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SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF LOS ANGELES - COMPLEX

NC, A MINOR,

PLAINTIFF,

VS.

CASE NO. 21STCV22822

HAIN CELESTIAL GROUP, INC.;
BEECH-NUT NUTRITION COMPANY;
NURTURE, INC., PLUM, PBC, DBA
PLUM ORGANICS; GERBER PRODUCTS
COMPANY; WALMART, INC.; SPROUT
FOODS, INC.; RALPHS GROCERY
COMPANY; AND DOES 1 THROUGH 100,
INCLUSIVE,

DEFENDANTS.

CERTIFIED COPY

REPORTER'S TRANSCRIPT OF PROCEEDINGS

FEBRUARY 2, 2022

(DAY 3)

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HELD BEFORE:

THE HONORABLE AMY D. HOGUE

A P P E A R A N C E S

(ALL APPEARANCES VIA REMOTE)

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I N D E X

WITNESS: HANNAH GARDENER, PH.D.

DIRECT	CROSS	REDIRECT
6	59	119

E X H I B I T S

EXHIBIT NUMBER/REFERENCED	EXHIBIT NUMBER/REFERENCED
2	702
145	50
159	24
126	119
121	92
78	
114	
692	
693	
630	
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LOS ANGELES, CALIFORNIA;
WEDNESDAY, FEBRUARY 2, 2022; 1:30 P.M.
BEFORE: HON. AMY D. HOGUE DEPARTMENT 7;
SUPERIOR COURT OF THE STATE OF CALIFORNIA
--000--

THE COURT: GOOD AFTERNOON. PLEASE PROCEED.
THE CLERK: MS. GARDENER, CAN YOU PLEASE RAISE
YOUR RIGHT HAND.

DO YOU SOLEMNLY STATE THAT THE TESTIMONY YOU
MAY GIVE IN THIS CAUSE NOW PENDING BEFORE THIS COURT
SHALL BE THE TRUTH, THE WHOLE TRUTH, AND NOTHING BUT THE
TRUTH SO HELP YOU GOD?

THE WITNESS: I DO.

THE CLERK: PLEASE STATE AND SPELL YOUR FIRST
AND LAST NAME FOR THE RECORD.

THE WITNESS: MY FIRST NAME IS HANNAH,
H-A-N-N-A-H. AND MY LAST NAME IS GARDENER,
G-A-R-D-E-N-E-R.

THE CLERK: THANK YOU.

DIRECT EXAMINATION

MR. WISNER:

Q GOOD AFTERNOON, DR. GARDENER.

A GOOD AFTERNOON.

Q THANK YOU VERY MUCH FOR BEING WITH US HERE.

THE COURT HAS ALREADY HEARD A BIT FROM DR. RITZ

1 AS WELL AS DR. SHAPIRO, SO WE'RE GOING TO TRY TO TARGET
2 YOUR TESTIMONY TODAY SPECIFICALLY ON ARSENIC AND MERCURY
3 AND FOCUS ON HOW YOU CAME TO THE OPINIONS YOU DID IN
4 YOUR REPORT AND EXPLORE SOME OF THOSE CONCEPTS, OKAY?

5 A OKAY.

6 Q BEFORE WE DO THAT, I WANT TO BRIEFLY GO OVER
7 YOUR BACKGROUND.

8 I'M SHOWING HERE EXHIBIT 2.

9 DO YOU SEE THIS IS A COPY OF YOUR C.V.

10 DO YOU SEE THAT?

11 A I JUST NEED TO FIX THIS SO I CAN -- IS THERE A
12 WAY WHERE I CAN SORT OF SEE WHATEVER THEY ARE SHOWING
13 BIGGER, I'M SORRY?

14 Q YOU SHOULD HAVE MY FACE PINNED SO IT'S THE
15 BIGGEST SCREEN AND IT SHOULD SHOW THAT.

16 A THANK YOU.

17 YES, NOW I CAN SEE IT.

18 Q OKAY. GREAT.

19 ALL RIGHT. JUST BRIEFLY, IT LOOKS YOU HAVE AN
20 UNDERGRADUATE DEGREE IN PSYCHOLOGICAL AND BRAIN SCIENCES
21 FROM DR. DARTMOUTH; IS THAT RIGHT?

22 A THAT'S RIGHT.

23 Q WHY DID YOU DECIDE TO STUDY PSYCHOLOGICAL AND
24 BRAIN SCIENCES IN UNDERGRAD?

25 A I WAS ALWAYS REALLY INTERESTED IN PSYCHOLOGY
26 AND PARTICULARLY SORT OF THE NEUROSCIENCE SIDE OF
27 PSYCHOLOGY. AND FRESHMAN YEAR I TOOK AN INTRODUCTION TO
28 PSYCHOLOGY CLASS AND I LOVED IT AND WENT FROM THERE.

1 Q ALL RIGHT. I SEE AFTER THAT YOU ATTENDED
2 HARVARD SCHOOL OF PUBLIC HEALTH AND GOT A DOCTOR OF
3 SCIENCE IN EPIDEMIOLOGY WITH A MINOR IN BIOSTATISTICS.

4 DO YOU SEE THAT?

5 A I DO. THAT'S CORRECT.

6 Q WHAT IS A DOCTOR OF SCIENCE, DOCTOR?

7 A SO IT'S BASICALLY HARVARD'S EQUIVALENT TO THE
8 PH.D., SO DIFFERENT UNIVERSITIES DO IT A LITTLE BIT
9 DIFFERENTLY. HARVARD ONLY GIVES PH.D.'S IN THE, LIKE,
10 SCHOOL OF LIBERAL ARTS OR ARTS AND SCIENCES, SO THE
11 OTHER GRADUATE SCHOOLS GIVE, LIKE, M.D.'S OR JD'S AND
12 THE SCHOOL OF PUBLIC HEALTH GIVES DOCTORATES IN SCIENCE.

13 Q NOW, IT SAYS HERE THAT -- AND I JUST WANT TO
14 MAKE SURE I'M LOOKING AT THIS RIGHT -- YOU HAD A GPA OF
15 3.98; IS THAT RIGHT?

16 A THAT'S CORRECT.

17 Q DOES THAT MEAN YOU WERE STRAIGHT A'S BASICALLY?
18 YOU HAVE A MINUS SOMEWHERE?

19 A I GOT ONE A MINUS.

20 Q OKAY. WELL, VERY IMPRESSIVE, DOCTOR.

21 DID YOU DO A DOCTORAL THESIS AS PART OF YOUR
22 DOCTOR OF SCIENCE?

23 A I DID.

24 Q AND WHAT WAS THAT SUBJECT MATTER?

25 A SO I LOOKED AT PRENATAL AND EARLY LIFE RISK
26 FACTORS FOR THREE NEUROLOGICAL DISEASES, AUTISM,
27 MULTIPLE SCLEROSIS AND PARKINSON'S DISEASE.

28 Q WHY DID YOU FOCUS YOUR DISSERTATIONAL WORK ON

1 THOSE DISEASES?

2 A SO I WAS ALWAYS -- OH, WELL, I WAS IN THE
3 NEUROLOGY EPIDEMIOLOGY TRACK. I HAD CHOSEN NEUROLOGICAL
4 DISEASES AS SIMPLY THE DISEASES THAT I WAS MOST
5 INTERESTED IN, AND THE SORT OF EARLY LIFE PRENATAL AND
6 NEONATAL AND EARLY LIFE MORE GENERALLY UNDERPINNINGS
7 WERE SORT OF AN INTEREST AND PASSION OF MINE STARTING
8 REALLY AS SOON AS I STARTED AT HARVARD.

9 Q NOW, I SEE AFTER YOU ATTAINED YOUR DOCTOR OF
10 SCIENCE FROM HARVARD, IT LOOKS LIKE YOU BEGAN WORKING
11 WITH THE UNIVERSITY OF MIAMI SCHOOL OF MEDICINE; IS THAT
12 RIGHT?

13 A YEAH. SO I -- IT SAYS THAT I GRADUATED IN
14 NOVEMBER, OR I THINK IT MAY SAY THAT I GRADUATED
15 TECHNICALLY IN 2008 OR NOVEMBER OF 2007, BUT I DEFENDED
16 MY DISSERTATION IN AUGUST OF 2007; SO IN SEPTEMBER I
17 MOVED TO MIAMI AND STARTED AS A POST-DOC IN THE
18 NEUROLOGY DEPARTMENT AT THE UNIVERSITY OF MIAMI.

19 Q AM I SHOWING THAT PORTION OF YOUR C.V. ON THE
20 SCREEN RIGHT NOW?

21 A YES.

22 Q OKAY. GREAT.

23 AND I TAKE IT YOU SPENT MOST OF YOUR ACADEMIC
24 CAREER AFTER HARVARD AT THE UNIVERSITY OF MIAMI SCHOOL
25 OF MEDICINE; IS THAT RIGHT?

26 A THAT'S CORRECT.

27 Q AND HAVE YOU FOCUSED SPECIFICALLY IN THE AREAS
28 OF NEUROLOGY AND EPIDEMIOLOGY WHILE YOU'VE BEEN THERE?

1 A YES. THERE WAS A PERIOD OF TIME WHEN I HAD A
2 DUAL APPOINTMENT IN PEDIATRICS AND IN NEUROLOGY, BUT
3 I'VE BEEN IN NEUROLOGY THE WHOLE TIME.

4 Q AND THAT WAS GOING TO BE MY NEXT QUESTION.

5 SO NOT ONLY HAVE YOU FOCUSED ON NEUROLOGY FOR
6 MOST OF YOUR ACADEMIC CAREER, YOU'VE ALSO FOCUSED
7 SPECIFICALLY IN THE PEDIATRIC COMPONENT OF NEUROLOGY; IS
8 THAT RIGHT?

9 A FOR A PERIOD OF TIME, YEAH, I WAS IN THE
10 PEDIATRICS DEPARTMENT.

11 Q OKAY.

12 NOW, I KNOW YOU CURRENTLY LIVE IN BOSTON.

13 A I DO.

14 Q BUT YOU STILL WORK AT THE UNIVERSITY OF MIAMI.
15 HOW DOES THAT WORK?

16 A IT'S VERY, VERY UNUSUAL, AND IT WAS NOT -- IT
17 WAS NOT INTENTIONAL OR WHAT I THOUGHT WOULD HAPPEN.

18 BUT I MOVED BACK TO -- I MOVED TO BOSTON OR
19 BACK TO BOSTON IN 2012 AND I FIGURED I WOULD WORK
20 REMOTELY FOR A SHORT PERIOD OF TIME WHILE I LOOKED FOR A
21 POSITION AT A ACADEMIC INSTITUTION IN BOSTON AND WHILE
22 MY COLLEAGUES AT THE UNIVERSITY OF MIAMI FOUND SOMEONE
23 TO FILL MY SHOES THERE, AND WE QUICKLY REALIZED THAT IT
24 WORKED REALLY WELL. WE REALIZED WHAT EVERY -- THE REST
25 OF THE WORLD HAS REALIZED IN 2020 THAT REMOTE WORK CAN
26 BE REALLY GREAT AND VERY EFFECTIVE.

27 SO, YEAH. SO THE PLAN NEVER CHANGED. I'VE
28 BEEN AT UNIVERSITY OF MIAMI SINCE THEN.

1 Q NOW, AS WE GO THROUGH YOUR C.V. HERE, WE SEE
2 THAT YOU HAVE NUMEROUS PUBLICATIONS UNDER JURIED OR
3 REFEREED JOURNAL ARTICLES.

4 DO YOU SEE THAT?

5 A YES.

6 Q AND THAT'S JUST ANOTHER WAY OF SAYING
7 PEER-REVIEWED LITERATURE?

8 A THAT'S CORRECT.

9 Q OKAY.

10 AND AS WE GO THROUGH HERE, I MEAN, WE'VE SEEN
11 YOUR NAME POP UP ON VARIOUS STUDIES AND REFERENCES SO
12 FAR. BUT IS IT FAIR TO SAY THAT YOU HAVE PUBLISHED
13 SPECIFICALLY ON AUTISM AND ITS CAUSES IN THE
14 PEER-REVIEWED LITERATURE?

15 A I HAVE.

16 Q AND IT WOULD BE FAIR TO SAY THAT YOU PUBLISHED
17 IN THIS AREA BEFORE YOU WERE EVER RETAINED IN ANY SORT
18 OF LITIGATION CAPACITY FOR THIS CASE?

19 A CORRECT.

20 Q I NOTICE DOWN HERE UNDER INVITED BOOK
21 CHAPTERS -- I'M POPPING IT OUT -- THERE IS A PUBLICATION
22 CALLED "THE COMPREHENSIVE GUIDE TO AUTISM," AND IT LOOKS
23 LIKE YOU HAD A BOOK CHAPTER TITLED "PRE, PERI AND
24 NEONATAL FACTORS IN AUTISM ETIOLOGY."

25 DO YOU SEE THAT?

26 A I DO.

27 Q AND CAN YOU JUST BRIEFLY EXPLAIN WHAT THAT
28 CHAPTER IS ABOUT AND WHAT YOU WERE DOING IN THAT

1 CHAPTER?

2 A SURE.

3 SO I WAS CONTACTED BY THE EDITORS OF THIS BOOK
4 AROUND 2011, ASKING ME TO WRITE A BOOK CHAPTER ABOUT
5 PRE, PERI AND NEONATAL RISK FACTORS FOR AUTISM, AND I
6 CONTACTED AN OLD A STUDENT, SOMEONE WHO I HAD GONE TO
7 SCHOOL WITH AT HARVARD, KRISTIN LYLE, WHO WAS ALSO
8 INTERESTED IN AUTISM AND I ASKED HER IF SHE WOULD LIKE
9 TO WRITE IT WITH ME.

10 AND I THINK WE FINISHED IT AROUND 2012. I'M
11 NOT SURE WHEN THE BOOK WAS PUBLISHED, BUT THAT WAS
12 AROUND WHEN WE WROTE OUR CHAPTER.

13 Q AND JUST FOR OUR OWN SORT OF THE EDIFICATION,
14 IS IT FAIR TO SAY THAT THE SCIENCE INVOLVING THE
15 ETIOLOGY OF AUTISM HAS EVOLVED EVEN IN THE LAST TEN
16 YEARS SINCE YOU WROTE THAT BOOK CHAPTER?

17 A YES. YEP.

18 Q OKAY.

19 NOW, THAT WE'VE SORT OF COVERED YOUR
20 QUALIFICATIONS, I JUST WANT TO SORT OF TOUCH ON SOME OF
21 THE HIGHLIGHTS. I WANT TO GO STRAIGHT INTO YOUR
22 METHODOLOGY. AND I SPECIFICALLY WANT TO FOCUS IN ON THE
23 BRADFORD HILL FACTORS, OKAY?

24 A OKAY.

25 Q SO HERE I AM SHOWING A DEMONSTRATIVE.
26 THIS IS EXHIBIT 145.

27 AND THESE ARE A LIST, SORT OF SHORTHAND, OF THE
28 HILL FACTORS.

1 DO YOU SEE THOSE, DOCTOR?

2 A I DO.

3 Q AND IN THE BRIEFING AND IN THE DISCUSSIONS WITH
4 THE COURT AND WHILE WE'RE HERE, THERE'S BEEN A LOT OF
5 CONTENTIONS ABOUT HOW YOU DID CERTAIN FACTORS, AND I
6 JUST WANT TO SORT OF GO THROUGH WHAT YOU DID GENERALLY
7 FOR ALL THE METALS, AND THEN AFTER THAT, WE'RE GOING TO
8 GET INTO SPECIFICALLY MERCURY AND ARSENIC, OKAY?

9 A OKAY.

10 Q ALL RIGHT. LET'S START OFF WITH THE STRENGTH
11 -- WELL, BEFORE WE START OFF WITH THE FIRST ONE, WILL
12 YOU AGREE WITH ME THAT THERE IS A DISTINCTION WITHIN THE
13 SCIENTIFIC COMMUNITY FOR THE FORMAL APPLICATION OF THE
14 BRADFORD HILL FACTORS VERSUS SORT OF THE BRADFORD HILL
15 FACTORS AS YOU'RE THINKING ABOUT ALL THE LITERATURE?

16 A I'M NOT SURE I UNDERSTAND YOUR QUESTION.

17 Q SURE.

18 WHAT ARE THE BRADFORD HILL FACTORS, YOUR
19 UNDERSTANDING OF THEM?

20 A SO THEY ARE NINE FACTORS THAT ARE USED TO HELP
21 SORT OF GUIDE THE WAY EPIDEMIOLOGISTS THINK ABOUT
22 WHETHER ASSOCIATIONS IN THE MEDICAL LITERATURE ARE
23 CAUSAL. IT'S SORT OF LIKE A FRAMEWORK OR A GUIDE OF --
24 OR A LIST OF ALL OF THE THINGS THAT WE ARE THINKING
25 ABOUT WHEN WE'RE TRYING TO INFER CAUSALITY.

26 Q NOW, THERE'S BEEN A CONTENTION THAT THERE MUST
27 BE A STATISTICALLY SIGNIFICANT AND UNCONFOUNDED
28 ASSOCIATION OBSERVED BEFORE YOU EVEN BEGIN THINKING

1 ABOUT THE HILL FACTORS.

2 PUTTING ASIDE WHAT YOU DID HERE, DOCTOR, IS
3 THAT SOMETHING THAT YOU GENERALLY THINK IS TRUE AND HOW
4 YOU THINK WITH THE HILL FACTORS?

5 A SO IN TERMS OF WHETHER THERE'S A SPECIFIC -- WE
6 THINK OF SPECIFIC ASSOCIATES IN STUDIES OF BEING
7 STATISTICALLY SIGNIFICANT OR NOT. WHEN WE THINK ABOUT
8 THE HILL FACTORS, WE REALLY THINK ABOUT THE LITERATURE
9 AS A WHOLE AND THAT WILL INCLUDE MANY STUDIES. AND SOME
10 OF THOSE STUDIES WILL BE STATISTICALLY SIGNIFICANT AND
11 SOME OF THOSE STUDIES WILL NOT BE STATISTICALLY
12 SIGNIFICANT.

13 I MEAN, THIS GOES TO THE SECOND HILL FACTOR,
14 "CONSISTENCY." IT WOULD BE SORT OF IMPLAUSIBLE TO
15 EXPECT THAT EVERY SINGLE STUDY AS BEING A STATISTICALLY
16 SIGNIFICANT ASSOCIATION.

17 BUT WHEN -- WE THINK ABOUT THE HILL FACTORS
18 WHEN WE'RE WRITING PAPERS, WE THINK ABOUT THE HILL
19 FACTORS WHETHER WE HAVE OBSERVED A STATISTICALLY
20 SIGNIFICANT ASSOCIATION IN OUR SPECIFIC STUDY OR NOT.

21 BUT WHEN WE THINK ABOUT THE HILL FACTORS IN
22 RELATION TO THE BODY OF LITERATURE, FIRST, WE THINK
23 ABOUT IS THERE AN ASSOCIATION?

24 SO I THOUGHT -- IN THIS SITUATION, I THOUGHT
25 ABOUT IS THERE AN ASSOCIATION BETWEEN THESE HEAVY METALS
26 AND AUTISM?

27 AND THEN I THINK ABOUT THESE HILL FACTORS AS A
28 FRAMEWORK.

1 BUT WE STILL SORT OF THINK ABOUT THESE HILL
2 FACTORS WHEN WE WRITE THE DISCUSSION SECTIONS OF OUR
3 JOURNAL ARTICLES, WHETHER WE HAVE FOUND A STATISTICALLY
4 SIGNIFICANT POSITIVE OR A NEGATIVE ASSOCIATION OR A NULL
5 ASSOCIATION.

6 Q I'D LIKE TO SHOW YOU EXHIBIT 2.

7 THIS IS A PORTION OF YOUR REPORT. AND I'LL
8 ZOOM IN SO YOU CAN SEE IT.

9 YOU SEE UNDER THE HEADING "OPINIONS" HERE IN
10 YOUR REPORT?

11 A YES.

12 Q AND HERE YOU START WITH YOUR DISCUSSION ABOUT
13 LEAD AND ASD.

14 DO YOU SEE THAT?

15 A I DO.

16 Q AND THE FIRST THING YOU DO IS YOU SORT OF
17 DISCUSS ALL THE NUMBERED STUDIES AND KIND OF WHAT THEY
18 ARE SHOWING AND WHETHER OR NOT THERE'S AN ASSOCIATION
19 THAT YOU OBSERVED; IS THAT RIGHT?

20 A CORRECT.

21 Q AND AS WE GO THROUGH THIS, YOU BEGIN DISCUSSING
22 DIFFER BIOMARKERS. YOU TALK ABOUT META ANALYSIS.

23 DO YOU SEE THAT, DOCTOR?

24 A I DO.

25 Q AND IT GOES ON FOR SEVERAL PAGES.

26 AND THEN AFTER YOU'VE DONE A FULL REVIEW OF ALL
27 OF THE LITERATURE, AT THE VERY END HERE YOU STATE:

28 "HAVING REVIEWED THE LITERATURE AND ASSESSED

1 THE QUALITY OF THE STUDIES, I TURN TO THE HILL
2 CRITERIA TO CONSIDER THE BURDEN OF EVIDENCE TO
3 SUPPORT CAUSALITY."

4 DO YOU SEE THAT?

5 A I DO.

6 Q AND THEN AFTER THIS YOU HAVE A CHART THAT IT
7 LITERALLY LISTS THE CRITERIA AND THEN YOU KIND OF TALK
8 ABOUT THE EVIDENCE THAT RELATE TO EACH CRITERIA; IS THAT
9 RIGHT?

10 A CORRECT.

11 Q ALL RIGHT.

12 AND I GUESS THE REASON I POINT THIS OUT IS, WHY
13 DID YOU SPEND SO MUCH TIME DISCUSSING ALL THE LITERATURE
14 AND THE STRENGTHS AND THE WEAKNESSES AND THE BIASES AND
15 THE CONSIDERATIONS AND ALL THAT STUFF BEFORE YOU STARTED
16 FORMALISTICALLY APPLYING THE HILL CRITERIA?

17 A I THINK IT REPRESENTS MY THOUGHT PROCESS.

18 SO FIRST WHAT I DO IS I COLLECT THE EVIDENCE.
19 I LOOK TO SEE WHAT THE DIFFERENT STUDIES HAVE SHOWN.
20 HAVE THEY SHOWN A POSITIVE ASSOCIATION, A NEGATIVE
21 ASSOCIATION, A NULL ASSOCIATION. AND THEN I THINK ABOUT
22 WHY THEY MAY HAVE FOUND THOSE ASSOCIATIONS OR DIDN'T
23 FIND THOSE ASSOCIATIONS. ARE THERE CONFOUNDING FACTORS
24 THAT WOULD HAVE BIASED THE RESULTS IN A POSITIVE
25 DIRECTION SORT OF AWAY FROM THE NULL OR TOWARDS THE NULL
26 IN EITHER DIRECTION AND I THINK ABOUT METHODOLOGICAL
27 LIMITATIONS OR CHALLENGES AND HOW THOSE COULD HAVE
28 AFFECTED THE RESULTS.

1 AND THEN I -- SO I SORT OF SYNTHESIZE THE
2 RESULTS TO FIRST DETERMINE IS THERE A -- IS THE
3 ASSOCIATION POSITIVE? IS THE ASSOCIATION NEGATIVE OR IS
4 THE ASSOCIATION NULL? AND IF SO, WHY COULD THAT -- WHY
5 WOULD THAT BE.

6 SO AFTER DETERMINING WHAT I THINK THE
7 ASSOCIATION IS, THEN I TURN TO THE HILL CRITERIA TO THEN
8 INFER CAUSALITY BECAUSE THE HILL CRITERIA DON'T REFLECT
9 WHETHER THERE IS AN ASSOCIATION OR NOT, THEY REFLECT
10 WHETHER THAT ASSOCIATION IS CAUSAL.

11 Q SO I WANT TO GO BACK TO THIS DEMONSTRATIVE THAT
12 WE WERE TALKING ABOUT, THE HILL FACTORS, AND I JUST KIND
13 OF WANT TO TALK GENERALLY ABOUT HOW YOU APPLY THESE IN
14 YOUR ANALYSIS.

15 SO SPECIFICALLY "STRENGTH OF ASSOCIATION."

16 WHAT FACTORS DID YOU THINK ABOUT IN THE STUDIES
17 IN THINKING ABOUT AND UNDERSTANDING WHETHER OR NOT THERE
18 WAS A STRONG ASSOCIATION FOR ANY PARTICULAR METAL AND
19 ASD OR ADHD?

20 A SURE.

21 SO WHEN I THINK ABOUT THE STRENGTH OF THE
22 ASSOCIATION, I THINK OF HOW IS THE ASSOCIATION BEING
23 PORTRAYED IN THE STUDY? IS IT A RELATIVE RISK OR A RISK
24 RATIO? IS IT A RISK DIFFERENCE? ARE THEY COMPARING THE
25 MEANS OF THE HEAVY METALS BETWEEN CASES AND CONTROLS?
26 SO HOW ARE THEY SHOWING THE ASSOCIATION IN THE STUDY?

27 AND THEN I THINK ABOUT THE UNITS OF MEASUREMENT
28 BECAUSE THE EFFECT MEASURE, WHICH IS WHAT WE WOULD --

1 HOW WE WOULD CALL IT -- REALLY DEPENDS ON THE UNIT OF
2 MEASUREMENT.

3 SO IF YOUR UNIT OF MEASUREMENT IS ONE MILLIGRAM
4 PER DECILITER VERSUS TEN MILLIGRAMS PER DECILITER, THE
5 EFFECT MEASURE WILL VARY. AND THEN I THINK ABOUT THE
6 BACKGROUND LEVELS; SO THE STRENGTH OF THE ASSOCIATION
7 MIGHT VARY BASED ON SORT OF WHAT THE BACKGROUND LEVEL
8 IS. AND IF WE'RE THINKING ABOUT STATISTICALLY
9 SIGNIFICANT ASSOCIATIONS, I THINK ABOUT SORT OF THE SIZE
10 OF THE STUDY AND WHAT IS REQUIRED TO GET A STATISTICALLY
11 SIGNIFICANT ASSOCIATION.

12 SO IN MY NORMAL WORK I WORK WITH DATA SETS OF
13 HUNDREDS OF THOUSANDS OF PEOPLE OR TENS OF THOUSANDS OF
14 PEOPLE SO A SMALL DIFFERENCE WILL BE STATISTICALLY
15 SIGNIFICANT.

16 IN THIS BODY OF LITERATURE, THE SAMPLE SIZES
17 ACROSS STUDIES WERE VERY SMALL; YOU KNOW, ALMOST ALWAYS
18 LESS THAN HUNDRED, OFTEN LESS THAN 50, SO YOU ACTUALLY
19 NEED A PRETTY STRONG ASSOCIATION TO ACHIEVE STATISTICAL
20 SIGNIFICANCE.

21 Q AND THE FACT THAT YOU WERE SEEING LARGE
22 DIFFERENCES BETWEEN KIDS WITH AUTISM OR ADHD IN NORMAL
23 -- NEURO-TYPICAL KIDS AND THE FACT THAT YOU WERE SEEING
24 STATISTICALLY SIGNIFICANT RESULTS IN REALLY SMALL
25 STUDIES, DOES THAT LEND ANY STRENGTH TO YOUR OBSERVATION
26 THAT THERE IS IN FACT A STRONG ASSOCIATION?

27 A YEAH. IT'S REALLY HARD TO OBSERVE SIGNIFICANT
28 ASSOCIATIONS IN SMALL STUDIES. THERE'S ALWAYS -- YOU

1 KNOW, THERE'S ALWAYS GOING TO BE A LOT OF VARIABILITY
2 REACHING A STATISTICAL SIGNIFICANCE, THAT'S P LESS THAN
3 .05 IS CHALLENGING WITH FEW PARTICIPANTS, WHICH IS WHY,
4 YOU KNOW, WE ALWAYS TRY TO DO STUDIES WITH HUNDREDS OF
5 THOUSANDS OF PEOPLE.

6 AND THEN WE RUN INTO THE OPPOSITE PROBLEM.

7 Q THE NEXT ONE IS "CONSISTENCY."

8 I WANT TO PUT A PIN IN THAT. WE'RE GOING TO
9 COME BACK TO IT WHEN WE'RE ACTUALLY LOOKING AT THE
10 STUDIES BECAUSE I THINK IT'S EASIER TO DO THAT IN THE
11 CONTEXT OF THE DATA.

12 A OKAY.

13 Q "SPECIFICITY."

14 DO YOU THINK SPECIFICITY APPLIES HERE?

15 A IT DOESN'T.

16 SPECIFICITY OFTEN -- OR I SHOULD SAY IN MY
17 CAREER IN NEUROLOGICAL DISEASES IN LIFESTYLE AND
18 ENVIRONMENT RISK FACTORS ALMOST NEVER APPLY.

19 SO ENVIRONMENTAL HEALTH FACTORS VERY, VERY
20 RARELY WILL ONLY CAUSE ONE OUTCOME IN THE BODY. THEY
21 WILL TYPICALLY CAUSE ACTUALLY MANY BECAUSE THERE'S A LOT
22 OF SORT OF SYMP PATHWAYS THAT ARE SIMILAR ACROSS
23 NEUROLOGICAL OUTCOMES AND ACROSS, YOU KNOW, LIKE THE
24 OUTCOMES MORE BROADLY.

25 Q AND GENERALLY IN YOUR AREA OF EPIDEMIOLOGY, DO
26 YOU OFTEN OR REALLY EVER SEE THAT KIND OF SPECIFICITY IN
27 DISEASE RELATIONSHIP?

28 A I CAN'T REALLY THINK OF -- NONE -- THERE'S

1 NOTHING IN THE WORK THAT I DO OR THE RISK FACTORS THAT I
2 LOOK AT THAT ARE EVER SPECIFIC TO ONE OUTCOME AND NOR DO
3 WE ASSUME THAT THEY WOULD BE.

4 Q NOW, IF WE LOOK AT EXHIBIT 159.

5 THIS IS ACTUALLY THE HILL PAPER.

6 AND ON PAGE 3 WHEN HE SPECIFICALLY DISCUSSES
7 SPECIFICITY, HE SAYS -- OH, SORRY -- I'LL CALL IT OUT
8 RIGHT HERE.

9 HE SAYS, "WE MUST NOT, HOWEVER, OVEREMPHASIZE
10 THE IMPORTANCE OF THE CHARACTERISTIC."

11 AND THEN IF WE GO DOWN, HE GOES ON TO TALK
12 ABOUT TOBACCO SMOKE.

13 AND HE SAYS, "COMING TO MODERN TIMES, THE
14 PROSPECTIVE INVESTIGATIONS OF SMOKING AND
15 CANCER OF THE LUNG HAVE BEEN CRITICIZED FOR NOT
16 SHOWING SPECIFICITY. IN OTHER WORDS, THE DEATH
17 RATE OF SMOKERS IS HIGHER THAN THE DEATH RATE
18 OF NON SMOKERS FOR MANY CAUSES OF DEATH."

19 DO YOU SEE THAT, DOCTOR?

20 A YES.

21 Q AND DO YOU --

22 A YEAH, THAT -- SMOKING IS A PERFECT EXAMPLE OF
23 THAT, AND IT'S SOMETHING THAT WE, YOU KNOW, IN MY
24 LECTURES, WE TALK ABOUT A LOT BECAUSE IT'S AN IMPORTANT
25 EPIDEMIOLOGY CONCEPT THAT THIS LACK OF SPECIFICITY SO
26 OFTEN APPLIES. IT'S THE -- IT'S REALLY MORE THE RULE
27 THAN THE EXCEPTION.

