. I work on many different studies in 16 prostate cancer epidemiologically. I also have 17 the cancer epidemiology program not only for the 18 School of Public Health, but the Dana Farber 19 Harvard Cancer Center, so in those capacities 20 I'm involved in a range of activities related to 21 a broad range of cancers actually. 22 Q. All right. 23 A. So it's hard to say specifically the 24 amount of time in a week I spend on any one 25 scope of my work.</p>	<p>1 (Whereupon, Mucci Exhibit 24-13, 2 Mucci, et al study, Maternal Smoking 3 and Childhood Leukemia and Lymphoma 4 Risk, was marked for identification.) 5 BY MR. MILLER: 6 Q. All right. Let me ask you, ma'am, in 7 this study you found an excess risk of 8 non-Hodgkin's lymphoma for smokers? 9 A. What we found was a suggestive small 10 increased risk of non-Hodgkin's lymphoma 11 associated with smoking. Although, you know, 12 given the number of cases, the confidence 13 intervals were fairly wide. 14 Q. And this was if the mother smoked was 15 the child at increased risk of leukemia; is that 16 it? 17 A. Correct. If the mother smoked during 18 pregnancy. 19 Q. Yes, ma'am. 20 Let's look at Table 1 of your study. 21 As regards non-Hodgkin's lymphoma, 22 you're showing mean age at diagnosis of what, 23 ma'am? That's 5.7 years? 24 A. Correct. 25 Q. And 74 percent male?</p>
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<p>1 Q. Okay. Do you currently have any 2 non-Hodgkin's lymphoma research ongoing? 3 A. Myself, I published something in 4 the -- that's on my CV in the past year that did 5 cover hematopoietic malignancies. 6 Q. Consider -- today do you have any 7 ongoing research that's not published in 8 non-Hodgkin's lymphoma? 9 A. No. 10 Q. Okay. 11 A. Although just because that's the case, 12 that doesn't mean that I can't critically review 13 the epidemiological studies on that. 14 Q. Do you know Dr. Marshall Kadin at 15 Harvard? 16 A. No, I don't. 17 Q. I want to look at one of your studies 18 that involved childhood leukemia and lymphoma 19 and maternal smoking. Do you remember that 20 study? 21 A. I do. 22 Q. Okay. I'll mark it as Exhibit 24-13. 23 24 25</p>	<p>1 A. Yes, correct. 2 Q. Please turn with me, if you would, to 3 Page 1531. Would you tell us here, and I'm on 4 the right side, middle of the page, "Because 5 such misclassification of exposure is 6 non-differential, the true associations between 7 maternal smoking and leukemia and lymphoma may 8 be greater than reported"; right? 9 A. I can see where it says this in this 10 document, yes. 11 Q. And it's true, misclassification of 12 exposure is non-differential, it can reduce the 13 true association? 14 A. Well, actually it's the issue of 15 non-differential misclassification. In general 16 when it's a yes/no variable, it will tend to 17 bias a result toward the null. However, when 18 there's more than two categories, it can 19 actually bias away from the null as well. 20 Q. And let's go, then, to Page 1532 and 21 your last paragraph there. "This study provides 22 supportive evidence of a positive 23 association" -- 24 A. I'm sorry, where are you? 25 Q. Sure.</p>

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<p>Page 138</p> <p>1 A. Okay. Yeah.</p> <p>2 Q. "This study provides supportive</p> <p>3 evidence of positive association with AML and</p> <p>4 NHL and an interesting protective effect with</p> <p>5 ALL, which needs to be explored further"; right?</p> <p>6 Did I read that correctly?</p> <p>7 A. That is what the manuscript says.</p> <p>8 Q. And I want to point out that you saw</p> <p>9 supportive evidence of a positive association</p> <p>10 even though there was no statistical</p> <p>11 significance; right?</p> <p>12 A. Right. And as I'd like to -- as this</p> <p>13 document said earlier, we use the word</p> <p>14 "suggestive" since the odds ratio, while it is</p> <p>15 above 1, the confidence intervals were somewhat</p> <p>16 wide because of the small numbers.</p> <p>17 Q. And this was not a cohort study, but</p> <p>18 this is a case-control study; right?</p> <p>19 A. No, that is not correct. This is</p> <p>20 actually a cohort study within 1.4 million</p> <p>21 Swedish children.</p> <p>22 Q. You look back at a register; right?</p> <p>23 That's how it's worked out?</p> <p>24 A. This was leveraging -- for this study</p> <p>25 we took advantage of a nationwide registry of a</p>	<p>Page 140</p> <p>1 several -- a few different publications on that</p> <p>2 topic.</p> <p>3 Q. This one is in the journal National</p> <p>4 Cancer Institute, 2009. I've got a copy for you</p> <p>5 here.</p> <p>6 (Whereupon, Mucci Exhibit 24-14,</p> <p>7 Stark, et al article, Prospective</p> <p>8 Study of Trichomonas vaginalis</p> <p>9 Infection and Prostate Cancer</p> <p>10 Incidence and Mortality, was marked</p> <p>11 for identification.)</p> <p>12 BY MR. MILLER:</p> <p>13 Q. And I just want to go over a couple of</p> <p>14 things with you on this.</p> <p>15 In your Results section, "Although not</p> <p>16 statistically significant, the magnitude of the</p> <p>17 association between T vaginal-seropositive</p> <p>18 status and overall prostate cancer risk (odds</p> <p>19 ratio 1.23) was similar to that reported</p> <p>20 previously."</p> <p>21 You conclude, "This large prospective</p> <p>22 case-control study obtained further support for</p> <p>23 an association between a seropositive status for</p> <p>24 antibodies against T vaginalis and the risk of</p> <p>25 prostate cancer"; true?</p>
<p>Page 139</p> <p>1 birth registry in Sweden that has information</p> <p>2 collected on smoking status, and that was then</p> <p>3 linked together with a cancer registry to look</p> <p>4 at cancer outcomes in children. We also have</p> <p>5 information from the death register as well.</p> <p>6 Q. So even if the confidence interval or</p> <p>7 the p-value is greater than .05, you can get</p> <p>8 important information from the study, I think we</p> <p>9 can agree?</p> <p>10 MR. COPLE: Objection. Vague.</p> <p>11 A. In some cases. You know, again, you</p> <p>12 wouldn't want to take one study in isolation.</p> <p>13 It would be important not only to look at the</p> <p>14 role of chance, but before even doing that, it's</p> <p>15 important to look at the role of potential bias</p> <p>16 and confounding in explaining associations. So</p> <p>17 I think that you need to think about a lot of</p> <p>18 different factors in looking through taking a</p> <p>19 relative risk estimate in this 95 percent</p> <p>20 confidence interval.</p> <p>21 BY MR. MILLER:</p> <p>22 Q. Do you remember the study you did on</p> <p>23 trichomonas vaginalis infection and prostate</p> <p>24 cancer incidence?</p> <p>25 A. Yes. Actually I was part of</p>	<p>Page 141</p> <p>1 A. So this is what the document says.</p> <p>2 To add some clarity on your comment</p> <p>3 regarding case-control study, this is actually a</p> <p>4 different approach to a case-control study than</p> <p>5 any of the case-control studies that were looked</p> <p>6 at for glyphosate and non-Hodgkin's lymphoma.</p> <p>7 What we did was perform a prospective analysis</p> <p>8 where the bloods were actually collected well</p> <p>9 before the cancer diagnosis. So that's very</p> <p>10 different than what we see in the glyphosate and</p> <p>11 NHL literature where the information on</p> <p>12 glyphosate is collected after the diagnosis. So</p> <p>13 I just wanted to clarify that point.</p> <p>14 And I think that statement that we</p> <p>15 made in the conclusion really was in large part</p> <p>16 because of the strong positive associations that</p> <p>17 we observed for extraprostatic prostate cancer</p> <p>18 as well as metastatic disease. Prostate cancer</p> <p>19 is a disease that's quite biologically variable</p> <p>20 in its risk of metastatic disease, and what</p> <p>21 we're really interested in looking at are</p> <p>22 associations for risk of more advanced cancer.</p> <p>23 And so that in terms of our conclusion, I think</p> <p>24 the basis for that statement was given the</p> <p>25 strong evidence of extraprostatic prostate</p>

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<p>1 cancer and clinically relevant lethal disease in 2 this study. 3 Q. You say on the next page -- oops, I 4 guess that's two pages -- on Page 3 in the 5 Discussion section that, "In this 6 large...case-control study, we provide further 7 evidence to support the previously" associated 8 -- I'm sorry, "previously reported association 9 between a T vaginalis-seropositive status and 10 prostate cancer risk." 11 You say that even though it's not 12 statistically significant; right? 13 A. So just to clarify, again in the 14 comment about the case-control study, this is a 15 case-control study where the information on the 16 exposure was collected prior to development of 17 any disease. So, again, just to clarify that 18 point. So these data, the relative risk 19 estimate was not statistically significant. 20 However, the confidence intervals were actually 21 fairly narrow around that point estimate because 22 we had such a large number of cases, and because 23 the exposure was so common. 24 So, you know, again we're taking an 25 odds ratio together with the size of the</p>	<p>1 marked for identification.) 2 BY MR. MILLER: 3 Q. 24.15, do you recognize that document? 4 A. Yes. 5 Q. And what is it? 6 A. Well, actually I have to remind 7 myself. This likely would have been a 8 presentation that was made at the University of 9 Pennsylvania, potentially. 10 Q. And turning with me to -- 11 A. Is that correct? I'm not sure. 12 Q. I know what it says. It says 13 "Epidemiology of Prostate Cancer Risk and 14 Progression, Prostate Cancer Evidence Academy." 15 A. But, again, I haven't seen this 16 document for a little while. So I'm just -- I'm 17 not sure specifically what this was from. 18 Q. Well, that's you, right, Lorelei -- 19 A. No, I'm saying it is, but I'm just not 20 sure what this is from, I -- you know, what the 21 Prostate Cancer Evidence Academy is. 22 Do you know where this document came 23 from? I'm sorry to ask. I just want to make 24 sure that I'm -- I have the right information 25 about what the document is.</p>
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<p>1 confidence intervals, and then taking that in 2 the context of other epidemiological studies. 3 Q. Which is what epidemiologists do; 4 right? 5 A. What epidemiologists do is you want to 6 review critically each individual epidemiology 7 study and look at the strengths and weaknesses 8 and assess whether there's potential bias or 9 confounding or trends that might explain 10 associations. 11 Q. And lots of epidemiologists use forest 12 plots to make their points about association of 13 exposures and outcomes; right? 14 MR. COPLE: Objection. Vague. 15 A. I wouldn't necessarily agree with that 16 one way or another. There can be instances 17 where in meta-analyses forest plots are used to 18 present data, but there also could be other 19 instances where it's not the case. 20 BY MR. MILLER: 21 Q. Let's look at an instance where you 22 use forest plots as part of a presentation. 23 (Whereupon, Mucci Exhibit 24-15, 24 PowerPoint, Epidemiology of Prostate 25 Cancer Risk and Progression, was</p>	<p>1 Q. That wonderful thing they call the 2 internet. 3 A. I understand that, but I'm just trying 4 to understand, like, what this comes from 5 actually. 6 Q. Let me know when you're ready. I have 7 some more questions. 8 A. I'm sorry, just -- I just want to 9 clarify what this actually is from. I've given 10 a number of different talks in 2015. So I just 11 want to make sure that I have the correct -- 12 that this is -- what this is referred to, where 13 these slides are from. 14 Q. Take your time and look at it as much 15 as you want, and I have some questions. 16 A. Okay. Go ahead, please. I'm ready. 17 Go ahead, please. 18 Q. Okay. So here we have Dr. Lorelei 19 Mucci -- 20 A. It's Lorelei. 21 Q. I'm sorry, excuse me. Lorelei Mucci 22 at the Prostate Cancer Evidence Academy, and I 23 want to go with you to -- 24 A. And just to clarify, again I'm not 25 sure what the Prostate Cancer Evidence Academy</p>

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<p>1 is. I just -- that's my point that I'm trying 2 to clarify with you. But I can look at my 3 slides irrespective of that and just give you 4 some information. 5 Q. Well, let's go to Page 13 of your 6 PowerPoint here. You do a summary slide of 7 "risk factors for advanced/lethal prostate 8 cancer." And you say that there is a strong 9 evidence of association with cigarette smoking. 10 Do you see that, Doctor? 11 A. Yes, I can see that in this 12 presentation. 13 Q. Let's go to Page 9 where you use 14 forest plots to make that point. 15 A. There's no forest plots here. These 16 are results from a specific analysis. This is 17 just one study. Actually, these are hazard 18 ratios for different categories of exposure. 19 This isn't a forest plot. 20 Q. I appreciate the clarification. This 21 is one study, and it's "Smoking and snus use 22 among 9,500 Swedish men with prostate cancer"; 23 right? 24 A. It's snus, yes. 25 Q. I'm sorry?</p>	<p>1 Q. Let's take a look at it. 24-16. 2 (Whereupon, Mucci Exhibit 24-16, 3 9/21/15 NAPP Study, was marked for 4 identification.) 5 BY MR. MILLER: 6 Q. You reviewed this, "Evaluation of 7 glyphosate use and the risk of non-Hodgkin 8 lymphoma major histological sub-types in the 9 North American Pooled Project" (handing)? 10 A. So what I reviewed with respect to 11 North American Pooling Project is an abstract 12 that was submitted to one of the scientific 13 meetings, as well as three PowerPoint 14 presentations. I have not seen this particular 15 manuscript. 16 Q. Well, let's take a look at it. Did 17 you -- let's just ask you first. All right. 18 23-16. One of the authors is Aaron 19 Blair. Have you read Dr. Blair's deposition? 20 A. I believe that I did review parts of 21 his deposition, yes. 22 Q. Did you review Dr. Weisenburger's 23 deposition? 24 A. No, I did not. 25 Q. You and I can agree that's the same</p>
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<p>1 A. Snus, that's how have you pronounce 2 it, snus. 3 Q. Snus. Snus. What is snus? 4 A. It's a smokeless tobacco product. 5 Q. And so from this one study, smoking 6 only, you show hazard ratio. You have a line 7 for 1, and it's above 1; right? But the 8 confidence interval crosses 1. Am I reading 9 that right? 10 A. While that is what this particular 11 study showed, this comment here about the 12 strength of evidence is based on a report from 13 the Surgeon General's Report, their fifth 14 anniversary report looking at the evidence for 15 the association between cigarette smoking and 16 the risk of developing an advanced or lethal 17 cancer. So that's where the strength of 18 evidence being strong comes from. 19 Q. All right. We'll move on. Do you 20 consider the NAPP study to be a published or 21 unpublished? It was an abstract. 22 A. I'm not sure I would qualify it one 23 way or the other. It was a -- it's a study that 24 has been presented at international scientific 25 meetings.</p>	<p>1 Dr. Blair that was a co-author of the 2 Agricultural Health Study; right? 3 A. I believe it is, yes. 4 Q. Let's look at this paper. What this 5 paper adds on Page 2 -- if you look with me, 6 please. So what this paper adds per these 7 authors is that significant or nearly 8 significant risk of non-Hodgkin's lymphoma 9 overall were observed for greater than two days' 10 use. Odds ratio of 2.42, statistically 11 significant. 12 Do you see that? 13 MR. COPLER: Objection. The document 14 speaks for itself. 15 A. Yes. While I can see that actually 16 there are a couple of concerns specifically here 17 with respect to both using greater than two days 18 per year of use, as well as the fact that these 19 odds ratio were not the odds ratio that they -- 20 Pahwa presented in the PowerPoint presentation 21 that mutually adjusted for use of 2,4-D, dicamba 22 and malathion, which was shown there was 23 confounding present because, in fact, the odds 24 ratio was substantially attenuated. 25 Secondly, I think an important issue</p>

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<p>1 is around the issue of the recall bias by the</p> <p>2 large proportion of proxy respondents. Again,</p> <p>3 the analysis in the presentation presented by</p> <p>4 Pahwa shows clearly the effect of the recall</p> <p>5 bias due to the high proportion of proxies in</p> <p>6 the studies in the North American Pooling</p> <p>7 Project.</p> <p>8 Q. What was the percentage of proxy</p> <p>9 respondents?</p> <p>10 A. In the studies it ranged from 30 to</p> <p>11 40 percent of the cases had proxy respondents.</p> <p>12 Q. And proxy respondent means what?</p> <p>13 A. Well, what happened was these studies</p> <p>14 recruited cases, and sometimes many years after</p> <p>15 when they were initially diagnosed, some of them</p> <p>16 had died or were too ill, so they had</p> <p>17 individuals, whether it would be a spouse, a</p> <p>18 child, or somebody else, fill out the</p> <p>19 information about the use of glyphosate or other</p> <p>20 pesticides in these studies.</p> <p>21 Q. Is that more accurate than estimating</p> <p>22 what the respondents would be, or less accurate?</p> <p>23 A. I'm sorry, I don't understand.</p> <p>24 Q. I mean, it just seems like you're</p> <p>25 criticizing proxy respondents, but you don't</p>	<p>1 A. If you -- if we could look at the</p> <p>2 slides that were presented by Pahwa, et al, they</p> <p>3 did an analysis where they looked specifically</p> <p>4 in those, where the data was based on the</p> <p>5 self-report versus the self-report plus the</p> <p>6 proxies together, and what you could see in</p> <p>7 those who just use the self-report there was an</p> <p>8 attenuation of the relative risk which shows</p> <p>9 that there was this issue of overreporting.</p> <p>10 Also, you can see a similar issue --</p> <p>11 let me just pull it up here so I make sure that</p> <p>12 I have the correct numbers.</p> <p>13 (Witness reviewing document.)</p> <p>14 A. So Wadell, et al, in 2001 looked</p> <p>15 specifically around the issue of proxy</p> <p>16 respondents looking at, not glyphosate per say,</p> <p>17 but specifically the organophosphate pesticides,</p> <p>18 and what they found was that when you looked at</p> <p>19 the association between pesticide -- this</p> <p>20 pesticide exposure and NHL risk, when you used</p> <p>21 the data from the proxies, it was a relative</p> <p>22 risk of 3.0, and those from the self-reports was</p> <p>23 1.2. So it's a very good example showing the</p> <p>24 issue of recall bias that results from the use</p> <p>25 of our proxy respondents.</p>
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<p>1 criticize multiple imputation in the AHS study,</p> <p>2 and it seems to be intellectually inconsistent.</p> <p>3 MR. COPLE: Objection. Argumentative.</p> <p>4 A. I think we can take those two issues</p> <p>5 separately. They're very, very different issues</p> <p>6 to be concerned about. What you asked me</p> <p>7 specifically with respect to the North American</p> <p>8 Pooling Project, and that one large concern and,</p> <p>9 in fact, which was demonstrated by Pahwa in this</p> <p>10 report and was also demonstrated by Wadell in</p> <p>11 his analysis which showed that the -- when you</p> <p>12 looked at the data specifically on -- from the</p> <p>13 self-respondents versus the self-respondent</p> <p>14 proxies, you see attenuation of the odds ratios.</p> <p>15 And I think it's a pretty well -- there's other</p> <p>16 published epidemiological studies that have</p> <p>17 shown in multiple different studies of cancer</p> <p>18 the fact that when in -- a spouse or a child</p> <p>19 loses somebody to cancer, they'll often ruminate</p> <p>20 and tend to overreport on the range of</p> <p>21 exposures. It was actually demonstrated clearly</p> <p>22 the issue of the recall bias induced</p> <p>23 specifically by the proxy respondents in the</p> <p>24 North American Pooling Project studies.</p> <p>25 Q. How was it demonstrated?</p>	<p>1 Q. Okay. Let's look what the authors of</p> <p>2 the NAPP study have to say about what this paper</p> <p>3 adds. They go on to say that for greater than</p> <p>4 seven days lifetime, the odds ratio, 55 percent</p> <p>5 of glyphosate use, with some differences in risk</p> <p>6 by subtype.</p> <p>7 Do you see that there?</p> <p>8 MR. COPLE: Objection. Document</p> <p>9 speaks for itself.</p> <p>10 A. Yes, while I can see that is the</p> <p>11 relative risk they chose to highlight, I think</p> <p>12 it's important to also note that is the relative</p> <p>13 risk that has not been mutually adjusted for</p> <p>14 other pesticides which was shown in the Pahwa</p> <p>15 presentation to -- there was confounding that</p> <p>16 was accounted for when you adjust for them. I</p> <p>17 think that's one important feature to consider.</p> <p>18 And then also the same issue of the proxy</p> <p>19 respondents is an issue there.</p> <p>20 BY MR. MILLER:</p> <p>21 Q. Let's look at the next page, Page 3.</p> <p>22 This is from the abstract, right?</p> <p>23 A. Page 3 refers to the abstract, yes.</p> <p>24 Q. And the Results, it said, "Cases who</p> <p>25 ever used glyphosate had a significantly</p>