28 Q EXACTLY.

1 AND HE GOES ON TO SAY HERE, "WE MUST ALSO KEEP
2 IN MIND THAT DISEASES MAY HAVE MORE THAN ONE
3 CAUSE."

4 HE GOES ON TO SAY HERE IN FACT, "I BELIEVE THAT
5 MULTI-CAUSATION IS GENERALLY MORE LIKELY THAN
6 SINGLE CAUSATION."

7 DO YOU SEE THAT?

8 A I DO.

9 Q AND WOULD YOU AGREE WITH THAT?

10 I MEAN, THIS WAS WRITTEN 50 YEARS AGO, AND HAS
11 EPIDEMIOLOGY SHIFTED AWAY FROM THAT GENERAL PERSPECTIVE?

12 A IT'S ABSOLUTELY TRUE. YOU KNOW, I'VE NEVER MET
13 AN EPIDEMIOLOGIST WHO DOESN'T MAKE THIS ASSUMPTIONS.

14 Q OKAY.

15 ALL RIGHT. SO LET'S LOOK AT THE "TEMPORALITY."

16 NOW, ONE THE BIG CRITICISMS HERE IN THIS BODY
17 OF LITERATURE IS THAT A LOT OF THE EXPOSURE ASSESSMENTS
18 OCCURRED AFTER DIAGNOSIS. AND WE'RE GOING TO GET INTO
19 THAT SPECIFICALLY WITH MERCURY AND ARSENIC IN A MINUTE
20 BECAUSE WE HAVE STUDIES TO HELP ELUCIDATE THAT.

21 BUT I GUESS, GENERALLY SPEAKING, FOR YOUR
22 OPINIONS, DOCTOR, DID YOU TAKE INTO CONSIDERATION
23 WHETHER OR NOT THE STUDIES THAT WE WERE SEEING THESE
24 RESULTS FOR WERE ACTUALLY CAPTURING PRIOR EXPOSURES OR
25 NOT?

26 A THAT WAS ABSOLUTELY SOMETHING THAT I THOUGHT A
27 LOT ABOUT AND I REALLY THOUGHT ABOUT CAREFULLY WITH
28 EVERY STUDY THAT I READ BECAUSE THE HILL FACTOR -- THIS

1 HILL FACTOR IS REALLY IMPORTANT IN THAT THE EXPOSURE OF
2 INTEREST HAS TO OCCUR BEFORE THE OUTCOME OF INTEREST.
3 THAT DOESN'T MEAN THE DATA COLLECTION ON THAT EXPOSURE
4 OF INTEREST NECESSARILY HAS TO COME BEFORE THE OUTCOME,
5 BUT YOU CAN'T BE TALKING ABOUT AN EXPOSURE THAT HAPPENED
6 AFTER THE OUTCOME HAS OCCURRED EVEN THOUGH THE EXPOSURE
7 ASSESSMENT, YOU KNOW, WHEN YOU RECORD IT, WHEN YOU
8 COLLECT DATA ON IT, THAT OFTEN HAPPENS AFTER THE
9 EXPOSURE -- AFTER THE OUTCOME HAS OCCURRED.

10 Q AND I GUESS, DOCTOR, WHEN YOU EXAMINE WHETHER
11 THESE RESULTS SHOWING THAT, YOU KNOW, CHILDREN DIAGNOSED
12 WITH ASD HAD HIGHER HEAVY METAL BURDENS, WHEN YOU SAW
13 THAT AND YOU ANALYZE WHETHER OR NOT THAT -- THOSE
14 RESULTS OF THOSE HEAVY METAL BURDENS WERE LIKELY
15 TEMPORALLY RELATED, DID YOU, FOR EACH METAL, THINK ABOUT
16 WHETHER OR NOT IT WAS PLAUSIBLE THAT THOSE WERE BEING
17 CAUSED BY THE DISEASE VERSUS THE DISEASE CAUSING THE
18 BURDEN?

19 A YES.

20 I MEAN, SO THAT WAS MY CHARGE IS TO JUST SORT
21 OF UNDERSTAND IF THESE METALS WERE CAUSING AUTISM, AND
22 SO I WAS ABSOLUTELY THINKING ABOUT WHETHER THIS APPLIED
23 AND WHETHER HAVING AUTISM, FOR EXAMPLE, COULD MAKE YOU
24 BE EXPOSED TO MORE MERCURY OR MORE ARSENIC. AND THAT
25 WAS A REALLY -- THAT'S A REALLY IMPORTANT CONSIDERATION.

26 Q OKAY. "BIOLOGICAL GRADIENT," IS THAT ALSO
27 KNOWN AS DOSE RESPONSE?

28 A IT IS.

1 Q AND WAS THERE ANY DOSE RESPONSE DATA IN THIS
2 BODY OF LITERATURE?

3 A SO THERE WAS DATA THAT SUGGESTS A BIOLOGICAL
4 GRADIENT, THAT AT HIGHER LEVELS OF HEAVY METALS, THE
5 RISK OF AUTISM MIGHT BE HIGHER, AND SPECIFICALLY THERE
6 WAS COMPELLING DATA THAT AT INCREASING LEVELS OF HEAVY
7 METALS, THE AUTISM SYMPTOMS, WHICH IS WHAT WE REALLY
8 CARE ABOUT, ARE HIGHER.

9 SO I FOUND THOSE STUDIES, LOOKING AT AUTISM
10 SYMPTOMS IN RELATION TO HEAVY METALS, TO BE PARTICULARLY
11 COMPELLING WHEN I WAS THINKING ABOUT BIOLOGICAL
12 GRADIENT.

13 AND ALSO THE FACT THAT THESE STUDIES WERE
14 CONDUCTED IN REALLY DIVERSE POPULATIONS, WHICH ISN'T A
15 PLEASURE THAT WE ALWAYS HAVE IN ALL FIELDS OF
16 EPIDEMIOLOGY THAT THIS LITERATURE IS REALLY DIVERSE IN
17 TERMS OF COUNTRY OF ORIGIN AND RACES AND ETHNICITIES AND
18 THE TIME WHEN THE DATA WAS COLLECTED BECAUSE THE
19 POPULATIONS VARY IN TERMS OF THEIR BACKGROUND EXPOSURE
20 LEVELS TO THESE METALS.

21 AND SO THE FACT THAT THE ASSOCIATION WAS
22 OBSERVED IN DIFFERENT POPULATIONS WITH DIFFERENT
23 BACKGROUND LEVELS ACTUALLY ALSO SPEAKS TO THIS
24 BIOLOGICAL GRADIENT.

25 Q "PLAUSIBILITY." AND I KNOW WE'VE TALKED A LOT
26 ALREADY ABOUT THIS. WE'RE GOING TO HEAR A LOT ABOUT IT
27 TOMORROW FROM DR. ASCHNER.

28 BUT, I MEAN, PUT SIMPLE IS THERE PLENTY OF

1 BIOLOGICAL PLAUSIBILITY FOR THESE METALS IN ASD AND
2 ADHD?

3 A ABSOLUTELY.

4 YOU KNOW, THESE ARE ALL KNOWN NEUROTOXINS.

5 AND IN THE EPI LITERATURE WE OFTEN DO INFER
6 CAUSALITY BEFORE WE ACTUALLY HAVE THE BIOLOGICAL
7 MECHANISM REALLY WELL UNDERSTOOD. BUT IN THIS CASE THE
8 BIOLOGICAL MECHANISM WAS REALLY THE IMPETUS FOR ALL OF
9 THIS WORK.

10 Q ALL RIGHT. THESE LAST THREE, I THINK WE CAN
11 GET THROUGH THEM QUICKLY.

12 "COHERENCE," WHAT IS THAT AND IS THE DATA HERE
13 COHERENT?

14 A SO THERE'S A LITTLE BIT OF OVERLAP BETWEEN
15 THESE.

16 SO BASICALLY -- SO THERE'S SOME OVERLAP BETWEEN
17 THE COHERENCE CRITERIA AND THE PLAUSIBILITY.

18 BUT BASICALLY COHERENCE REFERS TO, DOES THE
19 LITERATURE -- DOES THE DIFFERENT TYPES OF LITERATURE ON
20 THIS MAKE SENSE? YOU KNOW, INVIVO, IN VITRO, ANIMAL
21 STUDIES, HUMAN STUDIES, YOU KNOW, THE STUDIES ON AUTISM
22 SEVERITY AND AUTISM DIAGNOSIS, DO THE DIFFERENT TYPES OF
23 STUDIES WHEN THEY ALL COME TOGETHER, IS THERE COHERENCE
24 THERE? OR IS THERE CONSISTENCY?

25 Q ALL RIGHT. AND I GUESS, WAS THERE COHERENCE IN
26 THIS DATA?

27 A THERE WAS. ABSOLUTELY.

28 Q OKAY. ALL RIGHT.

1 "EXPERIMENT," WHAT IS THAT, AND DID YOU REALLY
2 HAVE THAT DATA AVAILABLE TO YOU IN THIS DATA SET?

3 A SO NOT FROM HUMAN. SO EXPERIMENT REFERS TO
4 WHETHER, LIKE, RANDOMIZED CONTROLLED TRIALS ARE
5 EXISTENT. AND IT'S NOT ETHICAL TO -- WE KNOW THAT
6 ARSENIC AND MERCURY AND LEAD ARE NEUROTOXINS. IT WOULD
7 BE HIGHLY UNETHICAL TO PURPOSEFULLY EXPOSE SOME CHILDREN
8 TO THESE AND NOT OTHERS.

9 AND SO WE WOULDN'T EXPECT TO SEE HUMAN
10 EXPERIMENTAL DATA FOR THIS LINE OF ANALYSIS, BUT THERE
11 HAS BEEN SOME EXPERIMENTAL DATA IN ANIMALS, WHICH IS
12 CHALLENGING, YOU KNOW, FOR THE ANIMAL MODEL OF AUTISM,
13 BUT WHAT DOES -- WHAT IS THERE IS, LIKE, CRITERIA
14 NUMBER 7 "COHERENCE."

15 Q OKAY. GREAT.

16 AND THEN FINALLY, "ANALOGY," WHAT IS THAT AND
17 DID IT APPLY HERE?

18 A YEAH. SO THE ANALOGY REFERS TO IF A SIMILAR
19 CHEMICAL OR COMPOUND HAS ALREADY BEEN SHOWN TO BE
20 CAUSALLY ASSOCIATED WITH THE OUTCOME, THEN YOU SORT OF
21 NEED LESS OF A BURDEN OF PROOF FOR A VERY SIMILAR
22 COMPOUND.

23 SO THE FACT THAT THERE ARE MULTIPLE NEUROTOXIC
24 HEAVY METALS THAT HAVE BEEN ASSOCIATED WITH THESE
25 OUTCOMES SORT OF DECREASES THE BURDEN FOR OTHER ONES
26 BECAUSE IT WOULD MAKE SENSE IF WE ALREADY KNOW, YOU KNOW
27 THAT THESE TOXIC HEAVY METALS ARE CAUSALLY RELATED WITH
28 DEVELOPMENTAL DISABILITIES, THEN IT MAKES MORE SENSE

1 BASED ON A SMALLER BODY OF LITERATURE FOR THE NEXT ONE
2 TO ALSO BE CAUSALLY RELATED.

3 Q I JUST WANT TO FINISH ON ONE THING HERE.

4 AND IF WE LOOK BACK TO THE HILL ARTICLE, AT THE
5 VERY END OF HIS DISCUSSION OF THESE FACTORS AND THE
6 CRITERIA, HE WRITES, STARTING RIGHT HERE, "WHAT I DO NOT
7 BELIEVE, AND THIS HAS BEEN SUGGESTED, IS THAT
8 WE CAN USEFULLY LAY DOWN SOME HARD AND FAST
9 RULES OF EVIDENCE THAT MUST BE OBEYED BEFORE WE
10 ACCEPT CAUSE AND EFFECT. NONE OF MY NINE
11 VIEWPOINTS CAN BRING INDISPUTABLE EVIDENCE FOR
12 OR AGAINST THE CAUSE AND EFFECT HYPOTHESIS AND
13 NONE CAN BE REQUIRED AS A SINE QUA NON. WHAT
14 THEY CAN DO, WITH GREATER OR LESS STRENGTH, IS
15 TO HELP US MAKE UP OUR MIND TO THE FUNDAMENTAL
16 QUESTION; IS THERE ANY OTHER WAY OF EXPLAINING
17 THE SET OF FACTS BEFORE US? IS THERE ANY OTHER
18 ANSWER EQUALLY OR MORE LIKELY THAN CAUSE AND
19 EFFECT."

20 DO YOU SEE THAT?

21 A I DO.

22 Q I GUESS MY QUESTION, DOCTOR, IS TO WHAT EXTENT
23 DOES YOUR EXPERIENCE AND JUDGMENT AS AN EPIDEMIOLOGIST
24 PLAY INTO HOW YOU APPLY THESE WIDELY RECOGNIZED
25 CRITERIA?

26 A IT'S VERY IMPORTANT.

27 SO THIS SENTIMENT WAS ECHOED IN THE SURGEON
28 GENERAL'S REPORT IN 1964 REGARDING SMOKING AND LUNG

1 CANCER.

2 YOU KNOW, DIFFERENT PEOPLE -- DIFFERENT
3 EPIDEMIOLOGISTS CAME TO THE CONCLUSION THAT SMOKING
4 CAUSES LUNG CANCER AT SLIGHTLY DIFFERENT TIME PERIODS OR
5 TIME POINTS, AND THERE WERE PEOPLE WHO, YOU KNOW, EVEN
6 IN 1964, YOU KNOW, WEREN'T QUITE SURE.

7 BUT WHAT -- MY TRAINING IN EPIDEMIOLOGY HAS
8 PROVIDED ME A BACKGROUND TO VIEW THE LITERATURE AND
9 UNDERSTAND IT IN RELATION TO ALL NINE OF THESE CRITERIA
10 AND UNDERSTAND WHEN THEY HAVE BEEN MET TO THE POINT
11 WHERE WE WOULD EXPECT THEM TO BE MET UNDER AND INFER
12 CAUSALITY.

13 Q IS IT APPROPRIATE IN YOUR MIND TO TREAT THEM AS
14 A CHECKLIST OF YES/NO, YES/NO AND THEN COUNT UP THE
15 NUMBER OF FACTORS AND THAT ANSWERS THE QUESTION FOR YOU?

16 A NO. NEVER. THAT'S NOT WHAT I -- THAT'S NOT
17 WHAT I TAUGHT MY STUDENTS YESTERDAY AND THAT'S NOT WHAT
18 -- THAT'S NOT WHAT I WAS TAUGHT AT HARVARD, SO
19 ABSOLUTELY NOT.

20 Q ALL RIGHT.

21 SO LET'S GET STRAIGHT INTO SOME OF THE DATA SO
22 WE CAN SORT OF UNPACK THIS A LITTLE BIT.

23 I'M GOING TO SHOW YOU -- WE'RE GOING TO START
24 OFF WITH ARSENIC.

25 AND SO THIS IS A CHART THAT I PREPARED, BUT
26 THANKFULLY, DID YOU HAVE A CHANCE TO ACTUALLY LOOK AT
27 THE STUDIES ON THIS MAKE SURE I'M NOT A COMPLETE BOZO?

28 A I SPENT MUCH OF THE WEEKEND LOOKING AT THIS

1 CHART AND CHECKING IT.

2 Q OKAY. GREAT.

3 NOW, AND TO BE CLEAR, ARE ALL STUDIES RELATED
4 TO ARSENIC AND ASD ON HERE, OR IS IT JUST POST-NATAL
5 DATA?

6 A I BELIEVE JUST POST-NATAL DATA.

7 Q AND CAN YOU EXPLAIN WHAT THE DIFFERENCE BETWEEN
8 POST-NATAL AND PRENATAL DATA IS?

9 A SURE.

10 SO PRENATAL DATA REFERS TO THE MEASUREMENT OF
11 ARSENIC DURING PREGNANCY, EITHER FROM THE MOTHER'S BLOOD
12 OR FROM THE -- BASICALLY FROM THE MOTHER'S BLOOD.

13 AND POST-NATAL WOULD BE FROM THE BABIES
14 THEMSELVES AFTER THEY ARE BORN.

15 Q AND SO HERE IN ARSENIC, I KNOW, FOR EXAMPLE,
16 THE DOHERTY STUDY RIGHT HERE, I CAN CALL IT UP. THE
17 DOHERTY STUDY RIGHT HERE, THAT'S A STUDY THAT INCLUDES
18 BOTH PRENATAL AND POST-NATAL, BUT IT'S ON HERE BECAUSE
19 IT HAS SOME POST-NATAL; IS THAT RIGHT?

20 A THAT'S RIGHT.

21 Q OKAY. ALL RIGHT.

22 SO THIS IS THE DATA.

23 AND I JUST WANT TO FIRST GET TO THIS
24 CONSISTENCY CONCEPT JUST OFF THE BAT.

25 WHEN YOU SEE DATA HERE LIKE THIS WHERE YOU HAVE
26 ALL THESE POSITIVE AND STATISTICALLY SIGNIFICANT DATA
27 AND YOU HAVE ALL THESE NON SIGNIFICANT RESULTS AND THEN
28 YOU HAVE THIS ONE NEGATIVE STATISTICALLY SIGNIFICANT

1 RESULT, HOW CAN YOU AS AN EPIDEMIOLOGY CLAIM THAT THIS
2 DATA IS CONSISTENT?

3 A SO, YOU KNOW, I THINK WE NEED -- YOU KNOW, IT
4 -- FOR ME IT INVOLVES HAVING A REALITY CHECK AND HAVING
5 BEEN AN EPIDEMIOLOGIST AND KNOWING THAT WE CAN'T -- WE
6 NEVER SEE COMPLETE CONSISTENCY.

7 IN A LOT OF THE ANALYZES THAT I HAVE DONE, YOU
8 KNOW, SMOKING HASN'T BEEN ASSOCIATED WITH HEART ATTACK
9 OR STROKE. I MEAN, THERE -- YOU KNOW, YOU DON'T HAVE A
10 SUFFICIENT SAMPLE SIZE, OR IF THERE ARE METHODOLOGICAL
11 ISSUES, THAT CAN IMPACT ASSOCIATIONS OR THERE ARE SO
12 MANY REASONS WHY IN A STUDY A TRUE CAUSAL ASSOCIATION
13 MIGHT NOT REACH STATISTICAL SIGNIFICANCE.

14 SO, BUT WHAT YOU ALSO WANT TO THINK ABOUT IS
15 WHAT ARE THE CHANCES IF THE ASSOCIATION WAS NOT CAUSAL
16 THAT WE WOULD SEE SO MANY DIFFERENT ASSOCIATIONS USING
17 DIFFERENT TYPES OF BIOMARKERS USING DIFFERENT PERIODS OF
18 TIME IN HISTORY AND IN DIFFERENT COUNTRIES AND
19 POPULATIONS.

20 Q AND THAT'S WHERE I WAS GOING TO GET AT.

21 SO WHEN WE LOOK AT THE STATISTICALLY
22 SIGNIFICANT DATA, DO YOU HAVE DIFFERENT COUNTRIES AND
23 DIFFERENT BIOMARKERS AND DIFFERENT TIME PERIODS?

24 A YES.

25 Q I MEAN, FOR EXAMPLE, YOU MENTIONED DOHERTY A
26 MINUTE AGO. I MEAN, THAT HAS PRENATAL DATA; RIGHT?

27 A YEP.

28 Q AND YOU KNOW, WE HAVE BLOOD MARKERS AND HAIR

1 MARKERS. AND WHEN YOU HAVE THIS SORT OF DIFFERENT
2 PEOPLE, DIFFERENT LOCATIONS, DIFFERENT TIME PERIODS,
3 DIFFERENT EXPOSURE PERIOD, DIFFERENT STUDY DESIGNS, DOES
4 THAT LEND ITS WEIGHT TO THERE BEING CONSISTENCY OF THE
5 DATA?

6 A YEAH. BECAUSE WHAT YOU WOULD -- I MEAN, YOU
7 WOULD -- IF YOU SAW THIS NUMBER OF STUDIES, BUT THEY
8 WERE ALL CONDUCTED IN, YOU KNOW, 2018 AMONG CHILDREN,
9 YOU KNOW, LIVING IN THE WEST COAST AND THE EAST COAST OF
10 THE UNITED STATES, BUT THEN YOU SAW THE SAME NUMBER OF
11 STUDIES, BUT THOSE WERE ALL DIVERSE, AND THOSE WERE, YOU
12 KNOW, HAD SOME STUDIES WERE CONDUCTED IN THOSE
13 POPULATIONS, BUT SOME WERE IN EUROPE AND SOME WERE IN
14 ASIA AND SOME WERE IN AFRICA, THEN YOU WOULD REALLY
15 START TO THINK ABOUT, IS THERE SOMETHING -- IS THERE
16 SOMETHING ABOUT, YOU KNOW, SOME AREAS THAT MIGHT BE
17 INVOLVED.

18 BUT WHEN YOU START SEEING CONSISTENCY ACROSS
19 DIFFERENT AREAS -- AND THE LATTER SITUATION THAT I JUST
20 DESCRIBED, THAT WOULD NOT MEAN THAT IT WOULD NOT BE
21 CAUSAL. I SHOULD BE VERY CLEAR ABOUT THAT.

22 BUT WHEN YOU SEE -- BUT WHAT YOU WOULD START TO
23 THINK IS, LIKE, MAYBE THERE IS SOMETHING GOING ON IN
24 THOSE POPULATIONS THAT, YOU KNOW, MIGHT BE MODIFYING THE
25 EFFECT OR MIGHT BE MAKING IT CAUSAL IN THOSE SITUATIONS.

26 BUT IT WOULD BE SO UNLIKELY IF YOU LOOKED IN
27 DIFFERENT STUDY DESIGNS AND DIFFERENT POPULATIONS AND
28 DIFFERENT SAMPLE SIZES AND DIFFERENT TIME PERIODS AND WE

1 CONTINUOUSLY SEE AN ASSOCIATION, THEN IT BECOMES LESS
2 LIKELY THAT IT'S DUE TO, YOU KNOW, DESIGN ISSUES OR IT'S
3 JUST DUE TO, YOU KNOW, HAVING TOO LARGE SAMPLE SIZES OR
4 -- WHICH IS NOT A PROBLEM IN THIS LITERATURE.

5 SO WHEN YOU START -- WHEN YOU SEE SOMETHING
6 LIKE THIS, YOU WANT TO THINK, ALL RIGHT. IS A EFFECT
7 MODIFICATION GOING ON HERE? IS THERE A REASON WHY SOME
8 STUDIES ARE SIGNIFICANT AND OTHERS AREN'T? OR ARE SOME
9 STUDIES NOT SIGNIFICANT DUE TO CHANCE BECAUSE THAT
10 ALWAYS COMES INTO PLAY OR DUE TO SMALL SAMPLE SIZES.

11 Q AND ALL THOSE CONSIDERATIONS THAT YOU'RE
12 TALKING ABOUT AND THAT SORT OF SYSTEMIC REVIEW OF EACH
13 STUDY AND UNDERSTANDING IT, IS THAT WHAT YOU DID HERE
14 FOR EACH ONE OF THESE STUDIES AS IT RELATES TO ARSENIC?

15 A ABSOLUTELY.

16 SO WHAT I DID, I DIDN'T CREATE -- I DIDN'T SEE
17 SUCH A BEAUTIFUL CHART UNTIL THIS WEEKEND, BUT THE
18 EQUIVALENT OF THAT CHART WAS IN MY HEAD AS I WAS LOOKING
19 AT THE LITERATURE AND LOOKING AT, YOU KNOW, STUDY AFTER
20 STUDY SHOWING SIGNIFICANT ASSOCIATIONS AND OTHER STUDIES
21 NOT SHOWING SIGNIFICANT ASSOCIATIONS, I HAD TO SORT OF
22 KEEP TRACK IN MY MIND OF SORT OF WHERE WE WERE IN
23 RELATION TO THIS CONSISTENCY AND HOW AND WHY SOME
24 STUDIES MIGHT NOT BE SIGNIFICANT.

25 Q NOW, ARE YOU FAMILIAR WITH SOMETHING CALLED A
26 META ANALYSIS?

27 A YES.

28 Q ARE META ANALYSIS ONE WAY OF TRYING TO

1 SYNTHESIZE MULTIPLE DIFFERENT STUDIES TO SEE IF THERE'S
2 A CONSISTENT OUTCOME?

3 A YEP.

4 Q ALL RIGHT. LET'S LOOK AT A META ANALYSIS FROM
5 2019. THIS IS THE WANG STUDY. WE ACTUALLY HAD A CHANCE
6 TO TALK ABOUT THIS BRIEFLY YESTERDAY AS IT RELATES TO
7 LEAD. OBVIOUSLY WE'RE GOING TO TALK ABOUT ARSENIC.

8 ARE YOU FAMILIAR WITH THIS STUDY, DOCTOR?

9 A I AM.

10 Q AND FOR THE RECORD, THIS IS EXHIBIT 126.

11 SO IN THIS STUDY I KIND OF WANT TO START OFF --
12 WELL, IN THIS STUDY, AS YOU CAN SEE HERE, THIS A LONG --
13 THERE'S A CHART, IT STARTS ON TABLE 1 SUMMARIZING -- OH,
14 SORRY, THERE'S A CHART HERE AND IT SAYS IT'S SUMMARIZING
15 THE RELEVANT STUDIES ON ARSENIC EXPOSURE AND ASD.

16 DO YOU SEE THAT?

17 A YES.

18 Q AND AS YOU GO THROUGH IT FOR A FEW PAGES, THE
19 AUTHORS ARE DESCRIBING THE STUDIES, THE HAIR, THE BODY,
20 THE EXPOSURE MEASURE, THE OUTCOME, THE FINDINGS AND THE
21 ASSOCIATION GROUPS, ET CETERA; RIGHT?

22 A YEP.

23 Q OKAY. ALL RIGHT.

24 SO THEN IF WE GO DOWN HERE, THEY ACTUALLY HAVE
25 A TABLE OF THEIR RESULTS OF THEIR META ANALYSIS. I WANT
26 TO WALK THROUGH THAT.

27 SPECIFICALLY, I WANT TO LOOK AT THE ARSENIC
28 HERE, AND IT LOOKS LIKE THEY DID A META ANALYSIS FOR

1 BLOOD AND HAIR; IS THAT RIGHT?

2 A CORRECT.

3 Q WHAT DOES THIS MEASURE HERE REFLECT? IT SAYS
4 "MEAN SD CASE." WHAT IS THAT REFERRING TO?

5 A SO THAT IS THE MEAN OF THE ARSENIC LEVELS IN
6 THE AUTISM CASES, AND IN THE PARENTHESES IS THE STANDARD
7 DEVIATION. AND NEXT TO IT IS THE MEAN AND STANDARD
8 DEVIATION OF THE ARSENIC LEVELS IN THE CONTROL OR
9 COMPARISON GROUP.

10 Q IS ONE WAY TO THINK ABOUT THIS IS THE CASES,
11 THESE ARE THE KIDS WITH AUTISM AND THIS IS THE AMOUNT OF
12 ARSENIC THEY GET WHEN THEY POOLED IT ALL TOGETHER?

13 A CORRECT, YES.

14 Q AND THE TOP ONE IS FOR BLOOD AND THE BOTTOM ONE
15 IS FOR HAIR?

16 A YES.

17 Q AND THEN IT LOOKS LIKE IF WE COMPARE THEM, JUST
18 EYEBALLING IT, FOR BLOOD IT LOOKS LIKE ALMOST FOUR OR
19 FIVE OR SIX TIMES GREATER AMOUNTS OF ARSENIC IN THE
20 AUTISTIC CHILDREN BLOOD THAN THE NEUROTYPICAL CHILDREN;
21 IS THAT RIGHT?

22 A CORRECT. YES.

23 Q AND THEN FOR HAIR IT LOOKS TO BE ABOUT FIVE
24 TIMES AS MUCH?

25 A YES.

26 Q AND THESE ARE ALL STATISTICALLY SIGNIFICANT;
27 RIGHT?

28 A THEY WERE, YES, HIGHLY STATISTICALLY

1 SIGNIFICANT.

2 Q AND YOU WOULD AGREE WITH ME THAT WHEN YOU PULL
3 THE DATA TOGETHER AND YOU HAVE A LOT MORE OBSERVATIONS,
4 IT'S EASIER TO FIND STATISTICAL SIGNIFICANCE; IS THAT
5 RIGHT?

6 A YEAH, BECAUSE ONE OF THE BIGGEST CHALLENGES TO
7 FINDING STATISTICAL SIGNIFICANCE FOR STRONG ASSOCIATIONS
8 IS SMALL SAMPLE SIZE. IN THE REALM OF EPIDEMIOLOGY
9 THESE ARE ACTUALLY, EVEN ONES POOLED, THEY ARE NOT HUGE
10 SAMPLE SIZES, BUT THEY ARE -- COMPARED TO THE INDIVIDUAL
11 STUDIES IN THIS LITERATURE, YOU HAVE A LOT MORE
12 STATISTICAL POWER.

13 Q NOW, IF WE LOOK AT THE ACTUAL DISCUSSION HERE,
14 THIS IS ON PAGE 12, THERE IS A DISCUSSION HERE ABOUT
15 ARSENIC. I'LL BLOW IT UP.

16 AND IT SAYS, "ARSENIC IS ABLE TO GAIN ACCESS TO
17 THE DEVELOPING BRAIN AND PRODUCE ADVERSE
18 EFFECTS ON NEURODEVELOPMENT, AND IN TURN,
19 DEFICITS IN NEUROBEHAVIORAL AND COGNITIVE
20 FUNCTIONS IN CHILDREN."

21 DO YOU SEE THAT?

22 A I DO.

23 Q AND THIS IS ESSENTIALLY A DISCUSSION ABOUT
24 BIOLOGICAL PLAUSIBILITY AND IT MAKING SENSE THAT IT
25 COULD BE A NEUROTOXIN?

26 A CORRECT.

27 Q AND IT GOES ON TO SAY, "STUDIES FOUND A
28 SIGNIFICANT ASSOCIATION BETWEEN HIGHER URINARY

1 ARSENIC CONCENTRATIONS AND POORER SCORES ON
2 TEST MEASURING VISUAL/SPACIAL REASONING,
3 LANGUAGE AND VOCABULARY, MEMORY AND
4 INTELLIGENCE AS WELL AS HYPERACTIVE BEHAVIOR IN
5 CHILDREN."

6 DO YOU SEE THAT?

7 A YES.

8 Q AGAIN, THE FACT THAT YOU SEE THESE SIGNIFICANT
9 ASSOCIATIONS BETWEEN ARSENIC AND CLOSELY RELATED
10 NEURODEVELOPMENTAL PROBLEMS, SUCH AS ASD, DOES THAT HAVE
11 ANY EFFECT ON YOUR OPINION?

12 A ABSOLUTELY.

13 SO IF THERE -- AS LONG AS THERE'S, YOU KNOW,
14 BIOLOGICAL PLAUSIBILITY, IT MAKES MORE SENSE WHEN WE SEE
15 STUDIES -- WHEN WE SEE ASSOCIATIONS IN THE EPI
16 LITERATURE BECAUSE THE EPI LITERATURE DOESN'T SHOW
17 WHETHER -- DOESN'T SHOW THE UNDERLYING MECHANISMS
18 TYPICALLY. IN THIS FIELD IT DOESN'T SHOW THE UNDERLYING
19 MECHANISMS.

20 HOPEFULLY, YOU KNOW, IN SOME FIELDS THE EPI
21 LITERATURE CAN SHOW BIOLOGICAL MECHANISMS, BUT WE RELY
22 ON OTHER TYPES OF STUDIES TO EITHER BE CONSISTENT OR
23 INCONSISTENT, AND THEREFORE, HELP US INFER WHETHER THE
24 ASSOCIATIONS ARE CAUSAL.

25 Q NOW, DOCTOR, WE HAVE THIS KNOWN DATA ABOUT
26 ARSENIC AND NEUROTOXICITY AND ALL THESE OUTCOMES.

27 WOULD IT BE FAIR TO SAY THAT IT'S SORT OF
28 LOGICAL AND EXPECTED TO SEE THESE HIGH LEVELS OF ARSENIC

1 IN THE EPI BASED ON WHAT WE KNOW ALREADY?

2 A YES. IT MAKES SENSE. IT'S THE UNDERLYING
3 HYPOTHESIS THAT DROVE ALL OF THESE EPIDEMIOLOGISTS TO
4 SPEND TIME AND SIGNIFICANT MONEY TO DO THESE STUDIES.

5 Q AND EVEN THE AUTHORS IN THIS STUDY RIGHT HERE
6 SAY, "THE POTENTIAL LINK BETWEEN ARSENIC AND LEAD
7 EXPOSURE AND AN INCREASED RISK OF ASD IS THUS
8 LOGICAL AND HIGHLY EXPECTED."

9 DO YOU SEE THAT?

10 A I DO.

11 Q IS IT REFRESHING TO SEE THAT THESE INDEPENDENT
12 SCIENTISTS DOING THESE STUDIES ARE ESSENTIALLY SAYING
13 THE SAME THING THAT YOU'RE SAYING HERE?

14 A ABSOLUTELY.

15 Q ALL RIGHT.

16 NOW, I KNOW THERE WAS SOME CONCERNS AND THERE'S
17 BEEN SOME CONCERNS RAISED BY COUNSEL ON THE DEFENSE
18 ABOUT TEMPORALITY, RIGHT, AND REVERSE CAUSATION.

19 ARE THESE CHILDREN HAVING HIGH LEVELS OF AUTISM
20 OR BECAUSE THEY HAVE AUTISM OR IS IT CAUSING THE AUTISM
21 ITSELF.

22 YOU UNDERSTAND THOSE CONCEPTS, I'M SURE.

23 A I DO.

24 Q ALL RIGHT.

25 IN YOUR REPORT YOU SQUARELY ADDRESS THIS. AND
26 I KIND OF WANT TO WALK THROUGH THE EVIDENCE THAT YOU
27 MARSHALLED IN YOUR ANALYSIS OF IT.

28 SO ON PAGE 32 OF YOUR REPORT, YOU HAVE A

1 SECTION HERE.

2 YOU WRITE, "A SECOND LIMITATION IN THE CURRENT
3 BODY OF LITERATURE IS THE FACT THAT ARSENIC IN
4 CHILDREN'S BODIES WERE MEASURED AFTER THE
5 DIAGNOSIS HAD ALREADY OCCURRED CHALLENGING
6 ASSUMPTIONS ABOUT TEMPORALITY AND CAUSALITY;
7 HOWEVER, AS EXPLAINED ABOVE WITH RESPECT TO
8 LEAD, REVERSE CAUSATION, SUCH THAT ASD
9 CHARACTERISTICS WOULD INCREASE ARSENIC EXPOSURE
10 IS NOT -- AN UNLIKELY EXPLANATION OF THE
11 OBSERVED ASSOCIATION."

12 DO YOU SEE THAT?

13 A I DO.

14 Q WHY DO YOU SAY THAT? WHAT'S YOUR THINKING?

15 A BECAUSE IT'S JUST -- IT'S SO HIGHLY IMPROBABLE
16 THAT THE DEFINING CHARACTERISTICS OF AUTISM WOULD LEAD
17 CHILDREN TO BE MORE EXPOSED TO ARSENIC. ARSENIC
18 EXPOSURE IS NOT RELATED TO THE BEHAVIORS THAT ARE
19 TYPICAL OF CHILDREN WITH AUTISM COMPARED TO CHILDREN
20 WITHOUT AUTISM.

21 Q I MEAN, COULDN'T THEY GET ARSENIC FROM PUTTING
22 LIKE TOYS IN THEIR MOUTH OR PAINT CHIPS OR SOMETHING
23 LIKE THAT?

24 A SO, NO, THAT'S NOT REALLY AN EXPOSURE FOR
25 ARSENIC. TOYS ARE NOT EXPOSURE SOURCES FOR ARSENIC.
26 THEY ARE EXPOSURE SOURCES FOR OTHER ENVIRONMENTAL
27 TOXINS, BUT NOT FOR ARSENIC, WHICH IS WHY, YOU KNOW,
28 SORT OF I THOUGHT ABOUT THIS, YOU KNOW, CHEWING ON THEIR

1 SWEATSHIRTS OR ON THEIR HAIR OR ON THEIR CLOTHING OR ON
2 THEIR TOYS, THAT MOUTHING IS NOT AN EXPOSURE ROUTE FOR
3 ARSENIC.

4 Q YOU ALSO DISCUSS SOME DATA THAT HELPS SUPPORT
5 THIS REASON.

6 THE FIRST ONE HERE IS YOU IDENTIFY A SERIES OF
7 PRENATAL EXPOSURE STUDIES --

8 A YES.

9 Q -- THAT LINKED PRENATAL EXPOSURE TO ARSENIC TO
10 LATER ASD DEVELOPMENT.

11 DO YOU SEE THAT?

12 A I DO.

13 Q YOU TALK ABOUT THE SKOGHEIM STUDY AND THE LONG
14 STUDY HERE.

15 DO YOU SEE THAT?

16 A YES.

17 Q I GUESS, DOCTOR, WHAT RELEVANCE DOES LOOKING AT
18 PRENATAL EXPOSURES HELP YOU IN UNPACKING THE TEMPORALITY
19 PUZZLE?

20 A SO THEY HELP -- IT HELPS ALLEVIATE OUR CONCERNS
21 BECAUSE WHEN WE SEE ASSOCIATIONS WITH EXPOSURE LONG
22 BEFORE THE OUTCOME HAS OCCURRED, WE ALLEVIATE ANY
23 CONCERNS THAT WE MIGHT HAVE ABOUT REVERSE CAUSATION.
24 EVEN THOUGH IT DOESN'T ACTUALLY MAKE SENSE THAT REVERSE
25 CAUSATION WOULD BE AT PLAY HERE, IT'S ALWAYS HELPFUL TO
26 SEE ACTUAL EVIDENCE ALLEVIATE THOSE CONCERNS TOO.

27 Q IN YOUR REPORT YOU GO ON TO FURTHER EXPLAIN
28 THAT THE ABILITY FOR EARLY LIFE ARSENIC EXPOSURE TO

1 CAUSE ASD-LIKE BEHAVIOR HAS BEEN SUPPORTED IN
2 EXPERIMENTAL RESEARCH IN ANIMALS.

3 DO YOU SEE THAT?

4 A I DO.

5 Q DOES THAT ALSO HELP ALLEVIATE CONCERNS ABOUT
6 REVERSE CAUSALITY?

7 A ABSOLUTELY, BECAUSE IT'S CERTAINLY NOT
8 HAPPENING IN RATS OR RODENTS OR ANY OTHER ANIMAL MODEL.

9 Q OKAY.

10 SO I GUESS THE QUESTION, THEN, IS IN COMING TO
11 YOUR CONCLUSION THAT ARSENIC EXPOSURE AT EARLY LIFE IN
12 CHILDREN IS A LIKELY SUBSTANTIAL FACTOR IN CAUSING THE
13 DEVELOPMENT OF ASD, DID YOU CONSIDER AND WORK THROUGH
14 ALL THESE CONCEPTS OF TEMPORALITY BEFORE ARRIVING AT
15 THAT OPINION?

16 A ABSOLUTELY. I WOULD SAY TEMPORALITY WAS THE
17 BIGGEST THING THAT I WAS THINKING ABOUT.

18 ANYTIME YOU HAVE LITERATURE WHERE A LOT OF IT
19 COMES FROM STUDIES WHERE THE EXPOSURE WAS ASSESSED AT
20 THE TIME OR AFTER DIAGNOSIS EVEN THOUGH, YOU KNOW, WE'RE
21 TALKING ABOUT THE EXPOSURE HAPPEN -- THE EXPOSURE -- WE
22 KNOW THE EXPOSURE OCCURS BEFORE THE TIME OF DIAGNOSIS.

23 IF WE HADN'T GOTTEN TO THAT POINT -- IF THAT
24 WASN'T POSSIBLE, WE WOULDN'T EVEN BE HERE, I WOULDN'T BE
25 HERE, AT LEAST, BUT WHENEVER IT'S ASSESSED, EITHER, YOU
26 KNOW, CONCURRENT OR AFTER THE TIME OF DIAGNOSIS, THEN WE
27 HAVE TO REALLY THINK HOW CONSISTENT ARE THESE EXPOSURES
28 OVER TIME, HOW LIKELY IS IT THAT IT RELATES ON A

1 POPULATION-WIDE LEVEL TO THE EXPOSURES BEFORE THE
2 DIAGNOSIS BECAUSE EVEN IF IT RELATES ON A
3 POPULATION-WIDE LEVEL, YOU KNOW, THAT DOESN'T
4 NECESSARILY REQUIRE THAT IT DOES SO ON EVERY SINGLE
5 INDIVIDUAL.

6 AND HOW LIKELY IS IT THAT THE CHARACTERISTICS
7 OF THE OUTCOME ITSELF INCREASES THAT EXPOSURE?

8 Q WELL, LET'S MOVE ON TO MERCURY. AND I WANT TO
9 ASK YOU POINT BLANK, DOCTOR.

10 YOU KNOW, I'VE HEARD THIS ARGUMENT ABOUT
11 MERCURY AND AUTISM BEFORE AND THAT VACCINE STUFF AND WE
12 KNEW THAT WAS GARBAGE, SO WHY ISN'T WHAT WE'RE DOING
13 HERE ALSO GARBAGE?

14 A WELL, BECAUSE THIS FIELD IS SUPPORTED BY THE
15 EVIDENCE. THERE HAVE BEEN MANY STUDIES THAT HAVE LOOKED
16 AT VACCINES IN RELATION TO AUTISM AND THEY HAVEN'T
17 SUPPORTED AN ASSOCIATION, NOT EVEN CLOSE. YOU KNOW,
18 THERE WERE RUMORS A LONG TIME AGO. AND VACCINE RESEARCH
19 IS SORT OF RIPE FOR RUMORS, AS WE'VE ALL BEEN ABLE TO
20 SEE OVER THE PAST TWO YEARS. IT'S HIGHLY SUSCEPTIBLE TO
21 BAD ACTORS AND TO PEOPLE WITH ULTERIOR MOTIVES THAT IS
22 -- THAT'S REALLY DISTINCT FROM THIS LINE OF RESEARCH.

23 Q TO BE CLEAR, DOCTOR, THE MERCURY IN VACCINES,
24 IS THAT THE SAME MERCURY THAT WE'RE TALKING ABOUT HERE
25 WHEN WE TALK ABOUT MERCURY IN ASD?

26 A NO. SO THE TYPE OF MERCURY IN VACCINES IS
27 SOMETHING CALLED THIMEROSOL, IT'S ETHYLMERCURY WITH IS
28 NOT AS -- IT'S READILY CLEAR, IT'S NOT AS TOXIC AS

1 METHYLMERCURY WHICH IS THE CONCERN HERE.

2 Q OKAY. ALL RIGHT. WELL, LET'S GET INTO THE
3 DATA.

4 SO WE HAVE ANOTHER CHART HERE FOR MERCURY.

5 AGAIN, I PREPARED THIS, BUT YOU HAD A CHANCE TO
6 SPEND A FEW HOURS GOING THROUGH THESE TO MAKE SURE THEY
7 WERE IN THE RIGHT COLUMNS; RIGHT?

8 A YEP.

9 Q AND IF THERE'S ANY DATES WRONG HERE, I
10 APOLOGIZE. I TOOK NOTES WHEN YOU GAVE ME ALL YOUR
11 COMMENTS, BUT I DON'T KNOW IF I CAUGHT ALL OF THEM, IT
12 WAS A LATE NIGHT.

13 SO THAT SAID, DOCTOR, GOING THROUGH THIS, I
14 WANT TO TALK ABOUT THE DATA GENERALLY.

15 NOW, WE HAVE A LOT MORE STUDIES HERE IN
16 MERCURY.

17 DO YOU SEE THAT?

18 A YES.

19 Q AND, AGAIN, WE SEE THAT THERE IS A VERY LARGE
20 NUMBER OF POSITIVE AND STATISTICALLY SIGNIFICANT
21 RESULTS.

22 DO YOU SEE THAT?

23 A I DO.

24 Q AND ONE OF THE THINGS THAT'S SORT OF UNIQUE
25 HERE IS WE HAVE URINE, BLOOD, HAIR, TEETH, NAILS AND AIR
26 POLLUTION.

27 DO YOU SEE THAT?

28 A I DO.

1 Q WHAT IS THE RELEVANCE OF SEEING ALL THESE
2 DIFFERENT BIOMARKERS, DIFFERENT STUDY DESIGNS, AND
3 DIFFERENT, FRANKLY, RESULTS -- ALL HAVING STATISTICALLY
4 SIGNIFICANT RESULTS, WHAT IS THE SIGNIFICANCE OF THAT?

5 A SO IN THE FIELD OF EPIDEMIOLOGY, THAT IS A LOT
6 OF STUDIES SHOWING A POSITIVE AND STATISTICALLY
7 SIGNIFICANT ASSOCIATION, SO MANY SO THAT IT MAKES IT --
8 IT WOULD MAKE IT MUCH HARDER IF I WERE DESIGNING A STUDY
9 RIGHT NOW AND ASKING FOR NIH FUNDING ON THIS TOPIC OR IF
10 I WAS TRYING TO PUBLISH ON THIS. I MEAN, THIS IS A
11 LARGE BODY OF LITERATURE SHOWING A POSITIVE AND
12 STATISTICALLY SIGNIFICANT ASSOCIATION IN DIFFERENT TYPES
13 OF BIOMARKERS OVER DIFFERENT PERIODS OF TIME IN
14 DIFFERENT STUDY POPULATIONS.

15 Q AND HAVE YOU OBSERVED IN THE EPIDEMIOLOGIC
16 COMMUNITY A LITTLE BIT OF HOSTILITY TO DOING STUDIES ON
17 MERCURY BECAUSE IT COULD BE PUT INTO THE SAME BUCKET AS
18 THE VACCINE STUFF?

19 A I HAVEN'T HEARD OF THAT PERSONALLY, BUT MY
20 ASSUMPTION IS THAT THAT WOULD BE TRUE IF I WERE WANTING
21 TO CREATE A STUDY LIKE THAT, THAT IT WOULD BE -- I THINK
22 IT'S REALLY IMPORTANT TO DISTINGUISH THE TWO SOURCES OF
23 MERCURY AND ALLAY ANY CONCERNS THAT YOU'RE TRYING TO
24 EXTRAPOLATE ONE TO THE OTHER.

25 Q ALL RIGHT. WELL, HERE'S WHAT I'D LIKE TO DO TO
26 GO OVER THIS. FIRST I WANT TO GO OVER A COUPLE OF META
27 ANALYSIS BECAUSE OBVIOUSLY THAT'S EASIER TO DO THAN
28 LOOKING AT A HUNDRED STUDIES, AND THEN I WANT TO LOOK AT

1 THIS RYU STUDY RIGHT HERE OR THE RYU STUDY, I'VE
2 PROBABLY BEEN PRONOUNCING THAT WRONG. WE ALWAYS CALLED
3 IT RY-U WHEN I PLAYED STREET FIGHTER BACK AS A KID, SO I
4 COULD HAVE BEEN SAYING IT WRONG.

5 BUT I WANT TO TALK ABOUT THAT ONE BECAUSE IT'S
6 A PROSPECTIVE STUDY AND HOW IT HELPS US UNDERSTAND
7 STUFF.

8 A SURE.

9 Q SO LET'S START OFF WITH SULAIMAN, WHICH IS
10 EXHIBIT 121.

11 THIS IS A META ANALYSIS TITLED "EXPOSURE TO
12 ALUMINUM, CADMIUM AND MERCURY AND AUTISM SPECTRUM
13 DISORDER IN CHILDREN, A SYSTEMATIC REVIEW AND META
14 ANALYSIS."

15 DO YOU SEE THAT?

16 A I DO.

17 Q ALL RIGHT. AND IT LOOKS AS THOUGH WHAT THEY
18 ARE TRYING TO DO -- AND I'LL JUST TRY TO CALL OUT WHAT
19 THEY ARE TRYING TO SAY HERE.

20 I'LL JUST READ IT TO YOU.

21 IT SAYS, "PREVIOUSLY WE PERFORMED A META
22 ANALYSIS OF EXISTING LITERATURE TO EXAMINE THE
23 POTENTIAL LINK BETWEEN INORGANIC ARSENIC AND
24 LEAD EXPOSURE IN ASD."

25 DO YOU SEE THAT?

26 A NO, I ACTUALLY WAS TRYING TO FIND IT AS YOU
27 WERE READING.

28 OH, I SEE.

1 YES, NOW I SEE IT.

2 Q ALL RIGHT. IT IS A CONTINUATION OF THAT STUDY
3 IN INVESTIGATING THE ASSOCIATION OF THE EXPOSURE OF
4 ALUMINUM, CADMIUM AND MERCURY IN ASD AND ADHD.

5 DO YOU SEE THAT?

6 A I DO.

7 Q "THESE METALS WERE CHOSEN BECAUSE THEY ARE
8 ABUNDANT IN OUR ENVIRONMENT, ARE KNOWN TO CAUSE
9 NEUROLOGICAL PROBLEMS IN HUMANS, AND HAVE
10 MULTIPLE PUBLISHED STUDIES EXAMINING THE
11 POTENTIAL LINKS WITH ASD."

12 DO YOU SEE THAT?

13 A I DO.

14 Q AND IS THAT TYPICALLY WHAT YOU DO META ANALYSIS
15 ON WHEN YOU HAVE A BUNCH OF DATA AND PLAUSIBILITY?

16 A YES.

17 Q OKAY.

18 ALL RIGHT. LET'S GO STRAIGHT TO THE RESULTS ON
19 PAGE 15. THERE IS A CHART OF THE META ANALYSIS.

20 DO YOU SEE IT?

21 A I DO.

22 Q AND AT THE BOTTOM HERE, WE HAVE THE DATA AS IT
23 RELATES TO THREE BIOMARKERS, BLOOD, HAIR AND URINE AND
24 MERCURY.

25 DO YOU SEE THAT?

26 A I DO.

27 Q AND HERE IT LOOKS LIKE WE HAVE THE MEAN SD FOR
28 THE CASES IN CONTROL.

1 IS THAT THE SAME SORT OF THING AS WE SAW IN THE
2 WANG STUDY A MINUTE AGO?

3 A EXACTLY, YEAH. SO LIKE 7.6 WOULD BE THE MEAN
4 ACROSS THE -- LIKE, THE POOLED MEAN -- ACROSS THE
5 STUDIES FOR THE BLOOD MERCURY LEVELS IN THE AUTISM
6 CASES, AND IN PARENTHESES IS THE STANDARD DEVIATION.
7 AND THEN 4.8 WOULD BE THE MEAN BLOOD MERCURY LEVELS IN
8 THE CONTROL OR THE COMPARISON, THE NON AUTISM GROUP.

9 Q NOW, DOCTOR, HERE EACH ONE OF THESE BIOMARKERS
10 BLOOD, HAIR, AND URINE SEEMS TO BE A STATISTICALLY
11 SIGNIFICANT RESULT; IS THAT RIGHT?

12 A CORRECT.

13 Q IT'S NOT AS SEVERE AS WE SAW WITH ARSENIC.
14 IT SEEMS ABOUT TWICE AS MUCH MERCURY IS BEING
15 FOUND IN THE AUTISTIC CHILDREN THAN THE NEUROTYPICAL
16 CHILDREN; IS THAT RIGHT?

17 A YEAH, ALTHOUGH, IT'S HARD -- LIKE, YOU CAN'T
18 REALLY COMPARE THE, YOU KNOW, THE DIFFERENCE ACROSS THE
19 TWO DIFFERENT BIOMARKERS BECAUSE THEY ARE -- I MEAN, THE
20 BACKGROUND LEVELS ARE VERY DIFFERENT SO I WOULDN'T
21 NECESSARILY SAY THAT THIS WAS LESS SEVERE.

22 Q FAIR ENOUGH.

23 GOOD POINT. AND I THINK THAT WHAT I'M TRYING
24 TO SAY IS WHAT WE'RE SEEING HERE AT LEAST IN THIS META
25 ANALYSIS, THERE'S ABOUT TWICE AS MUCH MERCURY IN THE
26 AUTISTIC KIDS THAN IN THE NON ONES; IS THAT RIGHT?

27 A YES. CORRECT.

28 Q AND JUST TO BE CLEAR, THEY -- WELL, IT'S NOT

1 DESIGNS. IT'S NOT THE STUDY. ALL RIGHT. THAT'S FINE.

2 SO I WANT TO GO TO ANOTHER META ANALYSIS THAT
3 HAS SLIGHTLY DIFFERENT RESULTS, JUST SORT OF COMPARING.

4 A OKAY.

5 Q SO THIS IS EXHIBIT 1 -- I'M SORRY --
6 EXHIBIT 78. AND THIS IS ANOTHER META ANALYSIS CALLED
7 "THE ASSOCIATION BETWEEN MERCURY LEVELS AND AUTISM
8 SPECTRUM DISORDERS, A SYSTEMIC REVIEW OF META ANALYSIS"
9 BY DOCTORS JAFARI, ET AL.

10 DO YOU SEE THAT?

11 A I DO.

12 Q AND THIS ONE WAS PUBLISHED IN 2017 SO THIS IS
13 ACTUALLY A OF COUPLE YEARS BEFORE THE SULAIMAN ONE THAT
14 WE JUST SAW; IS THAT RIGHT?

15 A CORRECT.

16 Q OKAY. SO IN THIS STUDY ON PAGE 3 THEY BEGIN
17 DISCUSSING THE RESULTS AND THIS IS JUST ABOUT MERCURY;
18 RIGHT?

19 SORRY, LET ME BACK UP.

20 A YEAH.

21 Q THIS STUDY IS JUST ABOUT MERCURY. I MEANT TO
22 ASK YOU THAT, IT'S NOT ABOUT THE OTHER METALS.

23 A SORRY, I DIDN'T REALIZE THAT WAS A QUESTION.
24 YES, IT'S JUST ABOUT MERCURY.

25 Q OKAY.

26 PAGE 3 THEY START GOING OVER THE RESULTS.

27 AND THE FIRST ONE THEY LOOK AT -- SORRY -- THE
28 FIRST ONE THEY LOOKED AT IS HAIR.

1 DO YOU SEE THAT?

2 A I DO.

3 Q AND THEY ACTUALLY DIDN'T OBSERVE IN THIS META
4 ANALYSIS A STATISTICALLY SIGNIFICANT DIFFERENCE BETWEEN
5 THE AUTISTIC CHILDREN AND THE NON AUTISTIC CHILDREN OF
6 THE AMOUNT OF MERCURY IN THEIR HAIR; RIGHT?

7 A YES.

8 Q OKAY.

9 AND THEN, SAME THING WITH URINE. THEY LOOKED
10 AT AUTISTIC CHILDREN'S URINE VERSUS NON AUTISTIC
11 CHILDREN, AND AGAIN, HERE THEY DIDN'T ACTUALLY FIND A
12 STATISTICALLY SIGNIFICANT DIFFERENCE, DID THEY?

13 A YOU'RE GOING FAST, SO I HAVE TO READ THIS TO
14 MAKE SURE.

15 Q SORRY.

16 A YES. YEP.

17 Q I'LL HIGHLIGHT IT FOR YOU TO HELP YOU IDENTIFY
18 IT. SORRY. I'M TRYING TO GO FAST BECAUSE I'M TRYING TO
19 GET YOU OFF IN THE NEXT TEN MINUTES.

20 ALL RIGHT. SO THEN WE HAVE WHOLE BLOOD.

21 AND HERE THEY DID FIND A STATISTICALLY
22 SIGNIFICANT RESULT; RIGHT?

23 A YES.

24 Q AND AGAIN, THEY LOOKED AT RBC.

25 WHAT IS RBC?

26 A RED BLOOD CELLS.

27 Q OKAY. SO IT'S A SUBCOMPONENT OF THE BLOOD; IS
28 THAT RIGHT?

1 A CORRECT.

2 Q OKAY.

3 AND HERE THEY ALSO FOUND A STATISTICALLY
4 SIGNIFICANT RESULT IN THE ASD PATIENTS?

5 A YES.

6 Q ALL RIGHT. AND THEN THEY ACTUALLY HAD THIS
7 INTERESTING AREA, A BIOMARKER OF BRAIN.

8 DO YOU SEE THAT?

9 A YES.

10 Q I'M JUST CURIOUS, HOW DO YOU MEASURE THE AMOUNT
11 OF MERCURY IN A BRAIN? HOW DOES THAT WORK?

12 A IF I RECALL CORRECTLY, THESE WERE POST-MORTEM
13 SO THESE WERE ON BRAINS AFTER THE PEOPLE HAD DIED.

14 Q OKAY.

15 AND SO HERE THEY FOUND IN THE BRAINS
16 STATISTICALLY -- DEMONSTRATED THE CONCENTRATION OF
17 MERCURY WAS SIGNIFICANTLY HIGHER IN ASD PATIENTS THAN
18 HEALTHY CELL PATIENTS.

19 DO YOU SEE THAT?

20 A I DO.

21 Q ALL RIGHT.

22 SO WE DON'T HAVE SIGNIFICANT RESULTS FOR HAIR
23 AND URINE BUT WE DO FOR BLOOD AND BRAIN, AND I WANT TO
24 SHOW YOU WHAT THE CONCLUSION OF THE AUTHORS WAS
25 NOTWITHSTANDING THOSE RESULTS.

26 THEY STATE RIGHT HERE: "THE RESULTS OF OUR
27 CURRENT META ANALYSIS REVEALED THAT MERCURY IS
28 A CAUSAL FACTOR IN THE ETIOLOGY OF ASD."

1 THAT'S WHAT THESE AUTHORS CONCLUDE; DO YOU SEE
2 THAT?

3 A I DO.

4 Q NOW, IS THAT APPROPRIATE THAT YOU CAN CONDUCT A
5 META ANALYSIS AND ACTUALLY SEE, YOU KNOW, NO RESULTS IN
6 ONE BIOMARKER BUT SEE IT IN OTHER BIOMARKERS AND STILL
7 REACH A CAUSALITY DETERMINATION?

8 A I WOULDN'T SAY THAT THEM THINKING THAT WOULD BE
9 SO UNUSUAL BASED ON WHAT THEY SAY. BUT WRITING THAT IN
10 A PAPER IS HIGHLY UNUSUAL. EVEN IF EVERYTHING HAD BEEN
11 COMPLETELY CONSISTENT, IT'S JUST NOT TYPICAL THAT WE
12 WRITE THAT WORD "CAUSAL FACTOR" IN EPI STUDIES.

13 IT'S -- WE TEND TO BE -- WHEN WE WRITE EPI
14 STUDIES, WE TEND TO BE -- I DON'T KNOW IF HUMBLE IS THE
15 RIGHT WORD OR MORE CONSERVATIVE. WE TEND TO ERR ON THE
16 SIDE OF LETTING OTHER PEOPLE, YOU KNOW, SAY THAT OUR
17 RESULTS WERE STRONG. IT'S SORT OF AN OCCUPATIONAL,
18 LIKE, TREND OR, LIKE, A, I DON'T KNOW WHAT THE RIGHT
19 WORD IS.

20 BUT EVEN WHEN WE ARE VERY CONFIDENT THAT THE
21 ASSOCIATION IS CAUSAL, WE TYPICALLY DON'T SAY THAT WORD
22 BECAUSE REVIEWERS, YOU KNOW, REVIEWERS LIKELY JUMP AT
23 IT, AND SO IT'S SAFER NOT TO SAY THAT.

24 SO THE FACT THAT THEY SAID IT AND REVIEWERS AND
25 THE EDITORS SUPPORTED THEM SAYING THAT IS -- I WOULD
26 CALL THAT UNUSUAL. NOT BECAUSE OF THE DATA. BUT JUST
27 BECAUSE OF OCCUPATIONAL NORMS OR FIELD NORMS.

28 Q SO A GOOD EXAMPLE IS WE GO BACK TO THE SULAIMAN

1 PAPER THAT WE WERE JUST LOOKING AT.

2 THIS IS EXHIBIT 121.

3 AT THE END OF THIS PAPER -- WHOOPS -- THEY SAY,
4 "ALTHOUGH FURTHER RESEARCH, ESPECIALLY COHORT
5 STUDIES, EVEN IN RETROSPECTIVE DESIGN, WILL
6 HELP EXAMINE THE EFFECTS OF THE EXPOSURES OVER
7 TIME AND DELINEATE THIS CRITICAL OF DEVELOPMENT
8 PERIOD FOR ASD."

9 DO YOU SEE THAT?

10 A I DO.

11 Q AND, YOU KNOW, I GUESS MY QUESTION IS EVEN
12 THOUGH THEY FOUND STATISTICALLY SIGNIFICANT RESULTS IN
13 EVERY BIOMARKER THEY LOOKED AT, THEY ARE STILL SAYING,
14 OH, WE NEED MORE RESEARCH.

15 IS THAT A COMMON PRACTICE IN YOUR WORK AS AN
16 EPIDEMIOLOGIST?

17 A ABSOLUTELY. UNLESS YOU'RE HOPING TO RETIRE
18 AFTER YOU SUBMIT THE PAPER.

19 YEAH, I MEAN, YOU KNOW, WE -- THAT'S JUST SORT
20 OF PART OF NORM. WE WANT TO, YOU KNOW, MOTIVATE FURTHER
21 RESEARCH, WHETHER IT'S OUR OWN PAPERS, OUR OWN GRANT.
22 WE WANT TO UNDERScore THE IMPORTANCE OF THE FIELD AND
23 PART OF THE REASON -- PART OF THE WAY THAT WE GET PAPERS
24 PUBLISHED IN JOURNALS IS TO CONVINCING THE EDITORS AND
25 THE REVIEWERS THAT THIS IS A REALLY IMPORTANT FIELD AND
26 NOT ONLY DESERVES THE ATTENTION OF THE STUDY THAT WE'RE
27 WRITING BUT MORE STUDIES FOLLOWING IT.

28 Q ALL RIGHT. DOCTOR, I WANT TO TALK QUICKLY

1 ABOUT TEMPORALITY WITH MERCURY AND ASD.

2 WE HAVE THE BENEFIT IN THIS CASE OF HAVING A
3 PRETTY ROBUST COHORT STUDY ON MERCURY, DON'T WE?

4 A CAN YOU REPEAT THE QUESTION?

5 Q SURE.

6 LET'S TALK ABOUT TEMPORALITY AND MERCURY.

7 A UH-HUH.

8 Q LET'S LOOK AT THE RYU STUDY FIRST. LET'S JUST
9 DO THAT AND BRING IT UP IN CONTEXT IN TEMPORALITY.

10 A OKAY. I DIDN'T KNOW IF YOU WERE REFERRING TO
11 THE META ANALYSIS OR TO THE A DIFFERENT --

12 Q OH, I'M SORRY. IT WAS A BAD QUESTION. I'M
13 SORRY ABOUT THAT.

14 SO WE'RE LOOKING HERE AT THE RYU STUDY, AND
15 THIS IS EXHIBIT 114, AND THIS IS LOOKING AT THE
16 ASSOCIATIONS OF PRENATAL AND EARLY CHILDHOOD MERCURY
17 EXPOSURE WITH AUTISTIC BEHAVIORS AT AGE FIVE, AT FIVE
18 YEARS OF AGE, THE MOTHERS AND CHILDREN, ENVIRONMENTAL
19 HEALTH STUDY.

20 DO YOU SEE THAT?

21 A I DO.

22 Q AND IF WE LOOK DOWN HERE, WE ACTUALLY HAVE THIS
23 NICE LITTLE GRAPHIC WALKING US THROUGH THE STUDY DESIGN.

24 DO YOU SEE THAT?

25 A YES.

26 Q AND IT LOOKS LIKE THEY FOLLOWED MOTHERS IN
27 EARLY PREGNANCY, LATE PREGNANCY, THEY TOOK CORD BLOOD,
28 THEY TOOK MERCURY LEVELS AT AGE TWO, AT PAGE THREE AND

1 THEN THEY ASSESSED AUTISTIC BEHAVIORS AT AGE FIVE.

2 DO YOU SEE THAT?

3 A YES.

4 Q WHEN YOU SEE A STUDY DESIGN LIKE THIS, ARE YOU
5 REALLY WORRIED ABOUT REVERSE CAUSALITY AT ALL?

6 A I MEAN, I THINK ABOUT REVERSE CAUSALITY IN
7 EVERY SINGLE STUDY NO MATTER WHAT. BUT WHAT I THINK
8 WHEN I READ THIS IS THAT THE DESIGN OF THIS STUDY IS
9 REALLY GREAT TO ALLEVIATE CONCERNS ABOUT REVERSE
10 CAUSALITY DEPENDING ON WHAT THEY SEE.