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<p>1 elevated risk of non-Hodgkin's lymphoma 2 overall." 3 That's true, isn't it? 4 A. While -- what the authors have decided 5 to present in the abstract is a relative risk of 6 1.43. It's shown clearly in the PowerPoint 7 presentation that this relative risk can be 8 explained both by confounding due to use of 9 these three pesticides, as well as the issue of 10 bias because of the high proportion of cases and 11 controls that used proxy data to report on 12 exposure. So they selected to present the 13 unadjusted estimate as well as the estimate that 14 we know is biased because of the use of proxy 15 respondents. 16 Q. You know it's biased. The authors do 17 not conclude it was biased. 18 A. Well, actually since I haven't seen 19 this manuscript before, I haven't looked through 20 carefully to see what they talk about in their 21 results section or their conclusions. So I 22 couldn't say why they decided to particularly 23 present this. 24 But what I do know is that Pahwa 25 themselves shows the issue of residual</p>	<p>1 or people who might have been using ten years. 2 So what really has been shown in a 3 number of the studies, what you'd like to do is 4 to be able to integrate information on more of a 5 lifetime exposure to account for both the number 6 of years as well as the number of days per year. 7 That would be the ideal dose-response. 8 Q. What is DLBCL? 9 A. DLBCL is one of the subtypes of 10 non-Hodgkin's lymphoma. 11 Q. And in the NAPP study, do you know 12 what that acronym stands for? 13 A. I do not recall the specific. I could 14 look it up if you'd like. 15 Q. That's all right. So that subtype of 16 non-Hodgkin's lymphoma had an odds ratio of 17 2.83, which was statistically significant; 18 right? 19 A. And as I said, this is the crudely 20 adjusted odds ratio, and which was actually 21 attenuated after additional adjustment by other 22 pesticides. And also does not deal with the 23 issue of the potential for recall bias using 24 proxy respondents. 25 So I think taken together, the results</p>
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<p>1 confounding as well as the issue of bias to the 2 proxy respondents in their presentation. 3 Q. What they say in their abstract is 4 that those who handled the glyphosate for 5 greater than two days per year had significantly 6 elevated non-Hodgkin's lymphoma overall, odds 7 ratio 2.42, statistically significant; right? 8 MR. COPLE: Objection. The document 9 speaks for itself. 10 A. Right. So, again, kind of based on 11 what I've said for some of the prior estimates, 12 all of these estimates that they're presenting 13 here are estimates that have not been fully 14 adjusted for by the use of other pesticides, and 15 there's a clear example both in these studies as 16 well as some of the other studies as well that 17 show the effect of confounding by other 18 pesticide use. So that's an important fact when 19 you look at the odds ratio for accounting for 20 also the proxy respondents. 21 And then finally, we can talk at 22 length the issue of using greater than two days 23 per year or more is sort of suboptimal in terms 24 of a dose-response, because you're comparing 25 people who might have only used it for one year,</p>	<p>1 that are presented here are not additionally 2 adjusted for the known confounding that exists 3 in this dataset by use of these other pesticides 4 as well. It does not account for the bias that 5 was induced by the 30 to 40 percent of cases 6 that have proxy respondents. 7 Q. Turn to Page 12, ma'am. This is a 8 Discussion section, the NAPP study. And what 9 Dr. Blair and Dr. Pahwa and others confirm here, 10 "This report confirms previous analyses 11 indicating increased risks of non-Hodgkin's 12 lymphoma in association with glyphosate 13 exposure." Do you agree with that? 14 MR. COPLE: Objection. Lacks 15 foundation, the document speaks for itself. 16 A. So as I stated previously, I haven't 17 had a chance to fully read the manuscript. 18 However, what odds ratio they've selected to 19 highlight here in this particular line is, as I 20 said, not the fully adjusted estimate. So there 21 is concern over residual confounding, and it is 22 not the estimate that takes into account the 23 issues of bias. 24 And you can actually see that later on 25 in the paragraph when they talk about further</p>

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<p>1 adjusting the odds ratio for 2,4-D dicamba and 2 malathion resulted in an attenuated risk of NHL 3 in this study, showing no association between 4 glyphosate use and NHL risk. 5 Q. What these scientists say in their 6 discussion is "Our results are also aligned with 7 findings from epidemiological studies of other 8 populations that found an elevated risk for 9 non-Hodgkin's lymphoma for glyphosate exposure 10 and with greater number of days/years of 11 glyphosate use, as well as a meta-analysis of 12 glyphosate use and non-Hodgkin's lymphoma risk." 13 That's true, isn't it? 14 MR. COPLE: Objection. Lacks 15 foundation, the document speaks for itself. 16 A. Right. So, again, as I have not had a 17 chance to review this, I'm not sure what 18 meta-analysis they're referring to, because it 19 looks like they're referring to De Roos 2003 as 20 the meta-analysis. So again, I'm not really 21 sure, I haven't had a chance to read this 22 manuscript yet. 23 However, as I've said previously, I 24 think one of the big concerns is the use of 25 number of days per year as a measure of</p>	<p>1 to here. 2 All I can say is that given my review 3 of the results from Pahwa, et al in the slide 4 deck that was presented where they show the 5 residual confounding that existed, as well as 6 the issue of recall bias due to the proxy 7 respondents, and again because I haven't read 8 the whole discussion, I can't say one way or the 9 other exactly how their results relate to really 10 anything at all. 11 BY MR. MILLER: 12 Q. Dr. Mucci, you say there is recall 13 bias here, but let's look and see what these 14 scientists say. Let's turn to Page 14. "No 15 similar analysis of recall bias has been 16 conducted in the Canadian case-control studies, 17 but the similarity of study designs between the 18 US and Canada make it likely that recall bias is 19 not a major concern in the Canadian study and 20 NAPP as a whole." 21 That's true, isn't it? 22 MR. COPLE: Objection. Lacks 23 foundation, the document speaks for itself. 24 A. I'd like to take a look briefly at the 25 Canadian study.</p>
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<p>1 dose-response. I think it was discussed in a 2 lot of detail in the Agricultural Health Study, 3 for example, but other studies as well, where 4 you'd really want to integrate not only the 5 number of days per year, but also the number of 6 years that somebody has been using it to really 7 understand the full dose of exposure. And so 8 they've selected one of the specific doses. But 9 the other important feature is that when they 10 looked at the more integrated measure of dose 11 they actually find no association after they've 12 adjusted for the residual confounding and dealt 13 with the issue of proxy bias. 14 BY MR. MILLER: 15 Q. So these scientists in their 16 Discussion section say "From an epidemiological 17 perspective, our results were supportive of the 18 IARC evaluation of glyphosate as a probable 19 carcinogen for non-Hodgkin's lymphoma." 20 That's true, isn't it? 21 MR. COPLE: Objection. Lacks 22 foundation, document speaks for itself. 23 A. So, again, I haven't had a chance to 24 read through this publication, so I can't 25 comment specifically on what they are referring</p>	<p>1 Q. We're going to take a break. You can 2 look at that during the break. He has to change 3 the tape now, that's why we have to take a 4 break? 5 A. Okay. 6 THE VIDEOGRAPHER: Going off the 7 record. The time is 11:39. 8 (Whereupon, a recess was taken.) 9 THE VIDEOGRAPHER: Back on the record. 10 The time is 11:56. 11 BY MR. MILLER: 12 Q. All right. Let's get some work done 13 before lunch. Okey-dokey? 14 A. Sounds great. 15 Q. Okay. Great. You've heard of IARC? 16 A. I have. 17 Q. What is IARC? 18 A. IARC stands for the International 19 Agency for Research on Cancer. 20 Q. Okay. Would you agree it's a 21 prestigious organization? 22 MR. COPLE: Objection. Vague. 23 A. Could you clarify what you mean by 24 "prestigious"? 25 BY MR. MILLER:</p>

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1 Q. I don't know how to clarify words that
 2 are in common usage in the English language.
 3 A. Well, I guess what do you mean with
 4 respect to -- it's a very broad set of terms.
 5 Maybe you could just clarify what you mean.
 6 Q. I don't have to. If you can't answer
 7 the question, you can't answer it.
 8 Have you used the word "prestigious"
 9 before?
 10 MR. COPLE: Objection. Argumentative.
 11 A. I have used the word prestigious in
 12 many different contexts. That's why I would
 13 like some clarification on what you mean by
 14 prestigious in this setting.
 15 BY MR. MILLER:
 16 Q. Have you been asked to be on any IARC
 17 panels?
 18 A. Yes, I have.
 19 Q. And when was that?
 20 A. It was about two years. I was unable,
 21 however, to be a part of it.
 22 Q. Two years ago you were asked?
 23 A. Yes.
 24 Q. And what panel?
 25 A. It was for reviewing the epidemiology

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1 of coffee and cancer.
 2 Q. And schedule didn't allow it?
 3 A. Correct.
 4 Q. Any other involvement with IARC?
 5 A. No.
 6 Q. You understand that other professors
 7 from Harvard have participated as members of
 8 IARC?
 9 MR. COPLE: Objection. Lacks
 10 foundation.
 11 A. Yeah, I'm not sure who or who hasn't
 12 participated on different IARC panels.
 13 BY MR. MILLER:
 14 Q. I didn't ask if you know who.
 15 Do you know generally whether Harvard
 16 professors have participated in IARC?
 17 A. Well, since I don't know of specific
 18 people, I'm not sure. People might have. They
 19 may not have. I don't know really one way or
 20 the other.
 21 Q. Let's find out. 24-17.
 22 (Whereupon, Mucci Exhibit 24-17, IARC
 23 Monograph, Volume 105 List of
 24 Participants, was marked for
 25 identification.)

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1 BY MR. MILLER:
 2 Q. List of IARC participants from IARC
 3 Volume 105, "Diesel and Gasoline Engine
 4 Exhaust," Thomas Smith, Harvard School of Public
 5 Health.
 6 Do you see that?
 7 A. I do. I don't know who Thomas Smith
 8 is.
 9 Q. 24-18, list of participants, IARC,
 10 Volume 112.
 11 (Whereupon, Mucci Exhibit 24-18, IARC
 12 Monograph, Volume 112 List of
 13 Participants, was marked for
 14 identification.)
 15 BY MR. MILLER:
 16 Q. Have you seen that document before?
 17 MR. COPLE: Do you have a copy for us?
 18 MR. MILLER: Of course (handing).
 19 BY MR. MILLER:
 20 Q. Have you seen that document before?
 21 A. I'm not sure. It's possible I've seen
 22 this document as part of something else. I'm
 23 not sure.
 24 Q. Dr. Aaron Blair, do you his name on
 25 there?

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1 A. I do.
 2 Q. The "National Cancer Institute, United
 3 States of America [retired] (Overall Chair)."
 4 Did I read that correctly?
 5 MR. COPLE: Objection. The document
 6 speaks for itself.
 7 A. That's what it says on the document,
 8 yes.
 9 BY MR. MILLER:
 10 Q. Now, we've talked before Dr. Blair was
 11 an author of the Agricultural Health Study study
 12 that you relied upon; right?
 13 A. Yes.
 14 Q. And is an author of the NAPP study
 15 that you have been commenting on; right?
 16 A. Yes.
 17 Q. Okay. And is chair of the IARC
 18 monograph that spent from the 3rd of March to
 19 the 10th of March looking at these issues, and
 20 it's Lyon, France?
 21 A. That's what the document says, yes.
 22 Q. Is that where they meet in IARC? Are
 23 you --
 24 A. I -- I'm not sure where they meet.
 25 Q. Okay. Others at Harvard put on the

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1 website the findings of this panel. Are you
 2 aware of that?
 3 A. No, I was not.
 4 Q. Let's take a look at Exhibit 24-19.
 5 (Whereupon, Mucci Exhibit 24-19,
 6 Document from Harvard T.H. Chan
 7 website, The Nutrition Source,
 8 Research Roundup, was marked for
 9 identification.)
 10 BY MR. MILLER:
 11 Q. A document from the Harvard T.H. Chan
 12 School of Public Health.
 13 MR. COPLE: Do you have a copy for
 14 counsel?
 15 MR. MILLER: Yes, of course (handing).
 16 BY MR. MILLER:
 17 Q. Are you a member of the Harvard T.H.
 18 Chan School of Public Health?
 19 A. I am a -- I am on the faculty of the
 20 Harvard T.H. Chan School of Public Health.
 21 Q. And so let's look at this website
 22 publication. And it states in pertinent part
 23 that in this report -- excuse me. "In March of
 24 2015, 17 experts from 11 countries assessed the
 25 carcinogenicity of five pesticides including

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1 glyphosate at the International Agency for
 2 Research on Cancer."
 3 Do you see that, ma'am?
 4 MR. COPLE: Objection. Lacks
 5 foundation, the document speaks for itself.
 6 A. I can see that on this website
 7 document.
 8 BY MR. MILLER:
 9 Q. "In this report, glyphosate was
 10 classified as 'probably carcinogenic to humans'
 11 (Group 2A)"; right?
 12 MR. COPLE: Objection. Lacks
 13 foundation, the document speaks for itself.
 14 A. Yeah, I'm just seeing this now. I
 15 haven't had a chance to look at the website
 16 directly, but I believe this is just simply
 17 stating what was reported in The Lancet
 18 Oncology.
 19 BY MR. MILLER:
 20 Q. Yes, ma'am, for non-Hodgkin's
 21 lymphoma; right?
 22 MR. COPLE: Same objection.
 23 A. Yeah, again, it's just simply
 24 restating what was stated as part of the IARC
 25 document.

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1 BY MR. MILLER:
 2 Q. Do you agree with the IARC scientists
 3 who concluded that glyphosate is probably
 4 carcinogenic to humans for non-Hodgkin's
 5 lymphoma?
 6 A. That classification -- what I did in
 7 my expert report was specifically to review the
 8 epidemiology studies, whereas a classification
 9 would have much broader topics on it. So I
 10 specifically reviewed the epidemiology
 11 literature, and based on my review of the
 12 epidemiology, I don't believe the epidemiology
 13 support a causal association.
 14 Q. This publication from Harvard's
 15 website goes on to explain the "Evidence
 16 suggested the potential mechanism for cancer
 17 were primarily through two pathways: First, the
 18 chemicals damaged DNA, which caused mutations or
 19 alterations in their gene code. Second,
 20 glyphosate could induce oxidative stress."
 21 Do you see where I'm reading that,
 22 ma'am?
 23 MR. COPLE: Objection. Lacks
 24 foundation, the document speaks for itself.
 25 A. Yes. While I can see that's what this

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1 states on the website, this is not a
 2 statement -- I really don't know. But
 3 specifically what I do know is this is
 4 highlighting what was in the IARC report rather
 5 than being a comment one way or the other from
 6 the Harvard School of Public Health.
 7 BY MR. MILLER:
 8 Q. And you're not opining in the area of
 9 DNA or oxidative stress, that's not part of your
 10 role here; right?
 11 A. My role was to specifically review the
 12 epidemiology studies.
 13 Q. You did review the deposition of
 14 Dr. Blair; right?
 15 A. I did take a look at the deposition of
 16 Dr. Blair.
 17 Q. And you have relied in part upon the
 18 AHS unpublished 2013 manuscript as part and
 19 parcel of your opinions; right?
 20 A. That was one part of the epidemiology
 21 I reviewed to make my assessment of a causal
 22 association, and assuming there's not. But,
 23 actually, even without that publication, my
 24 review of the epidemiology supported no
 25 association between NHL and glyphosate.

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<p>1 Q. You're aware that Dr. Blair said it's</p> <p>2 irresponsible to rush out an analysis that's not</p> <p>3 fully thought out when discussing the 2013 AHS</p> <p>4 manuscript?</p> <p>5 MR. COPLE: Objection. Lacks</p> <p>6 foundation.</p> <p>7 A. You know, I didn't review Dr. Blair's</p> <p>8 deposition at great length because it didn't</p> <p>9 weigh in one way or the other in my critical</p> <p>10 review of the epidemiology studies.</p> <p>11 BY MR. MILLER:</p> <p>12 Q. Are you aware that Dr. Blair still, in</p> <p>13 light of this draft manuscript of AHS 2013,</p> <p>14 still believes that glyphosate is a probable</p> <p>15 carcinogen for non-Hodgkin's lymphoma?</p> <p>16 MR. COPLE: Objection. Lacks</p> <p>17 foundation.</p> <p>18 A. Again, since I didn't really</p> <p>19 thoroughly review his deposition, I couldn't say</p> <p>20 one way or the other what his feelings are on</p> <p>21 this topic.</p> <p>22 BY MR. MILLER:</p> <p>23 Q. Given that he is an author of the</p> <p>24 Agricultural Health Study that you rely upon,</p> <p>25 he's the author of the draft manuscript that you</p>	<p>1 Q. Let's look at Exhibit 24-20.</p> <p>2 (Whereupon, Mucci Exhibit 24-20,</p> <p>3 Excerpt of the 3/20/17 deposition</p> <p>4 transcript of Aaron Blair, PhD, was</p> <p>5 marked for identification.)</p> <p>6 BY MR. MILLER:</p> <p>7 Q. Here's some excerpts from Dr. Blair's</p> <p>8 sworn testimony in this case (handing).</p> <p>9 Look with me, please, on Page 204 --</p> <p>10 and I'm looking at the page numbers on the top</p> <p>11 right -- concerning whether the AHS study</p> <p>12 findings of the 2013 draft should be made</p> <p>13 available. The question is at Line 7, "And</p> <p>14 would you agree with Dr. Alavanja that it would</p> <p>15 be irresponsible for AHS...investigators not to</p> <p>16 publish the updated findings on pesticides and</p> <p>17 NHL in time to influence IARC's decision?"</p> <p>18 His answer, "No. I don't agree with</p> <p>19 that. And the reason is because the timetable</p> <p>20 about when you have to have it published is</p> <p>21 arbitrary. And doing analyses and writing</p> <p>22 papers is not wedded to a timetable. And what</p> <p>23 is irresponsible is to rush something out that's</p> <p>24 not fully analyzed and thought out. That's</p> <p>25 irresponsible."</p>
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<p>1 rely upon, he was the chairman of IARC, he was</p> <p>2 an author in NAPP, wouldn't he know more about</p> <p>3 the potential association between glyphosate and</p> <p>4 non-Hodgkin's lymphoma than you would?</p> <p>5 MR. COPLE: Objection. Vague.</p> <p>6 A. I guess my comment to that is I don't</p> <p>7 know what is underlying since I haven't reviewed</p> <p>8 anything that he's written specifically that</p> <p>9 summarizes in great detail how he's coming to</p> <p>10 his assessment.</p> <p>11 But in reviewing critically the</p> <p>12 epidemiology literature that I've reviewed and</p> <p>13 looking through each individual studies</p> <p>14 assessing potential bias, including the studies</p> <p>15 from Dr. Blair, the NAPP, as well the</p> <p>16 unpublished and published AHS studies, taken</p> <p>17 together, these epidemiology studies do not</p> <p>18 support a positive association. So I couldn't</p> <p>19 say one way or the other what respect Dr. Blair</p> <p>20 is coming to his own assessment about this.</p> <p>21 However, in reviewing the studies that</p> <p>22 I did that included Dr. Blair as a co-author,</p> <p>23 those studies do not support a causal</p> <p>24 association.</p> <p>25 BY MR. MILLER:</p>	<p>1 Do you see that, ma'am?</p> <p>2 MR. COPLE: Objection. The document</p> <p>3 speaks for itself, lacks foundation. I object</p> <p>4 to the incomplete document, selectively using</p> <p>5 Pages 204, 206, 207, and 293 without any of the</p> <p>6 remaining pages of this document.</p> <p>7 BY MR. MILLER:</p> <p>8 Q. You can answer.</p> <p>9 A. So, yes, I can see where they're</p> <p>10 saying that. However, I'm not going to comment</p> <p>11 one way or the other about whether it's</p> <p>12 responsible or irresponsible about the</p> <p>13 publication. But I will say a few things.</p> <p>14 One is Dr. Blair himself, when he</p> <p>15 wrote a manuscript on the use of meta-analyses</p> <p>16 in pesticide epidemiology, stated that it is --</p> <p>17 indeed, you should include unpublished studies</p> <p>18 in your meta-analyses, often because of the</p> <p>19 issue of publication bias. So he, himself, has</p> <p>20 actually commented specifically on the use of</p> <p>21 unpublished studies and meta-analyses.</p> <p>22 Secondly, as I commented previously in</p> <p>23 this discussion, I, myself, was able to review</p> <p>24 both the manuscript from 2013 as well as what</p> <p>25 was published from 2014. The methodologies that</p>

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<p>1 were presented in the Methods section and the</p> <p>2 type of presentation of results were very, very</p> <p>3 similar. I can review -- given my role as a</p> <p>4 peer reviewer in multiple publications, I could</p> <p>5 review critically that unpublished document</p> <p>6 myself.</p> <p>7 So all of this taken together, whether</p> <p>8 or not it was responsible or irresponsible</p> <p>9 doesn't really take away from the fact that the</p> <p>10 2013 publication, actually, is quite useful in</p> <p>11 summing up the state of epidemiology of NHL and</p> <p>12 glyphosate at the same time. Even without that</p> <p>13 updated follow-up, the body of evidence taken</p> <p>14 together would suggest no causal association</p> <p>15 between the glyphosate and NHL risks.</p> <p>16 Q. Turn to Page 293. After three hours</p> <p>17 and 40 minutes of questioning by Monsanto</p> <p>18 lawyers, you're aware that Dr. Blair still held</p> <p>19 the opinion that he had at IARC, that glyphosate</p> <p>20 is a probable human carcinogen for non-Hodgkin's</p> <p>21 lymphoma?</p> <p>22 MR. COPLER: Objection. Lacks</p> <p>23 foundation. Object to the use of an incomplete</p> <p>24 document.</p> <p>25 A. Again, I don't have the full document</p>	<p>1 experts from 11 countries met at IARC to assess</p> <p>2 the carcinogenicity of the organophosphate</p> <p>3 pesticides," names several of them, one of them</p> <p>4 glyphosate.</p> <p>5 Do you see that?</p> <p>6 MR. COPLER: Objection. Lacks</p> <p>7 foundation.</p> <p>8 A. I can see where it says that in this</p> <p>9 news article.</p> <p>10 BY MR. MILLER:</p> <p>11 Q. What these experts tell us is that</p> <p>12 case-control studies of occupational exposure in</p> <p>13 US, Canada, and Sweden reported increased risks</p> <p>14 for non-Hodgkin's lymphoma that persisted after</p> <p>15 adjustment for other pesticides.</p> <p>16 That's true, isn't it?</p> <p>17 MR. COPLER: Objection. Lacks</p> <p>18 foundation, the document speaks for itself.</p> <p>19 A. Well, that is what this particular</p> <p>20 news article states. Actually, it's not fully</p> <p>21 correct for a number of reasons.</p> <p>22 First, we can see from the analysis</p> <p>23 that was done in Pahwa, et al that adjusting for</p> <p>24 2,4-D dicamba and malathion actually led to a</p> <p>25 substantial attenuation of the odds ratio to the</p>
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<p>1 in front of me. I didn't review it carefully</p> <p>2 because -- and I didn't think it was important</p> <p>3 to do so because I -- it wasn't going to</p> <p>4 influence -- his comments or others wasn't going</p> <p>5 to influence one way or the other my independent</p> <p>6 review of all of the epidemiology studies.</p> <p>7 BY MR. MILLER:</p> <p>8 Q. Let's look at the independent review</p> <p>9 of the epidemiological studies performed by</p> <p>10 IARC, and we'll mark that as Exhibit 24-21.</p> <p>11 (Whereupon, Mucci Exhibit 24-21, Paper</p> <p>12 titled Carcinogenicity of</p> <p>13 tetrachlorvinphos, parathion,</p> <p>14 malathion, diazinon and glyphosate,</p> <p>15 was marked for identification.)</p> <p>16 BY MR. MILLER:</p> <p>17 Q. You've seen this before, ma'am?</p> <p>18 A. I -- this is a news piece I have not</p> <p>19 seen previously.</p> <p>20 Q. This is the -- from the Lancet,</p> <p>21 May 2015.</p> <p>22 Do you see that, ma'am?</p> <p>23 A. I see that, where it says that on the</p> <p>24 document.</p> <p>25 Q. And it says, "In March of 2015, 17</p>	<p>1 null value. So I think that is an important</p> <p>2 consideration.</p> <p>3 Secondly, there was an analysis by</p> <p>4 Hohenadel using the Canadian dataset that looks</p> <p>5 specifically at whether the association between</p> <p>6 glyphosate and NHL risk may be confounded by use</p> <p>7 of malathion. And, in fact, when you looked at</p> <p>8 glyphosate alone in the absence of malathion,</p> <p>9 the odds ratio in that study in Canada was 0.92,</p> <p>10 again showing the issue of confounding.</p> <p>11 So that is --</p> <p>12 BY MR. MILLER:</p> <p>13 Q. Do you hold an opinion to a reasonable</p> <p>14 degree of scientific certainty that 2,4-D causes</p> <p>15 non-Hodgkin's lymphoma?</p> <p>16 A. I have not thoroughly looked at the</p> <p>17 epidemiology literature on 2,4-D and NHL risk.</p> <p>18 However, for something to be a confounder of an</p> <p>19 association, it does not necessarily have to be</p> <p>20 a cause of the disease itself. If it is</p> <p>21 associated with the outcome and it's correlated</p> <p>22 with the exposure and its prevalence is high</p> <p>23 enough, it can induce confounding even if, in</p> <p>24 fact, that factor is not truly causally linked</p> <p>25 to the outcome.</p>

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<p>1 So the definition of a confounder does</p> <p>2 not need to be -- need to be that it is a formal</p> <p>3 true cause of the disease.</p> <p>4 Q. "And glyphosate formulations and AMPA"</p> <p>5 -- do you know what AMPA is?</p> <p>6 A. I do not. It's aminomethyl phosphoric</p> <p>7 acid.</p> <p>8 Q. -- "induced oxidative stress in</p> <p>9 rodents and in vitro."</p> <p>10 What does in vitro mean?</p> <p>11 A. It would be studies that are performed</p> <p>12 experimentally in cells.</p> <p>13 Q. "The working group classified</p> <p>14 glyphosate as probably carcinogenic to humans in</p> <p>15 (Group 2A)."</p> <p>16 Do you agree?</p> <p>17 A. Yes. I know that the statement that</p> <p>18 came out from the IARC review was a</p> <p>19 classification of 2A. However, in reviewing all</p> <p>20 of the epidemiology studies, including studies</p> <p>21 that have been published subsequent to the</p> <p>22 publication, but even before that, the body of</p> <p>23 evidence could not rule out that the few studies</p> <p>24 that suggested a positive association --</p> <p>25 association with glyphosate and NHL risk may be</p>	<p>1 footnoted with 8, it's the Department of</p> <p>2 Environmental Health, the Department of</p> <p>3 Epidemiology, Harvard T.H. Chan School of Public</p> <p>4 Health.</p> <p>5 Do you see that, ma'am?</p> <p>6 A. Yes, I do.</p> <p>7 Just to clarify, Dr. Baccarelli is no</p> <p>8 longer at Harvard.</p> <p>9 Q. Okay. And we're going to go through.</p> <p>10 So Dr. Baccarelli was at Harvard;</p> <p>11 right?</p> <p>12 A. Yes.</p> <p>13 Q. And why did he leave?</p> <p>14 A. I don't know.</p> <p>15 Q. And Dr. David C. Christian -- or</p> <p>16 Christiani?</p> <p>17 A. Christiani.</p> <p>18 Q. Oh, I'm sorry. Christiani, he's at</p> <p>19 Harvard?</p> <p>20 A. He is.</p> <p>21 Q. And you know him?</p> <p>22 A. I do.</p> <p>23 Q. Well-respected scientist?</p> <p>24 A. He is.</p> <p>25 Q. Also Francis -- I'm sorry,</p>
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<p>1 due to confounding or bias.</p> <p>2 Q. Did the scientists of IARC that met in</p> <p>3 March of 2015 follow reliable scientific</p> <p>4 methodology in looking at this issue?</p> <p>5 A. I couldn't say one way or the other</p> <p>6 what the methodology was that was used by them.</p> <p>7 I wasn't part of the IARC working group.</p> <p>8 Q. Have other scientists at Harvard</p> <p>9 commented on whether the scientists at IARC used</p> <p>10 reliable scientific methodology?</p> <p>11 A. I'm not aware one way or the other</p> <p>12 about that.</p> <p>13 Q. Let's take a look at it.</p> <p>14 Exhibit 24-22, "IARC Monographs: 40 Years of</p> <p>15 Evaluating Carcinogenic Hazards to Humans."</p> <p>16 (Whereupon, Mucci Exhibit 24-22, IARC</p> <p>17 Monographs: 40 Years of Evaluating</p> <p>18 Carcinogenic Hazards to Humans, was</p> <p>19 marked for identification.)</p> <p>20 BY MR. MILLER: A copy for you, ma'am.</p> <p>21 Copy for counsel (handing).</p> <p>22 BY MR. MILLER:</p> <p>23 Q. So there are lots of scientists on</p> <p>24 here. Some of them are from Harvard, I think we</p> <p>25 can agree. Let's look. If the name is</p>	<p>1 Francine Laden?</p> <p>2 A. Yes.</p> <p>3 Q. Do you know her?</p> <p>4 A. I do.</p> <p>5 Q. Well-respected scientist?</p> <p>6 A. Yes.</p> <p>7 Q. Okay. Also Richard Monson?</p> <p>8 A. Yes.</p> <p>9 Q. At Harvard?</p> <p>10 A. Yes.</p> <p>11 Q. And a respected scientist?</p> <p>12 A. Yes.</p> <p>13 Q. Okay. Dr. Ritz is not at Harvard, but</p> <p>14 you've read her deposition; right?</p> <p>15 A. Yes, I did.</p> <p>16 Q. She's an expert for the plaintiff.</p> <p>17 And Dr. Eva Schernhammer?</p> <p>18 A. Yes.</p> <p>19 Q. At Harvard?</p> <p>20 A. She is.</p> <p>21 Q. And --</p> <p>22 A. No. Actually, she's not really at</p> <p>23 Harvard any longer. She has an adjunct</p> <p>24 affiliation.</p> <p>25 Q. I see. She was at Harvard full-time,</p>

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<p>1 and now she's adjunct at Harvard? 2 A. She, actually, wasn't even at Harvard 3 full-time. She was at Brigham & Women's 4 Hospital. 5 Q. Which is affiliated in some fashion 6 with Harvard? 7 A. Not exactly, but it's with Harvard 8 University, not the School of Public Health. 9 Q. Yeah. All right. And you also -- 10 have you read Dr. Weisenburger's deposition in 11 this case? 12 MR. COPLE: Objection. Asked and 13 answered. 14 A. I have not. 15 BY MR. MILLER: 16 Q. Okay. Let's look at what these 17 scientists from Harvard and others said about 18 IARC monographs in this commentary that was 19 published in June of 2015, some three months 20 after IARC concluded that glyphosate was a 21 problem with human carcinogen for non-Hodgkin's 22 lymphoma. Go to Page 2 and look at this. 23 A. I'm sorry. What is Page 2? 24 Q. That's Page 508. 25 A. Okay.</p>	<p>1 A. I'm sorry. Could you repeat your 2 question? 3 BY MR. MILLER: 4 Q. Sure. 5 You understand these 17 scientists at 6 IARC conducted their independent evaluation of 7 these epidemiological studies; right? 8 MR. COPLE: Same objection. 9 A. That being they performed an 10 independent epidemiology review. I don't know 11 exactly -- I wasn't there. I don't know exactly 12 what happened during this process, so I can't 13 really comment specifically on that. 14 BY MR. MILLER: 15 Q. Well, let's see what these scientists 16 have to say. "Discussion: We concluded that 17 these recent criticisms are unconvincing. The 18 procedures employed by IARC to assemble Working 19 Groups of scientists from the various 20 disciplines and the techniques followed to 21 review the literature and perform hazard 22 assessment of various agents provides a balanced 23 evaluation and an appropriate indication of the 24 weight of the evidence." 25 You don't have any comment on whether</p>
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<p>1 Q. The Objectives, make sure I have this 2 right, "The authors of this Commentary are 3 scientists from various disciplines relevant to 4 the identification and hazard evaluation of 5 human carcinogens. We examined criticisms of 6 IARC classification process to determine the 7 validity of these concerns. Here, we present 8 the results of that examination, review the 9 history of IARC evaluations, and describe how 10 the IARC evaluations are performed." 11 Did I read that correctly? 12 MR. COPLE: Objection. The document 13 speaks for itself. 14 A. Yes, that is what is stated here. I 15 have not reviewed this document. 16 I also think it's important to note 17 that I took my own independent review of the 18 epidemiology studies. 19 BY MR. MILLER: 20 Q. And you understand that these 17 21 scientists performed their own independent 22 review of the epidemiological studies without 23 pay for a seven-day period in 2015; right? 24 MR. COPLE: Objection. Lacks 25 foundation.</p>	<p>1 that's true or not? 2 A. Well, so I haven't reviewed this 3 particular document previously. I'm not aware 4 specifically what the criticisms are that they 5 were referring to. So I couldn't really comment 6 on that. 7 And, also, I think it's important to 8 state that I reviewed the epidemiology 9 literature on glyphosate and NHL risk in 10 addition to the studies that were -- have 11 subsequently come out since that IARC review. 12 and I think it's important to note that the IARC 13 epidemiologists were concerned about potential 14 residual confounding and bias explaining some of 15 the positive associations. 16 And indeed, actually some of the 17 studies that have come out since then actually 18 document this -- that actually residual 19 confounding and recall bias were actually a 20 concern in several of the studies. I think 21 that's an important comment. And then 22 finally -- well, I think I'll stop there. 23 Q. Okay. Let's look at the document, and 24 I have a few more questions. 25 So you're unaware of any criticisms of</p>

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<p>1 IARC, is that what I should understand?</p> <p>2 A. I'm not familiar with specifically</p> <p>3 what criticisms -- I have never seen this</p> <p>4 document before you handed it to me, So I'm</p> <p>5 unfamiliar with the specific critiques and</p> <p>6 concerns that were addressed in this manuscript.</p> <p>7 Q. Have you reviewed the scientific</p> <p>8 advisory panel report that was prepared by the</p> <p>9 scientific advisory panel of the EPA?</p> <p>10 MR. COPLE: Objection. Lacks</p> <p>11 foundation.</p> <p>12 A. Have I -- for -- I'm sorry, for what</p> <p>13 topic?</p> <p>14 BY MR. MILLER:</p> <p>15 Q. For glyphosate and potential</p> <p>16 association with non-Hodgkin's lymphoma.</p> <p>17 A. I believe I briefly looked at part of</p> <p>18 it. However, I did not read through the entire</p> <p>19 document, and it was not part of my evaluation</p> <p>20 one way or the other of the epidemiology</p> <p>21 studies.</p> <p>22 Q. Okay. So let's go, then, back to the</p> <p>23 IARC paper we were looking at here,</p> <p>24 Exhibit 23-14, I believe -- or 24. I'm sorry,</p> <p>25 what's the exhibit number?</p>	<p>1 and evaluated by this set of authors. I'm</p> <p>2 also -- that's it.</p> <p>3 BY MR. MILLER:</p> <p>4 Q. All right. Let's move on.</p> <p>5 Were you aware that Harvard T.H. Chan</p> <p>6 School of Public Health is currently working on</p> <p>7 a scientific project with IARC?</p> <p>8 MR. COPLE: Objection. Lacks</p> <p>9 foundation.</p> <p>10 A. Could you be more specific, please?</p> <p>11 BY MR. MILLER:</p> <p>12 Q. Let's look at the document. 24-23.</p> <p>13 (Whereupon, Mucci Exhibit 24-23,</p> <p>14 Goldie, et al paper, Global Cervical</p> <p>15 Cancer: HPV Vaccination and</p> <p>16 Diagnostics, was marked for</p> <p>17 identification.)</p> <p>18 BY MR. MILLER:</p> <p>19 Q. Pulled off the Harvard website. Do</p> <p>20 you see it's from the Harvard T. Chan School of</p> <p>21 Public Health, ma'am?</p> <p>22 A. I am just seeing this document now.</p> <p>23 So if you could give me a second --</p> <p>24 Q. Sure.</p> <p>25 A. -- to look it over.</p>
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<p>1 A. 24-21.</p> <p>2 Q. Thank you. 24-21.</p> <p>3 A. This is the news article you're</p> <p>4 talking about, or the --</p> <p>5 MR. HOLLINGSWORTH: We are on 22.</p> <p>6 A. -- the 40 years of --</p> <p>7 MS. MILLER: That was 22.</p> <p>8 MR. MILLER: 24-22. Thank you.</p> <p>9 BY MR. MILLER:</p> <p>10 Q. All right. Go back and look at 24-22.</p> <p>11 Have I got it? All right. And I'm now on</p> <p>12 Page 513. This group of scientists, including</p> <p>13 several from Harvard, conclude this article with</p> <p>14 this sentence, "as a group of international</p> <p>15 scientists, we have looked carefully at the</p> <p>16 recent charges of flaws and bias in the hazard</p> <p>17 evaluations by IARC Working Groups, and we have</p> <p>18 concluded that the recent criticisms are unfair</p> <p>19 and unconstructive."</p> <p>20 Did I read that correctly?</p> <p>21 MR. COPLE: Objection. The document</p> <p>22 speaks for itself.</p> <p>23 A. Yes. While that is what is said in</p> <p>24 this article, I'm not really sure what</p> <p>25 specifically the concerns were that were raised</p>	<p>1 Yes, it seems to be from the Harvard</p> <p>2 School of Public Health website.</p> <p>3 Q. Center for Health Decision Science.</p> <p>4 And what is that?</p> <p>5 A. It is -- kind of as the name implies,</p> <p>6 it's the use of decision and analysis tools in</p> <p>7 public health.</p> <p>8 Q. And the only reason I'm going over it</p> <p>9 is to show that one of Harvard's partners in</p> <p>10 this project on cervical cancer is the IARC.</p> <p>11 Do you see that, ma'am?</p> <p>12 MR. COPLE: Objection. Lacks</p> <p>13 foundation, the document speaks for itself.</p> <p>14 A. You know, I -- I can -- I'm not</p> <p>15 familiar with this particular campaign. IARC,</p> <p>16 or the International Agency for Research in</p> <p>17 Cancer, is a very broad research group. So I</p> <p>18 guess I'm not exactly sure what their role is</p> <p>19 with this specific campaign. I'm just not</p> <p>20 familiar with this specific project.</p> <p>21 BY MR. MILLER:</p> <p>22 Q. According to this Harvard document,</p> <p>23 "IARC, which coordinates and conducts</p> <p>24 epidemiological and laboratory research on the</p> <p>25 causes of cancer. In this partnership, IARC</p>