11 Q AND THIS PROCESS OF LOOKING AT MOTHERS AND
12 THEIR CHILDREN AND FOLLOWING THEM ALONG AND MEASURING
13 THEIR MERCURY AT VARIOUS PARTS AND THEN ASSESSING
14 AUTISTIC BEHAVIORS AT AGE FIVE, IS THAT A SOLID DESIGN
15 FOR SAYING, OKAY, IS MERCURY REALLY A TEMPORALLY CAUSAL
16 AGENT HERE?

17 A IT'S AN EXTREMELY WELL CONDUCTED DESIGN. IT IS
18 THE DESIGN THAT THE REST OF THE INVESTIGATORS WOULD HAVE
19 WANTED TO DO. IT JUST REQUIRES MORE TIME AND MONEY.

20 Q ALL RIGHT. WELL, LET'S LOOK AT THE RESULTS OF
21 THIS STUDY.

22 NOW, LET'S START OFF WITH THE FIRST HALF. I
23 UNDERSTAND THIS IS A LITTLE COMPLICATED AND SO YOU MIGHT
24 HAVE TO WALK US THROUGH IT A LITTLE BIT.

25 A SURE.

26 Q BUT IT LOOKS LIKE THEY HAD -- OH, ACTUALLY LET
27 ME CALL IT OUT BIGGER SO YOU CAN SEE IT -- BUT IT LOOKS
28 LIKE THERE WAS FOUR DIFFERENT MODELS.

1 DO YOU SEE THAT?

2 A YEP.

3 Q AND THIS IS OBVIOUSLY USING SRS T SCORES.

4 WHAT ARE THOSE, DOCTOR?

5 A SO THOSE ARE COMPARING -- SO THE SRS -- I, YOU
6 KNOW, I THINK I'M CORRECT, I HAVEN'T READ THIS PAPER IN
7 THE PAST 24 HOURS, BUT UNLESS I'M WRONG THAT THE SRS
8 THAT THEY ARE -- THAT THE ABBREVIATION HERE IS FOR THE
9 SOCIAL RESPONSIVE SCALE, WHICH IS A MEASURE OF AUTISM
10 BEHAVIORS, AND IT'S A VALID AND RELIABLE MEASURE OF SORT
11 OF AUTISM BEHAVIORS, BASICALLY. THE T SCORE IS A
12 MEASURE -- IS A WAY TO LOOK AT THE LEVEL OF THOSE
13 MEASURES ACROSS DIFFERENT GROUPS.

14 Q AND BECAUSE IT'S A CONTINUOUS SCALE, IT'S NOT A
15 BINARY, YES/AUTISTIC, NO/AUTISTIC, THE AUTHORS HERE WERE
16 ACTUALLY ABLE TO RUN REGRESSIONS OF THE AMOUNT OF
17 MERCURY AT DIFFERENT AGE TIMES AND THE LIKELIHOOD OF
18 THEM HAVING AN INCREASE IN THE SRS SCORE.

19 DO YOU SEE THAT?

20 A I DO.

21 Q AND THE MOST FULLY ADJUSTED MODEL IS HERE AT
22 THE BOTTOM AND THIS IS LOOKING AT ALL THE CHILDREN IN
23 THE COHORT, AND IT LOOKS TO BE THAT LEAD EXPOSURE -- I'M
24 SORRY, NOT LEAD -- MERCURY EXPOSURE AT TWO YEARS OF AGE
25 HAD A 2.2 ODDS RATIO -- 2.12 ODDS RATIO THAT WAS NOT
26 STATISTICALLY SIGNIFICANT.

27 DO YOU SEE THAT -- OR I'M SORRY -- THAT WAS
28 STATISTICALLY SIGNIFICANT.

1 DO YOU SEE THAT?

2 A YES. IS THAT AN ODDS RATIO? I THINK THAT'S A
3 BETA EFFECT ESTIMATE, ACTUALLY.

4 Q OH, I'M SORRY. I THOUGHT THIS WAS --

5 A UNLESS IT'S -- I'M NOT POSITIVE, IT COULD -- IT
6 SORT OF LOOKS LIKE IT. YEAH, IT WOULD NOT BE AN ODDS
7 RATIO BECAUSE YOU CAN'T HAVE A NEGATIVE ODDS RATIO.

8 SO IT IS -- BUT IT IS -- IT'S THE ESSENCE.
9 IT'S AN EFFECT ESTIMATE. IT'S THE BETA VALUE.

10 Q OKAY.

11 SO YOU HAVE THIS BETA VALUE OF 2.12 AND THAT
12 APPEARS TO BE STATISTICALLY SIGNIFICANT AT TWO YEARS OF
13 AGE.

14 LET ME BLOW IT UP SO YOU CAN SEE IT. IT'S A
15 LITTLE BIT HARD TO READ.

16 A YEAH.

17 Q THERE YOU GO.

18 A YES. SO IT'S STATISTICALLY SIGNIFICANT.

19 SO HERE, IF IT WERE AN ODDS RATIO, WE WOULD BE
20 LOOKING FOR A VALUE OF ONE TO INCLUDE THE NULL HERE, BUT
21 BECAUSE IT'S A BETA, THAT VALUE WOULD BE ZERO.

22 SO IT'S STATISTICALLY SIGNIFICANT FOR LATE
23 PREGNANCY CORD BLOOD, TWO YEARS OF AGE AND THREE YEARS
24 OF AGE.

25 Q WELL, WHEN YOU SEE THIS CONSISTENT RESULT ON,
26 YOU KNOW, THE SRS RATINGS AT THESE DIFFERENT PERIODS OF
27 EXPOSURE, WHAT DOES THAT TELL YOU IN ASSESSING
28 CAUSALITY?

1 A BASICALLY, IT ALLEVIATES CONCERNS ABOUT REVERSE
2 CAUSALITY. IT SHOWS THAT THIS HEAVY METAL IS HIGHLY
3 ASSOCIATED WITH AUTISM SEVERITY DURING EXPOSURE VERY
4 EARLY ON, SO LATE PREGNANCY AS WELL AS THROUGH THE THIRD
5 YEAR OF LIFE.

6 Q NOW, THEY ALSO DID AN ANALYSIS JUST LOOKING AT
7 CHILDREN THAT HAD SRS SCORES OF GREATER THAN 60.

8 DO YOU SEE THAT?

9 A YES.

10 Q AND HERE -- I THOUGHT -- THIS IS WHY I THOUGHT
11 IT WAS A RISK RATIO BECAUSE I THOUGHT I SAW RR, SO MAYBE
12 IT SAYS RELATIVE RISK, SO HERE WE HAVE RELATIVE RISK.

13 A YEAH, THIS IS A DIFFERENT EFFECT ESTIMATE.

14 SO THE RR HERE FOR THESE ANALYZES WHAT WE'RE
15 LOOKING FOR, LIKE, THE NULL VALUE WOULD BE A VALUE OF
16 ONE FOR STATISTICAL SIGNIFICANCE, SO THIS IS SIMILAR TO
17 AN ODDS RATIO, IT'S THE RELATIVE RISK IN THE 95 PERCENT
18 CONFIDENCE INTERVAL AROUND IT.

19 Q OKAY.

20 AND AS YOU SEE HERE AS YOU LOOK AT THE SECOND
21 AND THIRD YEARS OF LIFE MERCURY LEVELS, ALTHOUGH THERE
22 ARE ELEVATED RISK RATIOS OR RELATIVE RISKS, THEY DO NOT
23 -- THEY ARE NOT EXACTLY STATISTICALLY SIGNIFICANT.

24 DO YOU SEE THAT?

25 A RIGHT.

26 SO THEY ARE STATISTICALLY SIGNIFICANT FOR LATE
27 PREGNANCY AND CORD BLOOD, IF I REMEMBER FROM THE
28 PREVIOUS BLOWUP, AND THEY ARE NOT STATISTICALLY

1 SIGNIFICANT FOR TWO YEARS, AND THEN I WOULD SAY THEY ARE
2 VERY -- THEY ARE VERY JUST SHY OF STATISTICALLY
3 SIGNIFICANT AT THREE YEARS. I MEAN, IT WOULD BE HARD TO
4 ARGUE THAT IT'S NOT THERE AT THREE YEARS, BUT IT IS
5 THERE EARLIER ON BECAUSE THAT'S REALLY JUST SHY OF
6 STATISTICAL SIGNIFICANCE, AND WE OFTEN SORT OF GIVE THAT
7 WIGGLE ROOM OF, YOU KNOW, UP TO .10.

8 Q SO WHEN YOU LOOK AT THESE TWO DATA SETS, THESE
9 GROUPS OF CONTINUOUS SRS T SCORES AND THEN THE SCORES
10 FOR THE HIGHER SCORED CHILDREN WHO MORE LIKELY HAVE
11 AUTISM, WHAT IS THIS TELLING YOU WITH REGARDS TO
12 TEMPORALITY?

13 A SO WHAT IT SHOWS IS THAT MERCURY EXPOSURE AT
14 MULTIPLE TIME POINTS, I MEAN, THIS IS A WIDE
15 DEVELOPMENTAL WINDOW AND IT IS CONSISTENT WITH WHAT WE
16 WOULD EXPECT, THAT THIS MERCURY IS A NEUROTOXIN, THAT IT
17 WOULD HAVE -- IT WOULD BE ASSOCIATED WITH DEVELOPMENTAL
18 CONSEQUENCES WHEN THE EXPOSURE IS DURING PREGNANCY AS
19 WELL AS DURING, LIKE, THE INFANCY/TODDLER EARLY LIFE
20 YEARS.

21 Q DOCTOR, WHEN YOU TAKE A LOOK AT THIS
22 PROSPECTIVE STUDY AND YOU LOOK AT IT THE CONTEXT OF THE
23 OVERALL DATA -- OH, THERE WE GO.

24 A CAN I ACTUALLY FINISH? I WANTED TO SAY ONE
25 MORE THING.

26 Q OH, YEAH. SORRY.

27 A SO WHAT IS REALLY VALUABLE ABOUT THAT PREVIOUS
28 ANALYSIS IS THAT WE SAW THE ASSOCIATION WITH AUTISM

1 SEVERITY AND WE ALSO SAW THE ASSOCIATION WITH, LIKE A
2 DICHOTOMOUS OUTCOME WITH LIKE WHETHER, YOU KNOW, AUTISM
3 LIKE CRITERIA ARE DICHOTOMOUS CATEGORIZED OUTCOMES, AND
4 WHAT'S VALUABLE THERE IS IT SORT OF TAKES AWAY ANY SORT
5 OF WORRIES ABOUT EXTREME VALUES THAT COULD HAVE BEEN
6 INFLUENCING A CONTINUOUS RESULT THAT WOULDN'T HAVE THE
7 ABILITY TO HAVE THAT INFLUENCE, SO IT'S LOOKING AT IT IN
8 TWO DIFFERENT WAYS AND IT PROVIDES A, I WOULD SAY, MORE
9 CONFIDENCE ABOUT THE ASSOCIATION.

10 Q AND IF WE ACTUALLY LOOK AT THE RESULTS, THE
11 CONCLUSION IN THE STUDY, I MEAN, THEY STATE, "WE
12 OBSERVED THAT HIGHER BLOOD MERCURY LEVELS AT
13 LATE PREGNANCY CORD BLOOD AND AT TWO AND THREE
14 YEARS OF AGE WERE POSITIVELY ASSOCIATED WITH
15 AUTISTIC BEHAVIORS AMONG PRESCHOOL CHILDREN."
16 DO YOU SEE THAT?

17 A I DO.

18 Q I MEAN, I THINK THE QUESTION I HAVE HERE,
19 DOCTOR, IS CONSIDERING THAT THEY ARE SPECIFICALLY
20 IDENTIFYING THAT TWO TO THREE YEARS OF AGE, YOUR
21 CONCERNS ABOUT WHETHER OR NOT THIS DATA ON MERCURY IS
22 ACCURATELY AT THAT ETIOLOGICAL WINDOW THAT WE'RE REALLY
23 FOCUSING ON IN THIS CASE, DO YOU HAVE CONCERNS ABOUT
24 THAT IN LIGHT OF THAT DATA?

25 A I -- NO, I THINK THESE RESULTS ALLAY THOSE
26 CONCERNS BECAUSE IT SHOWS IN THE COHORT THAT IT'S
27 ASSOCIATED AT MULTIPLE -- AT MULTIPLE TIME POINTS.

28 Q ALL RIGHT. DOCTOR, AND THEN WE TAKE THAT STUDY

1 AND WE PUT IT BACK INTO THE SCOPE OF THIS DATA SET, THIS
2 IS ALL POST-NATAL OBVIOUSLY, BUT WE PUT IT IN THIS
3 CONTEXT.

4 DO YOU HAVE ANY REAL HESITATION IN CONCLUDING
5 TO A REASONABLE DEGREE OF SCIENTIFIC CERTAINTY THAT
6 MERCURY AT EARLY LIFE IS A CAUSATIVE SUBSTANTIAL
7 CONTRIBUTING FACTOR TO THE DEVELOPMENT OF ASD?

8 A WHEN I -- AFTER REVIEWING ALL THE LITERATURE
9 AND THINKING ABOUT IT IN RELATION TO NOT JUST THE EPI
10 LITERATURE, BUT ANIMAL STUDIES AND SORT OF STUDIES ON
11 THE BIOLOGICAL PLAUSIBILITY, THE CONCLUSION I CAME TO
12 WAS THAT BASED ON MY TRAINING AND MY UNDERSTANDING, THAT
13 THIS -- THAT WE HAVE THE DATA TO SAY THAT MERCURY
14 EXPOSURE IS CAUSALLY ASSOCIATED WITH AUTISM.

15 Q AND I GUESS THE RIGOR BY WHICH YOU APPROACH
16 THIS STUDY ON LOOKING AT THESE HUNDREDS AND HUNDREDS OF
17 STUDIES, WOULD YOU APPLY THE SAME INTELLECTUAL RIGOR
18 THAT YOU DO IN YOUR WORK AS AN EPIDEMIOLOGIST EVERY DAY?

19 A ABSOLUTELY. A STRONGER RIGOR BECAUSE, I MEAN,
20 THE WEIGHT, YOU KNOW, THE IMPLICATIONS, THE WEIGHT HERE,
21 IT'S REALLY DIFFERENT THAN WRITING A PAPER OR WRITING A
22 GRANT. YOU KNOW, THIS HAS REALLY STRONG IMPLICATIONS,
23 SO THE DEGREE TO WHICH I REALLY THOUGHT ABOUT THE -- MY
24 CHARGE HERE, THE DEGREE TO WHICH I REALLY THOUGHT ABOUT
25 THE QUESTION AT HAND AND WHAT EVIDENCE WE HAVE IS JUST
26 AS STRONG IF NOT STRONGER THAN ANYTHING ELSE I'VE EVER
27 DONE AS AN EPIDEMIOLOGIST AND CONSISTENT WITH WHAT I
28 LEARNED IN GRADUATE SCHOOL.

1 MR. WISNER: THANK YOU VERY MUCH, DOCTOR. I
2 REALLY APPRECIATE YOUR TIME. WE ARE EXACTLY ON TIME.

3 I PASS THE WITNESS, YOUR HONOR. THANK YOU.

4 THE COURT: THANK YOU.

5 MR. BOEHM: YOUR HONOR, JUST AS A HOUSEKEEPING
6 MATTER, WOULD THE COURT BE INTERESTED AND PERHAPS THE
7 WITNESS BE INTERESTED IN A BREAK NOW, IF YOU THINK WE'RE
8 AT THE HALFWAY MARK, OR WOULD THE COURT PREFER THAT I
9 PROCEED FOR SOMETIME AND THEN WE TAKE A BREAK AFTER A
10 SHORT PERIOD?

11 THE COURT: WHY DON'T WE TAKE A BREAK UNTIL
12 3:00 O'CLOCK. THANK YOU.

13 MR. BOEHM: VERY GOOD. THANK YOU.

14 (RECESS)

15 THE COURT: LOOKS LIKE WE'RE READY TO PROCEED.
16 ARE YOU READY, MR. BOEHM?

17 MR. BOEHM: I AM YOUR, HONOR THANK YOU.

18
19 CROSS EXAMINATION

20 MR. BOEHM:

21 Q DR. GARDENER, IT'S VERY NICE TO SEE YOU. HOW
22 ARE YOU?

23 A NICE TO SEE YOU AGAIN TOO.

24 FOR SOME REASON I DON'T SEE YOU ON MY SCREEN SO
25 I'M WONDERING IF THERE'S SOMETHING I NEED TO DO.

26 Q YOU MIGHT HAVE PINNED MR. WISNER. YOU CAN KEEP
27 LOOKING AT HIM, HE'S A MORE ATTRACTIVE GUY.

28 MR. WISNER: I WISH EVERY DAY, SIR. I WISH

1 EVERY DAY.

2 THE WITNESS: OH, NO. I THINK YOU SWITCHED IT

3 BACK. OH, OKAY. ALL RIGHT. WHOEVER IS TALKING WILL

4 POP UP.

5 MR. BOEHM:

6 Q LET'S SEE IT IF YOU WORKS.

7 DID I POP UP?

8 A YES. YOU POPPED UP. GOOD TO SEE YOU AGAIN.

9 Q GREAT.

10 I JUST WANTED TO GIVE YOU A LITTLE BIT OF AN

11 OVERVIEW OR A ROADMAP OF WHAT I'M GOING TO BE ASKING YOU

12 ABOUT TODAY SO THAT YOU KIND OF ARE READY FOR THAT AND

13 KIND WHERE WE'RE GOING.

14 DOES THAT SOUND OKAY?

15 A READY AS EVER.

16 Q OKAY.

17 YOU PREPARED A REPORT IN THIS CASE AND I KNOW

18 THAT THE COURT HAS, IF I UNDERSTOOD CORRECTLY, HAS

19 REVIEWED THAT REPORT.

20 I WANT TO START BY SHOWING YOU A PARAGRAPH ON

21 PAGE 13 OF YOUR REPORT IN THIS CASE THAT DESCRIBES WHAT

22 YOU WERE FOCUSED ON IN REVIEWING THE SCIENTIFIC

23 LITERATURE.

24 THIS IS PAGE 13 WHERE YOU DESCRIBED YOUR

25 METHODOLOGY.

26 AND, YOUR HONOR, JUST TO MAKE SURE, ARE YOU

27 ABLE TO SEE THIS CLEARLY AND OKAY?

28 THE COURT: SURE.

1 MR. BOEHM: OKAY. GOOD.

2 Q LET'S LOOK IN THE MIDDLE OF THIS PARAGRAPH
3 WHERE YOU HAVE GENERALLY DESCRIBED YOUR APPROACH AND
4 WHAT YOU FOCUSED ON.

5 YOU WRITE THAT YOU FOCUSED ON STUDIES THAT
6 MEASURED HEAVY METALS FROM THE POST-NATAL PERIOD THROUGH
7 CHILDHOOD.

8 DO YOU SEE THAT?

9 A I DO.

10 Q AND POST-NATAL, THAT MEANS AFTER A BIRTH?

11 A THAT IS CORRECT.

12 Q OKAY. AND THEN YOU SAY THROUGH CHILDHOOD.

13 AND I WANT TO -- BEFORE -- I'M GOING TO SHOW
14 YOU WHAT YOU SAY IN YOUR REPORT ABOUT THAT, BUT BEFORE
15 WE DO THAT, CAN YOU VERY BRIEFLY SAY WHY YOU FOCUSED ON
16 THE POST-NATAL PERIOD?

17 A BECAUSE MY UNDERSTANDING WAS THAT THE PURPOSE
18 OF THIS STUDY -- OR I'M SORRY, NOT OF THIS STUDY -- OF
19 THIS CASE WAS EVENTUALLY TO BE CONSIDERING THESE
20 EXPOSURES FROM BABY FOOD, WHICH IS A POST-NATAL EXPOSURE
21 RATHER THAN A PRENATAL EXPOSURE.

22 BUT AS YOU CAN SEE IN THE SECOND HALF OF THIS
23 SENTENCE, I ALSO DID --

24 Q RIGHT.

25 A -- LOOK AT PRENATAL HEAVY METAL EXPOSURES.

26 Q RIGHT.

27 YOU REVIEWED PRENATAL STUDIES, BUT YOU FOCUSED
28 ON STUDIES THAT MEASURED HEAVY METALS FROM POST-NATAL

1 THROUGH CHILDHOOD; CORRECT?

2 A THAT'S CORRECT.

3 Q OKAY.

4 LET'S LOOK AT PAGE 23 OF YOUR REPORT TO
5 ILLUMINATE THE CHILDHOOD PART OF THAT.

6 YOU SAY IN YOUR REPORT AT PAGE 23 THAT FOR
7 AUTISM THE PRESUMED ETIOLOGICALLY RELEVANT PERIOD IS
8 PRENATALLY TO THE FIRST YEAR -- OR WITHIN THE FIRST YEAR
9 OF LIFE.

10 DO YOU SEE THAT?

11 A I'M READING IT.

12 YES. SO, AGAIN, THAT -- WHAT I WAS REFERRING
13 TO I BELIEVE HERE IS THAT THE PERIOD THAT THIS CHARGE
14 REFERS TO IN TERMS OF BABY FOOD WAS WITHIN THE FIRST
15 YEAR OF LIFE. THE ETIOLOGICALLY RELEVANT PERIOD GOES
16 BEFORE THEN, BUT IT CAN ALSO EXTEND AFTER THAT FIRST
17 YEAR OF LIFE.

18 Q DR. GARDENER, WHAT YOU'RE REFERRING TO HERE
19 ACTUALLY IS RELATED TO STUDY DESIGNS THAT YOU HAD
20 AVAILABLE TO YOU.

21 DO YOU SEE THE SENTENCE ACTUALLY SAYS THAT A
22 LIMITATION IS THE FACT THAT THE CASE CONTROL AND
23 CROSS-SECTIONAL STUDIES MEASURED, IN THIS CASE LEAD -- I
24 KNOW YOU WERE TALKING ABOUT ARSENIC AND MERCURY TODAY --
25 BUT LEVELS DURING CHILDHOOD RATHER THAN AT INFANCY AFTER
26 THE ASD DIAGNOSES HAD BEEN MADE AND FOLLOWING THE
27 PRESUMED ETIOLOGICALLY RELEVANT PERIOD, PRE-NATAL AND
28 WITHIN THE FIRST YEAR OF LIFE.

1 DID I READ THAT CORRECTLY?

2 A YOU DID READ THAT CORRECTLY.

3 Q OKAY.

4 AND YOU'RE SAYING THAT THE PRESUMED
5 ETIOLOGICALLY RELEVANT PERIOD THAT THE PERIOD WE'RE
6 TALKING ABOUT THAT'S ETIOLOGICALLY RELEVANT RELATES IN
7 THIS CASE TO ASD, WHICH MEANS AUTISM SPECTRUM DISORDER;
8 CORRECT?

9 A ASD MEANS AUTISM SPECTRUM DISORDER.

10 WHAT THIS IS REFERRING TO IS THE PRESUMED
11 ETIOLOGICALLY RELEVANT PERIOD WHICH IS PRIOR TO
12 DEVELOPING AUTISM.

13 Q OKAY.

14 A WHICH CAN ACTUALLY EXTEND BEYOND THE FIRST YEAR
15 OF LIFE, BUT THERE'S MUCH OF CHILDHOOD THAT HAPPENS
16 AFTER THE DEVELOPMENT OF AUTISM.

17 Q ETIOLOGY IS A WORD THAT MEANS THE CAUSE OF
18 SOMETHING, CORRECT, IT'S CAUSAL?

19 A THAT IS CORRECT.

20 Q SO AN ETIOLOGICALLY RELEVANT PERIOD MEANS THE
21 PERIOD WHEN SOMETHING IS CAUSED; CORRECT?

22 A THAT IS CORRECT.

23 Q OKAY. YOU CAN TAKE THAT DOWN.

24 I WANT TO DIRECT YOUR ATTENTION NEXT TO ANOTHER
25 SECTION OF YOUR REPORT ON PAGES 14 AND 15.

26 ANOTHER GROUND RULE OF YOUR ANALYSIS AS YOU
27 WRITE IN YOUR REPORT LOOKING AT THE BOTTOM OF PAGE 14
28 AND CARRYING OVER TO 15: "A PRIMARY WEAKNESS IN THIS

1 FIELD RELATES TO THE TIMING OF ASSESSMENT OF
2 EXPOSURES TO HEAVY METALS."

3 DO YOU SEE THAT?

4 A I DO.

5 Q OKAY.

6 AND WHEN YOU SAY "IN THIS FIELD," YOU'RE
7 REFERRING TO THE PARAMETERS OF YOUR REPORT OR DO YOU
8 HAVE SOMETHING ELSE IN MIND?

9 A SO WHAT I'M REFERRING TO IS THE BODY OF
10 LITERATURE ON METALS AND AUTISM.

11 Q OKAY.

12 A AND --

13 Q SO WHEN --

14 A -- THE FACT THAT IN A LOT OF STUDIES THEY WERE
15 ASSESSED EITHER AROUND THE SAME TIME OR AFTER THE
16 DIAGNOSIS HAS ALREADY OCCURRED.

17 Q RIGHT. OKAY. PERFECT.

18 AND YOU SAY, "A PRIMARY WEAKNESS IN THIS FIELD"
19 -- AND THAT REFERS TO THIS QUESTION OF WHETHER OR NOT
20 THERE IS AN ASSOCIATION BETWEEN EXPOSURE TO HEAVY METALS
21 AND AUTISM, THAT'S THE FIELD WE'RE TALKING ABOUT?

22 A THAT IS THE FIELD WE'RE TALKING ABOUT.

23 Q OKAY.

24 "A PRIMARY WEAKNESS IN TERMS OF ASSESSING
25 WHETHER THERE'S AN ASSOCIATION BETWEEN HEAVY
26 METALS AND ASD OR AUTISM SPECTRUM DISORDER
27 RELATES TO THE TIMING OF THE ASSESSMENT OF
28 EXPOSURE TO HEAVY METALS."

1 CORRECT?

2 A THAT IS CORRECT.

3 Q OKAY.

4 AND WHAT YOU'RE TALKING ABOUT HERE IS THE TYPES
5 OF STUDIES THAT ARE AVAILABLE TO YOU AND OTHERS IN
6 ASSESSING THAT QUESTION; CORRECT?

7 A IT'S NOT NECESSARILY THE TYPES OF STUDIES BUT
8 THE WAY THAT THE EXPOSURES WERE ASSESSED, WHICH CAN BE
9 -- THAT MANNER OF EXPOSURE ASSESSMENT CAN OCCUR IF ANY
10 TYPE OF STUDY.

11 Q WELL, LET'S LOOK AT THE REST OF YOUR PARAGRAPH
12 HERE.

13 YOU SAY THAT, "IN AN IDEAL WORLD" -- YOU CAN
14 WAIT FOR ME TO GET THERE, IAN -- YOU SAY THAT, "IN AN
15 IDEAL WORLD, WE WOULD ASSESS HEAVY METAL
16 EXPOSURE IN VERY EARLY LIFE WHEN THERE WERE NO
17 CLEAR SIGNS OF ASD/ADHD DIAGNOSIS AND THEN
18 FOLLOW CHILDREN UP UNTIL THE TIME OF DIAGNOSIS
19 WITH REPEATED HEAVY METAL ASSESSMENTS."
20 THAT'S WHAT YOU'D DO IN AN IDEAL WORLD; IS THAT
21 RIGHT?

22 A THAT'S RIGHT. LIKE, THE STUDY THAT WE WERE
23 LOOKING AT, THE RYU OR RU, I DON'T KNOW HOW YOU
24 PRONOUNCE IT EITHER, STUDY. LIKE THAT. THAT IN AN
25 IDEAL WORLD ALL STUDIES WOULD BE CONDUCTED LIKE THAT
26 STUDY.

27 Q GREAT. WE'RE DEFINITELY GOING TO TALK ABOUT
28 RYU, BUT FOR RIGHT NOW I JUST WANT TO GO THROUGH THIS

1 PARAGRAPH.

2 YOU SAY, "IN AN IDEAL WORLD YOU'D BE ABLE TO
3 ASSESS HEAVY METAL EXPOSURE IN VERY EARLY LIFE
4 WHEN THERE ARE NO CLEAR SIGN OF ASD AND ADHD
5 AND THEN FOLLOW CHILDREN UP UNTIL THE TIME OF
6 DIAGNOSIS WITH REPEATED HEAVY METAL
7 ASSESSMENTS."

8 AND THEN YOU SAY, "SUCH STUDIES, TO THE EXTENT
9 THEY COULD BE ACCURATELY CONDUCTED, WOULD BE
10 EXTREMELY EXPENSIVE AND TIME-CONSUMING AND
11 WOULD REQUIRE VERY LARGE SAMPLES DUE TO THE
12 RARITY OF THESE OUTCOMES."

13 DO YOU SEE THAT?

14 A I DO.

15 Q OKAY.

16 SO YOU'RE REFERRING HERE TO THE NATURE OF THE
17 STUDIES YOU HAVE AVAILABLE AND SPECIFICALLY ONE STUDY
18 THAT WE WISH WE COULD HAVE, AS YOU SAY IN YOUR REPORT ON
19 A ANOTHER PAGE, ARE RANDOMIZED CONTROLLED TRIALS, "WE
20 WISH WE COULD HAVE THOSE TO ANSWER QUESTIONS ABOUT
21 CAUSATION;" RIGHT?

22 A WELL, THEY WOULD BE UNETHICAL, SO.

23 Q NO, I UNDERSTAND --

24 A I DON'T KNOW ABOUT SAYING WE WISH WE COULD HAVE
25 THEM, BUT THEY ARE -- THEY WOULD BE UNETHICAL.

26 Q I UNDERSTAND YOUR POSITION HERE THAT THEY ARE
27 NOT ETHICAL OR POSSIBLE.

28 THE FACT IS WE DON'T HAVE ANY TO HELP US ANSWER

1 THE QUESTION IN THIS FIELD, AS YOU SAY, OF WHETHER HEAVY
2 METALS ARE ASSOCIATED WITH AUTISM. WE DON'T HAVE ANY
3 RANDOMIZED CONTROLLED TRIALS; IS THAT CORRECT?

4 A THAT'S CORRECT. WE DON'T HAVE ANY.

5 Q AND YOU REFER TO RANDOMIZED CONTROLLED TRIALS
6 AS THE GOLD STANDARD WHEN TRYING TO ASSESS CAUSAL
7 ASSOCIATIONS; CORRECT?

8 A CORRECT.

9 Q OKAY.

10 HERE YOU SAY IN THE NEXT SENTENCE, "MOST
11 STUDIES RELATING HEAVY METAL EXPOSURE TO AUTISM
12 ASD/ADHD, IN FACT, ASSESSED HEAVY METALS
13 EXPOSURE SIMULTANEOUSLY WITH ASD/ADHD
14 ASSESSMENT IN CASE CONTROL AND CROSS-SECTIONAL
15 DESIGN."