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Page 190	<p>1 collates published data on HPV type distribution 2 in cervical cancer." 3 And I'm not trying to get into 4 cervical cancer. It's really not an issue here. 5 But were you aware Harvard was partnered with 6 IARC? 7 A. For this particular project -- 8 MR. COPLÉ: Objection. It lacks 9 foundation, the document speaks for itself. 10 A. Yeah, as I said, there's -- this 11 particular project I was not aware of one way or 12 the other. 13 BY MR. MILLER: 14 Q. Were you aware of any other projects 15 that Harvard has partnered with IARC on? 16 A. I -- it wasn't something that I -- I'm 17 not aware one way or the other of other 18 collaborations going on. I think I -- I think 19 whether or not, however, Harvard is 20 collaborating with IARC, whether Harvard 21 investigators have served on IARC panels, I 22 think for me in reviewing the epidemiology 23 studies, looking at the IARC report was one 24 small piece of this entire process that I put 25 forth together in looking through my expert</p>	Page 192	<p>1 evidence. And in light of the concerns that 2 IARC themselves raised about these important 3 issues, I think -- and seeing the fact that they 4 played out in the analysis of Pahwa, et al, as 5 well as others, I think you can see that these 6 are real issues in these epidemiology studies, 7 the case-control studies, these are real issues 8 that the bias and confounding existed. 9 BY MR. MILLER: 10 Q. All right. So you don't agree with 11 IARC and their findings? 12 A. As I said, what I -- what I said just 13 briefly wasn't disagreeing one way or the other 14 with IARC. What I looked at was the 15 epidemiology evidence. And, indeed, IARC 16 themselves, the epidemiology group, said 17 specifically that they could not rule out bias, 18 confounding, or chance in those epidemiology 19 studies. So that part I actually agree with. 20 And not only that, now with the 21 additional analyses that have taken place in 22 those same datasets of the studies that IARC 23 reviewed, those concerns play out with actual 24 data from -- I think Pahwa is an excellent 25 example that highlights the residual confounding</p>
Page 191	<p>1 report. I'm not trying to make -- comment one 2 way or the other on IARC as an organization or 3 review body, but what to say is to specifically 4 talk to you about the process in which I put 5 together my epidemiology studies. 6 Q. But you see, one of the things I'm 7 here today to do is to inquire as to why you 8 disagree with the 17 scientists at IARC on 9 whether glyphosate is a probable cause of 10 non-Hodgkin's lymphoma. 11 MR. COPLÉ: Objection. Argumentative. 12 A. I think, as I said previously, I think 13 when you look at what IARC said specifically 14 about the epidemiology studies was that they 15 found the evidence to be limited, and that they 16 couldn't rule out bias, confounding, and chance. 17 And, in fact, actually, as I've stated 18 previously, now reanalyses of those same studies 19 that IARC looked at actually demonstrate in the 20 actual datasets that there was recall bias 21 because of the proxy respondents, and there was 22 residual confounding by the lack of adjustment. 23 So those -- so actually I'm not 24 disagreeing, but -- with IARC, but, in fact, 25 actually looking at the body of epidemiology</p>	Page 193	<p>1 that was present in the -- some of the US and 2 Canadian studies, the issues of proxy 3 respondents that were in those studies, as well 4 as in the Swedish studies as well. 5 Q. So you agree with the IARC scientists 6 that there's limited evidence, but you don't 7 agree with them that glyphosate is a probable 8 form -- cause of non-Hodgkin's lymphoma? 9 A. That's not actually what I said. 10 What I said was my goal of my expert 11 report was specifically to look at the 12 epidemiology literature on the association 13 between glyphosate and NHL risk, which is what I 14 did. And I looked at all of the evidence, 15 including studies that have been conducted after 16 IARC occurred. And when I look at that entire 17 body of evidence and look at each of the 18 individual studies critically and look at the 19 strengths as well as the weaknesses and look at 20 the totality of evidence, based on that, I come 21 to my expert opinion that NHL and glyphosate are 22 not causally linked. 23 Q. Is there a positive association in the 24 case-control studies? 25 A. While some analyses -- it depend -- I</p>

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<p>1 don't think you could say across the board there</p> <p>2 is one way or the other of positive association.</p> <p>3 While some of the earlier studies -- for</p> <p>4 example, De Roos 2003 reported an odds ratio</p> <p>5 that suggested a positive association. However,</p> <p>6 reanalysis of that same data actually found no</p> <p>7 association.</p> <p>8 Q. Reanalysis by whom?</p> <p>9 A. Pahwa, et al.</p> <p>10 Q. Would you defer to Pahwa, et al about</p> <p>11 whether there is an association between</p> <p>12 glyphosate and non-Hodgkin's lymphoma?</p> <p>13 A. As I said previously, I wouldn't defer</p> <p>14 to just any one study. I think you have to take</p> <p>15 it in totality, and which is what I did.</p> <p>16 Q. Do you know who Richard Clapp is?</p> <p>17 A. I am familiar with Dr. Clapp.</p> <p>18 Q. He's a professor emeritus at Boston</p> <p>19 University School of Public Health?</p> <p>20 A. Yes, I'm familiar with his name.</p> <p>21 Q. Well-respected scientist?</p> <p>22 A. I don't know him very well, actually.</p> <p>23 I couldn't say one way or the other.</p> <p>24 Q. Let's mark as Exhibit 24-24 off the</p> <p>25 Harvard T.H. Chan website a picture of</p>	<p>1 Dr. Clapp, Dr. Portier, and others, and ask if</p> <p>2 anyone has provided this letter to you before.</p> <p>3 It's Exhibit 24-25.</p> <p>4 (Whereupon, Mucci Exhibit 24-25,</p> <p>5 Portier, et al paper, Differences in</p> <p>6 the carcinogenic evaluation of</p> <p>7 glyphosate between the IARC and EFSA,</p> <p>8 was marked for identification.)</p> <p>9 A. I don't recall. It's possible that it</p> <p>10 was provided to me, but I don't recall this</p> <p>11 particular publication.</p> <p>12 BY MR. MILLER:</p> <p>13 Q. Let's look at it. Okay? "Differences</p> <p>14 in the carcinogenic evaluations of</p> <p>15 glyphosate" --</p> <p>16 A. I'm sorry, where are you reading?</p> <p>17 Q. I'm reading the title right now,</p> <p>18 ma'am.</p> <p>19 A. Okay.</p> <p>20 Q. Okay. The "Differences in</p> <p>21 carcinogenic evaluation of glyphosate between</p> <p>22 the IARC and the European Food Safety</p> <p>23 Authority."</p> <p>24 You see Dr. Clapp is one of the</p> <p>25 authors here? Let me find his name. There he</p>
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<p>1 Dr. Clapp.</p> <p>2 (Whereupon, Mucci Exhibit 24-24,</p> <p>3 Harvard T.H. Chan website biography of</p> <p>4 Richard Clapp, D.Sc, was marked for</p> <p>5 identification.)</p> <p>6 BY MR. MILLER:</p> <p>7 Q. That's the -- a gentlemen we've been</p> <p>8 talking about?</p> <p>9 A. I'm sorry, is that a question?</p> <p>10 Q. Yes, it is. Is that the gentleman --</p> <p>11 A. I'm sorry, what is the question?</p> <p>12 Q. Is that the gentleman we've been</p> <p>13 talking about?</p> <p>14 A. I've never seen his photo, so I</p> <p>15 couldn't say. But the Richard Clapp that I'm</p> <p>16 thinking about was at Boston University.</p> <p>17 Q. Okay. Are you aware that Dr. Clapp</p> <p>18 signed a letter published in the Journal of</p> <p>19 Epidemiology and Community Health concerning the</p> <p>20 issue of glyphosate in non-Hodgkin's lymphoma?</p> <p>21 MR. COPLE: Objection. Lacks</p> <p>22 foundation.</p> <p>23 A. No, I wasn't aware one way or another.</p> <p>24 BY MR. MILLER:</p> <p>25 Q. Here's a copy of that letter signed by</p>	<p>1 is. See that, ma'am?</p> <p>2 A. Yes.</p> <p>3 MR. COPLE: Objection. The document</p> <p>4 speaks for itself.</p> <p>5 A. Yes, I can see that he's a co-author</p> <p>6 on this study.</p> <p>7 BY MR. MILLER:</p> <p>8 Q. So in this August of 2016 letter,</p> <p>9 Dr. Clapp and others write -- let's go to Page 2</p> <p>10 of this document. What Dr. Clapp says is that,</p> <p>11 "The IARC Working Group carefully and thoroughly</p> <p>12 evaluated all available epidemiology data,</p> <p>13 considering the strengths and weaknesses of each</p> <p>14 study."</p> <p>15 Do you disagree with that?</p> <p>16 A. With what it says, this is</p> <p>17 specifically what it says, yes. I -- but,</p> <p>18 again, I wasn't part of the review process. So,</p> <p>19 you know, I can't comment one way or the other</p> <p>20 about the thoroughness of the review. But it is</p> <p>21 what it says here.</p> <p>22 Q. Dr. Clapp goes on to say, "This is key</p> <p>23 to determining that the positive associations</p> <p>24 seen in case-control studies are a reliable</p> <p>25 indication of association and not simply due to</p>

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<p>Page 198</p> <p>1 chance or methodological flaws." 2 That's true, isn't it? 3 MR. COPLE: Objection. The document 4 speaks for itself. 5 A. That is what it specifically says here 6 in this commentary. 7 BY MR. MILLER: 8 Q. Dr. Clapp goes on to say, "To provide 9 a reasonable interpretation of the findings, an 10 evaluation needs to properly weigh studies 11 according to quality rather than simply count 12 the number of positive and negative studies." 13 That's true as well, isn't it? 14 MR. COPLE: Objection. The document 15 speaks for itself. 16 A. That's specifically what this document 17 says. 18 BY MR. MILLER: 19 Q. He goes on to say, "The two 20 meta-analyses cited in the IARC Monograph are 21 excellent examples of objective evaluations and 22 show a consistent positive association between 23 glyphosate and non-Hodgkin's lymphoma." 24 That's true as well, isn't it, ma'am? 25 MR. COPLE: Objection. Lacks</p>	<p>Page 200</p> <p>1 meta-analyses and the results that they had in 2 their study. 3 BY MR. MILLER: 4 Q. Let's see what Dr. Clapp and others 5 say in their summary on these issues. Going to 6 the last page, this is Page 743, and, "The most 7 appropriate and scientifically based evaluation 8 of the cancers reported in humans and laboratory 9 animals as well as supportive mechanistic data 10 is that glyphosate is a probable human 11 carcinogen." 12 That's true, isn't it? That's true 13 what it says, and as a scientific opinion that 14 is correct? Do you agree or not agree? 15 A. So as I stated previously, first of 16 all, this is what the words here say. However, 17 what I reviewed specifically was the 18 epidemiology data in humans, and there, based on 19 that evaluation of the studies, you cannot rule 20 out confounding and bias. And, indeed, we see 21 that when you account for confounding and bias, 22 actually, and when you look at the best 23 epidemiology evidence, the -- in its entirety, 24 there actually -- it does not support a causal 25 association based on the epidemiology data.</p>
<p>Page 199</p> <p>1 foundation, the document speaks for itself. 2 A. So, while that is specifically what 3 those words say in the commentary, I think I've 4 talked about this issue in a greater detail 5 earlier today specifically. And I'm not even 6 sure which of the two meta-analyses they're 7 referring to. It only cites one of the 8 meta-analyses here. 9 But if you take the Schinasi 10 meta-analysis, I think there were concerns that 11 were -- that, indeed, actually IARC mentions, 12 which are that the -- for some reason they 13 didn't always use the most-adjusted estimates in 14 their analysis. 15 Secondly, if we look at the Chang and 16 Delzell meta-analysis of 2016, that also is 17 important to note that those meta-analyses -- a 18 meta-analysis is going to be biased if the 19 individual studies going into it are biased. 20 And if -- based on what we talked about earlier, 21 we can see clearly that there was residual 22 confounding present in some of the US studies. 23 You can see that from the Pahwa analysis. 24 And so I think that is an important 25 consideration when we're thinking about these</p>	<p>Page 201</p> <p>1 Q. Dr. Clapp and others go on to say, "On 2 the basis of this conclusion and in the absence 3 of evidence to the contrary, it is reasonable to 4 conclude that glyphosate formulations should 5 also be considered likely human carcinogens"; 6 right? 7 MR. COPLE: Objection. The document 8 speaks for itself. 9 A. That is what the -- this is what is 10 written in this commentary. However, as I've 11 stated previously, the body of epidemiology 12 evidence actually does not support this. 13 BY MR. MILLER: 14 Q. They just got it wrong? 15 MR. COPLE: Objection. Argumentative. 16 A. Is that a question? 17 BY MR. MILLER: 18 Q. Yes. 19 A. So, again, when you look at what IARC 20 specifically said based on the studies they had, 21 they said the evidence was limited, and that 22 confounding and bias could not be ruled out. 23 And, indeed, given the subsequent analyses that 24 we've looked at and talked about earlier today, 25 we can see that, indeed, confounding due use of</p>

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<p>1 other pesticides, as well as the recall bias, 2 because a very high proportion of proxy 3 respondents really accounts for any small 4 positive associations that might have been seen 5 in the earlier studies. 6 When you look at the updated analysis 7 and the highest level of evidence from Alavanja 8 using the cohort study that's immune from the 9 recall bias, and that also dealt with the issue 10 of residual confounding by adjusting for 11 multiple pesticides in the study, taken together 12 this body of evidence does not support a 13 positive association between NHL and glyphosate. 14 Q. We talked before about 15 John Acquavella, the epidemiologist who at times 16 had been a full-time employee of Monsanto. Are 17 you aware that he was deposed, and he said that 18 IARC's classification of glyphosate as a 19 probable carcinogen was a correct finding? 20 MR. COPLÉ: Objection. Lacks 21 foundation. 22 A. I have not -- could I, please, look at 23 the report from Dr. Acquavella? 24 BY MR. MILLER: 25 Q. The testimony, sworn-under testimony,</p>	<p>1 A. I'm sorry. What -- 2 Q. Page 472, Line 22. 3 A. Mm-hm. 4 Q. Okay. "IARC determined, based on 5 hazard identification, that glyphosate, in its 6 view, is a probable carcinogen. Is that a 7 correct finding?" 8 Let's see what the doctor's answer 9 under oath is here. 10 "Right. So I say yes in the context 11 that they don't consider, you know, feasibility, 12 necessarily, or plausibility, first, based on 13 the amount of likely exposure and the frequency 14 of exposure that people who have contact with 15 the chemical are likely to have. So that the 16 shorthand for that is hazard identification, so, 17 yes, in that context." 18 Do you see that, ma'am? 19 MR. COPLÉ: Same objection. 20 A. I find it difficult since I don't have 21 access to this entire testimony. And, actually, 22 frankly, just in reading through his answer, 23 I'm, actually, not really sure one way or the 24 other what he's trying to say. Whether 25 Dr. Acquavella feels one way or the other about</p>
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<p>1 and I'm going to hand it to you now. 2 (Whereupon, Mucci Exhibit 24-26, 3 Excerpt of 4/8/17 deposition 4 transcript of John Acquavella, PhD, 5 was marked for identification.) 6 BY MR. MILLER: 7 Q. 24-26 is portions of Dr. Acquavella's 8 deposition. 9 Have you been provided 10 Dr. Acquavella's deposition by anyone? 11 MR. COPLÉ: Object to the use of an 12 incomplete document that provides only pages 13 Pages 337, 472, 473. 14 A. I'm sorry. Could you repeat the 15 question? 16 BY MR. MILLER: 17 Q. Yes, ma'am. 18 Have you been previously provided what 19 I just handed you? 20 MR. COPLÉ: Same objection. 21 A. I don't believe I've seen this. 22 BY MR. MILLER: 23 Q. Let's look together at Page 472. 24 Dr. Acquavella was asked, "Question: IARC 25 determined, based upon hazard identification" --</p>	<p>1 the IARC finding, it wouldn't have influenced 2 one way or the other my own independent 3 evaluation of the epidemiology studies on NHL 4 and glyphosate. 5 BY MR. MILLER: 6 Q. Let's move on to look at some of those 7 studies. 8 THE WITNESS: Might this be a good 9 time to take a break? Or what's our plan -- 10 MR. MILLER: Sure. 11 THE WITNESS: -- for taking a break? 12 MR. MILLER: If you want a break, 13 we'll take a break. 14 THE WITNESS: Okay. 15 THE VIDEOGRAPHER: Going off the 16 record. The time is 12:49. 17 (Whereupon, a luncheon recess was 18 taken.) 19 20 21 22 23 24 25</p>

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<p>1 AFTERNOON SESSION</p> <p>2</p> <p>3 THE VIDEOGRAPHER: Back on the record.</p> <p>4 The time is 1:30.</p> <p>5 MR. MILLER: I said that. Give me one</p> <p>6 second. Perfect.</p> <p>7 BY MR. MILLER:</p> <p>8 Q. All right. Doctor, how was lunch?</p> <p>9 A. Fine. Thank you.</p> <p>10 Q. Good.</p> <p>11 A. How was your lunch?</p> <p>12 Q. Perky and sassy. Thanks. Great.</p> <p>13 Okay. You had mentioned before the</p> <p>14 Pahwa PowerPoint and how it helped you look at</p> <p>15 things, generally speaking. Do you generally</p> <p>16 remember that line of --</p> <p>17 A. What I remember is the importance of</p> <p>18 the analysis by Pahwa, et al, in terms of</p> <p>19 showing the issues of recall bias and residual</p> <p>20 confounding.</p> <p>21 Q. Is this 24-27 that PowerPoint?</p> <p>22 A. There were three different PowerPoint</p> <p>23 presentations that I looked at by Pahwa, et al.</p> <p>24 I believe the one -- well, yeah, let me -- I can</p> <p>25 look through specifically my report and tell you</p>	<p>1 A. Well, it doesn't, because it's missing</p> <p>2 one of the key analyses. It seems like</p> <p>3 comparing -- it's also these results are</p> <p>4 slightly different than what's reported in the</p> <p>5 manuscript. So I think it would be the August,</p> <p>6 2015 that would be useful to have.</p> <p>7 Q. What is that key analysis that is</p> <p>8 missing?</p> <p>9 A. As I said, it's comparing the --</p> <p>10 showing the comparison of the crudely adjusted</p> <p>11 and the multivariable adjusted analyses together</p> <p>12 to show the issue of residual confounding. I</p> <p>13 think that was one important feature. And then,</p> <p>14 also, separately looking at the self-respondents</p> <p>15 only. So, again, it's just different. So it</p> <p>16 would be helpful to look at the August, 2015</p> <p>17 presentation.</p> <p>18 Q. Do you have a copy of that with you</p> <p>19 here today?</p> <p>20 A. I have it on my computer, but I don't</p> <p>21 have a printout of the copy.</p> <p>22 Q. Are your findings in that regard</p> <p>23 referenced in your report?</p> <p>24 A. Yes.</p> <p>25 Q. Which page?</p>
<p>Page 207</p> <p>1 which ones they are.</p> <p>2 (Whereupon, Mucci Exhibit 24-27,</p> <p>3 6/3/15 PowerPoint, A Detailed</p> <p>4 Evaluation of Glyphosate Use and the</p> <p>5 Risk of Non-Hodgkin Lymphoma in the</p> <p>6 NAPP, was marked for identification.)</p> <p>7 A. So there were two PowerPoint versions</p> <p>8 for a meeting. One was dated June 3, which is</p> <p>9 this one, and there's a second one, August 31st,</p> <p>10 2015.</p> <p>11 BY MR. MILLER:</p> <p>12 Q. Okay. How does this June 13, 2015 aid</p> <p>13 you in coming to your opinions in this case?</p> <p>14 A. This printout is a little difficult to</p> <p>15 see with the sort of extra text here. And</p> <p>16 there's no page numbers. I'm not sure if I</p> <p>17 could refer you to a specific page in the</p> <p>18 presentation.</p> <p>19 These data also look actually</p> <p>20 different from the presentation of August 31st.</p> <p>21 I don't know if you have that presentation</p> <p>22 available.</p> <p>23 Q. I don't.</p> <p>24 Does this exhibit help you form your</p> <p>25 opinions, inform you of your opinions?</p>	<p>Page 209</p> <p>1 A. So if you look, for example, on the</p> <p>2 top of Page 47, this talks about the ever versus</p> <p>3 never exposure.</p> <p>4 And so what we can see here, I present</p> <p>5 first the odds ratio that was in the abstract,</p> <p>6 conference abstract document. Secondly, looking</p> <p>7 at the odds ratio from the 2015 August</p> <p>8 presentation, looking at the crudely adjusted</p> <p>9 odds ratio, and then looking at the</p> <p>10 multivariable adjusted odds ratio, and then</p> <p>11 finally the odds ratio multivariable that was</p> <p>12 restricted to the self-reported data from</p> <p>13 self-respondents.</p> <p>14 Q. So Exhibit 24-27 is one of the</p> <p>15 PowerPoints that we've been discussing; right?</p> <p>16 A. As I'd mentioned, it's one of the</p> <p>17 presentations that I looked at. But in terms of</p> <p>18 what I looked at, present in the report, it's</p> <p>19 specifically the odds ratio from the 2015 August</p> <p>20 presentation.</p> <p>21 Q. Let's look at the June presentation</p> <p>22 for a minute and see what these scientists find,</p> <p>23 and then we can move on.</p> <p>24 A. Sorry, I just want to make sure that</p> <p>25 we have the -- you know, I don't know why the</p>