16 DO YOU SEE THAT?

17 A I DO.

18 Q OKAY.

19 AND YOU SAY THAT THAT RAISES A CONCERN ABOUT
20 TEMPORALITY.

21 DO YOU SEE THAT?

22 A I DO.

23 Q BECAUSE CASE CONTROL AND CROSS-SECTIONAL
24 DESIGNS ARE NOT CONSIDERED PROSPECTIVE; CORRECT?

25 A NO, THAT'S NOT CORRECT. THERE ARE PLENTY OF
26 PROSPECTIVE CASE CONTROL DESIGNS.

27 Q OKAY. WELL, LET'S JUST LOOK AT YOUR LANGUAGE
28 HERE.

1 "MOST STUDIES RELATING HEAVY METAL EXPOSURE TO
2 ASD/ADHD ASSESSED HEAVY METAL EXPOSURE
3 SIMULTANEOUSLY WITH ASD/ADHD ASSESSMENT IN CASE
4 CONTROL AND CROSS-SECTIONAL DESIGN."
5 IS THAT A TRUE STATEMENT?
6 A THAT SENTENCE THAT'S HIGHLIGHTED IN YELLOW?
7 Q YES.
8 A YES.
9 Q AND THOSE STUDIES WOULD NOT BE CONSIDERED
10 PROSPECTIVE?
11 A SO IF THE EXPOSURE AND THE OUTCOME ARE ASSESSED
12 SIMULTANEOUSLY OR THE EXPOSURE IS ASSESSED AFTER THE
13 OUTCOME HAS OCCURRED, THEN IT WOULD NOT BE CONSIDERED
14 PROSPECTIVE.
15 Q IT WOULD NOT BE CONSIDERED PROSPECTIVE WHICH
16 WOULD RAISE CONCERNS ABOUT TEMPORALITY; CORRECT?
17 A THAT'S CORRECT.
18 Q OKAY.
19 "SPECIFICALLY WHETHER THE EXPOSURE OCCURRED
20 PRIOR TO THE DISEASE" IS WHAT YOU WRITE NEXT.
21 DO YOU SEE THAT?
22 A YES. ACTUALLY SHOW ME.
23 YES.
24 Q OKAY.
25 NOW, THESE CASE CONTROL AND CROSS-SECTIONAL
26 DESIGN ARE A SPECIFIC TYPE OF OBSERVATIONAL STUDY THAT
27 IS SOMETIMES USED IN RESEARCH; CORRECT?
28 A CORRECT.

1 Q THERE ARE ALSO STUDIES CALLED COHORT STUDIES;
2 CORRECT?

3 A CORRECT.

4 Q AND COHORT STUDIES ARE VERY DIFFERENT FROM CASE
5 CONTROL AND CROSS-SECTIONAL STUDIES WHEN IT COMES TO THE
6 QUESTION OF TEMPORALITY BECAUSE COHORT STUDIES CAN
7 ADDRESS THIS WHAT YOU CALL PRIMARY WEAKNESS IN THIS
8 FIELD RELATED TO THE TIMING OF THE ASSESSMENT OF
9 EXPOSURE; CORRECT?

10 A INCORRECT.

11 SO CASE CONTROL STUDIES CAN BE PROSPECTIVE OR
12 RETROSPECTIVE. COHORT STUDY CAN ALSO BE RETROSPECTIVE
13 OR PROSPECTIVE OR -- AND IN PROSPECTIVE COHORT STUDIES,
14 A LOT OF THE ANALYZES WITHIN THEM CAN BE
15 CROSS-SECTIONAL, SO IT'S NOT CORRECT AT ALL TO CLASSIFY
16 -- TO THINK OF JUST COHORT STUDIES AS JUST BEING
17 PROSPECTIVE AND CASE CONTROL STUDIES AS JUST BEING
18 RETROSPECTIVE. YOU REALLY HAVE TO SORT OF LOOK AT THE
19 -- LOOK AT HOW THE EXPOSURE WAS IS ASSESSED IN EACH OF
20 THOSE STUDY DESIGNS.

21 Q OKAY. LET ME SAY IT THIS WAY FOR YOU.

22 COHORT STUDIES -- IN COHORT STUDIES THE STUDY
23 POPULATION, YOU CONTRACT THE STUDY POPULATION, WHO IS
24 NOT ALREADY BEEN DIAGNOSED WITH THE DISEASE OR DISORDER,
25 THAT IS THE OUTCOME OF THAT STUDY; CORRECT?

26 A CORRECT.

27 Q AND THAT MAKES IT POSSIBLE TO ESTABLISH THAT
28 THE EXPOSURE OCCURRED BEFORE THE DISEASE. THAT'S ONE OF

1 THE BENEFITS OF THOSE KINDS OF STUDIES; CORRECT?

2 A THAT'S A BENEFIT OF PROSPECTIVE COHORT STUDY.

3 SO THERE ARE PROSPECTIVE COHORT STUDIES AND
4 THERE ARE RETROSPECTIVE COHORT STUDIES AND THERE ARE
5 CASE CONTROL STUDIES THAT ARE PROSPECTIVE AND
6 RETROSPECTIVE.

7 Q OKAY. THAT --

8 A BUT.

9 Q -- THAT WOULD BE -- OH, I'M SORRY.

10 A IT'S OKAY. YOU CAN GO AHEAD.

11 Q THAT WOULD BE THE BENEFIT OF A STUDY THAT
12 MEASURED EXPOSURE TO A HEAVY METAL PRIOR TO A DIAGNOSIS
13 OF ASD; CORRECT?

14 A THAT'S CORRECT.

15 A PROSPECTIVE STUDY, WHETHER IT'S A CASE
16 CONTROL OR A COHORT OR ANY OTHER CASE COHORT DESIGN, IT
17 HAS THE BENEFIT OF LESS UNCERTAINTY ABOUT WHETHER THE
18 EXPOSURE OCCURRED PRIOR TO THE OUTCOME.

19 Q A CASE CONTROL STUDY IS A STUDY WHERE YOU BEGIN
20 WITH A GROUP THAT ALREADY HAS THE DISEASE OR THE
21 DISORDER THAT YOU'RE STUDYING; CORRECT?

22 A SO A CASE CONTROL STUDY FROM THE PERSPECTIVE OF
23 THE INVESTIGATOR, THE OUTCOMES HAVE ALREADY OCCURRED.

24 Q OKAY.

25 A SO YOU SELECT CASES AND YOU SELECT CONTROLS AND
26 YOU COLLECT THE -- AND YOU IDENTIFY THE EXPOSURE OF
27 INTEREST, BUT IN -- OFTENTIMES THAT EXPOSURE HAS ALREADY
28 BEEN COLLECTED PREVIOUSLY, IT WAS COLLECTED

1 PROSPECTIVELY IN RELATION TO WHEN THE OUTCOME OCCURRED.

2 Q OKAY.

3 AND WE'RE GOING TO LOOK AT SOME OF THE SPECIFIC
4 STUDIES, BUT I JUST WANT TO SET THE PARAMETERS OF WHAT
5 THE LIMITATIONS ARE AND WHAT YOU DESCRIBE, AGAIN, AS
6 THIS PRIMARY WEAKNESS IN THIS FIELD.

7 AND THEN -- AND I DO WANT TO TALK TO YOU ABOUT
8 THE STUDIES THAT DO TIME THE ASSESSMENT OF THE EXPOSURE
9 PRIOR TO A DIAGNOSIS VERSUS THE STUDIES THAT TIME THE
10 ASSESSMENT OF THE EXPOSURE AFTER THE DIAGNOSIS ALREADY
11 HAS OCCURRED, THEREBY, RAISING CONCERNS ABOUT
12 TEMPORALITY, I.E., WHETHER THE EXPOSURE OCCURRED PRIOR
13 TO THE DISEASE.

14 SO LET'S TALK ABOUT THAT.

15 A OKAY.

16 Q AND SPECIFICALLY, I JUST WANTED TO SUM UP A
17 COUPLE OF POINTS THAT WE JUST COVERED TO KIND OF FRAME
18 WHAT I THINK WILL BE OUR ROADMAP FOR THE REST OF THE
19 PRESENTATION OR THE EXAMINATION.

20 IF YOU COULD PUT UP EXHIBIT 692.

21 THIS JUST RECAPS WHAT WE JUST COVERED, DR.
22 GARDENER.

23 FIRST AS WE READ IN YOUR REPORT AT PAGE 13, YOU
24 WERE FOCUSED ON STUDIES THAT MEASURE HEAVY METALS FROM
25 THE POST-NATAL PERIOD THROUGH CHILDHOOD. I KNOW YOU
26 LOOKED AT OTHERS, BUT THAT'S WHERE YOU WERE FOCUSED, AND
27 THE SECOND BIT WE READ PRIMARY WEAKNESS IN THIS FIELD
28 RELATES TO THE TIMING OF THE ASSESSMENT OF EXPOSURE TO

1 HEAVY METALS.

2 OKAY. MY FIRST QUESTION ABOUT ARSENIC IS THIS:
3 ARE YOU ABLE TO IDENTIFY ANY STUDY OR STUDIES
4 THAT LOOKED AT POST-NATAL EXPOSURE TO ARSENIC THAT WAS
5 MEASURED BEFORE ASD WAS DIAGNOSED?

6 A CAN YOU SAY THE QUESTION AGAIN?

7 Q YES. FOR SURE.

8 ARE YOU ABLE TO IDENTIFY ANY STUDY OR STUDIES
9 THAT LOOKED AT POST-NATAL EXPOSURE TO ARSENIC MEASURED
10 BEFORE ASD WAS DIAGNOSED?

11 A SO I READ HUNDREDS OF STUDIES. OFF THE TOP OF
12 MY HEAD, I AM NOT SURE -- I CAN'T PULL ONE UP OFF THE
13 TOP OF MY HEAD. THAT DOESN'T MEAN -- BUT I SUMMARIZE
14 THEM IN MY REPORT, SO I'D BE HAPPY TO TAKE A -- YOU
15 KNOW, TO TAKE A READ THROUGH OF ANY SECTIONS OF MY
16 REPORT IF YOU --

17 Q WELL, THIS IS A SUPREMELY IMPORTANT POINT AND
18 IF YOU, DR. GARDENER, NEED TO LOOK BACK AT YOUR REPORT,
19 I KNOW YOU HAVE IT IN FRONT OF YOU, WE CAN TAKE A
20 MOMENT, BUT I DO WANT TO GET AN ANSWER TO THE QUESTION
21 OF WHETHER OR NOT YOU CAN IDENTIFY ANY STUDY OR STUDIES
22 THAT LOOKED AT POST-NATAL EXPOSURE, THE THING YOU WERE
23 FOCUSED ON, TO ARSENIC THAT WAS MEASURED BEFORE ASD WAS
24 DIAGNOSED?

25 A I CAN'T THINK OF ANY OFF THE TOP OF MY -- WHICH
26 ONES -- OFF THE TOP OF MY HEAD.

27 Q YOU -- OKAY. YOU CAN'T THINK OF ANY. OKAY.

28 I WANT TO PULL UP EXHIBIT 693 WHICH SUMMARIZES

1 STUDIES.

2 THIS IS A COMPLETE LIST OF STUDIES THAT
3 MEASURED ARSENIC EXPOSURE PRIOR TO DIAGNOSIS AND
4 THEREFORE ALLOW FOR AN ASSESSMENT OF TEMPORALITY THAT
5 WAS THE ISSUE, THIS PRIMARY WEAKNESS, THAT YOU DESCRIBED
6 IN YOUR REPORT AND THERE ARE FOUR.

7 OKAY. LONG, ALAMPI, SKOGHEIM, THOSE ARE NOT
8 POST-NATAL STUDIES SO WE CAN'T MEET THAT CRITERIA, OKAY,
9 THOSE ARE -- THOSE ARE ALL PRENATAL STUDIES. OKAY.

10 DOHERTY, WHICH IS NOT REFERENCED IN YOUR
11 REPORT, YOU DO NOT DISCUSS DOHERTY IN YOUR REPORT. I
12 KNOW MR. WISNER, HE ASKED YOU ABOUT IT, BUT THAT'S NOT
13 ACTUALLY A STUDY YOU DISCUSS AT ALL IN YOUR REPORT --

14 MR. WISNER: OBJECTION.

15 MR. BOEHM:

16 Q -- IS THE ONE THAT MEASURES POST-NATAL AND HAS
17 THIS QUESTION OF WHETHER THERE IS A STATISTICALLY
18 SIGNIFICANT ASSOCIATION AS TO THE POST-NATAL ASSESSMENT.

19 OKAY. IS THERE ANYTHING ON THIS CHART THAT
20 LOOKS INCORRECT TO YOU, DR. GARDENER?

21 A I CAN'T VERIFY.

22 MR. WISNER: OBJECTION IS -- I'M SORRY --
23 OBJECTION, YOUR HONOR. THAT WAS A VERY COMPOUND AND
24 TESTIFYING QUESTION. I DON'T EVEN KNOW WHAT HE'S
25 "OKAYING" TO.

26 MR. BOEHM: I WAS JUST TRYING TO -- I'M SORRY,
27 YOUR HONOR, I WAS JUST TRYING TO DESCRIBE WHAT WE'RE
28 WE'VE DONE HERE IN THIS CHART.

1 THE COURT: THAT'S ALL RIGHT. OVERRULED.
2 PROCEED.

3 MR. BOEHM: THANK YOU.

4 Q DR. GARDENER, WOULD YOU JUST TAKE A MOMENT TO
5 LOOK AT THIS CHART THAT'S BEEN MARKED AS EXHIBIT 693 AND
6 TELL US WHETHER OR NOT YOU SEE ANYTHING THAT IS NOT
7 CORRECT.

8 A SO I CAN'T VERIFY ANY PARTS OF THIS JUST SORT
9 OF BY SIGHT.

10 IF WHEN A POST -- WHEN A MEASURE IS TAKEN FROM
11 AMNIOTIC FLUID OR FROM MATERNAL BLOOD, THAT WOULD NOT BE
12 CONSIDERED POST-NATAL. I CAN DEFINITELY VERIFY THAT.
13 AND YES, INFANT TOENAILS WOULD BE POST-NATAL.

14 THEN THE NEXT COLUMN SAYS, "WITH ASD DIAGNOSIS,
15 WHAT WAS EVALUATED." LIKE I SAID, I'VE READ HUNDREDS
16 AND HUNDREDS OF STUDIES SO I ABSOLUTELY CANNOT JUST LOOK
17 AT NAMES AND SAY WAS ASD DIAGNOSIS, WHAT WAS EVALUATED
18 IN THAT STUDY, NOR CAN I SAY WAS THE ASSOCIATION
19 OBSERVED STATISTICALLY SIGNIFICANT.

20 Q WELL, WHAT WE WANTED TO DO, DR. GARDENER, IS
21 ACTUALLY WE HAVE -- WE WANTED TO HELP A LITTLE BIT
22 BECAUSE YOU HAD SAID YOU WERE FOCUSED ON POST-NATAL
23 STUDIES AND THEN YOU TALKED ABOUT THIS TEMPORALITY
24 ISSUE, THE MEASUREMENT OF THE HEAVY METAL AS BEING
25 ASSESSED PRIOR TO DIAGNOSIS, SO WE TRIED TO PUT THIS
26 CHART TOGETHER TO SEE IF YOU SAW ANY STUDY WE'D LEFT
27 OFF.

28 THE COURT: MAY I ASK YOU A QUESTION, COUNSEL.

1 IS THE POINT OF THE CHART --

2 MR. BOEHM: YES.

3 THE COURT: -- TO DISTINGUISH BETWEEN A
4 DIAGNOSIS OF ASD, MEANING EVERY -- TICKING EVERY BOX IN
5 THE SPECTRUM OF SYMPTOMS OR JUST THE SYMPTOMS OF ASD?
6 IS THAT --

7 MR. BOEHM: YEAH.

8 THE COURT: -- THE DISTINCTION?

9 MR. BOEHM: IT'S A GREAT QUESTION. THAT'S A
10 GREAT QUESTION. THANK YOU.

11 THE COURT: SHE DID ALREADY TESTIFY ABOUT THAT
12 SO MAYBE YOU CAN QUESTION HER FURTHER.

13 MR. BOEHM: YEAH, YOUR HONOR. THANK YOU.
14 THAT'S A VERY GOOD QUESTION AND I'M HAPPY TO EXPLAIN
15 WHAT THIS CHART IS ATTEMPTING TO DO THAT REGARD.

16 SO YOU SEE IT HAS THE FOUR COLUMNS AND THE
17 FIRST ONE IS THE EASIEST, THAT'S JUST THE NAME THE STUDY
18 AND THE YEAR.

19 THE SECOND IS A QUESTION OF WHETHER OR NOT
20 THERE WAS ANY MEASUREMENT OR ASSESSMENT OF ARSENIC
21 EXPOSURE POST-NATALLY BECAUSE DR. GARDENER HAS INDICATED
22 IN HER REPORT THAT IT'S THE POST-NATAL EXPOSURE THAT SHE
23 WAS FOCUSED ON, SO WE LOOKED FOR ANY STUDIES THAT WERE
24 POST-NATAL.

25 THE THIRD COLUMN -- AND THERE'S JUST ONE,
26 DOHERTY, OKAY.

27 THE SECOND -- THE THIRD COLUMN ASKS, WAS THE
28 STUDY EVALUATING ASD DIAGNOSIS OR SOMETHING ELSE? AND I

1 THINK THAT'S THE QUESTION YOU'RE ASKING NOW.

2 LONG AND SKOGHEIM WERE LOOKING AT ASD
3 DIAGNOSIS, BUT ALAMPI AND DOHERTY WERE LOOKING AT
4 BEHAVIORS OR SOMETIMES WHAT'S REFERRED TO AS AUTISTIC
5 BEHAVIORS, BUT AS YOU HEARD FROM DR. SHAPIRO ON MONDAY
6 DURING HIS TESTIMONY, AUTISTIC BEHAVIORS, THESE SCREENS
7 LIKE THE SRS QUESTIONNAIRE, THOSE ARE NOT THE SAME AS AN
8 ASD DIAGNOSIS.

9 IT'S LIKE YOU HAVE A SYMPTOM OF SOMETHING
10 DOESN'T MEAN YOU HAVE THE DISEASE OR THE DISORDER, IT
11 MEANS YOU NEED FURTHER EVALUATION BECAUSE YOU MAY NEED
12 AN ASSESSMENT. THAT'S WHAT DR. SHAPIRO TOLD US.

13 SO THIS CHART IS SHOWING IN THAT THIRD COLUMN
14 IS THE OUTCOME OF THE STUDY AN ACTUAL DIAGNOSIS OF ASD
15 OR IS IT AUTISTIC BEHAVIORS? IS IT SOMETHING OTHER THAN
16 AN ACTUAL ASD DIAGNOSIS?

17 AND THEN THE FOURTH AND FINAL COLUMN IN THE
18 CHART ASKS THE QUESTION, IS THERE A STATISTICALLY
19 SIGNIFICANT ASSOCIATION THAT WAS DETECTED BASED ON THE
20 ASSESSMENT OF THE EXPOSURE?

21 THE COURT: AND IS IT ANSWERING THE QUESTION
22 WHETHER THERE WAS A STATISTICALLY SIGNIFICANT
23 ASSOCIATION WITH ASD DIAGNOSIS OR WITH WHAT THE RESEARCH
24 WAS INVESTIGATING?

25 MR. BOEHM: SO THAT DEPENDS ON -- IT'S
26 ANSWERING THE QUESTION AS TO WHATEVER IT WAS THAT THE
27 STUDY WAS ASSESSING.

28 THE COURT: OKAY.

1 MR. BOEHM: SO LET'S LOOK AT DOHERTY AS AN
2 EXAMPLE.

3 THE COURT: THANK YOU. UNDERSTOOD.

4 MR. BOEHM: OKAY. YES. GOOD.

5 Q OKAY.

6 DR. GARDENER, YOU'VE HAD SOME TIME TO LOOK AT
7 THIS, I TAKE IT.

8 AND LET ME JUST ASK YOU AGAIN:

9 AS YOU SIT HERE NOW, CAN YOU IDENTIFY ANY
10 STUDIES OR -- STUDY OR STUDIES THAT LOOKED AT POST-NATAL
11 EXPOSURE TO ARSENIC MEASURED BEFORE ASD WAS DIAGNOSED?

12 A NOT OFF THE TOP OF MY HEAD, NOT WITHOUT
13 REFERRING TO --

14 Q OKAY.

15 A -- MY LITERATURE REVIEW.

16 BUT WHAT I DO NOTICE IS, IF I RECALL CORRECTLY,
17 THERE WAS A SIGNIFICANT ASSOCIATION OBSERVED IN DOHERTY,
18 BUT I DON'T --

19 Q LET'S LOOK AT THAT.

20 A -- I DON'T RECALL THE NATURE OF IT.

21 AND SKOGHEIM, IF I REMEMBER IT CORRECTLY, THERE
22 WAS A NON LINEAR SIGNIFICANT ASSOCIATION, LIKE AN UPSIDE
23 DOWN U SHAPE ASSOCIATION.

24 Q ALL RIGHT.

25 WELL, WE CAN LOOK AT EITHER ONE OF THOSE OR
26 BOTH, DR. GARDENER, BUT LET'S START WITH DOHERTY.

27 DOHERTY IS THE ONE THAT MR. WISNER HIGHLIGHTED
28 FOR YOU, SO IT MAKES SENSE TO PAUSE ON THAT ONE. IT'S

1 ALSO THE ONLY STUDY THAT MEASURED ARSENIC EXPOSURE PRIOR
2 TO DIAGNOSIS THAT ACTUALLY WAS POST-NATAL THAT HAD A
3 POST-NATAL MEASUREMENT.

4 AND AS WE INDICATE HERE IN THE CHART, THE
5 POST-NATAL MEASUREMENT WAS INFANT TOENAILS AT SIX WEEKS.

6 DO YOU SEE THAT?

7 A I SEE THAT THAT'S WRITTEN THERE, YEAH.

8 Q OKAY.

9 LET'S ACTUALLY GO TO THIS STUDY.

10 IT'S EXHIBIT 630.

11 IT DOES HAVE SOME PRENATAL EXPOSURES, BUT I
12 ASKED YOU ABOUT POST-NATAL EXPOSURES, SO LET'S LOOK AT
13 THE POST-NATAL EXPOSURE.

14 I THINK MR. WISNER HAD ACTUALLY PUT THIS ONE IN
15 THE STATISTICALLY SIGNIFICANT POSITIVE ASSOCIATION SO
16 THAT WAS CURIOUS.

17 LET'S LOOK AT WHAT IT ACTUALLY SHOWS FOR THE
18 POST-NATAL.

19 I WANT TO GO TO FIGURE 6, WHICH IS THE KIND OF
20 VISUAL DEPICTION OF THESE RESULTS.

21 AND THE A-S, THAT STANDS FOR ARSENIC; RIGHT?

22 A THAT'S CORRECT.

23 Q AND DO YOU SEE THAT THERE'S MATERNAL PRENATAL,
24 MATERNAL POST-NATAL, AND THEN THERE'S INFANT AND THAT'S
25 ACTUALLY THE POST-NATAL MEASUREMENT OF THE CHILD ITSELF;
26 CORRECT?

27 A CORRECT.

28 Q OKAY.

1 AND YOU CAN SEE THE RED DOTS THAT GO DOWN AT
2 THAT -- BASED ON THE SRS -- AGAIN, IT'S NOT AN ASD
3 DIAGNOSIS SO IT HAS THE SURVEY RESPONSE, IT HAS SOME
4 OTHER METRICS.

5 NOT ONE OF THOSE SHOWS THE STATISTICALLY
6 SIGNIFICANT ASSOCIATION BASED ON THE POST-NATAL
7 MEASUREMENT; CORRECT?

8 A NO, THAT'S NOT CORRECT.

9 IF YOU LOOK IN THE SECOND TO BOTTOM ROW AMONG
10 MALE, AND I -- YOU KNOW, I AM NOT VERY FAMILIAR -- I
11 HAVEN'T LOOKED AT THIS CHART IN A LONG TIME, BUT JUST
12 EYEBALLING IT, IT LOOKS LIKE THAT AMONG MALES, THE
13 INFANT TOENAIL EXPOSURES ARE POSITIVELY ASSOCIATED WITH
14 INTERNALIZING PROBLEM.

15 Q OKAY.

16 SO WE HAVE AN INTERNALIZING PROBLEM.

17 LET'S LOOK SPECIFICALLY AT THAT ONE.

18 YOU SEE OVER IN THE RIGHT HAND SIDE OF THE
19 DOCUMENT THERE'S A KEY THAT TELLS US WHAT THE DOT, THE
20 TRIANGLE AND THE SQUARE MEAN.

21 DO YOU SEE THAT?

22 A I DO.

23 Q OKAY.

24 AND YES, IT DOES LOOK LIKE THE MALES HAVE A
25 SLIGHTLY HIGHER MARK THERE FOR THAT ONE METRIC.

26 BUT IF YOU LOOK AT THE ALL, WHEN THEY LOOK AT
27 ALL THE DATA TOGETHER, THAT LOOKS LIKE IT'S BASICALLY
28 RIGHT ON 0.0, MEANING NO ASSOCIATION; CORRECT?

1 A THAT'S CORRECT. AND WHEN WE SEE DIFFERENCES IN
2 MALES AND FEMALES, IT BECOMES INAPPROPRIATE TO LOOK AT
3 EVERYONE. SO THIS IS OFTEN SOMETHING THAT WE SEE IN THE
4 AUTISM LITERATURE IS WE'LL SEE DIFFERENT ASSOCIATES IN
5 MALES AND FEMALES, AND WHEN WE DO SEE THAT, THEN IT
6 BECOMES INAPPROPRIATE TO LOOK AT THE ALL.

7 Q OKAY.

8 WELL, LET'S LOOK AT ALL THE OTHER METRICS.

9 DO YOU SEE JUST UP AND DOWN, YOU GOT AT SRS
10 TWO, THE BASIC TWO, BEHAVIORAL SYMPTOMS, YOU GOT THE
11 BASICS TWO EXTERNALIZING PROBLEMS.

12 I HAVE TO TURN MY HEAD A LITTLE BIT TO READ
13 THAT.

14 INTERNALIZING PROBLEMS. BASIC TWO ADAPTIVE
15 SKILLS.

16 YOUR EYE WENT -- YOU KNOW, WE CAN DRAW OUR OWN
17 CONCLUSIONS ABOUT WHY YOUR EYE WENT TO THE ONE PLACE.

18 BUT IF YOU LOOK UP AND DOWN, YOU SEE HOW OF --
19 IT'S GOING TO BE THREE TIMES FIVE, 15. THERE ARE 15
20 EITHER CIRCLES, TRIANGLES OR SQUARES, 14 OF THEM ARE
21 VERY CLEARLY NOT STATISTICALLY SIGNIFICANT ASSOCIATION.

22 DO YOU SEE THAT?

23 A YEAH, SO, I MEAN, MY -- WHAT'S EASY TO SEE IN
24 THESE VERY, VERY SCRUNCED GRAPHS LIKE THAT IS WHERE IT
25 IS OBVIOUSLY STATISTICALLY SIGNIFICANT, SO THAT'S WHERE
26 MY EYE JUMPED IS WHERE -- IS THE REALLY STRONG
27 ASSOCIATION, THAT'S SORT OF NATURALLY WHERE ONE'S EYES
28 GO.

1 Q GOT IT.

2 A AND IF YOU LOOK UP AND DOWN, YOU SORT OF SEE
3 THAT MALES WERE CONSISTENTLY ABOVE ZERO, AND -- BUT IT
4 LOOKS LIKE IN TERMS OF REACHING STATISTICAL SIGNIFICANCE
5 THAT THAT ONE -- THAT ONE FOR INTERNALIZING BEHAVIOR IS
6 THE ONE THAT REACHES STATISTICAL SIGNIFICANCE AND THE
7 OTHER ONES ARE NOT STATISTICALLY SIGNIFICANT ABOVE THAT
8 ZERO MARK.

9 Q WELL, SOME EVEN FALL BELOW THE ONE, BUT I WON'T
10 -- THIS IS FINE. THERE'S NO OTHER STATISTICALLY
11 SIGNIFICANT ASSOCIATIONS HERE.

12 LET ME ASK YOU, DR. GARDENER, DID YOU PUT THIS
13 STUDY IN THE POSITIVE, STATISTICALLY SIGNIFICANT
14 POSITIVE ASSOCIATIONS, BASED ON THAT ONE BOY MARKER FOR
15 THE ONE METRIC OUT OF THE FIVE? IS THAT ARE WHY YOU ALL
16 CATEGORIZED THIS STUDY A POSITIVELY STATISTICALLY
17 SIGNIFICANT ASSOCIATION ON YOUR CHART?

18 A SO AS YOU MENTIONED BEFORE, AND ACTUALLY I DID
19 NOTICE IT WASN'T IN MY REPORT, SO I WOULD HAVE TO READ
20 THE FULL STUDY --

21 Q OKAY.

22 A -- IN TERMS OF WHEN I CHECKED -- MR. WISNER
23 MADE THAT GRAPHIC AND I CHECKED IT, SO I WILL TAKE
24 RESPONSIBILITY FOR CHECKING IT. BUT IN TERMS OF THERE
25 ARE MANY ANALYZES DONE IN THIS STUDY, AND AS YOU CAN SEE
26 IN OTHER AREAS, THERE'S MATERNAL PRENATAL AND MATERNAL
27 POST-NATAL, AND SO THIS WASN'T THE ONLY STATISTICALLY
28 SIGNIFICANT ASSOCIATION, AND SO THERE WERE OTHER REASONS

1 TO PUT IT IN THE POSITIVE ASSOCIATION AS WELL.

2 Q I'M LOOKING AT THE POST-NATAL INFORMATION HERE,
3 AND LET'S GO JUST TO CINCH THIS UP, LET'S GO TO YOUR
4 REPORT AT PAGE 35.

5 YOUR REPORT AT PAGE 35 MAKES IT CLEAR THAT YOUR
6 CONCLUSIONS REGARDING ARSENIC ARE SPECIFICALLY DIRECTED
7 AT THE POST-NATAL PERIOD.

8 IAN, CAN YOU GO TO PAGE 35 OF DR. GARDENER'S
9 REPORT AND LET'S PULL UP THE PARAGRAPH WHERE YOU
10 SUMMARIZE YOUR ARSENIC CONCLUSIONS.

11 THIS IS YOUR FINAL CONCLUSION PARAGRAPH OF YOUR
12 ARSENIC SECTION OF YOUR REPORT.

13 AND YOU SAY:

14 "A REVIEW OF THE LITERATURE FOLLOWED BY
15 CONSIDERATION OF THE HILL CRITERIA DEMONSTRATES
16 TO A REASONABLE DEGREE OF SCIENCE -- OF DEGREE
17 OF SCIENTIFIC CERTAINTY THAT EARLY LIFE
18 POST-NATAL ARSENIC EXPOSURE CAN CAUSE THE
19 DEVELOPMENT OF ASD."

20 BUT, DR. GARDENER, YOU HAVEN'T IDENTIFIED A
21 SINGLE STUDY THAT MEASURED ARSENIC EXPOSURE PRIOR TO
22 DIAGNOSIS THAT'S POST-NATAL; ISN'T THAT TRUE?

23 A THAT'S -- THAT'S -- I DID NOT SAY THAT I DID,
24 NOR WOULD IT BE NECESSARY.

25 SO WHEN YOU SEE --

26 Q OKAY.

27 A -- WHEN YOU SEE THAT ARSENIC IS ASSOCIATED
28 CONSISTENTLY IN THE LITERATURE WHEN IT'S MEASURED AT THE

1 TIME OF DIAGNOSIS OR AFTER DIAGNOSIS, WHAT YOU HAVE TO
2 SORT OF THINK ABOUT IS CAN REVERSE CAUSALITY EXPLAIN
3 THAT? LIKE IS THERE SOMETHING ABOUT CHILDREN WITH
4 AUTISM THAT'S MAKING THEM BE MORE EXPOSED TO ARSENIC?
5 AND I COULDN'T THINK OF ANY REASON.

6 IT'S NOT PLAUSIBLE TO THINK THAT THE
7 CHARACTERISTICS OF AUTISM ARE SUCH THAT IT WOULD
8 INCREASE YOUR ASSOCIATION -- SORRY -- YOUR EXPOSURE TO
9 ARSENIC TO THE DEGREE THAT WE SEE IN THIS LITERATURE
10 BETWEEN THAT AND THE FACT THAT PRENATAL ARSENIC EXPOSURE
11 HAS BEEN EXAMINED TO SOME EXTENT.

12 BUT REALLY WHEN YOU'RE THINKING ABOUT THIS
13 EXPOSURE, YOU REALLY WANT TO THINK HOW PLAUSIBLE IS
14 REVERSE CAUSALITY HERE? AND I COULDN'T THINK OF ANY
15 REASON WHY REVERSE CAUSALITY COULD EXPLAIN THIS
16 CONSISTENT ASSOCIATION IN THE POST-NATAL LITERATURE
17 WHICH IS THAT'S HOW I CAME TO THAT CONCLUSION.