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<p>1 data are different between the conference 2 abstract and the August, 2015 presentation or 3 the June, 2015 presentation. So I'm also 4 looking at the manuscript from Pahwa. Are there 5 data tables associated with this manuscript, do 6 we know, by Pahwa, et al? 7 Q. You don't get to depose me now. 8 A. Oh, I'm sorry. 9 Q. I depose you. 10 A. Yes, I'm sorry about that. I just -- 11 I was hoping to see the actual data. 12 Q. Let's look at this exhibit. If you'd 13 please turn with me to "Selected Characteristics 14 of Non-Hodgkin's Lymphoma Cases and Controls." 15 Okay. 16 A. Okay. Selected characteristics, cases 17 and controls. 18 Q. Yes, ma'am. And all I'm trying to do 19 by looking at this is to get some of the 20 acronyms down. These are different types of 21 non-Hodgkin's lymphoma. I think we can agree FL 22 is -- how do you pronounce that? 23 A. Follicular. 24 Q. Say again? 25 A. Follicular.</p>	<p>1 But, again, that differs from the 2 August, 2015 publications with the relative risk 3 of 1.23 and 95 percent confidence interval of 4 0.8 to 1.8, suggesting no association. 5 Q. And for the subtype SLL of 6 non-Hodgkin's lymphoma, they show an 87 percent 7 increased risk, again with -- not statistically 8 significant finding; right? 9 A. And just to give you the data for 10 August, 2015, the odds ratio is attenuated 1.51, 11 0.87 to 2.60, based on 15 exposed cases. 12 Q. Okay. So instead of an 87 percent 13 increase, it shows a 51 percent increased risk 14 in the August PowerPoint? 15 MR. COPLE: Objection. 16 Mischaracterizes the witness's testimony. 17 A. I'm not talking about it being 18 increased risk at all. What I was saying was 19 what the reported odds ratio and 95 percent 20 confidence intervals were. This -- in this 21 analysis, that number that I'm giving you and 22 this number here actually don't deal with the 23 issue of proxy respondents. They have limited 24 the analysis to the self-reported data. 25 So adjusting for the way that they</p>
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<p>1 Q. Follicular. Okay. And DLBCL is 2 the -- is diffuse; right? 3 A. Yes. 4 Q. All right. And small lymphocytic, 5 SLL, also a form of non-Hodgkin's lymphoma; 6 right? 7 A. Yes. 8 Q. So if we go two pages back, the 9 authors tell us with overall non-Hodgkin's 10 lymphoma risk, 22 percent increased risk; right? 11 A. So the odds ratio is 1.22. The 12 confidence interval includes the null value. 13 But just to clarify, that is -- that odds ratio 14 that is there is different than the odds ratio 15 that was presented in the August, 2015 16 publication, which was an odds ratio of 1.13 17 with a confidence interval of 0.84 to 1.51. 18 Q. All right. And for DLBCL, a subtype 19 of non-Hodgkin's lymphoma, they showed a 20 32 percent increased risk, not statistically 21 significant; right? 22 A. Again, the relative risk is 1.32. The 23 95 percent confidence interval is somewhat wide 24 given the number of exposed cases. 0.87 25 includes the null value.</p>	<p>1 have, putting proxy respondent in the model, 2 actually doesn't adjust for the recall bias 3 that's inherent in these studies. 4 BY MR. MILLER: 5 Q. These authors have adjusted for age; 6 right? 7 A. Correct. 8 Q. For sex? 9 A. Correct. 10 Q. For state/province? 11 A. Yes. Correct. 12 Q. For lymphatic and hemopoietic cancer 13 in a first-degree relative? 14 A. Correct. 15 Q. And for use of proxy respondent? 16 A. As I said, while they put that in the 17 model, it doesn't account for the recall bias 18 that is present in these studies. That's not an 19 appropriate way to deal with the recall bias. 20 Q. And they've adjusted for the use of 21 any personal protective equipment; right? 22 A. Yes. 23 Q. For the use of 2,4-D? 24 A. Correct. 25 Q. And adjusted for the use of dicamba</p>

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<p>1 and malathion; right?</p> <p>2 A. Correct.</p> <p>3 Q. And for other types of non-Hodgkin's</p> <p>4 lymphoma, other than the three subtypes</p> <p>5 identified, they have a 75 percent,</p> <p>6 statistically significant; right?</p> <p>7 A. Just to clarify, that does differ what</p> <p>8 was in the August, 2015 public -- presentation,</p> <p>9 which presented a non-statistically significant</p> <p>10 association. And, again, just to clarify, it's</p> <p>11 not appropriate, their approach to adjusting for</p> <p>12 the proxy respondents' recall bias by just</p> <p>13 putting it in the model.</p> <p>14 Q. So, please, turn to "Frequency of</p> <p>15 Glyphosate Handling and Non-Hodgkin's Lymphoma</p> <p>16 Risks" from this PowerPoint. And for greater</p> <p>17 than two days they show a statistically</p> <p>18 significant 98 percent increased risk; right?</p> <p>19 A. Yes. Well, that's what the data shows</p> <p>20 here.</p> <p>21 What I'd like to do is look at -- just</p> <p>22 because I think it's important that there are</p> <p>23 differences between the August, 2015 publication</p> <p>24 and this June publication. So -- and just to</p> <p>25 clarify, it's a small difference, but the odds</p>	<p>1 (Whereupon, Mucci Exhibit 24-28,</p> <p>2 McDuffie, et al study, Non-Hodgkin's</p> <p>3 Lymphoma and Specific Pesticide</p> <p>4 Exposures in Men, was marked for</p> <p>5 identification.)</p> <p>6 BY MR. MILLER:</p> <p>7 Q. You've reviewed this?</p> <p>8 A. Yes, I did.</p> <p>9 Q. And let's go over it. This is a study</p> <p>10 about non-Hodgkin's Lymphoma and Specific</p> <p>11 Pesticide Exposures in Men; right?</p> <p>12 A. Yes.</p> <p>13 Q. Now, do you know any of these</p> <p>14 scientists?</p> <p>15 A. I know the names, but I don't know</p> <p>16 these individuals.</p> <p>17 Q. Okay. Now, this was published in</p> <p>18 Cancer Epidemiology, Biomarkers & Prevention.</p> <p>19 Do you see that?</p> <p>20 A. Yes.</p> <p>21 Q. It's a peer-reviewed journal; right?</p> <p>22 A. It is, yes.</p> <p>23 Q. So this article would have undergone a</p> <p>24 peer review process and then been accepted for</p> <p>25 publication; right?</p>
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<p>1 ratio was attenuated somewhat to 1.73.</p> <p>2 I think one other important issue to</p> <p>3 raise, which we've discussed previously, is the</p> <p>4 concerns around using only frequency to measure</p> <p>5 an actual dose-response. I think there's -- it</p> <p>6 doesn't take into account the lifetime of</p> <p>7 exposures and the intensity. It's really only</p> <p>8 taking into account how many days per year</p> <p>9 someone is using it.</p> <p>10 Q. You didn't tell me whether the 1.73</p> <p>11 from the August PowerPoint was statistically</p> <p>12 significant. Is it?</p> <p>13 A. The 95 percent confidence interval is</p> <p>14 1.02 to 2.93.</p> <p>15 Q. Statistically significant; right?</p> <p>16 A. It is an association that is</p> <p>17 statistically significant. However, the</p> <p>18 interpretation of that odds ratio is somewhat</p> <p>19 challenging because the selection of number of</p> <p>20 days per year as a measure of dose.</p> <p>21 Q. I'm going to hand you what's been</p> <p>22 marked as 24-28, the McDuffie study from 2001.</p> <p>23</p> <p>24</p> <p>25</p>	<p>1 A. Yes.</p> <p>2 Q. And this is a population-based</p> <p>3 case-control study, we can agree?</p> <p>4 A. It is a population-based case-control</p> <p>5 study, yes.</p> <p>6 Q. And what these -- one, two, three,</p> <p>7 four, five, six, seven, eight -- nine scientists</p> <p>8 concluded in this peer-reviewed case-control</p> <p>9 study, if we could look at Page 1161, was that</p> <p>10 for glyphosate greater than two days per year</p> <p>11 had over a doubling of the risk, statistically</p> <p>12 significant. That's what they concluded; right?</p> <p>13 A. I'm not sure. Could you point to</p> <p>14 specifically in the discussion where they</p> <p>15 conclude that? Because I think they report on</p> <p>16 that as the relative risk. But I'm just trying</p> <p>17 to find where the -- where they make a specific</p> <p>18 conclusion about that relative risk.</p> <p>19 Q. I'm looking at the table. Let me know</p> <p>20 if I'm reading the table wrong. They're talking</p> <p>21 about glyphosate.</p> <p>22 Do you see where I read that?</p> <p>23 A. Yes, I do see. But there's a</p> <p>24 difference between reporting a relative risk</p> <p>25 estimate and a conclusion about that relative</p>

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<p>1 risk. And I think the reason that I say that</p> <p>2 that is important is a number of things.</p> <p>3 One is that this study had kind of a</p> <p>4 couple of important issues to consider. One is</p> <p>5 the issue of the proxy respondents, which I've</p> <p>6 talked a lot about and which we show in the</p> <p>7 Pahwa analysis, is an important issue.</p> <p>8 Secondly, the issue of residual</p> <p>9 confounding, I think, by other pesticides used,</p> <p>10 and they haven't adjusted for other pesticides</p> <p>11 in this analysis. And I think particularly so</p> <p>12 what's been seen in several of these studies,</p> <p>13 that individuals who are using glyphosate more</p> <p>14 regularly tend to also more regularly use other</p> <p>15 pesticides. And so this is an example where the</p> <p>16 unadjusted odds ratio can lead to a spurious</p> <p>17 association.</p> <p>18 So that's why I was trying to find</p> <p>19 specifically what the authors conclude. They</p> <p>20 may -- they reported a number. The question is</p> <p>21 how did they interpret that number and what are</p> <p>22 the strengths and limitations that they thought</p> <p>23 about. And then secondly, what do we know from</p> <p>24 the Pahwa analysis of which a large proportion</p> <p>25 of the cases for this dose analysis came from</p>	<p>1 they reported here is 2.12, I think we can see</p> <p>2 from the Pahwa analysis that we're concerned</p> <p>3 about unmeasured confounding, as well as the</p> <p>4 potential issue of the proxy respondents.</p> <p>5 And then finally, it's, again, the</p> <p>6 issue of the days per year perhaps not being</p> <p>7 really the optimal way of looking at this</p> <p>8 response.</p> <p>9 BY MR. MILLER:</p> <p>10 Q. And that 2.12 they report is</p> <p>11 statistically significant?</p> <p>12 A. The 2.12 for the unadjusted odds</p> <p>13 ratio, you know, again, when we think about --</p> <p>14 we can't really think about statistical</p> <p>15 significance being important or not important if</p> <p>16 we're concerned about bias or confounding, which</p> <p>17 I think we are in this case. So the issue of</p> <p>18 statistical significance, we can't -- we can't</p> <p>19 talk -- comment about chance without if we think</p> <p>20 there's bias or confounding, which I think we</p> <p>21 are very concerned about here.</p> <p>22 Q. I'm sure you are.</p> <p>23 Let's see what the authors say. Let's</p> <p>24 go to Page 1162. We're already there. Let's</p> <p>25 see what they say.</p>
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<p>1 McDuffie.</p> <p>2 Q. Well, that was a mouthful, but let me</p> <p>3 give you my question. It's a narrow one.</p> <p>4 I'm looking at Page 1161. And did</p> <p>5 these authors, these nine scientists in this</p> <p>6 peer-reviewed journal, report an odds ratio of</p> <p>7 2.12, statistically significant? Am I reading</p> <p>8 that wrong?</p> <p>9 MR. COPLE: Objection. Asked and</p> <p>10 answered, argumentative.</p> <p>11 A. As I -- as I said, while that is the</p> <p>12 odds ratio that is reported in this manuscript,</p> <p>13 the authors as well acknowledge the fact that</p> <p>14 there is potential issues with the recall bias</p> <p>15 because of the proxy respondents.</p> <p>16 Another issue that I didn't mention</p> <p>17 already was that the response rates for both the</p> <p>18 cases and controls was fairly low.</p> <p>19 And what you worry about here,</p> <p>20 particularly with the controls, the controls are</p> <p>21 meant to provide information about the</p> <p>22 experience in the population that gave rise to</p> <p>23 the cases. And so if you don't have a good</p> <p>24 response rate, then you can lead to a form of</p> <p>25 selection bias. So while the odds ratio that</p>	<p>1 These nine authors in this</p> <p>2 peer-reviewed journal on the association between</p> <p>3 non-Hodgkin's lymphoma say, "Our results support</p> <p>4 previous findings of association between</p> <p>5 non-Hodgkin's lymphoma and specific pesticide</p> <p>6 exposure."</p> <p>7 Did I read that correctly?</p> <p>8 MR. COPLE: Objection. Argumentative.</p> <p>9 A. That is what it says, but I want -- I</p> <p>10 think an important thing also is that they</p> <p>11 looked at multiple pesticides in this study, not</p> <p>12 only glyphosate. So it's difficult to say one</p> <p>13 way or the other what they're referring to here.</p> <p>14 I think it's also important to note</p> <p>15 that one can be concerned about potential</p> <p>16 systematic bias given the number of positive</p> <p>17 associations that are seen across the board in</p> <p>18 this study.</p> <p>19 BY MR. MILLER:</p> <p>20 Q. You've never written to an editor to</p> <p>21 criticize his study; true?</p> <p>22 A. I'm sorry. For this particular study?</p> <p>23 Q. Yes.</p> <p>24 A. I have never written a letter to the</p> <p>25 editor for this particular study. However, in</p>

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<p>1 looking through critically this study now, and 2 also taken together with the analysis of Pahwa, 3 et al, I can see very clearly the bias and 4 confounding that exists in this study. 5 Q. Sure you can. All right. Let's move 6 on. 7 Let's look at Hardell. Does this 8 study have bias and confounding, Hardell? 9 MR. COPLE: Objection. Argumentative. 10 A. I'm sorry. Hardell is part of a 11 number of publications. Which particular 12 publication are you referring to? 13 BY MR. MILLER: 14 Q. One we're going to mark as 24-29. 15 (Whereupon, Mucci Exhibit 24-29, 16 Hardell, et al article, Exposure to 17 Pesticides as Risk Factor for 18 Non-Hodgkin's Lymphoma and Hairy Cell 19 Leukemia, was marked for 20 identification.) 21 BY MR. MILLER: 22 Q. Is there bias and confounding in this 23 Hardell study (handing)? 24 A. So for each of the studies that I 25 looked at, I went through this as a similar</p>	<p>1 A. Yes. 2 Q. And it's published in Leukemia & 3 Lymphoma, a peer-reviewed journal; right? 4 A. Correct. 5 Q. So it's undergone scrutiny of peer 6 review and been accepted for publication, and 7 you've reviewed it; right? 8 A. I have reviewed this study. It was 9 published in a peer-reviewed journal, studies -- 10 yes. 11 Q. Okay. Let's look at what they 12 concluded in this peer-reviewed journal, these 13 three scientists. On -- in their abstract 14 section, they show, "Increased risks in an 15 univariate analysis were found for subjects 16 exposed to herbicides. Among herbicides, 17 significant associations were found for 18 glyphosate, a tripling of the risk, 19 statistically significant." 20 That's what they reported; right? 21 A. What they're reporting there is the 22 odds ratio that is unadjusted. However, the 23 association for glyphosate was considerably 24 attenuated in the multivariable analysis with an 25 odds ratio of 1.85 in very wide confidence</p>
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<p>1 strategy, to look at the strengths and the 2 limitations. In terms of the limitations 3 specifically of this study, it's actually some 4 of the same problems we're worried about with 5 the earlier case-control studies from the US and 6 Canada. 7 First, 43 percent of the cases were 8 actually dead by the time the study was 9 undertaken. So that's a large number of proxy 10 respondents. 11 Secondly, the way that the issue -- 12 what we're concerned about is also the issue of 13 residual confounding. So, again, case-control 14 studies are a lot more susceptible to the issues 15 of bias that the cohort study is not an issue 16 of. 17 Q. So this study is subject to bias and 18 confounding, in the Hardell study? 19 A. This particular study, I think another 20 key issue is the very small number of exposed 21 cases and controls, which is -- can lead to a 22 spurious association as well. 23 Q. Okay. And so just to be clear, this 24 is a study by three scientists, Dr. Hardell, 25 Eriksson, and Dr. Nordstrom; right?</p>	<p>1 intervals of 0.5 to 6.20, which is kind of an 2 issue in terms of being able to interpret such 3 findings that include the null value as well as 4 potential protective effects. 5 Q. So instead of a 300 increased risk 6 when we use the multivariate analysis, it was an 7 85 percent increased risk? 8 MR. COPLE: Objection. Misstates the 9 witness's testimony. 10 A. I think -- one of the critical issues 11 in epidemiology and getting at a causal 12 association is the issue of confounding. It's 13 one of the -- our most important issues to 14 address. Here, they actually address themselves 15 is there evidence of confounding or not. And, 16 indeed, they actually see that there's 17 considerable confounding. 18 The main issue is given that there 19 were only eight exposed cases and eight exposed 20 controls, when they're adding different factors 21 into the multivariate model, you get these 22 extremely wide confidence intervals. I would 23 say this is basically a very difficult odds 24 ratio and confidence interval to interpret. 25 BY MR. MILLER:</p>

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<p>1 Q. Doesn't this study prove that 2 glyphosate is a risk factor for non-Hodgkin's 3 lymphoma? 4 A. No, this study does not prove that. 5 It's -- as I said, it's actually a study 6 difficult really to interpret given the very 7 small number of exposed cases and small exposed 8 controls. 9 There's also an issue of latency. 10 When these cases were actually recruited, the 11 amount of sufficient latency really isn't there. 12 And the issue of the fact that you had 13 43 percent of your cases were dead and you're 14 relying on proxy respondents, which we've seen 15 in other settings, has induced a recall bias. 16 Q. Let's turn to Page 1047, and see what 17 these scientists say about whether glyphosate is 18 an increased risk of non-Hodgkin's lymphoma, and 19 they state in pertinent part, "In this study, 20 exposure to glyphosate was a risk factor for 21 non-Hodgkin's lymphoma." 22 Do you disagree with them? 23 A. Yes, I do. 24 Q. Okay. 25 A. You can't -- given their own data, I</p>	<p>1 concluded that they, IARC, that glyphosate was a 2 probable human carcinogen for non-Hodgkin's 3 lymphoma. Can't we agree on that much? 4 A. Their statement was a classification 5 of glyphosate as a Class 2A. However, what I 6 was asked specifically to comment on was the 7 epidemiology literature. And my assessment of 8 the epidemiology is that there is no causal 9 association of glyphosate and NHL risk, also 10 IARC's assessment of the epidemiology 11 literature. So I'm just talking about the 12 epidemiology literature here, specifically that 13 the epidemiology studies were limited because 14 they couldn't rule out bias, confounding, or 15 chance. 16 And this is a clear example where all 17 three factors played a role here. We have 18 chance findings because of the fact you only 19 have eight exposed cases and eight exposed 20 controls. You have the issue of confounding 21 here, and then you also have the real concern 22 about recall bias, particularly because of the 23 high proportion of proxy respondents. 24 Q. Are high ejaculators at a decreased 25 risk of prostate cancer?</p>
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<p>1 disagree on that. It's not my own opinion about 2 this. But just looking at the multivariable 3 odds ratio, so accounting for these other 4 herbicides in the multivariate model in Table 7, 5 we can see that it's not really interpretable at 6 all. You have an odds ratio of 1.85, but your 7 confidence interval is so enormous. It's only 8 based on eight exposed cases and eight exposed 9 controls. 10 Q. Are you aware that IARC relied in part 11 on the Hardell study in reaching their 12 conclusion that glyphosate was a probable 13 form -- cause of non-Hodgkin's lymphoma? 14 MR. COPLE: Objection. Lacks 15 foundation. 16 A. Again, so I know that the Hardell -- 17 this Hardell study was one of the epidemiology 18 studies that was reviewed. However, the 19 epidemiology panel for IARC came to the 20 assessment that the epidemiologic evidence was 21 actually limited because of issues of 22 confounding and bias, and it's clear here on 23 many levels concerns about bias. 24 BY MR. MILLER: 25 Q. Bias -- I understand. They also</p>	<p>1 A. I -- that's -- in what context? I'm 2 sorry. 3 Q. In the context of high ejaculators, 4 are they at decreased risk of prostate cancer? 5 MR. COPLE: Objection. Lacks 6 foundation. 7 A. If you'd like me to look at a specific 8 set of studies, I'm happy to do that. 9 BY MR. MILLER: 10 Q. No. I'd ask if you can answer that 11 question. If you can't answer it, you can't 12 answer it. But if you can, answer it. 13 MR. COPLE: Objection. Lacks 14 foundation, vague. 15 A. I'm, again, happy to look at some 16 specific studies or a whole body of literature, 17 but I'm not prepared to comment on that at the 18 moment. 19 BY MR. MILLER: 20 Q. Okay. Now, let's go back to 24-28. 21 We can at least agree that this peer-reviewed 22 study by these nine scientists was considered by 23 IARC and part of the evidence upon which they 24 base their conclusion that glyphosate is a 25 probable human carcinogen; right?</p>