18 Q WELL, DR. GARDENER, WHEN YOU LOOK AT THE LIST
19 OF STUDIES THAT MEASURED ARSENIC EXPOSURE PRIOR TO A
20 DIAGNOSIS, THE CONSISTENCY IS ON THE NOSE.

21 LOOK AT THIS CHART. LONG/NO. ALAMPI/NO.
22 DOHERTY, THE ONLY ONE THAT'S ACTUALLY POST-NATAL, THAT'S
23 NO, WE JUST LOOKED AT THAT.

24 NOW, YOU MENTIONED SKOGHEIM AND I DON'T --

25 MR. WISNER: OBJECTION, YOUR HONOR, COUNSEL IS
26 TESTIFYING ABOUT RESULTS HE HASN'T SHOWN THE COURT.
27 LACKS FOUNDATION. AND IT'S JUST ACTUALLY WRONG.

28 THE COURT: SUSTAINED. WE NEED A QUESTION.

1 MR. BOEHM: YEAH, OKAY. WELL, I JUST WANTED TO
2 GO BACK -- I MEAN, I THINK THE WITNESS HAS ALREADY
3 INDICATED SHE CAN'T THINK OF ANY OTHER STUDIES THAT FIT.

4 Q LET ME GO TO SKOGHEIM BECAUSE YOU DID MENTION
5 THAT ONE AS WELL.

6 I KNOW THAT MR. WISNER DIDN'T ASK YOU ABOUT IT.
7 HE MENTIONED IT, BUT HE DIDN'T GET INTO THE DETAILS. I
8 WANT TO JUST VERY QUICKLY ESTABLISH SOMETHING IMPORTANT
9 GIVEN THE NATURE OF YOUR REPORT AND THAT YOUR OPINIONS
10 FOR ARSENIC ARE DIRECTED SPECIFICALLY AT POST-NATAL
11 EXPOSURE.

12 DO YOU AGREE?

13 A CAN I -- CAN I SAY ONE THING? JUST THAT I --

14 Q I'M SORRY, LET ME JUST FINISH MY QUESTION.

15 A OKAY.

16 Q SKOGHEIM IS A STUDY THAT DOES NOT ASSESS
17 POST-NATAL ARSENIC EXPOSURE; CORRECT?

18 A I DON'T KNOW OFF THE TOP OF MY HEAD IF THEY --

19 Q OKAY. WELL, LET'S GO AND LOOK AT THAT.

20 LET'S GO TO THE SKOGHEIM STUDY. IT'S
21 EXHIBIT 629.

22 A AM I -- IS IT OKAY IF I CLARIFY SOMETHING ABOUT
23 THE PREVIOUS SLIDE?

24 THE COURT: WELL, THE PROTOCOL IS THAT YOUR
25 LAWYER CAN BRING THAT OUT ON REDIRECT AND YOU'LL HAVE
26 TIME TOO CLARIFY.

27 THE WITNESS: OKAY. THANK YOU.

28 THE COURT: YOU'RE WELCOME.

1 MR. BOEHM: YOUR HONOR, I DON'T MIND LETTING
2 THE WITNESS SAY SOMETHING ABOUT THAT. I KNOW THAT THIS
3 IS RELATIVELY INFORMAL AND IT'S MOSTLY FOR YOU, SO IF
4 YOU'D LIKE THE WITNESS TO SAY SOMETHING ABOUT IT, I
5 DON'T MIND GOING BACK.

6 THE COURT: SURE.

7 WHAT WOULD YOU LIKE TO SAY, DOCTOR?

8 THE WITNESS: I JUST WANTED --

9 MR. BOEHM: LET'S PUT THE -- CAN WE JUST PUT
10 THE SLIDE BACK UP? IT'S -- THERE WE GO. THANK YOU.

11 THE WITNESS: YEAH, I JUST WANTED TO SAY THAT
12 MY LACK OF DISPUTE OF LONG AND ALAMPI SHOULD NOT BE
13 CONFUSED AS A CONFIRMATION. I DON'T RECALL THOSE TWO
14 OFF THE TOP OF MY HEAD, SO WHETHER I WOULD AGREE WITH
15 THOSE TWO LINES, IT -- I CAN'T SAY.

16 MR. BOEHM:

17 Q OKAY. THOSE ARE ACTUALLY REFERRED TO IN YOUR
18 REPORT AS WELL. THE LONG STUDY IS IN YOUR REPORT. AND
19 YOU SAY IN YOUR REPORT THAT THERE'S NO ASSOCIATION.

20 DO YOU RECALL THAT?

21 A I DON'T. DO YOU WANT TO PULL IT UP AND I CAN
22 TAKE A LOOK?

23 Q YEAH. BUT WE'LL COME BACK TO THAT IN A MINUTE.
24 YOU SAY THAT THIS -- YOU SAY THE SAME THING
25 ABOUT ALAMPI, JUST FOR THE RECORD.

26 AND, BUT MORE IMPORTANTLY, THE STUDIES
27 THEMSELVES, EXHIBIT 92, EXHIBIT 22, IF MR. WISNER WANTS
28 TO PULL THOSE UP AND SHOW YOU THE CONCLUSIONS OF THOSE

1 AUTHORS, THEN I'M SURE IF HE COULD SHOW THAT THE ANSWER
2 IS NOT NO, THEN WE CAN GO BACK TO THAT AND THEN WE CAN
3 LOOK AT YOUR REPORT.

4 MR. WISNER: I'M PRETTY CONFUSED, YOUR HONOR.
5 HE SAID HE WAS GOING TO SHOW HER REPORT AND THEN NOT. I
6 -- HE'S JUST RAMBLING. I DON'T KNOW WHAT WE'RE DOING
7 HERE, YOUR HONOR.

8 MR. BOEHM: OKAY. LET'S -- YOUR HONOR, GO
9 AHEAD.

10 THE COURT: LET'S HAVE A QUESTION. THANK YOU.

11 MR. BOEHM: YES.

12 Q I WANTED TO GO TO SKOGHEIM, WHICH IS ANOTHER
13 STUDY THAT YOU MENTIONED. IT'S EXHIBIT 629. I ASKED
14 YOU WHETHER OR NOT THIS WAS JUST A PRENATAL, NOT A
15 POST-NATAL STUDY AND YOU SAID YOU WEREN'T SURE SO I JUST
16 WANTED TO CONFIRM THAT WITH YOU.

17 IF WE GO TO PAGE 3, SECTION 2.3 TALKS ABOUT
18 EXPOSURES.

19 AND IF YOU KIND OF CUT, IAN, THAT FIRST
20 SENTENCE UNDER 2.3 CARRYING OVER TO THE NEXT PAGE.

21 WE CAN SEE, "IN THIS STUDY WE USE MATERNAL
22 BLOOD SAMPLES FROM APPROXIMATELY WEEK 17 OF
23 GESTATION."

24 DO YOU SEE THAT?

25 A I DO.

26 Q WOULD THAT BE A POST-NATAL PERIOD OR A PRENATAL
27 PERIOD?

28 A THAT'S A PRENATAL PERIOD.

1 Q OKAY.

2 OKAY. SINCE WE'RE HERE AND YOU SAID WE -- EVEN

3 THOUGH YOU'RE FOCUSED ON THE POST-NATAL, YOU SAID I

4 STILL LOOKED AT THE PRENATAL BECAUSE I THINK YOU SAID

5 THERE WAS SOME U SHAPED.

6 LET'S LOOK AT WHAT THE RESULTS SHOW.

7 IF WE CAN GO TO TABLE S-3.

8 THIS IS THE TABLE THAT KIND OF OUTLINES ALL THE

9 RESULTS WITH RESPECT TO EACH THE METALS, YOUR HONOR,

10 THAT ARE -- THAT WERE MEASURED.

11 AND A-S, DR. GARDENER, THAT STANDS FOR ARSENIC;

12 CORRECT?

13 A THAT IS CORRECT.

14 Q AND THEN WE HAVE FOUR QUARTERS, QUARTER ONE IS

15 THE REFERENCE, SO THAT'S SET AT -- THAT SETS THE O-R AT

16 1.0.

17 DO YOU SEE THAT?

18 A THAT IS CORRECT.

19 Q AND THEN WE HAVE Q2, AND THAT HAS

20 CONCENTRATIONS OF ARSENIC EXPOSURE FROM 1.01 TO 1.59,

21 AND THEN YOU GO INCREASINGLY HIGHER IN EXPOSURE. Q3 IS

22 1.59 TO 2.76. Q4 IS 2.77 ALL THE WAY UP TO 54.

23 DO YOU SEE THAT?

24 A I DO.

25 Q OKAY. SO THEN --

26 A SO 54 WOULD BE THE MAXIMUM OF QUARTILE 4.

27 Q RIGHT.

28 THAT'S THE HIGH END OF QUARTILE 4.

1 SO LET'S LOOK AT THESE RESULTS AGAIN. THIS IS
2 PRENATAL, NOT POST-NATAL.

3 Q3 -- Q2, EXCUSE ME, HAS AN ODDS RATIO OF 1.77
4 WITH A CONFIDENCE INTERVAL OF 1.26 TO 2.59. Q3, THAT'S
5 WHERE THE CONCENTRATION OF ARSENIC EXPOSURE IS GOING UP,
6 RIGHT? IT'S GOING UP, RIGHT, DR. GARDENER?

7 A Q3 IS HIGHER THAN Q2, CORRECT.

8 Q AND THE ODDS RATIO THERE IS 1.14 WITH A
9 CONFIDENCE INTERVAL OF .8 TO 1.64.

10 SO THAT'S ACTUALLY GOING DOWN; RIGHT?

11 A RIGHT. SO WHAT THIS SHOWS IS AN UPSIDE DOWN U
12 ASSOCIATION WHICH IS WHAT I HAD RECALLED AND WHAT THE
13 AUTHORS OF THIS STUDY DESCRIBE AS THE NATURE OF THIS
14 ASSOCIATION WHEN THEY TALK ABOUT PRENATAL ARSENIC
15 EXPOSURE BEING ASSOCIATED WITH AUTISM IN THIS STUDY,
16 THEY ARE TALKING ABOUT THIS UPSIDE DOWN U ASSOCIATION.
17 THAT'S HOW YOU --

18 MR. BOEHM: YOUR HONOR, I'M JUST GOING TO WAIT
19 FOR HER HONOR TO BE READY TO GO.

20 THE COURT: YOU CAN CONTINUE.

21 MR. BOEHM: OH, ARE YOU READY? OKAY.

22 THE COURT: YES, I'M JUST OFF SCREEN. THANK
23 YOU.

24 MR. BOEHM: OKAY. GREAT.

25 Q IN Q4 WE SEE THE CONCENTRATION FROM 2.77 TO 54,
26 AND THE ODDS RATIO THERE, THAT'S AT 0.95.

27 SO, YOUR HONOR, THAT -- THAT'S AN ODDS RATIO
28 THAT'S BELOW ONE.

1 SO THAT POINT ESTIMATE IS ACTUALLY IN THE
2 NEGATIVE DIRECTION; CORRECT?

3 A ARE YOU ASKING ME, OR.

4 Q YES.

5 A YOU SAID YOUR HONOR, SO I DIDN'T KNOW WHO YOU
6 WERE ASKING.

7 Q I WAS JUST KEEPING EVERYBODY -- SINCE SHE WAS
8 COMING BACK TO HER SEAT, I WAS DIRECTING HER BACK TO
9 WHERE WE WERE.

10 A OH, OKAY.

11 YEAH. SO LIKE I SAID, IT'S AN UPSIDE DOWN U
12 ASSOCIATION, SO WHERE IT INCREASES AND THEN IT GOES BACK
13 DOWN.

14 Q SO MY QUESTION IS --

15 THE COURT: HOW DOES THAT -- LET ME ASK DR.
16 GARDENER, IF IT'S A U SHAPED CURVE, HOW DOES THAT
17 SUPPORT YOUR HYPOTHESIS?

18 THE WITNESS: SO WHAT IT SUGGESTS IS THAT THERE
19 IS AN ASSOCIATION BETWEEN PRENATAL ARSENIC EXPOSURE AND
20 AUTISM, BUT THAT IT'S -- THERE'S NOT REALLY A -- IT'S
21 NOT LINEAR, SO IT'S NOT LIKE THERE'S A MONOTONIC TREND.
22 AND THE QUARTILES ARE ALL -- THESE QUARTILES ARE ALSO
23 SORT OF NOT REALLY LINEAR IN RELATION TO -- IN RELATION
24 TO MERCURY. THEY ARE -- AS YOU CAN SEE SORT OF QUARTILE
25 4 IS REALLY BROAD AND WONKY WHICH SORT OF SUGGESTS THAT
26 THERE'S SOMETHING -- THERE'S OTHER THINGS GOING ON IN
27 QUARTILE 4. IF YOU LOOK AT THE LOWER QUARTILES, THERE'S
28 A MUCH LOWER RANGE AND THEN THERE IS SOMETHING HAPPENING

1 IN QUARTER FILE 4 HAS WHAT WE CALL OUTLIERS.

2 MR. BOEHM:

3 Q YEAH, WE'RE GOING TO TALK ABOUT OUTLIERS IN A
4 MINUTE, BUT LET ME JUST KIND OF GO BACK TO THIS 0.95
5 ODDS RATIO.

6 WHEN THAT ODDS RATIO IS BELOW 1.1, THAT MEANS
7 THE POINT ESTIMATE IS IN A NEGATIVE DIRECTION, RIGHT,
8 NOT A POSITIVE DIRECTION, IT'S A NEGATIVE?

9 A THAT IS --

10 Q YEAH.

11 A -- THAT IS CORRECT. SO THE NULL FOR AN ODDS
12 RATIO IS ONE.

13 Q RIGHT.

14 A SO, YEAH.

15 Q SO, AND THAT IS ASSOCIATED WITH THE HIGHEST
16 LEVEL OF EXPOSURE TO ARSENIC; RIGHT?

17 A THAT IS CORRECT. IN THIS --

18 Q OKAY.

19 A -- IN THIS QUARTER -- IN THIS VERY WIDE
20 QUARTILE THAT CLEARLY INCLUDES SOME OUTLIERS. EXTREME.

21 Q ONE OF THE -- ONE OF THE -- OH, I'M SORRY, WERE
22 YOU DONE?

23 A I WAS JUST SAYING THOSE ARE -- THEY ARE -- IT'S
24 A QUARTILE THAT INCLUDES SOME EXTREME OUTLIERS.

25 Q ONE OF THE BRADFORD HILL CRITERIA THAT MR.
26 WISNER WAS GOING THROUGH WITH YOU IS THE DOSE RESPONSE
27 CRITERION, RIGHT, SOMETIMES WE CALL IT CALLED BIOLOGICAL
28 GRADIENT, THAT'S THE SAME THING?

1 A CORRECT.

2 Q AND A DOSE RESPONSE CRITERIA IN A BRADFORD HILL
3 BASICALLY SAYS YOU WOULD EXPECT THAT IF THERE IS A TOXIC
4 RELATIONSHIP BETWEEN AN EXPOSURE AND AN OUTCOME, THAT
5 THE HIGHER THE LEVEL OF EXPOSURE, THE GREATER THE
6 OUTCOME, THAT THAT WOULD -- THERE WOULD BE A DOSE
7 RESPONSE RELATIONSHIP; CORRECT?

8 A YEAH. SO WHEN YOU SEE A DOSE RESPONSE
9 RELATIONSHIP, IT IS UNDERSTOOD TO BE SUPPORTIVE OF
10 CAUSALITY. IT IS NOT ONE OF THE CRITERIA THAT IS
11 NECESSARY. WHAT WE OFTEN SEE IN ENVIRONMENTAL HEALTH,
12 ESPECIALLY WITH NEUROTOXINS AND DEVELOPMENTAL TOXINS IS
13 THAT THERE ISN'T A DOSE RESPONSE ASSOCIATION.

14 BUT WHEN WE DO SEE A DOSE RESPONSE ASSOCIATION,
15 IT DOES SORT OF INCREASE OUR CONFIDENCE, YOU KNOW,
16 NATURALLY SO.

17 Q AND HERE WE HAVE -- HERE, DR. GARDENER, WE HAVE
18 THE OPPOSITE OF A DOSE RESPONSE RELATIONSHIP. THE
19 GREATER THE EXPOSURE TO ARSENIC, THE LOWER THE ODDS
20 RATIO GETS IN THE SKOGHEIM STUDY; CORRECT?

21 A INCORRECT. THIS IS NOT THE OPPOSITE OF A DOSE
22 RESPONSE RELATIONSHIP. WHAT THIS IS --

23 Q OKAY.

24 A -- IS AN UPSIDE DOWN U ASSOCIATION. WE OFTEN
25 IN EPIDEMIOLOGY WILL SEE UPSIDE DOWN U ASSOCIATIONS.

26 Q UM-HMM.

27 A WE'LL SEE REGULAR U ASSOCIATIONS OR J --

28 Q OKAY.

1 A -- J SHAPED ASSOCIATIONS, THAT IS TOTALLY
2 DIFFERENT FROM THE OPPOSITE OF A DOSE RESPONSE
3 ASSOCIATION.

4 Q OKAY.

5 WE'RE GOING TO TALK ABOUT MERCURY IN JUST A
6 MINUTE, BUT SINCE WE'RE IN THE SKOGHEIM STUDY, I THOUGHT
7 IT WAS WORTH, JUST FOR EFFICIENCY'S SAKE, LET'S JUST
8 TAKE A QUICK LOOK AT WHAT SKOGHEIM SHOWS US WHEN IT
9 COMES TO MERCURY TO SAVE US SOME TIME.

10 LET'S GO TO PAGE 5 OF SKOGHEIM UNDER 3.2.1, END
11 OF THE FIRST PARAGRAPH WE SEE, "FOR MERCURY" -- THIS IS
12 THE MERCURY RESULTS. WE SAW -- WE JUST SAW THE ARSENIC,
13 AND AGAIN, THIS IS PRENATAL, NOT POST-NATAL. BUT FOR
14 WHATEVER IT'S WORTH.

15 "FOR MERCURY, ALL THREE QUARTILES HAD
16 SIGNIFICANTLY LOWERED RISK OF ASD COMPARED TO
17 THE QUARTILE 1," WHICH IS THE JUST THE
18 BASELINE; RIGHT?

19 A I'M SORRY, I'M JUST STARTING FROM THE
20 BEGINNING.

21 "FOR ASD, A QUARTILE MODEL SHOWED AN ELEVATED
22 RISK FOR CHILDREN IN QUARTILE 2 OF ARSENIC AND
23 WAS" --

24 Q I'M DIRECTING YOU TO THE MERCURY RESULTS.

25 A UM.

26 Q THAT'S THE ONLY SENTENCE THAT TALKS ABOUT THAT.

27 A YEAH.

28 OKAY. YES, I AGREE THAT --

1 Q SO FOR MERCURY --

2 A YEP.

3 Q AND THOSE ARE STATISTICALLY SIGNIFICANT IN THE

4 NEGATIVE DIRECTION; CORRECT?

5 A I WOULD HAVE TO LOOK BACK AT THE TABLE TO --

6 BUT THAT IS ABSOLUTELY WHAT THE AUTHORS SAY SO I WOULD

7 ASSUME THAT THAT'S TRUE.

8 Q LET'S LOOK AT IT, JUST TO BE SURE, LET'S GO TO

9 TABLE S3 AND LOOK AT THE MERCURY RESULTS.

10 HG, THAT'S AN ABBREVIATION FOR MERCURY,

11 DR. GARDENER?

12 A YES.

13 Q OKAY.

14 AND THEN WE HAVE THE SIMILAR --

15 A AND ALSO AN ABBREVIATION FOR MY NAME.

16 Q OKAY. FAIR ENOUGH.

17 WE HAVE A SIMILAR KIND OF SETUP AS WE JUST

18 LOOKED AT FOR THE ARSENIC RESULTS FOR MERCURY. YOU'VE

19 GOT THE CONCENTRATION. THAT'S THE AMOUNT OF MERCURY

20 EXPOSURE --

21 A UM-HMM.

22 Q -- THAT WE FOUND. THEN YOU HAVE THE ODDS

23 RATIO, WHICH IS A POINT ESTIMATE OF WHETHER THERE'S AN

24 ASSOCIATION.

25 AND YOU SEE THAT THEY ARE ALL STATISTICALLY

26 SIGNIFICANT IN A NEGATIVE DIRECTION; CORRECT?

27 A YEAH, SO THE -- WHAT I -- HOW I WOULD DESCRIBE

28 THIS IS QUARTILE 1, THE PEOPLE WITH THE LOWEST -- THE

1 LOWEST MERCURY LEVELS HAD AN INCREASED RISK OF AUTISM
2 COMPARED TO QUARTILES 2, 3 AND 4, THOSE DON'T REALLY
3 LOOK DIFFERENT FROM EACH OTHER, BUT THEY ALL LOOK
4 DIFFERENT FROM QUARTILE 1.

5 Q WELL, YOU DO HAVE A SIMILARITY HERE BETWEEN THE
6 MERCURY AND THE ARSENIC IN THAT IN THE HIGHEST QUARTILE
7 OF EXPOSURE -- AND HERE IT GOES FROM 2 TO 10, NOT ALL
8 THE WAY TO 54 LIKE IT DID FOR ARSENIC, BUT FROM 2 TO 10,
9 YOU DO HAVE THE LOWEST ODDS RATIO. THAT'S ALL THE WAY
10 DOWN TO 4.3.

11 DO YOU SEE THAT?

12 A THESE ARE NOT -- I -- THESE ARE NOT DIFFERENT
13 FROM EACH OTHER, SO THESE ARE ALL THE SAME AND THEY ARE
14 ALL DIFFERENT FROM 1, WHICH IS VERY DIFFERENT WITH WHAT
15 WE SAW WITH ARSENIC.

16 WHAT WE SAW WITH ARSENIC IS THAT QUARTILE 4 WAS
17 NOT DIFFERENT FROM QUARTILE 1.

18 Q OKAY.

19 A SO, AGAIN, U SHAPED RELATIONSHIP VERSUS HERE,
20 IT'S MORE OF LIKE A -- I WOULD CALL THIS LIKE A
21 THRESHOLD RELATIONSHIP WHERE QUARTILE 1 WAS HIGHER.

22 Q LET'S LOOK AT THE WANG STUDY BECAUSE I BELIEVE
23 THAT, DR. GARDENER, YOU AND MR. WISNER DISCUSSED THE
24 WANG STUDY. AND THIS WAS THE META ANALYSIS THAT YOU
25 DISCUSSED.

26 DO YOU RECALL THAT?

27 A YES.

28 Q PUBLISHED IN 2019.

1 LET ME JUST START WITH WHAT I THINK IS AN
2 IMPORTANT POINT IN CONNECTION WITH YOUR OPINIONS.

3 NONE OF THE STUDIES, NOT ONE OF THE STUDIES
4 INCLUDED IN WANG 2019 IN THIS META ANALYSIS MEASURED
5 POST-NATAL ARSENIC EXPOSURE PRIOR TO CHILDREN BEING
6 DIAGNOSED WITH AUTISM; CORRECT?

7 A I DON'T RECALL OFF THE TOP -- I CAN'T CONFIRM
8 OR DENY THAT OFF THE TOP OF MY HEAD.

9 Q DO YOU KNOW THIS STUDY THAT YOU DISCUSSED WITH
10 MR. WISNER, IT'S EXCLUSIVELY -- IT'S EXCLUSIVELY CASE
11 CONTROL AND CROSS-SECTIONAL STUDIES, THERE ARE NO COHORT
12 STUDIES IN THE WANG META ANALYSIS.

13 DID YOU KNOW THAT?

14 A I DO RECALL THAT, YEP.

15 Q OKAY.

16 A I AM FAMILIAR WITH THE STUDY.

17 Q AND I JUST WANT TO LOOK AT SOME OF THE
18 CONCLUSIONS FROM THE WANG AUTHORS, WHAT THEY HAD TO SAY
19 THEMSELVES --

20 A SURE.

21 Q -- ABOUT WHAT THE LITERATURE SHOWS AND WHAT
22 THEIR DATA SHOWS.

23 SO LET'S LOOK AT EXHIBIT 695.

24 THEY SAY, "THE INCONSISTENT FINDINGS OF THE
25 RESULTS IN THESE STUDIES MAKE IT DIFFICULT
26 TO CONCLUDE THE RELATIONSHIP BETWEEN IAS" --
27 THAT'S ARSENIC; RIGHT?

28 A YEAH, IT STANDS FOR INORGANIC ARSENIC.

1 Q "AND ASD IN CHILDREN."
2 DID I READ THAT CORRECTLY?
3 A YOU DID.
4 Q OKAY.
5 THEN THEY SAY -- THEY TALK ABOUT THE RESULTS OF
6 IT FOR BOTH LEAD AND -- SORRY -- INORGANIC ARSENIC.
7 AND THEY TALK ABOUT THE FACT THAT THESE ARE
8 METALS THAT DO HAVE KNOWN NEURODEVELOPMENTAL IMPACTS;
9 RIGHT? DO YOU SEE THAT IN THE FIRST SENTENCE?
10 A CAN YOU SHOW ME WHICH FIRST SENTENCE ARE YOU --
11 Q YEAH. I'M JUST LOOKING AT THE FIRST SENTENCE
12 THERE.
13 THAT PB -- I'LL JUST READ IT.
14 "BOTH PB" -- THAT'S LEAD; RIGHT?
15 A YES.
16 Q "AND INORGANIC ARSENIC ARE KNOWN TO CAUSE
17 NEURODEVELOPMENTAL EFFECTS WHEN THE EXPOSURE
18 OCCURS IN EARLY LIFE."
19 DO YOU SEE THAT?
20 A I DO.
21 Q SO THEY ARE SAYING, YEAH, THEY KNOW THAT THERE
22 ARE AT LEAST SOME NEURODEVELOPMENTAL IMPACTS THAT MIGHT
23 OCCUR.
24 BUT THEY GO ON TO SAY, "DUE TO A LACK OF
25 CONSISTENCY AMONG THE VARIOUS STUDY FINDINGS,
26 THE EFFECTS OF INORGANIC ARSENIC AND LEAD
27 SPECIFICALLY ON ASD HAVE NOT BEEN ESTABLISHED."
28 DO YOU SEE THAT THAT'S WHAT THE WANG AUTHORS

1 SAID ABOUT THE DATA?

2 A CORRECT.

3 Q THEY ALSO SAY THAT, "ALL TOGETHER THE DATA FOR
4 INORGANIC ARSENIC" -- AND THEY SAY IT FOR LEAD,
5 BUT I'M FOCUSED ON ARSENIC WITH YOU BECAUSE THAT'S WHAT
6 YOU FOCUSED ON -- "IS CONSIDERED WEAK AND NOT ADEQUATE
7 FOR A CAUSAL DETERMINATION."

8 DO YOU SEE THAT?

9 A YEAH. SO THIS SORT OF RELATES TO THE
10 CONVERSATION THAT MR. WISNER AND I WERE HAVING AT THE
11 END OF THE PREVIOUS SECTION, SO THAT IS -- THAT'S
12 TYPICAL IS THAT, YOU KNOW, ANY OBSERVATIONAL STUDY,
13 WHETHER IT'S A META ANALYSIS OR AN INDIVIDUAL
14 OBSERVATIONAL STUDY, FOR THE AUTHORS TO SAY THAT IT'S
15 NOT ADEQUATE FOR A CAUSAL DETERMINATION BECAUSE YOU CAN
16 NEVER DETERMINE CAUSALITY JUST BASED ON EPIDEMIOLOGY.

17 THIS STUDY WAS AN EPIDEMIOLOGICAL STUDY, SO IN
18 ORDER TO DETERMINE CAUSALITY, YOU NEED TO DO A WHOLE
19 OTHER PROCESS MORE SIMILAR TO THE ONE THAT I DID IN
20 PREPARATION FOR TODAY, WHICH WAS TO LOOK AT ALL THE
21 STUDIES IN RELATION TO THEIR STRENGTHS AND WEAKNESSES
22 AND LOOK AT THE ANIMAL LITERATURE, LOOK AT THE BASIC
23 SCIENCE.

24 SO IT WOULD BE EXPECTED AND APPROPRIATE, AND I
25 HAVE DONE THE SAME, YOU KNOW, IN ANY ONE OF MY
26 OBSERVATIONAL STUDIES TO CONCLUDE AT THE END THAT IT IS
27 NOT ADEQUATE FOR A CAUSAL DETERMINATION.

28 Q YOU WOULD HAVE SAID THAT YOURSELF?

1 A IN ANY OBSERVATIONAL STUDY THAT YOU WRITE --

2 Q YEAH.

3 A -- BECAUSE IT'S A DIFFERENT PROCESS FROM AN
4 EXERCISE LIKE HERE WHERE WE'RE NOT JUST DOING AN
5 EVALUATION OF THE EPI WHERE WE'RE REALLY LOOKING AT THE
6 TOTALITY OF THE EVIDENCE, THERE IS NO -- YOU CAN'T JUST
7 DETERMINE CAUSALITY JUST FROM THE EPI LITERATURE.

8 Q AND THEY SAID NOT JUST THAT IT COULDN'T -- THAT
9 IT WASN'T ADEQUATE FOR A CAUSAL DETERMINATION, THEY SAID
10 IT WAS WEAK.

11 DO YOU SEE THAT WORD?

12 A UM.

13 Q IT'S RIGHT THERE. WE HIGHLIGHTED IT IN YELLOW
14 IN THE LAST PART. WEAK.

15 DO YOU SEE THAT?

16 A YEAH, BUT IT IS RELEVANCE -- I MEAN, THE
17 RELEVANCE OF THE A-S AND... FOR THE PATHOGENIC...

18 (READING)

19 YEAH, SO, I MEAN, THEY ARE -- THEY ARE -- I
20 MEAN, WHAT THEY ARE SAYING IS THAT HOW RELEVANT THIS IS
21 IN TERMS OF THE PATHOGENESIS HAS NOT CONSIDERED TO BE
22 CAUSAL AND IT MAY BE WEAK, ALTHOUGH, YOU KNOW, THE
23 LITERATURE -- THE LITERATURE DOES SUGGEST THAT IT'S
24 ACTUALLY PRETTY STRONG AND THIS STUDY ACTUALLY LEFT OUT
25 A LOT OF STUDIES THAT WERE MUCH STRONGER.

26 I MEAN, YEAH.

27 Q THIS WAS THE ONLY ARSENIC META ANALYSIS THAT
28 YOU AND MR. WISNER DISCUSSED DURING YOUR DIRECT

1 EXAMINATION.

2 AM I WRONG?

3 A I DON'T RECALL WHETHER IT WAS THE ONLY ONE --
4 THE ONLY META ANALYSIS POSSIBLY, YEAH.

5 Q OKAY.

6 A BUT THE INDIVIDUAL STUDIES HAVE SHOWN -- IF YOU
7 LOOK AT THE INDIVIDUAL STUDIES, THIS META ANALYSIS --

8 Q CAN YOU PULL UP 692.

9 A -- DOESN'T INCLUDE ALL OF THE INDIVIDUAL
10 STUDIES AND THEY WERE OFTEN QUITE STRONG. AND FOR MANY
11 OF THEIR INDIVIDUAL ONES, THE STUDIES THAT WERE NOT
12 INCLUDED IN THE META ANALYSIS PORTION WERE ACTUALLY THE
13 STRONGER ASSOCIATIONS.

14 Q OKAY. THANK YOU, DR. GARDENER.

15 FOR THE SAKE OF TIME, LET'S MOVE TO MERCURY.

16 YOU DID GET SOME QUESTIONS TODAY ABOUT MERCURY.
17 I WANT TO SPEND SOME TIME ON THAT AS WELL.

18 A SURE.

19 Q MR. WISNER SHOWED YOU A SLIDE AND HE SHOWED THE
20 SAME SLIDE TO THE COURT IN HIS OPENING ON MONDAY AND I
21 JUST WANT TO PUT THAT BACK UP.