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<p>1 A. So as I mentioned, this is one of 2 several epidemiology studies that IARC reviewed. 3 However, when IARC was reviewing the 4 epidemiology, the epidemiology panel said the 5 data was limited because they couldn't rule out 6 the issues of bias, confounding, or chance. And 7 we actually know that both bias and confounding 8 played a role in these results from two 9 different analyses. One is the extra analysis 10 by Pahwa, et al; and, secondly, when we look at 11 the results from Hohenadel where they looked 12 specifically among what's the association 13 between glyphosate and NHL risk among those who 14 are not using malathion, and I think that's a 15 very clear example of the importance of 16 confounding that particular study. 17 Q. You keep saying "we." Who is we? You 18 and who else? 19 MR. COPLER: Objection. Objection. 20 Argumentative. 21 MR. MILLER: I'm just asking. 22 MR. COPLER: Objection. Argumentative. 23 BY MR. MILLER: 24 Q. You can answer. 25 MR. COPLER: Objection. Argumentative.</p>	<p>1 what they concluded, and then we can talk about 2 why you disagree with it? Okay. 3 MR. COPLER: Do you have a copy for 4 counsel? 5 (Whereupon, Mucci Exhibit 24-30, De 6 Roos, et al paper, Integrative 7 assessment of multiple pesticides as 8 risk factors for non-Hodgkin's 9 lymphoma among men, was marked for 10 identification.) 11 MR. MILLER: I'm sorry, yes, excuse 12 me. Here you are (handing). 13 BY MR. MILLER: 14 Q. And you have reviewed this study, 15 right, ma'am? 16 A. I have. 17 Q. And it was in the -- published in the 18 Occupational Environmental Medicine journal; 19 right? 20 A. Yes. 21 Q. And that's a peer-reviewed journal? 22 A. Yes. 23 Q. And it's by -- one, two, three, four, 24 five, six -- seven scientists, including 25 Dr. Blair and Dr. Weisenburger; right?</p>
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<p>1 MR. MILLER: Are you instructing her 2 not to answer? 3 MR. COPLER: Did you hear that, 4 Counselor? Objection. Argumentative. 5 MR. MILLER: I understand that. 6 BY MR. MILLER: 7 Q. You can answer. 8 A. So in epidemiology we tend to work 9 collaboratively, so if I'm using the word "we," 10 it's really "I." 11 Q. Okay. Fair enough. Let's look at -- 12 we're going to try to treat this as agreeable as 13 possible, even though we clearly disagree on 14 much. So I wasn't trying to be offensive. I 15 hope you didn't take any. 16 Let's look at the next study. The 17 next study, I think, in the line of studies on 18 this issue of association between glyphosate and 19 non-Hodgkin's lymphoma is De Roos 2003. 20 Did you review that study, ma'am? 21 A. I did. 22 Q. Okay. And let me hand it to you. 23 First let's talk about -- and I know you're 24 going to disagree with what the authors 25 concluded, but can we talk about for a minute</p>	<p>1 A. Yes. 2 Q. Okay. And these scientists looked at 3 the issue of the "assessment of multiple 4 pesticides as risk factors for non-Hodgkin's 5 lymphoma among men"; right? 6 A. That is the title of the paper. 7 Q. And what they're doing is they're 8 looking at three case-control studies; is that 9 right? 10 A. Correct. 11 Q. And as they integrate those three 12 case-control studies, they reached some 13 conclusions, and I'm certainly not going to try 14 to stop you from giving me your critique of 15 that. But let's look first at what they 16 concluded, please, at Page 5. 17 On Table 3, they were providing us a 18 table of effect estimates for use of specific 19 pesticides in non-Hodgkin's lymphoma incidence, 20 adjusting for use of other pesticides; right? 21 A. That is what Table 3 is -- includes, 22 yes. 23 Q. And when we say "effect estimates," is 24 that like relative risk? Is that what that 25 means?</p>

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<p>1 A. Yes.</p> <p>2 Q. Okay. And so they did two kinds of</p> <p>3 analysis, logistic regression and hierarchical</p> <p>4 regression; is that right?</p> <p>5 A. Correct.</p> <p>6 Q. Yes, ma'am.</p> <p>7 And they looked at glyphosate, and</p> <p>8 they calculated a 2.1 percent odds ratio,</p> <p>9 statistically significant, under the logistic</p> <p>10 regression; right?</p> <p>11 A. So the odds ratio is 2.1 percent, but</p> <p>12 odds ratio of 2.1 and then -- yes.</p> <p>13 Q. Okay. And using the hierarchical</p> <p>14 regression, they came up with a 60 percent, but</p> <p>15 it was not statistically significant; right?</p> <p>16 A. The odds ratio was 1.6.</p> <p>17 Q. Okay. Now -- and I know that you</p> <p>18 disagree with that as being a real association,</p> <p>19 and now I'm going to ask you to explain why.</p> <p>20 A. So actually I think -- just one thing</p> <p>21 I want to clarify. When we're looking at</p> <p>22 tables, we're not looking at conclusions. We're</p> <p>23 just looking at numbers that were generated from</p> <p>24 the analyses. While I would agree -- well, so a</p> <p>25 couple of things. While I would agree that</p>	<p>1 which we definitely see exists in the Pahwa,</p> <p>2 et al, analysis.</p> <p>3 In some ways, though, when you look at</p> <p>4 the -- so when you look at this totality of</p> <p>5 evidence, and when -- I think one of the</p> <p>6 important ways in which the updated technical</p> <p>7 memorandum of Chang and Delzell does, it -- when</p> <p>8 it takes the Pahwa's analysis for -- which kind</p> <p>9 of deals with all these other issues we've been</p> <p>10 talking about, and puts that into a model, you</p> <p>11 kind of see that the odds ratio generally</p> <p>12 varies. When you look at the body of evidence</p> <p>13 of epidemiology, there's no positive</p> <p>14 association.</p> <p>15 So I would agree with you that this --</p> <p>16 the results from this one study with a</p> <p>17 multivariable adjusted odds ratio generated an</p> <p>18 odds ratio of 1.6 with confidence intervals</p> <p>19 close to 1. However, it doesn't deal with the</p> <p>20 issue of recall bias, which -- you know, it's</p> <p>21 interesting we keep talking about these as</p> <p>22 individual studies, but I think one thing to</p> <p>23 remember is that several of the -- so it's</p> <p>24 McDuffie and De Roos and Cantor and Pahwa are</p> <p>25 kind of -- there's a lot of overlap in what</p>
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<p>1 these odds ratios are elevated, it's -- in a lot</p> <p>2 of ways this paper is -- it's a little</p> <p>3 challenging to understand a couple of things.</p> <p>4 One is, it's not clear -- I reviewed</p> <p>5 the paper several times. It's not exactly clear</p> <p>6 to me what is or is not included in the logistic</p> <p>7 regression model. So I think that's one thing</p> <p>8 to take into account.</p> <p>9 I think, secondly, what is a little</p> <p>10 bit challenging is the difference between the</p> <p>11 results that were seen in Cantor on its own and</p> <p>12 Cantor -- Cantor dataset, and that comprises the</p> <p>13 largest number of cases that are included in the</p> <p>14 study. And then also the Pahwa analysis. So I</p> <p>15 think it's interesting to see how this relative</p> <p>16 risk in the same study population seems to vary</p> <p>17 a lot.</p> <p>18 So if the hierarchical regression</p> <p>19 model, if you believe that to be adjusted for</p> <p>20 confounding, and I think it seems like it was a</p> <p>21 reasonable approach, then you could say it was a</p> <p>22 relative risk of 1.6 and the odds ratio of 0.9</p> <p>23 to -- or sorry, 1.6, 0.9 to 2.8. It seems to</p> <p>24 have dealt with the issue of confounding. We're</p> <p>25 still left here with the issue of recall bias,</p>	<p>1 these studies are. So although it seems like</p> <p>2 I'm picking apart each individual study, these</p> <p>3 are all studies that have similar issues in</p> <p>4 common and, indeed, actually are relying on the</p> <p>5 same studies.</p> <p>6 Q. So you think one of the problems with</p> <p>7 this paper is recall bias; right?</p> <p>8 A. Well, they haven't accounted for</p> <p>9 recall bias. That is one issue.</p> <p>10 The second issue could be is that</p> <p>11 because they're including adjustment for a large</p> <p>12 number of pesticides, and some of these had</p> <p>13 missing data, there's a concern about</p> <p>14 potentially how missing data might have</p> <p>15 influenced the result. But I think one of the</p> <p>16 big issues is around the recall bias that</p> <p>17 remains here.</p> <p>18 Q. But you're aware these scientists</p> <p>19 considered and rejected recall bias as a problem</p> <p>20 later? Are you aware of that?</p> <p>21 A. Well, I -- you know, in looking at the</p> <p>22 analysis from Pahwa, et al, you know, I don't --</p> <p>23 I don't know how they made that assessment about</p> <p>24 recall bias specifically, if they -- how they</p> <p>25 looked at it in their own data. But I do know</p>

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<p>1 by the same -- many of the same authors looking</p> <p>2 at the same dataset through Pahwa clearly shows</p> <p>3 the effect of the proxy respondents as a recall</p> <p>4 bias.</p> <p>5 So it was the same authors here now, I</p> <p>6 guess, 13 years later show, in fact, in their --</p> <p>7 this original dataset that there was concerns</p> <p>8 about recall bias from the proxy respondents.</p> <p>9 Q. And --</p> <p>10 A. Finally just one final comment, I'm</p> <p>11 sorry to interrupt you, but we haven't</p> <p>12 addressed -- or I haven't addressed here, you</p> <p>13 know, these are all studies that were conducted</p> <p>14 in the 1980s. So really the maximum amount of</p> <p>15 latency from -- and this is the maximum, it's</p> <p>16 not necessarily what it was, but the maximum</p> <p>17 possibility is less than ten years. So we do</p> <p>18 have concerns about really their real</p> <p>19 interpretation of these studies.</p> <p>20 Q. Let's see what these authors said</p> <p>21 about whether or not they had recall bias. Turn</p> <p>22 to Page 8, if you would. "Second, the fact that</p> <p>23 there were few associations suggests that the</p> <p>24 positive results we observed are not likely to</p> <p>25 be due to a systematic recall bias for pesticide</p>	<p>1 BY MR. MILLER:</p> <p>2 Q. You haven't read his deposition, and</p> <p>3 you have not read his report?</p> <p>4 A. I have not read his deposition. I</p> <p>5 read over his report briefly because it didn't</p> <p>6 cover -- it wasn't -- major focus wasn't on</p> <p>7 epidemiology. So I only reviewed a small part</p> <p>8 of it.</p> <p>9 Q. We can agree that this De Roos 2003</p> <p>10 article was one of the papers upon which the 17</p> <p>11 members of IARC concluded that glyphosate was a</p> <p>12 probable human carcinogen; right?</p> <p>13 A. The epidemiology group relied on the</p> <p>14 De Roos as one of the papers that looked at, in</p> <p>15 its conclusion, that the epidemiology actually</p> <p>16 was limited in that bias, confounding, and</p> <p>17 chance actually could not be ruled out. So it</p> <p>18 was one of the studies that they used and</p> <p>19 evaluated and came to their statement that the</p> <p>20 evidence was limited and that bias, confounding,</p> <p>21 and chance could not be ruled out.</p> <p>22 Q. Is that all they ruled, or did they</p> <p>23 rule anything else?</p> <p>24 MR. COPLER: Objection. Argumentative.</p> <p>25 BY MR. MILLER:</p>
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<p>1 exposures, or selection bias for subgroups</p> <p>2 included in the analyses of multiple</p> <p>3 pesticides."</p> <p>4 So they didn't think they had a recall</p> <p>5 bias; right?</p> <p>6 A. Yeah, I mean, I understand how they</p> <p>7 came to that assessment here. However, you</p> <p>8 know, several of these authors are authors on</p> <p>9 the Pahwa analysis where they looked at the</p> <p>10 issue of recall bias again in that analysis.</p> <p>11 So, in fact, they actually did, indeed, see the</p> <p>12 effect of the proxy respondents having in that</p> <p>13 same dataset. So several of the same authors on</p> <p>14 these two studies.</p> <p>15 Q. Ma'am, are you aware that one of the</p> <p>16 authors in this study is, in fact, an expert for</p> <p>17 plaintiffs in this case, Dr. Weisenburger?</p> <p>18 A. I am aware of that, yes.</p> <p>19 Q. And he stated under oath and in a very</p> <p>20 detailed report that, in fact, glyphosate causes</p> <p>21 non-Hodgkin's lymphoma. Are you aware of that?</p> <p>22 MR. COPLER: Objection. Lacks</p> <p>23 foundation.</p> <p>24 A. I was not aware one way or the other</p> <p>25 of his statement about that.</p>	<p>1 Q. You keep wanting to say that the</p> <p>2 evidence was limited, but you don't say that, in</p> <p>3 fact, they found that glyphosate was a probable</p> <p>4 human carcinogen. Can we agree that's what they</p> <p>5 found?</p> <p>6 MR. COPLER: Objection. Asked and</p> <p>7 answered.</p> <p>8 A. As I stated, what I'm referring to</p> <p>9 specifically is around the review of the</p> <p>10 epidemiology, which is actually the content of</p> <p>11 my specific expert report here. I reviewed all</p> <p>12 of the epidemiology evidence. And as I stated</p> <p>13 earlier, I think it was important to see that</p> <p>14 some of the concerns that IARC had in raising</p> <p>15 the issues of bias and confounding actually panned</p> <p>16 out in the future -- or the subsequent analyses</p> <p>17 that were performed in the same datasets that</p> <p>18 IARC made their review of.</p> <p>19 BY MR. MILLER:</p> <p>20 Q. And that's -- you're referring to the</p> <p>21 Pahwa article; right?</p> <p>22 A. That -- the Pahwa is one of the</p> <p>23 studies that I'm referring to that exemplifies</p> <p>24 the issue of confounding and bias in these</p> <p>25 studies that had been part of previously.</p>

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<p>Page 242</p> <p>1 Q. And the authors of the Pahwa article 2 would be in a better position to understand that 3 than you, or you cannot agree to that? 4 MR. COPLE: Objection. Argumentative. 5 A. I'm not sure I understand what your 6 question is. 7 BY MR. MILLER: 8 Q. Well, who is more knowledgeable about 9 this issue, you who has come in as an expert for 10 Monsanto or the actual authors who wrote these 11 articles over the last ten years? 12 A. I'm sorry, I don't understand 13 specifically what you're asking. 14 Q. Who is more knowledgeable -- 15 MR. MILLER: I can't read it while it 16 keeps scrolling. Why don't you read it back. I 17 try to read it, and it keeps moving. 18 (Whereupon, the reporter read back the 19 pending question.) 20 A. Yeah, I know the question that you 21 asked, but maybe you could clarify specifically 22 what you're asking. I think, you know, in 2003 23 when De Roos, et al, published, they hadn't 24 looked at the issue of proxy respondents the way 25 that Pahwa, et al, did. So, you know, and</p>	<p>Page 244</p> <p>1 Q. And this is in the International 2 Journal of Cancer, correct? 3 A. Correct. 4 Q. Peer-reviewed journal? 5 A. Yes. 6 Q. So this underwent peer review, was 7 accepted for publication, and published in 2008; 8 right? 9 A. Correct. 10 Q. And it is on the issue of "Pesticide 11 exposure as risk factor for non-Hodgkin lymphoma 12 including histopathological subgroup analysis"; 13 right? 14 A. Yes. 15 Q. And they tell us in their abstract 16 their findings are, "Exposure to glyphosate gave 17 an odds ratio of 2.02," statistically 18 significant. 19 That's what they report; right? 20 A. So that is the unadjusted odds ratio. 21 And the odds ratio that was adjusted for other 22 pesticides was attenuated with an odds ratio of 23 1.51 and a confidence interval of 0.77 to 2.94. 24 Q. And their conclusion is, in part, "The 25 association with glyphosate was considerably</p>
<p>Page 243</p> <p>1 similarly -- so I guess I'm not -- I guess I'm 2 trying to say the own authors looked at their 3 own data in a different way, and actually you 4 can see the issue of confounding and bias here. 5 BY MR. MILLER: 6 Q. Let's look at the Eriksson study from 7 2008. Have you reviewed that before? 8 A. Yes. 9 Q. Okay. Here's a copy. We've marked it 10 24-31. 11 (Whereupon, Mucci Exhibit 24-31, 12 Eriksson, et al article, Pesticide 13 exposure as risk factor for 14 non-Hodgkin lymphoma including 15 histopathological subgroup analysis, 16 was marked for identification.) 17 BY MR. MILLER: 18 Q. Just a few preliminary matters. 19 You can agree that this is an article 20 written by Dr. Eriksson, Hardell, Carlberg, and 21 Akerman? 22 A. Correct. 23 Q. You were in Sweden for a while. Did 24 you know any of these folks? 25 A. I did not.</p>	<p>Page 245</p> <p>1 strengthened." 2 That was their conclusion; right? 3 A. That is what was written here in this 4 manuscript. 5 Q. And please go to Table 2, if you 6 would. And regarding exposure to various 7 herbicides, these scientists in this 8 peer-reviewed journal conclude that if you've 9 been exposed to glyphosate for more than ten 10 days, you have a statistically significant, more 11 than doubling of the risk; right? 12 A. So just again a statement that I made 13 earlier which I think is important, the 14 presentation of data in a table is not a 15 conclusion. It's just some numbers. But the 16 odds ratio they report, which is an unadjusted 17 odds ratio, for more than ten days of use was an 18 odds ratio of 2.36 with a confidence interval of 19 1.04 to 5.37. 20 However, we're particularly concerned 21 with the issue of confounding here. The way 22 that they classified the exposure -- or actually 23 the unexposed group is actually -- not only 24 raises concerns about confounding but, in fact, 25 actually is more likely to result in</p>

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<p>1 confounding, because they defined unexposed not 2 only people who were not using glyphosate, but 3 people who are not using any form of pesticides. 4 So now you have people in more -- with 5 more than ten days of use are those, also, who 6 are using a number of other pesticides. So 7 these pesticides we know tend to vary together. 8 So now you're comparing a group that has many 9 pesticides being used compared to no pesticides 10 being used. So that's where the confounding 11 issue is even stronger an issue here in 12 Eriksson, et al. 13 Q. Let's look at Page 1662 and see what 14 these scientists concluded in their paper. They 15 concluded that, "Glyphosate was associated with 16 a statistically significant increased odds ratio 17 for lymphoma in our study, and that the result 18 was strengthened by a tendency to dose-response 19 effect as shown in Table 2." 20 That's what they concluded; right? 21 A. That is what they -- their statement 22 is that they -- they were associated. But, 23 again, you know, they -- what they're commenting 24 on is not the fully adjusted odds ratio, but the 25 odds ratio from the crude analysis. So they're</p>	<p>1 But I wouldn't want to say one way or the other 2 given that I wasn't on the panel and didn't hear 3 the discussions. 4 Q. You just don't know if those 5 epidemiologists invited to sit on IARC knew 6 about confounding or not; is that fair? 7 A. That's not what I said. What I said 8 was I don't know how they approached the issue 9 of confounding, but I do know in their summary 10 statement what the epidemiology panel did say, 11 that they couldn't exclude confounding as one of 12 the forms of bias from the epidemiology studies. 13 Q. Yes, ma'am. They said that, and they 14 also said that glyphosate was a probable human 15 carcinogen for non-Hodgkin's lymphoma? 16 A. What I'm talking about, specifically 17 about, is the epidemiology literature, not the 18 overall assessment that was made by the entire 19 panel. What I'm talking specifically about are 20 the epidemiologists. And they couldn't say -- 21 and also, you can see here the importance of 22 confounding in the ever-never. 23 For some reason they -- these authors 24 decided not to adjust for other confounders by 25 other pesticides and present those results for</p>
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<p>1 making a statement about what odds ratio was 2 statistically significant without actually 3 referring to the odds ratio that is adjusted for 4 other confounders. 5 And, again, with the dose-response -- 6 confounding is such a key issue here in 7 epidemiology. It's really important to 8 understand the important confounding that can 9 get induced due to the fact that people are 10 using multiple pesticides at the same time. 11 In this analysis of dose-response, as 12 I've mentioned, while it is true that they do 13 find this number here, the question is can you 14 exclude confounding as a reason for this number. 15 And there's big concerns for confounding. 16 Q. Confounding is a well-known concept 17 within epidemiology; fair? 18 A. Correct. 19 Q. You could, then, agree that the 20 epidemiologists who are on the IARC panel 21 looking at this issue knew about a confounding 22 and knew how to consider it; fair? 23 A. You know, I don't know the 24 individuals, but I'm sure if they're -- yeah, 25 I'm sure given the importance of confounding.</p>	<p>1 the dose analysis. But you can see the 2 important effect of confounding that existed in 3 the analysis for ever-never. 4 Q. All right. Let's look at what these 5 four scientists in Eriksson peer-reviewed 6 journal concluded within this article. 7 They concluded that based on their 8 research and based on this report, their earlier 9 indication of an association between glyphosate 10 and non-Hodgkin's lymphoma had been considerably 11 strengthened. 12 Do you agree with that? 13 A. Well, sometimes you can get to the 14 same numerical association because you have bias 15 in both studies. And I think -- well, actually, 16 I would agree that this study has some 17 additional strengths that the prior study did 18 not have. For example, they didn't use proxy 19 respondents. However, confounding, given what 20 we can see in Table 3, there's odds ratios in -- 21 or Table 2, the odds ratios are elevated for a 22 number of the different compounds presented, 23 raising the concern about confounding in the 24 dose-response analyses. 25 So there was confounding in this</p>

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<p>1 analysis. There was a confounding in the other</p> <p>2 analysis. Confounding tends to bias in the</p> <p>3 sense that things are positively associated with</p> <p>4 glyphosate use and NHL risk. And it makes -- it</p> <p>5 makes sense while you see numerically similar</p> <p>6 findings, but it doesn't add to -- or doesn't</p> <p>7 make the suggestion that there's a causal</p> <p>8 association.</p> <p>9 Q. IARC used Eriksson 2008 as one of the</p> <p>10 pieces of evidence upon which it based its</p> <p>11 conclusion that glyphosate was a probable human</p> <p>12 carcinogen for non-Hodgkin's lymphoma. We can</p> <p>13 agree with that, can't we?</p> <p>14 A. What I said previously is that it was</p> <p>15 one of the epidemiology studies the epidemiology</p> <p>16 panel looked at, and in their assessment of the</p> <p>17 epidemiology they came to the assessment that</p> <p>18 there was limited evidence because they could</p> <p>19 not rule out bias, confounding, or chance. And</p> <p>20 we see here themselves, these authors show the</p> <p>21 important effect of confounding just looking at</p> <p>22 the ever-never exposure. So I think that's an</p> <p>23 important feature.</p> <p>24 Q. Did you review the Cocco study of</p> <p>25 2013?</p>	<p>1 A. Yeah, that's the title.</p> <p>2 Q. And it's published in British Medical</p> <p>3 Journal.</p> <p>4 OEM, what does that mean? Do you</p> <p>5 know?</p> <p>6 A. It may be occupational environmental</p> <p>7 medicine.</p> <p>8 Q. A peer-reviewed journal?</p> <p>9 A. Yes.</p> <p>10 Q. And it's got -- one, two -- 18</p> <p>11 authors; right?</p> <p>12 A. I'll take your word for it.</p> <p>13 Q. Do you know who Paola Boffetta is?</p> <p>14 A. I do.</p> <p>15 Q. Epidemiologist?</p> <p>16 A. Yes.</p> <p>17 Q. Used to be with IARC?</p> <p>18 A. Yes.</p> <p>19 Q. Do you know where he is now?</p> <p>20 A. He is in New York, and he's also an</p> <p>21 adjunct faculty member at the Harvard School of</p> <p>22 Public Health.</p> <p>23 Q. How long has he been there?</p> <p>24 A. At Harvard?</p> <p>25 Q. Yeah.</p>
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<p>1 A. I briefly reviewed the Cocco -- let me</p> <p>2 see. Could you -- could you provide me the</p> <p>3 Cocco study just so I can make sure --</p> <p>4 Q. Yes.</p> <p>5 A. -- I'm talking about the right study?</p> <p>6 Q. I will.</p> <p>7 Did you -- do you know if you reviewed</p> <p>8 it?</p> <p>9 A. Cocco was one of the studies I</p> <p>10 reviewed. I just want to make sure I'm thinking</p> <p>11 about the right study.</p> <p>12 Q. Marked as Exhibit 23-32.</p> <p>13 (Whereupon, Mucci Exhibit 24-32,</p> <p>14 Cocco, et al article, Lymphoma risk</p> <p>15 and occupational exposure to</p> <p>16 pesticides, was marked for</p> <p>17 identification.)</p> <p>18 A. Yes, I did, but it wasn't a study I</p> <p>19 decided to comment on because it only had such a</p> <p>20 small number of exposed cases and small number</p> <p>21 of exposed controls.</p> <p>22 BY MR. MILLER:</p> <p>23 Q. Let's take a brief look at the study.</p> <p>24 Okay? This is a study on "Lymphoma risk and</p> <p>25 occupational exposures to pesticides; right?"</p>	<p>1 A. I couldn't say.</p> <p>2 Q. Let's look, Conclusions, they conclude</p> <p>3 that, "Our results provide limited support to</p> <p>4 the hypothesis of an increase in risk of</p> <p>5 specific lymphoma subtypes associated with</p> <p>6 exposure to pesticides"; right?</p> <p>7 A. That's what that statement says. But</p> <p>8 I would want to look, as I didn't read through</p> <p>9 this in great detail because I was -- felt that</p> <p>10 it was not an informative study given the</p> <p>11 limited number of cases exposed -- cases and</p> <p>12 controls to glyphosate. You know, I'm not</p> <p>13 exactly sure what they're referring to in terms</p> <p>14 of that specific concluding statement.</p> <p>15 Q. Let's look at Table 4 in the study,</p> <p>16 peer-reviewed, 18 scientists. They list in</p> <p>17 Table 4 the risk of B-cell lymphoma, which is a</p> <p>18 type of non-Hodgkin's lymphoma; right?</p> <p>19 A. It's the most common subtype, yes.</p> <p>20 Q. Yes, ma'am. The risk of B-cell</p> <p>21 lymphoma and occupational exposure to selected</p> <p>22 specific active ingredients of pesticides, one</p> <p>23 of them, glyphosate, and they show an odds ratio</p> <p>24 of 3.1 with a confidence interval from .6 to</p> <p>25 17.1; right?"</p>

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<p>1 A. Those are the numbers, yes. However,</p> <p>2 you know, as you can assess, that is not</p> <p>3 consistent. It's really a non-informative study</p> <p>4 to base an analysis on four exposed cases and</p> <p>5 two exposed controls.</p> <p>6 The reason I didn't include it in my</p> <p>7 assessment is that it's -- if you have one case</p> <p>8 or one control that goes from exposed to</p> <p>9 unexposed, your odds ratios are going to really</p> <p>10 sort of blow up. And it's really not an</p> <p>11 informative study for glyphosate and NHL risk.</p> <p>12 Q. Did IARC reference this study in their</p> <p>13 paper where they concluded glyphosate is a</p> <p>14 probable carcinogen for non-Hodgkin's lymphoma?</p> <p>15 A. As I said previously, I'm looking</p> <p>16 specifically at the epidemiology literature.</p> <p>17 The epidemiology panel found the evidence</p> <p>18 limited, but I'm not sure if this was or was not</p> <p>19 included in the IARC review.</p> <p>20 Q. Did you review of the Schinasi</p> <p>21 meta-analysis on this issue?</p> <p>22 A. Yes, I did.</p> <p>23 Q. Let's take a look at it.</p> <p>24 Do you know Dr. Schinasi?</p> <p>25 A. No, I don't.</p>	<p>1 International Journal of Environmental Res</p> <p>2 Public Health; right?</p> <p>3 A. Yes.</p> <p>4 Q. And that's a peer-reviewed journal?</p> <p>5 A. I'm not familiar with this journal.</p> <p>6 Q. Okay. Let's look, if we can, at</p> <p>7 supplement Page 4. The bottom half of the page,</p> <p>8 forest plot, can we agree that's what that is?</p> <p>9 A. Yes.</p> <p>10 Q. Okay. And so we understand, vertical</p> <p>11 line 1, what does that mean, vertical line 1?</p> <p>12 What does that signify?</p> <p>13 A. I'm sorry, what -- oh, which --</p> <p>14 Q. I'm on supplemental --</p> <p>15 A. The yellow line?</p> <p>16 Q. Yes, ma'am.</p> <p>17 A. That is referring to the value of 1.0</p> <p>18 for an odds ratio, which would suggest no</p> <p>19 association.</p> <p>20 Q. And so anything to the left of that</p> <p>21 line would be protective; right?</p> <p>22 A. You wouldn't only want to look</p> <p>23 specifically at the point estimate, but also the</p> <p>24 95 percent confidence intervals.</p> <p>25 Q. True.</p>
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<p>1 (Whereupon, Mucci Exhibit 24-33,</p> <p>2 Document, Non-Hodgkin Lymphoma and</p> <p>3 Occupational Exposure to Agricultural</p> <p>4 Pesticide Chemical Groups and Active</p> <p>5 Ingredients, was marked for</p> <p>6 identification.)</p> <p>7 MR. MILLER: All right. A slight</p> <p>8 technical difficulty. We'll be right back with</p> <p>9 you.</p> <p>10 There you go. All right. Thank you,</p> <p>11 Counselor.</p> <p>12 BY MR. MILLER:</p> <p>13 Q. Doctor, here's what we've marked as</p> <p>14 24-33. Here you go. Sorry. Counsel, 24-33</p> <p>15 (handing).</p> <p>16 All right. And you reviewed this;</p> <p>17 right?</p> <p>18 A. Yes. Although this is the</p> <p>19 supplemental table. So I'm not sure that --</p> <p>20 whether or not I looked specifically at the</p> <p>21 supplemental information or not.</p> <p>22 Q. Okay. Well, let's look at the</p> <p>23 supplemental information from Schinasi.</p> <p>24 And just to clarify a point or two,</p> <p>25 published in 2014 in the Journal -- I'm sorry,</p>	<p>1 A. So that would be -- those numbers</p> <p>2 would be suggestive of an inverse association.</p> <p>3 Q. If they were on the left side of 1.0?</p> <p>4 A. If they were on the left side.</p> <p>5 Q. And if they're on the right side of</p> <p>6 1.0, they are suggestive of an association?</p> <p>7 A. Of a positive association, yes. One</p> <p>8 of the challenges, you can see here already, is</p> <p>9 that Schinasi relies on the unadjusted</p> <p>10 estimates, even though for some the adjusted</p> <p>11 estimates were available.</p> <p>12 Q. And this is hard to read. I'm going</p> <p>13 to zoom it in a little bit.</p> <p>14 What she does, then, she takes a</p> <p>15 De Roos 2003, which we looked at, she takes</p> <p>16 De Roos 2005, the Agricultural Health Study,</p> <p>17 Eriksson '08, Hardell 2002, McDuffie 2001, and</p> <p>18 Orsi 2009; right?</p> <p>19 A. Yes.</p> <p>20 Q. And she comes up with a meta-analysis</p> <p>21 with a 1.46, statistically significant; right?</p> <p>22 A. Well, that is the number that she came</p> <p>23 up with. I think the problem with her approach</p> <p>24 was that she -- even when there is the more</p> <p>25 fully adjusted odds ratios available from the</p>

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<p>Page 258</p> <p>1 studies, for some reason she selected to provide 2 the unadjusted estimate. So the important 3 feature of interpretation of a meta-analysis is 4 that the individual studies should be devoid of 5 bias or confounding. And so, you know, while 6 she calculates a number of 1.46, I think there's 7 a lot of problems with the approach that she 8 took here. 9 Q. And IARC took this study, the Schinasi 10 meta-analysis, into consideration as one of the 11 studies upon which it based its conclusion that 12 glyphosate was a probable human carcinogen for 13 non-Hodgkin's lymphoma; true? 14 A. I'm actually not familiar one way or 15 the other whether they -- how they reviewed 16 Schinasi versus the individual studies. But, 17 again, the summary of the epidemiology by IARC 18 was that the evidence was limited in terms of 19 the epidemiology studies because bias, 20 confounding, and chance could not be ruled out. 21 Q. What's a sensitivity analysis? 22 A. Could you clarify a specific example 23 what you mean by that question? I mean, a 24 sensitivity analysis could mean many things in 25 different contexts.</p>	<p>Page 260</p> <p>1 (Whereupon, a recess was taken.) 2 THE VIDEOGRAPHER: Back on the record. 3 The time is 2:51. 4 (Whereupon, Mucci Exhibit 24-34, 5 Schinasi and Leon article, Non-Hodgkin 6 Lymphoma and Occupational Exposure to 7 Agricultural Pesticide Chemical Groups 8 and Active Ingredients, was marked for 9 identification.) 10 BY MR. MILLER: 11 Q. Making this easy for you, Doc. This 12 is Exhibit 24-34, the Schinasi non-Hodgkin's 13 lymphoma paper, and I've tabbed the only page I 14 want to talk about. 15 But you have reviewed this document; 16 right? 17 A. Yes, I have. 18 Q. Okay. I'll hand you my tabbed copy, 19 and I'm not sure I can find it. 20 A. Do you want -- 21 Q. What page is tabbed? That's what I 22 want to know. 23 A. 4513. 24 Q. 4513. Thank you so much. 25 All right. So Schinasi paper --</p>
<p>Page 259</p> <p>1 Q. Generally speaking, there's no way to 2 define it in general? 3 A. Well, a sensitivity analysis, as I 4 said, could mean different things in different 5 settings. So that's -- I don't want to give you 6 the wrong answer, depend -- I just would want to 7 know the context in what you're asking. 8 Q. If you can't answer, you can't answer. 9 MR. COPLE: Objection. Argumentative. 10 BY MR. MILLER: 11 Q. The textbook you're involved in, did 12 you put a definition of sensitivity analysis in 13 there? 14 A. I can't recall one way of the other if 15 I did. And, again, I'm not trying to avoid your 16 answer, but a sensitivity analysis can mean many 17 different things in epidemiology. So that's why 18 I can't answer such a general question. 19 Q. What I do have is Dr. Schinasi's 20 full -- 21 THE WITNESS: Would it be possible to 22 take a quick break? 23 MR. MILLER: Sure. 24 THE VIDEOGRAPHER: Going off the 25 record. The time is 2:39.</p>	<p>Page 261</p> <p>1 MR. COPLE: For the record, the 2 document marked as Exhibit 24-34 on Page 4513 3 has highlighting which was not in the -- in any 4 original copy. So counsel made that highlight. 5 MR. MILLER: That is true. That is 6 absolutely true. 7 BY MR. MILLER: 8 Q. All right. Now, let's look at this 9 exhibit. 10 It is by Dr. Schinasi and Leon; right? 11 A. Yes. 12 Q. And it's published in the 13 International Journal of Environmental Research 14 and Public Health; right? 15 A. Yes. 16 Q. And that was in 2014; right? 17 A. Yes. 18 Q. And if we look, then, to page -- can 19 you remind me again the page -- what, again, 20 page am I'm looking at? 21 A. 4513. 22 Q. 4513. Thank you, Doctor. 23 And this is a page where they give the 24 meta-analytic summary estimates of association 25 between herbicides and insecticides with</p>

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Page 262	<p>1 non-Hodgkin's lymphoma; right?</p> <p>2 A. Yes.</p> <p>3 Q. And I'm looking now for glyphosate,</p> <p>4 and they've shown the meta risk ratio at</p> <p>5 50 percent, statistically significant; right?</p> <p>6 A. So this is the relative risk that they</p> <p>7 have found in their meta-analysis which relied</p> <p>8 on taking some of the odds ratios from</p> <p>9 individual studies that were not mutually</p> <p>10 adjusted for other confounders. And this</p> <p>11 meta-analysis also doesn't account for the</p> <p>12 recall bias that was induced by the use of proxy</p> <p>13 respondents.</p> <p>14 Q. Right. I understand those are your</p> <p>15 criticisms of the study.</p> <p>16 But what they did find was a</p> <p>17 50 percent increase, statistically significant.</p> <p>18 I respect you have your criticisms, but that's</p> <p>19 what they found; right?</p> <p>20 A. The relative -- the meta relative</p> <p>21 risks that they calculated based on these</p> <p>22 unadjusted odds ratios ended up with a relative</p> <p>23 risk of 1.5. That is true. It's in contrast</p> <p>24 from the meta-analysis done most recently by</p> <p>25 Chang and Delzell which actually tries to deal</p>	Page 264	<p>1 Q. And the Schinasi and Leon study was</p> <p>2 one of the studies that IARC used to conclude</p> <p>3 that glyphosate was a probable human carcinogen</p> <p>4 for non-Hodgkin's lymphoma; true?</p> <p>5 A. Well, the overall statement from IARC</p> <p>6 was a Class 2A assignment. The epidemiology</p> <p>7 studies, which I'm not sure how much they did or</p> <p>8 did not rely on Schinasi in their review of the</p> <p>9 epidemiology studies, but taken together, the</p> <p>10 IARC panel for the epidemiology found there was</p> <p>11 only limited evidence because they couldn't rule</p> <p>12 out the confounding and bias were present.</p> <p>13 Q. Is that yes, they considered Schinasi,</p> <p>14 or no, they didn't?</p> <p>15 A. I couldn't say one way or the other</p> <p>16 the extent to which they integrated the results</p> <p>17 from Schinasi versus the results of the</p> <p>18 individual studies that went into Schinasi. I</p> <p>19 couldn't say one way or the other.</p> <p>20 Q. Okay. You rely upon Agricultural</p> <p>21 Health Study unpublished manuscript as part of</p> <p>22 your opinions; right?</p> <p>23 A. The unpublished manuscript, yes, was</p> <p>24 one of all of the epidemiological studies that I</p> <p>25 looked at in my -- in putting together my expert</p>
Page 263	<p>1 with some of the issues of confounding and</p> <p>2 recall bias from the proxy respondents.</p> <p>3 Q. And in this meta-analysis by Schinasi</p> <p>4 and Leon, they also list on Table 5 here the</p> <p>5 estimation risk of B-cell lymphoma, the most</p> <p>6 common type of non-Hodgkin's lymphoma, right?</p> <p>7 A. They do provide a summary meta risk</p> <p>8 ratio estimate, but it's only based on two</p> <p>9 studies.</p> <p>10 Q. And it's a doubling of the risk,</p> <p>11 statistically significant, is what they report?</p> <p>12 And I know you have your criticisms; right?</p> <p>13 A. And they're not just my criticisms.</p> <p>14 So the relative risks that they calculated in</p> <p>15 this meta risk ratio was a relative risk of 2.0.</p> <p>16 The criticisms that are inherent in</p> <p>17 meta-analysis is that they rely on the fact that</p> <p>18 the individual studies are not biased and that</p> <p>19 there's no confounding. And we know that the</p> <p>20 estimates they've taken in the Schinasi</p> <p>21 meta-analysis for some reason are the unadjusted</p> <p>22 and not the fully adjusted estimates. And that</p> <p>23 the estimation of the meta summary risk estimate</p> <p>24 is different than what was seen when we account</p> <p>25 for the most fully adjusted odds ratios.</p>	Page 265	<p>1 report.</p> <p>2 Q. And are you -- you are aware that</p> <p>3 Dr. Alavanja is one of the authors of the AHS</p> <p>4 manuscript?</p> <p>5 A. Yes.</p> <p>6 Q. Let's look at just one or two of his</p> <p>7 papers real quick.</p> <p>8 (Whereupon, Mucci Exhibit 24-35,</p> <p>9 Alavanja, et al paper, Increased</p> <p>10 Cancer Burden Among Pesticide</p> <p>11 Applicators and Others Due to</p> <p>12 Pesticide Exposure, was marked for</p> <p>13 identification.)</p> <p>14 BY MR. MILLER:</p> <p>15 Q. We're going to mark as 24-35</p> <p>16 Dr. Alavanja and Dr. Ross and Dr. Bonner's</p> <p>17 Increased Cancer Burden Among Pesticide</p> <p>18 Applicators and Others Due to Pesticide</p> <p>19 Exposure.</p> <p>20 Ma'am, have you seen this paper before</p> <p>21 (handing)?</p> <p>22 A. While I've seen the paper before, I</p> <p>23 didn't review it in detail.</p> <p>24 Q. This is a paper published in Pesticide</p> <p>25 Exposure and Cancer. Do you see that, ma'am?</p>