22 WE'VE MARKED IT AS EXHIBIT 697 JUST FOR THE
23 RECORD.

24 AND YOU SAID YOU DIDN'T CREATE THIS, MR. WISNER
25 DID, BUT YOU DID CHECK IT FOR ACCURACY; IS THAT RIGHT?

26 A THAT'S CORRECT.

27 Q OKAY. ALL RIGHT.

28 NOW, I WANT TO JUST DIRECT YOUR ATTENTION

1 SPECIFICALLY TO IN THE UPPER RIGHT HAND CORNER DO YOU
2 SEE A KEY THAT KIND OF IS TRYING TO SHOW US WHICH
3 STUDIES FIT INTO WHICH CATEGORIES? DO YOU SEE THAT IN
4 THE UPPER RIGHT?

5 A I DO.

6 Q AND THEN YOU HAVE THE LETTER H. THAT STANDS
7 FOR COHORT.

8 DO YOU SEE THAT?

9 A I DO.

10 Q OKAY.

11 AND AS OPPOSED TO THE CROSS-SECTIONAL AND CASE
12 CONTROL STUDIES THAT YOU TALKED ABOUT AT PAGES 14 AND 15
13 OF YOUR REPORT THAT WE WENT OVER, THIS IS -- H STANDS
14 FOR COHORT.

15 SO LET'S JUST LOOK AT THE COHORT STUDIES. I
16 THINK WE'VE KIND OF --

17 A SO ONE OF THEM IS NOT INDICATED, BUT EVERYTHING
18 ELSE IS -- THERE IS LIKE ONE X AND IT'S PRETTY CASE
19 CONTROL STUDIES, WHICH AS I EXPLAINED EARLIER IS THE --

20 Q UH-HUH.

21 A -- SORT OF THE HEART OF THIS LITERATURE.

22 Q SO WHAT WE'RE SHOWING YOU HERE ARE THE -- JUST
23 THE CASE -- JUST THE COHORT STUDIES SO THESE ARE
24 ADDRESSED -- THE ONES THAT ARE CAPABLE OF ADDRESSING
25 THIS PRIMARY WEAKNESS THAT YOU DESCRIBED IN YOUR REPORT
26 AND WE'RE LEFT WITH RYU --

27 A NO.

28 Q -- 2017 AND ABDULLAH.

1 DID WE -- SO LET'S TALK ABOUT RYU BECAUSE I
2 THINK THAT YOU AND MR. WISNER SPENT A LITTLE BIT OF TIME
3 ON THAT.

4 BUT BEFORE WE DO THAT, I WANT TO SHOW YOU SOME
5 ADDITIONAL STUDIES THAT WE FOUND THAT ARE NOT ON THIS
6 CHART AND ASK YOU, DR. GARDENER, WHETHER OR NOT YOU
7 THINK THAT THEY BELONG, OKAY.

8 SO LET'S PUT UP SOME ADDITIONAL STUDIES.

9 A CAN I MAKE A COMMENT? AM I ALLOWED TO MAKE A
10 COMMENT?

11 THE COURT: YES, PLEASE.

12 THE WITNESS: BECAUSE YOU -- YOU STATED
13 SOMETHING THAT I REALLY DISAGREE WITH.

14 YOU HIGHLIGHTED RYU AND ABDULLAH AND YOU SAID
15 THOSE ARE THE ONLY TWO STUDIES THAT COULD -- THAT COULD
16 OVERCOME THE -- WHAT I TALKED ABOUT IN MY REPORT, THE
17 WEAKNESS. BUT CASE CONTROL STUDIES CAN ALSO ADDRESS --
18 CAN ALSO BE PROSPECTIVE, SO IT'S NOT REALLY FAIR TO SAY
19 THAT ONLY COHORT STUDIES. AND COHORT STUDIES CAN ALSO
20 BE RETROSPECTIVE.

21 MR. BOEHM:

22 Q ARE THERE ANY -- DR. GARDENER, TO THAT POINT,
23 WOULD YOU HIGHLIGHT ANY ADDITIONAL PROSPECTIVE CASE
24 CONTROL STUDIES ON THIS CHART?

25 A NOT OFF --

26 Q CAN YOU IDENTIFY ANY OF THOSE?

27 A NOT OFF THE TOP OF MY HEAD.

28 Q OKAY.

1 A BUT THERE COULD BE. YOU KNOW, IT'S A LOT OF
2 NAMES AND A LOT OF YEARS, AND I HAVEN'T MEMORIZED IT.

3 Q OKAY. FAIR ENOUGH.

4 BUT WE'RE NOT GOING TO -- NONE THAT YOU SEE
5 RIGHT NOW THAT YOU CAN THINK OF; RIGHT?

6 A CORRECT.

7 Q OKAY.

8 SO LET'S TALK ABOUT RYU.

9 BUT BEFORE I DO THAT, I WANT TO GET TO THE
10 QUESTION. WE ADDED SEVERAL STUDIES THERE AT THE BOTTOM.
11 DO YOU SEE THAT?

12 A I DO.

13 Q YAU. ALAMPI, VAN WIJNGAARD, SKOGHEIM, GOLDING
14 AND MCKEAN.

15 ARE YOU FAMILIAR WITH THOSE STUDIES?

16 A SO WE WERE JUST TALKING ABOUT THE SKOGHEIM ONE,
17 AND THE REASON WHY IT WASN'T ON THIS CHART IS BECAUSE IT
18 WAS JUST PRENATAL. SO THE ONES THAT WERE INCLUDED HERE,
19 IF I RECALL CORRECTLY, WERE ONES THAT HAD POST-NATAL
20 ANALYZES, SO I DON'T KNOW THE OTHER NAMES AND DETAILS
21 OFF THE TOP OF MY HEAD TO EXPLAIN WHY THEY WEREN'T ON
22 THERE. I CAN ONLY EXPLAIN THE SKOGHEIM ONE.

23 SO, I MEAN, MAYBE THESE WERE ALL, YOU KNOW,
24 MAYBE THESE WERE ALL PRENATAL ONES.

25 Q OKAY. ALL RIGHT. LET'S GET TO IT.

26 THE OPINION THAT YOU EXPRESS ABOUT MERCURY AND
27 AUTISM, JUST AS IT WAS WITH ARSENIC AND AUTISM, IS
28 SPECIFICALLY ABOUT EARLY LIFE POST-NATAL EXPOSURE.

1 DO YOU SEE THAT? OR DO YOU RECALL THAT? I CAN
2 SHOW YOU. DO YOU RECALL THAT?

3 A I DON'T KNOW EXACTLY WHAT YOU'RE REFERENCING SO
4 IF YOU COULD SHOW ME, THAT WOULD BE REALLY HELPFUL.

5 Q SURE.

6 IAN, LET'S GO TO DR. GARDENER'S REPORT AT
7 PAGE 45.

8 THIS IS YOUR FINAL PARAGRAPH ABOUT MERCURY
9 WHERE YOU GIVE US THE UPSHOT OF YOUR CONCLUSIONS.

10 AND YOU SAY, "IN CONCLUSION," YOU TALK ABOUT
11 WHAT YOU REVIEWED, "I CONCLUDE TO A REASONABLE DEGREE OF
12 SCIENTIFIC CERTAINTY THAT EARLY LIFE POST-NATAL
13 MERCURY EXPOSURE CAN CAUSE THE DEVELOPMENT OF
14 ASD."

15 DO YOU SEE THAT?

16 A I DO.

17 Q OKAY.

18 I WANT TO SHOW YOU A COMPLETE LIST OF STUDIES
19 THAT ARE POST-NATAL AND THAT MEASURED MERCURY EXPOSURE
20 PRIOR TO DIAGNOSIS, SO GETTING AT THAT TEMPORALITY
21 ISSUE, OKAY?

22 A OKAY.

23 Q SO LET'S GO TO EXHIBIT 698.

24 THIS IS ACTUALLY IN TWO SEPARATE SLIDES. THEY
25 ARE BOTH 698.

26 NO, LET'S DO THE FIRST ONE FIRST FIRST, IAN, SO
27 PEOPLE CAN SEE. THANK YOU.

28 SO IN THE LEFT HAND COLUMN WE HAVE THE NAME OF

1 THE STUDY AND THERE'S EXHIBIT NUMBERS HERE AND THESE
2 WILL BE PROVIDED TO YOUR HONOR OF COURSE.

3 AND THE SECOND COLUMN, AS WITH ARSENIC IS, WAS
4 THE MEASUREMENT POST-NATAL OR WAS IT PRENATAL BECAUSE
5 YOU'VE BEEN FOCUSED, DR. GARDENER, ON POST-NATAL.

6 OKAY. THE THIRD COLUMN ASKS THE SAME QUESTION
7 AS WE LOOKED AT FOR ARSENIC, WERE THEY LOOKING AT A
8 DIAGNOSIS OF ASD OR WERE THEY LOOKING AT SOMETHING ELSE?

9 AND THEN THE FINAL COLUMN ASKS WHETHER OR NOT
10 THEY FOUND A STATISTICALLY SIGNIFICANT ASSOCIATION.

11 SO THAT'S HOW THIS IS SET UP.

12 AND, IAN, MAYBE NOW YOU CAN GO TO THE SECOND OF
13 THESE TWO.

14 AND, DR. GARDENER, I WANT TO GIVE YOU TIME TO
15 LOOK AT THIS AND JUST -- I KNOW YOU MAY SAY YOU NEED TO
16 GO THROUGH YOUR REPORT, UNFORTUNATELY WE DON'T HAVE TIME
17 FOR YOU TO KIND OF CONDUCT A BRAND NEW ANALYSIS.

18 BUT AS YOU LOOK AT THESE TWO SLIDES, WHICH ARE
19 A LIST OF THESE MERCURY STUDIES THAT MEASURED EXPOSURE
20 PRIOR TO DIAGNOSIS, IS THERE ANY STUDY THAT YOU SEE THAT
21 WE LEFT OFF?

22 LET'S START WITH THE FIRST PAGE SO THAT DR.
23 GARDENER CAN SEE THE FIRST PAGE.

24 AND THEN, DR. GARDENER, LET US KNOW WHEN YOU
25 WANT TO SEE THE SECOND.

26 A I'M READY TO SEE THE SECOND.

27 Q OKAY.

28 A (DOCUMENT REVIEWED).

1 SO I'M NOT SURE IF THERE WAS A QUESTION THAT
2 I'M SUPPOSED TO ANSWERING, BUT --

3 Q THE QUESTION --

4 A -- OF ALL OF THESE THE ONE THAT I AM POST
5 FAMILIAR WITH THAT WE TALKED ABOUT WAS THE RYU.

6 AND WHAT CONCERNS ME HERE IS THAT YOU -- WE
7 WERE JUST LOOKING AT THE DATA REALLY CAREFULLY. WE SAW
8 HOW CLEARLY THE POST-NATAL MERCURY LEVELS, YOU KNOW,
9 WERE ASSOCIATED WITH AUTISM SYMPTOMS AND YOU HAVE --
10 YOU'VE SHOWN THIS AS A NO.

11 SO I CAN'T -- I REALLY -- YOU KNOW, THE OTHER
12 -- THE OTHER STUDIES I HAVEN'T THOUGHT ABOUT OR TALKED
13 ABOUT TODAY SO I'M NOT AS FAMILIAR, BUT I REALLY COULD
14 NOT CONFIDENTLY AGREE WITH YOUR ASSESSMENT WITH ANY OF
15 THE REST OF THEM CONSIDERING THE ONE THAT I AM FAMILIAR
16 WITH I DEFINITELY DO NOT AGREE WITH YOUR ASSESSMENT
17 HERE.

18 Q MY FIRST QUESTION -- WE'RE GOING TO TALK ABOUT
19 RYU NEXT, SO WE'LL GET TO THAT IN JUST A MINUTE, BUT
20 BEFORE WE GET TO RYU, MY QUESTION ACTUALLY WAS WHETHER
21 OR NOT YOU BELIEVE WE'VE LEFT OFF ANY STUDIES THAT YOU
22 CAN THINK OF THAT WE SHOULD PUT ON THIS CHART THAT MEET
23 THE CRITERIA OF MEASURED MERCURY EXPOSURE POST-NATALLY
24 PRIOR TO A DIAGNOSIS.

25 A I DON'T KNOW.

26 Q OKAY. SO LET'S TALK ABOUT RYU. THAT'S
27 EXHIBIT 114.

28 FIRST OF ALL, THIS A STUDY THAT DID NOT INVOLVE

1 AUTISM DIAGNOSIS; CORRECT?

2 A SO WHAT THEY USE AS THEIR OUTCOME WAS THE
3 SOCIAL RESPONSIVENESS SCALE, WHICH IS A SCALE THAT
4 MEASURES AUTISM BEHAVIORS AND THEY LOOKED AT IT
5 CONTINUOUSLY AND THEY LOOKED AT IT CATEGORICALLY, WHICH
6 IS WHAT ONE WOULD DO TO IDENTIFY A CHILD WITH MODERATE
7 -- MILD TO MODERATE OR MODERATE TO SEVERE AUTISM
8 SYMPTOMS OR NOT.

9 Q DR. GARDENER, MY QUESTION WAS SIMPLY WHETHER
10 YOU AGREE THAT THE RYU STUDY DOES NOT HAVE AUTISM
11 DIAGNOSIS AS ITS END POINT.

12 A SO I DON'T THINK THEY HAD A PHYSICIAN DIAGNOSIS
13 IF THAT'S WHAT YOU'RE ASKING, NO.

14 Q THAT'S WHAT I'M ASKING.

15 AND YOU CAN -- ACTUALLY, LET'S GO TO -- WE'LL
16 COME BACK TO RYU IN JUST A SECOND.

17 BUT ON THAT POINT I WANT TO PUT UP A STUDY FROM
18 2013.

19 IT'S EXHIBIT 694.

20 THIS IS THE VAN WIJNGAARD STUDY. YOU CITE THIS
21 IN YOUR REPORT, I BELIEVE.

22 AND IT TALKS -- THIS STUDY TALKED ABOUT THIS
23 SRS SCALE.

24 THEY SAY, "IT CAN BE USED ONLY TO IDENTIFY
25 PERSONS WHO HAVE THE CHARACTERISTICS OF ASD AND
26 REQUIRE A CLOSER EVALUATION. THEY ARE NOT
27 DIAGNOSTIC INSTRUMENTS AND FURTHER EXPERT
28 CLINICAL EVALUATION IS NECESSARY TO CONFIRM A

1 DIAGNOSIS OF ASD."

2 DO YOU SEE THAT?

3 A I DO.

4 Q OKAY. NOW, YOU'VE NEVER DIAGNOSED WITH ANYBODY

5 WITH ASD? THAT'S NOT WHAT YOU DO; RIGHT?

6 A NO, I'M AN EPIDEMIOLOGIST, SO I'M NOT A

7 CLINICIAN AND I DON'T DIAGNOSIS PEOPLE WITH ASD, NOR --

8 YEAH -- NOR WOULD I.

9 Q AND JUST TO BE CLEAR, YOU'RE NOT PUTTING

10 YOURSELF FORWARD AS AN EXPERT IN THE DIAGNOSIS OF ASD;

11 RIGHT?

12 A I AM NOT, NO.

13 Q OKAY. LET'S GO BACK TO RYU.

14 MR. WISNER: I JUST WANT TO, YOUR HONOR, LODGE

15 AN OBJECTION TO COMPLETENESS. COUNSEL JUST SHOWED A

16 SEGMENT OF A QUOTE AND WE HAVE NO IDEA WHAT'S

17 AFTERWARDS.

18 THE COURT: OVERRULED.

19 MR. BOEHM:

20 Q NOW, LET'S GO TO YOUR REPORT AT PAGE 41.

21 JUST VERY QUICKLY ON THIS POINT.

22 I'M GOING TO PULL OUT WHERE YOU TALK ABOUT THE

23 RYU STUDY IN YOUR REPORT IN THE MIDDLE OF THIS -- OF

24 THIS PAGE, AND YOU SAY, "THE STUDY EXAMINED MERCURY

25 EXPOSURE IN EARLY LIFE PRIOR TO ASD DIAGNOSIS."

26 DO YOU SEE THAT?

27 A YES.

28 Q THAT'S A MISTAKE, ISN'T IT?

1 A I'M NOT SURE. I'D HAVE TO READ THE FULL STUDY.
2 IT WASN'T AFTER ASD DIAGNOSIS, IF THAT'S WHAT YOU'RE
3 ASKING. MY UNDERSTANDING -- YEAH, I WOULD -- I WOULD
4 REALLY HAVE TO READ THE STUDY.

5 Q ALL RIGHT. LET'S GO BACK TO EXHIBIT 114.
6 AND, IAN, IF YOU CAN JUST PULL THE ABSTRACT.
7 THIS IS THE RYU STUDY.

8 A UM-HMM.

9 Q AND PULL UP THE PART WHERE IT SAYS "NOT
10 DIAGNOSIS."
11 IT SAYS, "AUTISTIC BEHAVIORS WERE ASSESSED
12 USING THE SOCIAL RESPONSIVENESS SCALE AT FIVE YEARS OF
13 AGE."
14 DO YOU SEE THAT?

15 A YEP.

16 Q SO THAT WAS THE OUTCOME THEY WERE MEASURING,
17 NOT DIAGNOSIS; CORRECT?

18 A THAT'S CORRECT.

19 Q OKAY.

20 A WELL, THEY -- IT WAS THE AUTISTIC BEHAVIORS AND
21 ALSO THEY WERE USING A WELL ESTABLISHED CUT POINT.

22 Q OKAY.

23 A LIKE A DICHOTOMIZED STUDY.

24 Q DO YOU RECALL THAT THE RYU STUDY ALSO MEASURED
25 TOTAL MERCURY AND NOT JUST METHYMERCURY?

26 A OH, I DON'T RECALL OFF THE TOP OF MY HEAD.

27 Q YOU DON'T KNOW. OKAY.

28 IF IT MEASURED ETHYLMERCURY AND INCLUDED

1 ETHYLMERCURY IN ITS MEASUREMENT, THAT WOULD BE THE SAME
2 KIND OF MERCURY THAT YOU AND MR. WISNER WERE TALKING
3 ABOUT WITH RESPECT TO MERCURY THAT'S IN VACCINES; RIGHT?

4 A THAT'S CORRECT. BUT THAT TYPE OF MERCURY IS
5 CLEARED VERY QUICKLY. BLOOD MERCURY TYPICALLY DOESN'T,
6 AS FAR AS I KNOW, ISN'T -- WOULDN'T BE REFLECTIVE OF
7 THAT. I'M NOT CONCERNED ABOUT THIS STUDY MEASURING
8 ETHYLMERCURY, IN OTHER WORDS.

9 AND THOSE ARE PRETTY SPECIFIC. METHYLMERCURY
10 IS A COMMON EXPOSURE. ETHYLMERCURY FROM VACCINES WOULD
11 BE VERY, VERY UNLIKELY IMPLAUSIBLE EXPLANATION FOR THAT.

12 Q ALL RIGHT.

13 A AND, YOU KNOW, I THINK IT SHOULD BE REALLY
14 CLEAR THAT THE LITERATURE HAS BEEN EXTREMELY CLEAR THAT
15 MERCURY -- ETHYLMERCURY THAT -- IN VACCINES IS NOT
16 ASSOCIATED WITH AUTISM.

17 Q ALL RIGHT. I WANT TO SHOW YOU TABLE 3 OF THE
18 RYU STUDY WHERE IT SHOWS THAT THE ONLY ASSOCIATION THAT
19 WAS DETECTED EVEN USING SRS SCALE, NOT DIAGNOSIS, IT WAS
20 PRENATAL, NOT POST-NATAL, OKAY?

21 SO LET'S LOOK AT TABLE 3. THAT'S PAGE 255.

22 IT'S SLIDE -- IAN, IT'S THE FIFTH PAGE OF THE
23 PDF.

24 AND YOU CAN LOOK AT THE SRS T-SCORES FOR LATE
25 PREGNANCY AND CORD BLOOD, ALL RIGHT. BUT THEN YOU GET
26 DOWN TO THE POST-NATAL SCORES. TWO YEARS, THREE YEARS
27 OF AGE.

28 THERE WAS NO STATISTICALLY SIGNIFICANT

1 ASSOCIATION DETECTED FOR THE POST-NATAL MEASUREMENTS,
2 CORRECT, DR. GARDENER?

3 A SO AT THOSE YEARS OF AGE, LIKE WE DISCUSSED
4 EARLIER, THE MERCURY LEVELS WERE SIGNIFICANTLY
5 ASSOCIATED WITH THE CONTINUOUS CORDS, AND WHEN WE LOOKED
6 AT THEM -- THEY, NOT WE -- WHEN THEY LOOKED AT IT IN A
7 DICHOTOMIZED WAY, THE LEVEL AT THREE YEARS OF AGE WAS
8 REALLY JUST SHY OF STATISTICAL SIGNIFICANCE AND THEY HAD
9 THEY HAD SIGNIFICANT -- IF YOU LOOK AT THE SECOND COLUMN
10 THEY --

11 Q MY QUESTION -- MY QUESTION -- YOUR HONOR, I
12 DON'T HAVE MUCH -- YOUR HONOR, IF I MAY, WE'RE RUNNING
13 OUT OF TIME AND MY QUESTION IS ACTUALLY MUCH MORE SIMPLE
14 THAN THIS. I WOULD JUST ASK THAT YOU --

15 THE COURT: WELL, I THINK YOU'VE MADE YOUR
16 POINT. LET'S MOVE ON.

17 MR. BOEHM: OKAY. WE CAN MOVE ON.

18 Q LET'S GO -- YOU MENTIONED THE JAFARI STUDY WITH
19 MR. WISNER AND I WANT TO GO TO THAT.

20 IT'S EXHIBIT 78.

21 AND I'M GOING TO DIRECT YOUR ATTENTION TO THE
22 CONCLUSIONS OF THAT -- OF THOSE AUTHORS IN THAT
23 PUBLICATION.

24 IF YOU GO TO PAGE 296, IT'S THE SECOND TO LAST
25 PAGE OF THE PDF, IAN, AND IF YOU HIGHLIGHT -- DO YOU SEE
26 THE TWO BULLET POINTS -- NO, NO, NO -- JUST ABOVE THAT,
27 I'M SORRY. I SAID CONCLUSIONS, BUT IT'S THE END OF
28 RESULTS SECTION. START WITH THE BULLETS.

1 OKAY.

2 THIS STUDY SAYS -- THE AUTHORS OF THIS STUDY

3 SAY:

4 "THE MAJOR PROBLEM WITH CASE CONTROL STUDIES IS

5 THE TEMPORAL RELATIONSHIP BETWEEN EXPOSURE AND

6 OUTCOME. IT'S POSSIBLE, FOR EXAMPLE, THAT

7 OLDER CHILDREN WITH ASD MAY EXHIBIT MORE

8 MOUTHING BEHAVIOR THAN HEALTHY CONTROLS LEADING

9 TO INCREASED LEVELS OF MERCURY AND OTHER

10 POLLUTANTS IN THEIR BIOLOGICAL TISSUES."

11 DO YOU SEE THAT?

12 A I DO.

13 Q I WANT TO DIRECT YOUR ATTENTION TO THE THIRD

14 BULLET.

15 "MEASUREMENT" -- I'M SORRY, THE FOURTH. I

16 APOLOGIZE.

17 "MEASUREMENT OF TOTAL MERCURY, BUT NOT

18 INORGANIC OR ORGANIC FORMS SEPARATELY IN THE

19 STUDIES" -- THAT'S A LIMITATION -- "IT'S

20 BELIEVED THAT EXPOSURE TO ORGANIC FORMS OF

21 MERCURY SUCH AS ETHYLMERCURY USED IN VACCINES

22 AS PRESERVATIVES THIMEROSAL AND METHYLMERCURY

23 FOUND PRIMARILY IN SEAFOOD PRODUCTS ARE MOSTLY

24 IMPLICATED IN THE ASD."

25 THESE AUTHORS -- I AGREE WITH YOU,

26 DR. GARDENER, THERE'S NOT GOOD EVIDENCE ABOUT THIMEROSAL

27 IN CHILDHOOD VACCINES, BUT THESE AUTHORS IN THIS STUDY

28 THAT YOU'RE RELYING ON, THEY DO ESPOUSE THE THEORY THAT

1 MERCURY IN VACCINE CAUSES ASD.

2 DO YOU SEE THAT?

3 A I TOTALLY DISAGREE WITH YOUR FIRST STATEMENT.

4 SO LET'S -- LIKE, I REALLY APPRECIATE YOU
5 BRINGING THIS UP BECAUSE THEIR FIRST STATEMENT: "THE
6 MAJOR PROBLEM WITH CASE CONTROL STUDIES IS THE
7 TEMPORAL RELATIONSHIP."

8 CASE CONTROL STUDIES CAN ASSESS TEMPORAL
9 RELATIONSHIPS PROSPECTIVELY, LIKE I KEEP SAYING, IT IS
10 SORT A FALLACY TO THINK THAT CASE CONTROL STUDIES CAN'T
11 BE PROSPECTIVE.

12 AND I ALSO DISAGREE WITH THIS ASSUMPTION THAT
13 MOUTHING ACTIVITIES INCREASES YOUR RISK FOR MERCURY. IT
14 CAN CERTAINLY INCREASE YOUR RISK FOR MANY ENVIRONMENTAL
15 TOXICANTS, BUT NOT MERCURY.

16 AND YES, WE ARE IN TOTAL AGREEMENT THAT
17 ETHYLMERCURY USED AS A PRESERVATIVE IN VACCINES AND IN
18 OTHER PRODUCTS AS WELL IS NOT IMPLICATED IN AUTISM.

19 Q OKAY. FAIR ENOUGH.

20 MR. WISNER NOTED DURING HIS QUESTIONING OF YOU
21 THAT YOU HAD PUBLISHED SOME ARTICLES PREVIOUSLY IN YEARS
22 PAST ON THE CAUSES OF AUTISM AND YOU INDICATED THAT WAS
23 BEFORE YOU HAD BEEN RETAINED AS AN EXPERT.

24 DO YOU REMEMBER THOSE QUESTIONS?

25 A YES.

26 Q AND HE KIND OF SAID THAT WAS A LONG TIME AGO,
27 HAS THE SCIENCE CHANGED AND YOU SAID YES.

28 DO YOU REMEMBER THAT?

1 A YEP.

2 Q OKAY. I JUST WANT TO JUST PULL UP THOSE
3 STATEMENTS. WE'LL JUST DO THIS REALLY QUICKLY.

4 IT'S IN THE BRIEFING, YOU HONOR, SO I WILL NOT
5 BELABOR IT.

6 THIS IS EXHIBIT 701.

7 THESE ARE JUST A COUPLE OF EXAMPLES.

8 YOU SAID IN 2014, THE BOOK CHAPTER THAT YOU
9 REFERENCED EARLIER, THAT "THE PERINATAL TIME PERIOD THAT
10 ENCOMPASSES FIVE MONTHS BEFORE THE ONE MONTH AFTER BIRTH
11 IS INCREASINGLY RECOGNIZED AS KEY IN AUTISM'S ETIOLOGY."

12 AND YOU ALSO SAID "THE PERI AND NEONATAL TIME
13 FRAMES ARE IMPORTANT PERIODS OF NEURODEVELOPMENT WITH
14 KEY RELEVANCE TO AUTISM."

15 THOSE ARE YOUR WORDS IN YOUR BOOK CHAPTER;
16 CORRECT?

17 A THOSE ARE CORRECT.

18 Q AND THEN YOU SAID IN A 2017 FACEBOOK POST THAT
19 AGAIN IS IN THE BRIEFING, AND THIS IS THROUGH YOUR
20 COMPANY, YOUR PRIVATE FOR-PROFIT COMPANY CALLED A GREEN
21 SLATE, "I BELIEVE THAT AUTISM IS PRIMARILY DETERMINED
22 BEFORE A CHILD GETS HIS OR HER FIRST VACCINE."

23 YOU SAID THAT IN 2017; CORRECT?

24 A I SAID THAT TO A FRIEND WITH AN UNDERSTANDING
25 THAT WE WERE TALKING BETWEEN FRIENDS, A FRIEND OF MINE
26 WHO WAS VERY, VERY WORRIED ABOUT VACCINATING HER
27 CHILDREN.

28 I DID NOT BELIEVE AT THE TIME, NOR DO I BELIEVE

1 NOW THAT AUTISM IS DETERMINED BEFORE A CHILD GETS HIS OR
2 HER FIRST VACCINE. A LOT OF KIDS ARE -- OR I WOULD SAY
3 THE MAJORITY OF KIDS GET THEIR FIRST VACCINE AT BIRTH,
4 THAT IS WHAT IS TYPICAL IS TO GET THE FIRST VACCINE AT
5 BIRTH.

6 MY -- THE WORK THAT I HAVE DONE IN AUTISM HAS
7 CLEARLY SHOWN THAT I -- THAT NEONATAL RISK FACTORS THAT
8 EXTEND BEYOND THE FIRST DAY OF LIFE ARE IMPORTANT AND
9 RELEVANT SO I DID NOT BELIEVE THAT AT THE TIME.

10 AND SINCE THAT COMMENT TO A FRIEND ON FACEBOOK,
11 A FRIEND WHO I KNOW AND I KNOW WHAT HER CONCERNS ARE AND
12 WHAT SHE WAS ASKING OF ME, IN THE FIVE YEARS SINCE THEN,
13 MY VIEWS OF AUTISM HAVE ACTUALLY CHANGED TO I BELIEVE
14 THAT EVEN LONGER INTO THE INFANCY AND TODDLER YEARS IS
15 RELEVANT AFTER, YOU KNOW, SORT OF FOLLOWING THE
16 LITERATURE FOR THE PAST FIVE YEARS, BUT I DIDN'T EVEN
17 BELIEVE IT THEN AND I CERTAINLY DON'T BELIEVE THAT NOW.

18 Q OKAY. THANK YOU FOR YOUR ANSWER, DR. GARDENER.
19 I'M VERY NEARLY DONE.

20 THIS IS NOT YOUR FIRST TIME WORKING AS AN
21 EXPERT IN A CASE THAT INVOLVES THE CAUSES OF AUTISM; IS
22 THAT CORRECT?

23 A THIS IS MY FIRST -- THIS WAS MY FIRST TIME
24 BEING DEPOSED AND TODAY IS MY FIRST TIME IN A HEARING,
25 WHICH IS A LOT OF FUN, AND -- BUT I HAVE BEEN RETAINED
26 BEFORE AS AN EXPERT WITNESS, BUT IT'S NEVER GOTTEN TO
27 THE POINT THAT CASES HAVE ALWAYS SETTLED BEFORE A
28 DEPOSITION.

1 Q YOU TOLD ME WHEN I HAD THE OPPORTUNITY TO VISIT
2 WITH YOU BACK IN DECEMBER THAT YOU HAD WORKED AS AN
3 EXPERT ON BEHALF OF A HOSPITAL, SOME DOCTORS AND SOME
4 NURSES WHO IN THAT COMPLAINT WERE ALLEGED TO HAVE BEEN
5 RESPONSIBLE FOR A CHILD DEVELOPING AUTISM BASED ON WHAT
6 HAPPENED AT THE TIME OF THE BIRTH.

7 DO YOU REMEMBER TELLING ME ABOUT THAT?

8 A I DO.

9 Q OKAY.

10 AND YOU TOLD ME YOU DIDN'T PREPARE A WRITTEN
11 EXPERT REPORT IN THAT CASE.

12 IS THAT TRUE?

13 A THAT IS TRUE.

14 Q OKAY.

15 AND IN MARYLAND LIKE IN CALIFORNIA, IT'S NOT
16 REQUIRED TO PREPARE A WRITTEN REPORT, INSTEAD WHAT YOU
17 DO IS YOU SEND A DISCLOSURE THAT SUMMARIZES THE EXPERT'S
18 OPINIONS.

19 DO YOU RECALL THAT?

20 A I DON'T RECALL THAT. WHAT I DO RECALL IS THAT
21 THE LAWYERS SENT SOMETHING ON MY BEHALF THAT WAS NOT AN
22 ACCURATE REPRESENTATION, WHICH IS WHY I BACKED OUT OF
23 THAT CASE.

24 Q OKAY.

25 A I MEAN, HE SAID SOMETHING WITHOUT PASSING IT BY
26 ME, WITHOUT ANY SORT OF CONFIRMATION.

27 Q DO YOU REMEMBER AN ATTORNEY BY THE NAME OF
28 CHANTALE CUSTODIA WHO YOU WORKED WITH ON THAT CASE?

1 A I DO.

2 Q DID YOU COMMUNICATE WITH HER ABOUT YOUR
3 OPINIONS IN THAT CASE?

4 A I DID.

5 Q OKAY.

6 AND DID YOU TALK TO HER ABOUT WHAT THE SCOPE OF
7 YOUR OPINIONS WERE IN THAT CASE?

8 A YES.

9 Q OKAY. WE WENT ON THE PUBLIC DOCKET AND WE
10 FOUND THAT --

11 THE COURT: WELL, COUNSEL, LET ME JUST
12 INTERRUPT YOU.

13 MR. BOEHM: YEAH, UM-HMM.

14 THE COURT: THERE IS -- NONE OF THIS EVIDENCE
15 BEARS ON SARGON. THIS MIGHT BE GOOD IN A TRIAL, BUT I
16 DON'T THINK IT BEARS ON SARGON.

17 MR. BOEHM: YOUR HONOR, THIS WOULD JUST BE --
18 IT'S THE LAST THING I'M GOING TO DO. IT'S IMPEACHMENT
19 EVIDENCE BECAUSE IT DIRECTLY CONTRADICTS DR. GARDENER'S
20 STATEMENTS AND OPINIONS THAT SHE'S PROVIDED TO THIS
21 COURT.

22 THE COURT: ALL RIGHT.

23 MR. BOEHM: SO IF WE CAN PUT UP EXHIBIT 702, I
24 THINK YOUR HONOR CAN, YOU KNOW JUST WEIGH WHETHER OR NOT
25 IT'S WORTH -- YOU KNOW, WHAT -- HOW IT SHOULD BE
26 CONSIDERED.

27 THE COURT: OKAY.

28 MR. BOEHM: WE REDACTED JUST OUT OF COURTESY --

1 MR. WISNER: YOUR HONOR, I JUST WANT TO ISSUE
2 AN OBJECTION. THIS IS NOT AN INCONSISTENT STATEMENT
3 BECAUSE THIS ISN'T HER STATEMENT. THIS IS JUST SOME
4 LAWYER WHO MISREPRESENTED HER.

5 THE COURT: YEAH, THAT'S MY CONCERN. IT'S
6 HEARSAY UNLESS SHE'S --

7 MR. BOEHM: WELL, YOUR HONOR, IT'S NOT HEARSAY
8 AND I'LL TELL YOU WHY. IT'S NOT BEING USED FOR THE
9 TRUTH OF THE MATTER ASSERTED. WE'RE NOT TRYING TO
10 ESTABLISH THAT THE OPINIONS DR. GARDENER HAD IN THAT
11 CASE WERE --

12 THE COURT: MY CONCERN IS FOUNDATION. I DON'T
13 KNOW THAT THESE ARE HER STATEMENTS. IF THEY -- IF IT'S
14 SIGNED BY AN ATTORNEY, IT'S JUST LIKE A COMPLAINT. THE
15 ATTORNEY SIGNS THE COMPLAINT, IT DOESN'T MEAN, UNLESS
16 IT'S VERIFIED, THAT THE PLAINTIFF HAS SWORN TO IT UNDER
17 OATH. SO IS THE LAST SIGNATURE -- IS THE SIGNATURE PAGE
18 BY THE ATTORNEY? IN OTHER WORDS, SHE DIDN'T SIGN THIS,
19 DID SHE?

20 THE WITNESS: I'VE NEVER EVEN SEEN THIS.

21 MR. BOEHM: THIS IS A NOTICE OF -- I CAN
22 EXPLAIN, YOUR HONOR. THIS IS A NOTICE OF SERVICE OF
23 DISCOVERY THAT'S AVAILABLE ON THE PUBLIC DOCKET BY GOING
24 TO THE COURT IN MARYLAND.

25 THE COURT: I UNDERSTAND.

26 MR. BOEHM: AND THIS IS THE DISCLOSURE THAT'S
27 ASSOCIATED WITH THAT.

28 THE COURT: YEAH.

1 MR. BOEHM: AND IT'S THE SAME THING YOU DO IN
2 CALIFORNIA WHERE YOU PROVIDE A DISCLOSURE.

3 SO, YOUR HONOR -- IF YOUR HONOR -- I UNDERSTAND
4 YOUR HONOR'S POINT. WHAT OUR POSITION WOULD BE IS WE
5 SHOULD BE ABLE TO ASK DR. GARDENER ABOUT IT. IF SHE
6 WANTS TO SAY THAT SHE DIDN'T BELIEVE THIS, IT WAS A
7 MISTAKE BY THE LAWYERS, THEN THAT'S FINE, AND THE COURT
8 CAN WEIGH IT HOWEVER IT SEES FIT, BUT IT --

9 THE COURT: IT DOESN'T BEAR ON SARGON. IT'S
10 JUST NOT RELEVANT. AND I DON'T KNOW THAT IT'S HER
11 STATEMENTS. I DON'T THINK IT'S FRUITFUL.

12 MR. BOEHM: OKAY.

13 YOUR HONOR, I THINK THAT WITH THAT, I WILL
14 PAUSE, AND I DON'T KNOW IF MR. WISNER IS GOING TO HAVE
15 MORE QUESTIONS, BUT I'LL STOP THERE FOR NOW.

16 THE COURT: OKAY. THANK YOU.

17 MR. BOEHM: THANK YOU, DR. GARDENER.

18 THE WITNESS: THANK YOU.

19 THE COURT: CAN YOU DO TEN MINUTES, MR. WISNER?

20 MR. WISNER: OH, YES, I CAN GET THIS DONE. I'M
21 GOING TO GO ROCKET FAST, YOUR HONOR. FAMOUS LAST WORDS.

22 THE COURT: I WILL CONFESS THAT I DO NOT HAVE A
23 ROCKET DOCKET.

24 MR. WISNER: ALL RIGHT. THERE WE GO.

25 OKAY. DR. GARDENER -- YOUR HONOR, MAY I
26 PROCEED?

27 THE COURT: PLEASE.

28 MR. WISNER: OKAY.

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REDIRECT EXAMINATION

MR. WISNER:

Q DR. GARDENER, YOU KNOW, THERE WAS A LOT OF CHARTS SHOWN TO YOU AND I DON'T HAVE THEM IN FRONT OF ME AND I DON'T HAVE THE TIME TO GO THROUGH THE MERCURY CHART. THERE WAS A LOT OF STUDIES AND A LOT OF INFORMATION THROWN UP THERE.

VERY CLEARLY, ARE YOU TESTIFYING TODAY THAT ANY OF THOSE CHARTS THAT YOU WERE SHOWN TODAY WERE ACCURATE?

A NO.

Q OKAY.

A THE CHARTS THAT -- THAT THE OPPOSING COUNSEL JUST SHOWED ME --

Q YES.

A -- I AM NOT, YEAH, I AM NOT STATING THAT THEY ARE ACCURATE.

Q OKAY.

SO I WANT TO QUICKLY FOCUS ON THE ARSENIC CHART BECAUSE THAT ONLY HAD A COUPLE OF STUDIES THAT I SHOWED QUICKLY, OKAY.

DO YOU REMEMBER HE SHOWED YOU THE DOHERTY STUDY, THE ALAMPI STUDY, THE SKOGHEIM STUDY AND THE LONG STUDY FOR ARSENIC?

A YES.

Q AND HE HAD "NO" FOR ANY STATISTICALLY SIGNIFICANT ASSOCIATIONS IN THERE FOR EACH ONE OF THEM?

A CORRECT.

Q ALL RIGHT.

1 MR. BOEHM: WOULD YOU LIKE ME TO PUT IT UP? I
2 CAN PUT IT BACK UP.

3 MR. WISNER: NO, IT'S FINE. IT'S FINE. WE'VE
4 ESTABLISHED THAT IT'S FINE.

5 Q WELL, LET'S LOOK AT THE STUDIES, DOCTOR.
6 FIRST LET'S LOOK AT DOHERTY. THIS IS
7 EXHIBIT 50.

8 AND RIGHT -- WE CAN SEE HERE ON PAGE 5 OF THE
9 STUDY, THERE IS A DISCUSSION OF THE RESULTS.

10 AND IT SAYS RIGHT HERE, "LINEAR REGRESSION
11 MODELS WERE CONSISTENT WITH ADVERSE
12 ASSOCIATIONS BETWEEN BEHAVIORAL OUTCOMES AND
13 ARSENIC AND MN, INCLUDING MATERNAL POST-NATAL
14 TOENAILS. ARSENIC VAS-C-2 BSI SCORES."

15 AND IT GIVES A BETA COEFFICIENT AND A
16 STATISTICALLY SIGNIFICANT NUMBER.

17 DO YOU SEE THAT, DOCTOR?

18 A I DO.

19 Q AND THEN IT HAS INFANT TOENAIL ARSENIC AND THEN
20 THE BAS-C-2 ADAPTIVE SKILL SCORE. IT GIVES YOU AGAIN A
21 DATA COEFFICIENT AND A CONFIDENCE INTERVAL.

22 DO YOU SEE THAT?

23 A I DO.

24 MR. BOEHM: YOUR HONOR, I OBJECT. THAT'S NOT
25 -- THAT'S NOT -- THAT'S NOT THE SAME HEAVY METAL.
26 THAT'S MANGANESE. AND THAT'S THE INCORRECT FINDING.
27 MR. WISNER:

28 Q DOCTOR, I UNDERSTAND --

1 THE COURT: JUST A MOMENT. IT LOOKS LIKE
2 ARSENIC AND MANGANESE, BUT THE A-S IS ARSENIC, CORRECT?

3 MR. WISNER: THAT'S CORRECT, YOUR HONOR.

4 THE COURT: ALL RIGHT. WELL, YOU CAN INQUIRE
5 ABOUT THE ARSENIC FOR SURE.

6 MR. BOEHM: YEAH, ABOUT -- BUT HE ASKED ABOUT
7 -- OKAY.

8 MR. WISNER:

9 Q AND, DOCTOR, IT SAYS RIGHT HERE, INFANT TOENAIL
10 A-S BAS C-2 ADAPTIVE SKILLS SCORES AND IT GIVES A BETA
11 COEFFICIENT AND A CONFIDENCE INTERVAL FOR ARSENIC;
12 RIGHT?

13 A YES.

14 Q OKAY.

15 WITH THIS STATEMENT BY THE AUTHORS THAT LINEAR
16 REGRESSION MODELS WERE CONSISTENT WITH ADVERSE
17 ASSOCIATION BETWEEN BEHAVIORAL OUTCOMES AND ARSENIC AND
18 MANGANESE, IS THERE ANY WAY YOU CAN SAY THAT THIS STUDY
19 WAS NO FOR NO ASSOCIATION?

20 A NO, I THINK WE CLASSIFIED IT AS YES FOR THAT
21 REASON.

22 Q YEAH, BECAUSE THAT'S WHAT THE AUTHORS TOLD US;
23 RIGHT?

24 A CORRECT.

25 Q OKAY.

26 LET'S LOOK AT ALAMPI. THIS WAS ALSO SHOWN TO
27 YOU AS A NEGATIVE STUDY.

28 THIS IS EXHIBIT 24 IN THE RECORD.

1 AND LET'S GO TO PAGE 5.
2 SPECIFICALLY, IN THE RESULTS SECTION, AND THIS
3 IS UNDER THE FREQUENT LIST OF LINEAR REGRESSION
4 ANALYSIS.
5 DO YOU SEE THAT, DOCTOR?
6 A YES.
7 Q AND IT SAYS THE P VALUES FOR LINEAR AND
8 QUADRATIC DEVIATION FROM HOMOSCEDASTICITY WERE PRESENTED
9 IN LEAD TABLE 2.
10 STOP RIGHT THERE.
11 WHAT IS HOMOSCEDASTICITY?
12 A HOMOSCEDASTICITY. THAT RELATES TO -- OH,
13 THAT'S A -- YOU'RE REALLY TESTING ME ON MY EPI RIGHT
14 NOW. BUT IT'S THE RELATIONSHIP OF THOSE VALUES, LIKE
15 THE DISTRIBUTION OF THOSE VALUES.
16 Q THAT'S RIGHT.
17 SO WE'RE COMPARING THE CONTROLS VERSUS THE KIDS
18 WITH AUTISM AND THE KIDS WITHOUT AUTISM; RIGHT?
19 A CORRECT.
20 Q OKAY.
21 AND IT SAYS ARSENIC, CADMIUM, LEAD, THAT THING,
22 AND MCCP HAD STATISTICALLY SIGNIFICANT DEVIATIONS.
23 DO YOU SEE THAT?
24 A YES.
25 Q AND THAT'S AFTER ADJUSTING FOR CONFOUNDERS.
26 DO YOU SEE THAT?
27 A YES.
28 Q AGAIN, THAT'S A STATISTICALLY SIGNIFICANT

1 RESULT; RIGHT?

2 A YES, BUT I WOULD HAVE TO LOOK -- I WOULD HAVE
3 TO LOOK AT THE PAPER MORE TO UNDERSTAND EXACTLY WHAT
4 THAT'S REFERRING TO.

5 Q FAIR ENOUGH.

6 HE SHOWED YOU QUOTES. I'M JUST SHOWING YOU
7 QUOTES. WE'RE DOING THE BATTLE OF QUOTES HERE.

8 LET'S LOOK AT SKOGHEIM.

9 AGAIN, THIS IS EXHIBIT 119 AND THERE'S TWO
10 PORTIONS I WANT TO SHOW YOU.

11 THE FIRST IS THE SECTION AS IT RELATES TO A --
12 OR I'M SORRY -- ASD. LET ME PULL IT UP THERE.

13 AND IT SAYS, "FOR ASD THE QUARTILE MODELS
14 SHOWED AN ELEVATED RISK FOR CHILDREN IN
15 QUARTILE 2 OF ARSENIC."

16 AND IT GIVES YOU AN ODDS RATIO THAT'S
17 STATISTICALLY SIGNIFICANT.

18 DO YOU SEE THAT?

19 A I DO.

20 Q "COMPARED TO A QUARTILE 1 REFERENCE WITH A
21 DECREASING MONOTONIC TREND IN THE NEXT TWO
22 QUARTILES."

23 DO YOU SEE THAT?

24 A I DO.

25 Q NOW, THE AUTHORS HERE ARE REPORTING, QUOTE, "A
26 STATISTICALLY" -- OR NOT QUOTE -- ARE SPECIFICALLY
27 CITING A STATISTICALLY SIGNIFICANT ELEVATED ODDS RATIO.
28 IS THAT RIGHT?

1 A YES. FOR QUARTILE 2 VERSUS QUARTILE 1.

2 Q EXACTLY.

3 AND THEN LATER ON IN THE LEAD SECTION ON PAGE 9
4 -- I'M SORRY -- ON THE ARSENIC SECTION IN PAGE 9, THEY
5 SPECIFICALLY SAY, "OUR FINDINGS OF INCREASED RISK OF ASD
6 AND ADHD ASSOCIATED WITH PRENATAL ARSENIC
7 EXPOSURE ARE IN LINE WITH THE EPIDEMIOLOGICAL
8 LITERATURE WITH NUMEROUS STUDIES DOCUMENTING
9 THE DEVELOPMENTAL NEUROTOXIC EFFECT OF
10 ARSENIC."

11 DO YOU SEE THAT?

12 A I DO.

13 Q SO AGAIN, THE SKOGHEIM AUTHORS SURELY AREN'T
14 CHARACTERIZING THERE TO BE A LACK OF AN ASSOCIATION.
15 THEY ARE SAYING IT'S THERE AND THAT IT'S ACTUALLY
16 CONSISTENT WITH THE EPIDEMIOLOGICAL LITERATURE; RIGHT?

17 A THAT'S WHAT THEY ARE SAYING.

18 Q WOULD IT BE APPROPRIATE IN YOUR MIND TO
19 CHARACTERIZE THIS AS A "NO" ON A CHART?

20 A NO.

21 Q OKAY.

22 MR. BOEHM: YOUR HONOR, I WOULD JUST -- I DON'T
23 KNOW IF I'M GOING TO HAVE A CHANCE TO EXAMINE THE
24 WITNESS, BUT I JUST NEED TO PUT ON THE RECORD THAT THE
25 SCOGHEIM AUTHORS ACTUALLY SPECIFICALLY REFER TO THE
26 LITERATURE AS INCONSISTENT, AND IF I HAVE AN OPPORTUNITY
27 TO EXAMINE AGAIN, I WOULD BRING THAT OUT.

28 THE COURT: I PICKED THAT UP. I PICKED THAT

1 UP.

2 MR. BOEHM: OKAY. THANK YOU.

3 THE COURT: YEAH.

4 MR. WISNER: FAIR ENOUGH. YOUR HONOR, I TRIED
5 MY BEST NOT TO TESTIFY DURING THE CROSS EXAMINATION. IF
6 I KNEW THAT WAS ALLOWED, I PROBABLY WOULD HAVE JUMPED IN
7 WITH ALL THE INACCURACIES I SAW. BUT FAIR ENOUGH, YOUR
8 HONOR.

9 THE COURT: WELL...

10 MR. WISNER:

11 Q ALL RIGHT. LET'S GO TO THE LAST STUDY, THE
12 LONG STUDY.

13 AND HERE, DOCTOR, THE AUTHORS REPORT -- THIS
14 AGAIN WAS REPRESENTED AS A NO, AND YOU ACTUALLY DISCUSS
15 THIS IN YOUR REPORT, AND I WANT TO SHOW YOU THAT IN JUST
16 ONE SECOND.

17 BUT HERE'S WHAT THE AUTHORS SAY.

18 THIS WAS EXHIBIT 92. AND WE'RE ON PAGE 8.

19 IT SAYS, "HOWEVER, NO SIGNIFICANT" -- IT SAYS,
20 "HOWEVER, ALTHOUGH NO SIGNIFICANT ASSOCIATION
21 BETWEEN TOXIC METALS AND ASD RISK WAS
22 OBSERVED, WE NOTICED THAT ADJUSTED ODD RATIOS
23 WERE 1.496 WITH A CONFIDENCE INTERVAL OF .924
24 AND 2.424 WITH A P VALUE OF .101 FOR ARSENIC."
25 DO YOU SEE THAT?

26 A YEAH, THAT REALLY SORT OF IS SUGGESTIVE OF AN
27 ASSOCIATION.

28 AND LIKE I SAID EARLIER, ESPECIALLY WITH

1 SMALLER STUDIES, WE GIVE OURSELVES SOME WIGGLE ROOM.
2 LIKE, THAT HAS A P VALUE OF .10 WITH A LOWER BOUND OF
3 .92. THAT'S REALLY JUST SHY OF STATISTICAL SIGNIFICANCE
4 AND WITH AN ODDS RATIO OF 1.496.

5 YOU -- THAT -- I REMEMBER THIS. THAT THIS
6 REALLY CONTRIBUTED TO MY -- IN MY HEAD AFTER REVIEWING
7 THE LITERATURE AND THE STRENGTHS AND WEAKNESSES OF THIS
8 STUDY, THIS WAS COMPELLING TO ME DESPITE IT BEING JUST
9 SHY OF FORMAL STATISTICAL SIGNIFICANCE.

10 Q AND, IN FACT, IN YOUR REPORT, GOING TO
11 EXHIBIT 2, NOW WE'RE ON PAGE 32 OF YOUR REPORT, YOU
12 SPECIFICALLY STATE THAT.

13 YOU STATE, "MOREOVER, A SMALLER DANISH STUDY
14 PUBLISHED IN 2019 EVALUATED AMNIOTIC FLUID
15 SAMPLES FROM 37 ASD CASES AND 50 CONTROLS
16 BETWEEN FOUR YEAR PERIODS, THEY QUOTE THE LONG
17 STUDY."

18 DO YOU SEE THAT, DOCTOR?

19 A I DO. LIKE I SAID, THAT'S A TINY STUDY SO
20 YOU'RE GOING TO STILL SEE A STRONG ASSOCIATION LIKE THAT
21 BEING JUST SHY OF STATISTICAL SIGNIFICANCE BECAUSE IT
22 WAS SO SMALL.

23 Q YEAH.

24 AND YOU SAY IN YOUR REPORT, YOU SAID, "THE
25 ASSOCIATION OF ARSENIC AND ASD WAS SHY OF
26 STATISTICAL SIGNIFICANCE WITH AN ADJUSTED ODDS
27 RATIO PER ONE MILLIGRAM LITTER INCREASE IN
28 ARSENIC OF 1.5."

1 AND YOU GIVE THE CONFIDENCE INTERVAL.
2 "BUT THE RESULTS DID SUGGEST A CONTRIBUTION
3 OF PRENATAL ARSENIC EXPOSURE IN RELATION TO
4 ASD."
5 DO YOU SEE THAT?
6 A I DO.
7 Q AND, AGAIN, DOCTOR, IN YOUR OPINION, DO YOU
8 THINK PUTTING "NO" ON A CHART WOULD BE APPROPRIATE IN
9 CHARACTERIZING THE NUANCES OF THE DATA?
10 A NO, I DON'T. I HAD MEANT TO BRING THAT UP
11 ACTUALLY THAT, BECAUSE I REMEMBERED THERE WAS ONE OF
12 THOSE ASSOCIATIONS THAT WAS, LIKE, IN A SMALL STUDY JUST
13 SO SHY OF STATISTICAL SIGNIFICANCE.
14 MR. WISNER: THANK YOU.
15 I HAVE NO FURTHER QUESTIONS AT THIS TIME, YOUR
16 HONOR.
17 THE COURT: ALL RIGHT. WELL, I THINK WE NEED
18 TO ADJOURN, BUT LET'S FIGURE -- THANK YOU, DOCTOR, VERY
19 MUCH. YOU'VE BEEN VERY PATIENT.
20 THE WITNESS: THANK YOU.
21 MR. BOEHM: THANK YOU, DR. GARDENER.
22 THE WITNESS: THANK YOU.
23 THE COURT: LET'S TALK ABOUT WHAT WE'RE DOING
24 NEXT.
25 I HAVE -- I THINK WE HAVE TOMORROW OFF.
26 MR. WISNER: THAT'S RIGHT.
27 THE COURT: WELL, GOOD. NO ONE IS DISAGREEING
28 WITH THAT.

1 MR. BOEHM: YES THAT'S CORRECT, YOUR HONOR.

2 THE COURT: ALL RIGHT. GOOD. AND THEN ON
3 FRIDAY, I HAVE THE DAY MOSTLY BLOCKED OFF FOR YOU. AND
4 WHAT'S THE AGENDA FOR FRIDAY?

5 MR. WISNER: SO ON FRIDAY, YOUR HONOR, WE'VE
6 TALKED ABOUT IT AND WE'VE DECIDED THAT THE BEST APPROACH
7 WOULD BE TO DO DR. ASCHNER AS SCHEDULED IN THE MORNING.
8 HE WILL BE OFF PROBABLY IN THE MIDDLE OF THE AFTERNOON,
9 AND THEN WE'LL FINISH UP THE DAY ON FRIDAY WITH THE
10 COMPLETION OF DR. RITZ'S EXAMINATION.

11 THE COURT: OKAY. IS THAT AGREEABLE TO
12 EVERYBODY, I GATHER.

13 MR. WISNER: YEAH, WE --

14 THE COURT: ALL RIGHT. AND WHAT TIME WOULD YOU
15 LIKE TO BEGIN ON FRIDAY?

16 MR. WISNER: 9:30 OR 9:00 A.M., THE EARLIER THE
17 -- AS MUCH TIME AS YOU'RE WILLING TO GIVE US, WE'LL TAKE
18 IT.

19 THE COURT: OKAY. WELL, LET'S SHOOT FOR
20 9:00 A.M., THEN.

21 MR. WISNER: OKAY.

22 THE COURT: AND I MAY HAVE TO INTERRUPT WITH A
23 COUPLE LITTLE THINGS AROUND 10:00 O'CLOCK. WE'LL SEE IF
24 THEY ARE STILL ON CALENDAR.

25 MR. WISNER: I WILL ELBOW MY CO-COUNSEL TO TAKE
26 A BREAK AT 10:00 A.M.

27 THE COURT: YEAH. WELL, THE OTHER THING IS
28 WANT TO MAKE SURE WE FINISH. IF WE CAN FINISH A LITTLE

1 EARLY, THAT WOULD BE EVEN BETTER SO LET'S SEE WHAT WE
2 CAN DO. I WOULD APPRECIATE THAT.

3 I SEE MR. PETROSINELLI HAS JOINED US. HI.

4 MR. PETROSINELLI: HOW ARE YOU, YOUR HONOR?

5 THE COURT: I'M FINE.

6 ANY OTHER HOUSEKEEPING TODAY?

7 MR. WISNER: YEAH, SO THERE'S ONE ISSUE THAT WE
8 SORT OF ARE DISAGREEING ON AND WE KIND OF WOULD NEED
9 YOUR GUIDANCE. AND MAYBE YOU CAN'T TELL US UNTIL
10 FRIDAY.

11 OUR THINKING WAS WE WOULD DO -- MY THINKING WAS
12 THAT WE DO OUR CLOSINGS 45 MINUTES EACH ON TUESDAY
13 AFTERNOON AT THAT TIME FRAME, THE TIME SCHEDULE THAT YOU
14 TOLD US ABOUT BECAUSE INSTEAD OF THAT TIME THAT WE HAD
15 RESERVED FOR THIS, WE'RE USING DR. RITZ TO FINISH OFF
16 HER TESTIMONY.

17 WITH THAT SAID, YOUR HONOR, WE WILL --
18 MR. PETROSINELLI AND I SORT OF HAVE A FUNDAMENTAL
19 THRESHOLD DISAGREEMENT ABOUT WHETHER OR NOT THEY EVEN
20 NEED TO HAPPEN BECAUSE HE BELIEVES THAT HE NEEDS TO CALL
21 IN ALL OF HIS EXPERTS TO TESTIFY IN MARCH AS PART OF THE
22 SARGON RECORD, BUT WE DON'T THINK THAT'S NECESSARY. WE
23 THINK THAT RULE 402 DOESN'T ACTUALLY PROVIDE FOR OFFERS
24 OF PROOF UNLESS THE PARTIES -- THE TESTIMONY IS BEING
25 STRICKEN BECAUSE THEY ARE ATTACKING OUR TESTIMONY, WE --
26 THEY DON'T NEED TO MAKE A PROFER. WE THINK THE CASE LAW
27 IS PRETTY CLEAR ON THAT.

28 AND SO WE REALLY WOULD LIKE JUST LIKE TO

1 FINALLY FINISH THIS UP ON TUESDAY AND GET THE CASE
2 GOING, BUT I THINK WE DISAGREE UPON WHETHER OR NOT
3 THERE'S GOING TO BE NEED FOR FURTHER TESTIMONY.

4 THE COURT: AND I THINK I'VE KIND OF WAVERED
5 ON IT, BUT LET'S TALK ABOUT IT ON FRIDAY BECAUSE WE NEED
6 TO THINK IT THROUGH. IT SEEMS TO ME THAT THE ATTORNEYS
7 WHO HAVE ALREADY MET WITH THEIR EXPERTS SHAPE THE CROSS
8 EXAMINATION TO DEMONSTRATE, IN ESSENCE, WHAT THEIR
9 EXPERTS ARE GOING TO SAY.

10 SO I THINK WHAT I WOULD LIKE IS AN OFFER OF
11 PROOF FROM -- ON FRIDAY - WE'LL SQUEEZE IT IT SOMEWHERE.
12 WHAT IS IT YOU THINK THE EXPERTS ARE GOING TO SAY. I'D
13 WANT TO MAKE SURE THAT I THINK I NEED THAT FOR A SARGON
14 RULING. I THINK IT'S A LITTLE DANGEROUS FROM THE
15 DEFENDANTS' POINT OF VIEW TO PRESENT EXPERTS BECAUSE I
16 THINK IT THEN OPENS THE RECORD UP TO AN ARGUMENT THAT
17 THE COURT SOMEHOW BALANCED THE EVIDENCE OR DIDN'T DO ITS
18 JOB PROPERLY, SO YOU MIGHT WANT TO THINK THAT THROUGH
19 CAREFULLY, BECAUSE I THINK THE FUNDAMENTAL RULE, I THINK
20 IS CORRECTLY STATED BY MR. WISNER. THE POINT OF A 402
21 IS I HEAR WHAT THE EXPERT HAS TO SAY, DOES IT HOLD WATER
22 OR NOT? AND I DON'T KNOW HOW THE EXPERTS ENLIGHTEN THAT
23 OTHER THAN TO TELL ME THAT THE STUDIES, JUST AS A CROSS
24 EXAMINATION HAS ATTEMPTED TO SAY -- OH, YES, I CAN
25 EXCUSE THE WITNESS. YES, THANK YOU.

26 MR. WISNER: I WAS TEXTING HER AS WE SPOKE.

27 THE COURT: OH, YEAH. BY THANKING HER, I MEANT
28 TO EXCUSE HER. THANK YOU. ALFREDO IS KEEPING ME

1 STRAIGHT.

2 THE WITNESS: OKAY.

3 MR. PETROSINELLI: YOUR HONOR, WE COULD BE
4 PREPARED TO DO THAT ON FRIDAY.

5 THE COURT: OKAY.

6 MR. PETROSINELLI: WE THINK IT'S CRITICALLY
7 IMPORTANT FOR REASONS WE'VE COVERED WITH YOU BEFORE.

8 THE COURT: YEAH.

9 MR. PETROSINELLI: BUT ON FRIDAY WE CAN TALK
10 ABOUT WHY EXACTLY WE THINK WE NEED TO DO IT.

11 THE COURT: OKAY. THAT WOULD BE HELPFUL
12 BECAUSE OBVIOUSLY I KNOW A LOT MORE NOW THAN I DID
13 BEFORE AND SO I HAVE CONTEXT THAT I DIDN'T HAVE BEFORE
14 AND I'M OPEN EITHER WAY, BUT I JUST WANT TO MAKE SURE
15 WE'RE DOING IT APPROPRIATELY.

16 MR. PETROSINELLI: THANK YOU, YOUR HONOR.

17 THE COURT: YOU'RE WELCOME. SO I APPRECIATE
18 THAT. AND WE WILL HAVE THE DAY OFF TOMORROW FROM THIS
19 CASE ONLY, AND I'LL SEE YOU ON FRIDAY. I'M GOING TO
20 SHOOT TO GET HERE AT 9:00 O'CLOCK AND START WITH YOU
21 RIGHT AWAY.

22 MR. WISNER: THANK YOU, YOUR HONOR.

23 MR. PETROSINELLI: HAVE A GOOD EVENING, YOUR
24 HONOR. THANK YOU.

25

26

27 {TIME NOTED: 4:36 P.M.}

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STENOGRAPHIC REPORTER'S CERTIFICATION

I, JEANESE JOHNSON, CERTIFIED SHORTHAND
REPORTER, OFFICIAL REPORTER PRO TEMPORE, IN AND FOR THE
STATE OF CALIFORNIA, DO HEREBY CERTIFY:

THAT THE FOREGOING PROCEEDINGS WERE
REPORTED STENOGRAPHICALLY BY ME;

THAT THE FOREGOING IS A TRUE RECORD OF THE
PROCEEDINGS TAKEN AT THAT TIME.

I FURTHER CERTIFY THAT I AM NOT ATTORNEY
OR COUNSEL OF ANY OF THE PARTIES, NOR AM I A RELATIVE OR
EMPLOYEE OF ANY ATTORNEY OR COUNSEL OF ANY PARTY
CONNECTED WITH THE ACTION, NOR AM I FINANCIALLY
INTERESTED IN THE ACTION.

IN WITNESS WHEREOF, I HAVE SUBSCRIBED MY NAME THIS
6TH DAY OF FEBRUARY, 2022.



JEANESE JOHNSON, CSR NO. 11635, CLR
CERTIFIED STENOGRAPHIC REALTIME REPORTER
OFFICIAL REPORTER PRO TEMPORE

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