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<p>1 A. I believe actually the journal was 2 Cancer Journal for Clinicians. That may have 3 been a running title or something. 4 Q. I think you're right. Excuse me. 5 Yes, A Cancer Journal for Clinicians. 6 Is that a peer-reviewed journal? 7 A. Yes, it is. 8 Q. So here we have three scientists, 9 Dr. Alavanja, one of the authors of the AHS 10 draft manuscript that you rely upon. 11 Dr. Ross, are you aware he was on the 12 IARC panel for IARC and glyphosate? 13 A. I'm sorry, was there a question? 14 Q. Yes. There was. 15 A. Sorry. 16 Q. Are you aware that Dr. Ross, 17 Dr. Alavanja's co-author, was a member of the 18 panel that voted glyphosate for IARC? 19 A. I was not aware that Dr. Ross was on 20 the panel. 21 Q. And then a third scientist, a Matthew 22 Bonner; right? These are the three authors; 23 right? 24 A. Correct. 25 Q. And what they tell us is "A growing</p>	<p>1 BY MR. MILLER: 2 Q. Dr. Alavanja in his paper, if you 3 please turn with me to Table 5, indicates that 4 glyphosate is positively associated with 5 non-Hodgkin's lymphoma. 6 Do you see that, ma'am? 7 A. I'm sorry, I don't see it on Table 5. 8 Q. Page 2 of Table 5. There are actually 9 two pages to Table 5. 10 A. I see. 11 Q. In the middle of the page there. 12 A. I -- you know, I can see where in this 13 table he comments on this. I didn't thoroughly 14 review this as in assessing the epidemiology. I 15 felt what was important to do was to review the 16 individual assessment and come up with the 17 strengths and limitations. So I couldn't 18 comment specifically what is -- what that -- 19 what the basis of that statement is coming from. 20 Q. Well, he's -- Dr. Alavanja is one of 21 the authors of the AHS study; right? 22 A. He is one of the authors from the AHS 23 study. However, I'm not exactly sure what this 24 line here is referred to, you know, 25 specifically, what each of these columns are</p>
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<p>1 number of well-designed epidemiological and 2 molecular studies provide substantial evidence 3 that the pesticides used in agricultural, 4 commercial, and home and garden applications are 5 associated with excess cancer risk." 6 Has that been your observation from 7 studying the literature? 8 MR. COPLE: Objection. Lacks 9 foundation, the document speaks for itself. 10 A. I have -- my -- in putting together my 11 expert report, I specifically focused on 12 glyphosate and NHL risk. I have not done a 13 thorough systematic evaluation of epidemiology 14 studies more broadly, so I wouldn't be able to 15 comment one way or the other. 16 Q. Dr. Alavanja says that "The literature 17 does strongly suggest that the public health 18 problem is real." And is that something that 19 you can comment on? 20 MR. COPLE: Objection. Lacks 21 foundation, the document speaks for itself. 22 A. As I've stated, I specifically for 23 this expert report looked at the epidemiology of 24 NHL and glyphosate, and wouldn't be able to 25 comment specifically on -- beyond that scope.</p>	<p>1 referred to. 2 Q. And he's one of the authors of the AHS 3 manuscript, draft manuscript upon which you 4 rely, right? 5 A. Well, he is one of the authors; that 6 is true. What I'm saying here is that I'm not 7 sure what information went into this table that 8 he put together. So I couldn't comment 9 specifically on what he's getting at here. 10 Q. Let's see what he's getting at. 11 He's saying glyphosate is positively 12 associated with non-Hodgkin's lymphoma. Do you 13 disagree with him? 14 MR. COPLE: Objection. Asked and 15 answered. 16 A. Again, so I haven't looked at this. 17 Clearly he's listing one reference in this, 18 which is the study by Eriksson, et al. I'm not 19 sure where he's coming up with this. Again, I 20 can't really interpret this table because I 21 haven't looked through it carefully. I haven't 22 looked to see how he's assembled all of this 23 information together, but looking at all of the 24 epidemiology evidence together, there is no 25 supportive evidence of a causal association</p>

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<p>1 between glyphosate and NHL risk. Like, I 2 couldn't comment specifically on what this table 3 is referring to. 4 BY MR. MILLER: 5 Q. So let's go now from Dr. Alavanja 6 where he says -- what's the name of that last 7 article? Anyway, let's move on. 8 (Whereupon, Mucci Exhibit 24-36, 9 Alavanja, et al, Draft, Lymphoma risk 10 and pesticide use in the Agricultural 11 Health Study, was marked for 12 identification.) 13 BY MR. MILLER: 14 Q. He's also the author of this draft 15 that you rely upon; right? 16 A. It was one of the reports I relied 17 upon. I looked at all of the epidemiology 18 literature. 19 Q. All right. So -- I'm thinking out -- 20 the last Alavanja article we looked at was 2013 21 where he said in the Table 5 that there was a 22 positive association. I want to go now down to 23 the article that you looked at which was a 24 draft, and here is Exhibit 24-36. Is this -- 25 and there have been several iterations of that.</p>	<p>1 of reasons to think that the data are valid. 2 Just because something hasn't gone through yet a 3 peer review process, it doesn't mean it's not 4 valid. And I think we can say because part of 5 the data presented here using the same 6 methodology actually had been published in a 7 2014 manuscript using the same methodology. 8 Q. If I was a student in your 9 epidemiology class and I asked you whether I 10 should give equal strength of evidence to 11 unpublished data as to peer-reviewed published 12 data, what would you tell me? 13 MR. COPLE: Objection. Incomplete 14 hypothetical. 15 A. I think it would really depend on the 16 situation. But as I stated, you know, as 17 somebody who has reviewed hundreds of articles 18 for medical journals, and given the fact these 19 methods have been actually peer-reviewed and 20 published subsequently on non-Hodgkin's lymphoma 21 and other pesticides using the same methodology, 22 and even given a comment by Dr. Blair himself in 23 the importance of including unpublished studies 24 in meta-analyses, but one should be cautious, he 25 says in his manuscript on meta-analyses,</p>
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<p>1 Is that the iteration that you looked at? 2 A. I couldn't say specifically if it was 3 or was not. I believe that the March 15, 2013 4 was the date that I looked at. 5 Q. And I'm not trying to pull any punches 6 on you here. We looked at a couple versions 7 yesterday with Dr. Rider. This one looks like 8 it was redrafted 2000 -- several times. It 9 looks like March 18th, March 21st, July 10th, 10 July 19th, and then September 19th. And do you 11 remember which of these iterations you might 12 have looked at? 13 A. Well, I'm not sure what this footnote 14 is referring to. It may be, in fact, when it 15 was printed, but I think by looking at the draft 16 date that's here underneath the author's name, I 17 believe that is the draft version that I looked 18 at. 19 Q. Okay. And this is by that same 20 Dr. Alavanja; right? 21 A. Correct. 22 Q. Okay. And this is draft, meaning this 23 hasn't gone through peer review, right? 24 A. No. Although it has not gone through 25 peer review, however, I think there's a number</p>	<p>1 however, it's important to include unpublished 2 data because of the issue of publication bias. 3 Q. Dr. Blair also said glyphosate is a 4 probable cause of non-Hodgkin's lymphoma. Is 5 that important to you? 6 A. What was important to me was to have 7 all of the epidemiology evidence available that 8 covered the topic of glyphosate and NHL risk, 9 and to review each of these studies, to review 10 their strengths, their limitations, their 11 finding, and come to an assessment based on the 12 totality of evidence. 13 Q. Dr. Blair also -- 14 (Videographer interruption.) 15 BY MR. MILLER: 16 Q. Dr. Blair also says it would be 17 irresponsible to look at draft data to come to 18 conclusions. Do you agree with that? 19 MR. COPLE: Objection. Lacks 20 foundation. 21 A. I haven't seen specifically where or 22 what context Dr. Blair said something like that. 23 So I wouldn't be able to comment on that 24 specifically. 25 BY MR. MILLER:</p>

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<p>1 Q. Does this draft report say there's</p> <p>2 missing data?</p> <p>3 A. This report discusses some of the</p> <p>4 missing data related to the phase 2 of the</p> <p>5 collection of data on pesticides.</p> <p>6 Q. So it admits there's missing data;</p> <p>7 right?</p> <p>8 A. It discusses it. It also discusses</p> <p>9 the potential for bias in this study, and then</p> <p>10 also it's addressed in subsequent studies</p> <p>11 following that have examined whether this type</p> <p>12 of missing data could lead to a bias in the</p> <p>13 study, and have come to the conclusion that the</p> <p>14 effect is likely to be limited on the</p> <p>15 association of glyphosate and NHL risk.</p> <p>16 Q. The study had 37 percent loss to</p> <p>17 follow-up?</p> <p>18 A. As I mentioned earlier, the term loss</p> <p>19 to follow-up we tend to refer specifically to</p> <p>20 outcome assessment. Here what you're talking</p> <p>21 about specifically is whether or not the data on</p> <p>22 the questionnaire for exposure is available.</p> <p>23 And while -- and another important</p> <p>24 thing is that while they -- what the authors did</p> <p>25 to address this is to use a well established</p>	<p>1 study, please.</p> <p>2 A. So the first set of questionnaires</p> <p>3 were -- the first wave was in 1993 to 1997, and</p> <p>4 it asked not only about current exposure, but</p> <p>5 also past exposure as well.</p> <p>6 Q. And when were the second</p> <p>7 questionnaires handed out, or filled out?</p> <p>8 A. I just have to refer to this. So</p> <p>9 the -- sorry, I just want to review before so I</p> <p>10 can give you the exact dates. The follow-up</p> <p>11 questionnaire was 1998 to 2003.</p> <p>12 Q. How many people were participants in</p> <p>13 the study in the 1993, 1997 process?</p> <p>14 A. So it states that over 57,000</p> <p>15 individuals were included in this particular</p> <p>16 analysis, and included the phase 1 data.</p> <p>17 Q. And how many people filled out the</p> <p>18 second questionnaire?</p> <p>19 A. Of these, 63 percent, which translates</p> <p>20 into 36,300 participants.</p> <p>21 Q. Fair to say over 20,000 people did not</p> <p>22 fill out the second questionnaire?</p> <p>23 A. Yes, while that is true, we can see</p> <p>24 from a number of evidence that the people who</p> <p>25 did report were very similar on a number of --</p>
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<p>1 epidemiological approach, which is to use a</p> <p>2 method of imputation, which we know is reliable</p> <p>3 in this setting, because the data that is</p> <p>4 missing on the people who didn't fill out the</p> <p>5 second questionnaire, those people are similar</p> <p>6 to the people who actually did report the</p> <p>7 information, and therefore, that data are not --</p> <p>8 are missing at random, which means that the</p> <p>9 imputation is a valid methodology for dealing</p> <p>10 with this issue of missing data.</p> <p>11 Q. Are you aware that IARC will not</p> <p>12 consider unpublished data?</p> <p>13 A. I know that IARC has as part of its</p> <p>14 review panel, that is what they do in that</p> <p>15 situation. However, other agencies and review</p> <p>16 panels take a different approach. I believe</p> <p>17 actually given the -- I agree with Dr. Blair and</p> <p>18 what he said of the importance in doing a</p> <p>19 complete assessment, and if there are</p> <p>20 unpublished data available, too, that it could</p> <p>21 be part of the review process as long as you can</p> <p>22 critically review the methodology that's being</p> <p>23 used in the study.</p> <p>24 Q. So tell me when the first</p> <p>25 questionnaires were handed out for the first AHS</p>	<p>1 based on demographic factors, as well as cancer</p> <p>2 outcomes, and those who did and did not</p> <p>3 participate. So actually while the actual</p> <p>4 number may seem large, the actual potential for</p> <p>5 bias is somewhat minimized. And actually, the</p> <p>6 authors in a number of subsequent studies have</p> <p>7 addressed this issue of whether there's</p> <p>8 potential bias.</p> <p>9 Q. When did they close the analysis for</p> <p>10 the second study?</p> <p>11 A. The follow-up was through December 31,</p> <p>12 2008.</p> <p>13 Q. So that -- let me understand.</p> <p>14 If I filled out the questionnaire in</p> <p>15 -- I'm sorry, in 1993, and I said I was a never</p> <p>16 user of glyphosate, and I failed to fill out the</p> <p>17 second questionnaire, and I die in 2007 from</p> <p>18 non-Hodgkin's lymphoma, but I used Roundup from</p> <p>19 1994 through 19 -- through 2007, I'm going to</p> <p>20 show up as a never user of glyphosate; right?</p> <p>21 A. No, that's actually not correct. The</p> <p>22 method they used of imputation was to look at</p> <p>23 the pattern of pesticide use in the individuals</p> <p>24 for whom there was the baseline and follow-up</p> <p>25 data, and then based on those patterns, apply it</p>

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<p>Page 278</p> <p>1 to the people who did not have that second wave 2 data. And, in fact, actually the Agricultural 3 Health Study authors assess the validity of this 4 approach in a number of ways. There was a -- 5 the validation study that looked at this 6 imputation method and showed actually that for 7 glyphosate specifically that -- what they did 8 was to look at the people they actually had both 9 data on and take it as a random sample, and then 10 impute what those values would be, and then they 11 could compare it to what they actually did do. 12 What they saw was this imputation method 13 actually worked quite well. 14 So, no, it's not correct that they 15 necessarily would or would not have been, and 16 actually given the imputation, most likely they 17 would have been assigned as a glyphosate user in 18 that second wave. 19 Q. So of the 20,000 people that didn't 20 fill out the second questionnaire, how many of 21 those did they impute used glyphosate? 22 A. I couldn't tell you specifically at 23 this point. 24 Q. Let's go back to my example. 25 If I filled out the questionnaire in</p>	<p>Page 280</p> <p>1 point one year apart, and they looked at 2 reliability of information collected in one year 3 and then the next year, and actually for 4 glyphosate showed a very high reliability of 5 reporting. So I think if it is an issue, there 6 might be some small misclassification. But it 7 seemed like given the high reliability, that 8 that amount of misclassification would probably 9 be pretty small. 10 Then, secondly, with the validation 11 they did with the self-reported data and the 12 biomarker studies, I think that also supports 13 that if there's misclassification which you're 14 referring to, it's actually pretty small. 15 Q. From '94 to '98, was there an increase 16 in Roundup use in America? 17 A. Well, there appears to have been 18 perhaps an increase in intake. It's unclear 19 specifically in this population of pesticide 20 users what the uptake and the increase would 21 have been if they were already using glyphosate. 22 And part of that would be captured actually in 23 the second wave in the questionnaire. 24 And I think what's important to see is 25 that the findings with this updated follow-up</p>
<p>Page 279</p> <p>1 '93, then used glyphosate in '94 through '98, in 2 the first study I'm put down as a never user of 3 glyphosate; true? 4 A. I'm sorry, could you repeat the 5 statement? 6 Q. Sure. 7 If I filled out my questionnaire in 8 '93 and say I've never used glyphosate, then I 9 go out the next spring and start spraying 10 glyphosate, and spray it every year from '94 11 through '98, I'm going to show in that study as 12 a never user of glyphosate; right? 13 A. I'm not sure how that person would be 14 or wouldn't be coded for that second 15 questionnaire. 16 Q. For the first study? 17 A. For the first they would have been 18 classified as an unexposed, yes, correct. And 19 that is, you know, a valid concern to think 20 about and worry about. 21 However, in this particular case, I 22 think there was the validation study that was 23 done with actual biomarker data where they 24 compared the -- first of all, they looked at the 25 reliability and looked at one questionnaire time</p>	<p>Page 281</p> <p>1 are actually really similar to the baseline 2 analysis of 2005, suggesting that no matter how 3 you look at the data, they're pretty internally 4 consistent with each other and support no 5 association. 6 MR. MILLER: I have no further 7 questions. Thank you for your time. 8 A. Okay. Thank you so much. 9 MR. COPLER: Take a short break. 10 THE VIDEOGRAPHER: Going off the 11 record. The time is 3:20. 12 (Whereupon, a recess was taken.) 13 THE VIDEOGRAPHER: Back on the record. 14 The time is 3:24. 15 MR. COPLER: We have no questions for 16 Dr. Mucci. 17 MR. MILLER: I don't have any 18 follow-up, then, obviously. 19 I do strongly urge counsel to not 20 attempt to designate this entire deposition as 21 confidential. There were short spots where we 22 used documents under seal. The Court has 23 cautioned parties not to needlessly designate as 24 confidential, and so we'll ask counsel to look 25 hard at the Rider deposition and Dr. Mucci</p>

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<p style="text-align: center;">Page 282</p> <p>1 deposition and follow the Court's instructions. 2 MR. COPLE: We understand the Court's 3 instructions, and we, as always, intend to 4 follow the Court's instructions. 5 The designation provisionally stands 6 as confidential. We, of course, will endeavor 7 to completely review Dr. Rider and Dr. Mucci's 8 deposition and ensure we are in compliance with 9 Judge Chhabria's order. 10 MR. MILLER: Have a good evening. 11 THE WITNESS: Thank you so much. 12 MS. MILLER: Thank you. 13 THE VIDEOGRAPHER: This concludes the 14 September 22, 2017 deposition of Dr. Lorelei 15 Mucci. Going off the record. The time is 3:25. 16 (Whereupon, the deposition was 17 concluded.) 18 19 20 21 22 23 24 25</p>	<p style="text-align: center;">Page 284</p> <p style="text-align: center;">INSTRUCTIONS TO WITNESS</p> <p>1 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. 17 18 19 20 21 22 23 24 25</p>
<p style="text-align: center;">Page 283</p> <p>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 22nd day 6 of September, 2017, at 8:05 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 23rd day of September, 2017. 19 20 _____ 21 MAUREEN O'CONNOR POLLARD, NOTARY PUBLIC 22 Realtime Systems Administrator 23 CSR #149108 24 25</p>	<p style="text-align: center;">Page 285</p> <p>1 ----- 2 E R R A T A 3 ----- 4 PAGE LINE CHANGE 5 _____ 6 REASON: _____ 7 _____ 8 REASON: _____ 9 _____ 10 REASON: _____ 11 _____ 12 REASON: _____ 13 _____ 14 REASON: _____ 15 _____ 16 REASON: _____ 17 _____ 18 REASON: _____ 19 _____ 20 REASON: _____ 21 _____ 22 REASON: _____ 23 _____ 24 REASON: _____ 25 _____</p>

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2	ACKNOWLEDGMENT OF DEPONENT
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	_____ LORELEI A. MUCCI, ScD DATE
13	
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16	Subscribed and sworn
17	To before me this
18	_____ day of _____, 20____.
19	My commission expires: _____
20	_____ Notary Public
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