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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.



REPORTER'S TRANSCRIPT OF PROCEEDINGS
JANUARY 31, 2022
(DAY 1)



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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: KEVIN SHAPIRO, M.D., PH.D.

DIRECT	CROSS	REDIRECT
51	92	132

WITNESS: BEATE RITZ, M.D., PH.D.

DIRECT	CROSS	REDIRECT
137		

E X H I B I T S

EXHIBIT NUMBER	REFERENCED
137	56
71	66
651	112
635	114
674	114
661	129
3	139
32	146
140	151
159	175
57	193

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LOS ANGELES, CALIFORNIA;
MONDAY, JANUARY 31, 2022; 9:28 A.M.
BEFORE: HON. AMY D. HOGUE DEPARTMENT 7;
SUPERIOR COURT OF THE STATE OF CALIFORNIA
--000--

THE COURT: OKAY. I DID SPEND A LITTLE TIME OVER THE WEEKEND REVIEWING THE MOTION AND SOME OF THE OTHER PAPERS AND THE OPPOSITION AND REPLY AND I DID READ THROUGH THE EXPERT REPORTS, AND THIS MORNING I WAS JUST REVIEWING TO CLARIFY IN MY MIND SOME OF THE BASIC PRINCIPLES THAT WE HAVE AND I WAS USING THE RESTATEMENT FOR THAT PURPOSE, ALWAYS A HANDY SOURCE, AND OF COURSE WE HAVE IN CALIFORNIA, I THINK MOST EVERYWHERE ELSE NOW, A SUBSTANTIAL FACTOR TEST.

SO WHEN WE ARE ASKING THE QUESTION ARE METALS CAPABLE OF CAUSING A PARTICULAR CONDITION, I THINK WE ARE ASKING ARE THEY CAPABLE OF BEING A SUBSTANTIAL FACTOR CAUSING HARM.

AND THE RESTATEMENT GOES INTO A DISCUSSION THAT BASICALLY SAYS SOMETIMES WE CAN HAVE TWO INDEPENDENT CAUSES, NEITHER ONE OF WHICH WOULD HAVE CAUSED THE HARM AND SOMETIMES THERE IS A SYNERGY, AND IT SEEMED TO ME I SEE BOTH CONTINGENTS ON THE PLAINTIFF'S SIDE. AND THE RESTATEMENT GIVES AN EXAMPLE, A CASE WHERE THE PLAINTIFF CLAIMS THAT A VACCINATION CAUSED SEIZURES AND THE DEFENDANT CLAIMS THAT THE SEIZURES WERE NOT CAUSED BY

1 THE VACCINE, BUT BY A PREEXISTING TRAUMATIC INJURY THAT
2 IS SOMEWHAT PARALLEL TO OUR CASE IF YOU ASSUME THAT
3 THERE IS A GENETIC PREDISPOSITION TO ASD OR ADHD.

4 SO IT EXPLAINS THAT THE CAUSAL SET PRESENTS
5 THESE AS ALTERNATIVE CAUSES. IF THERE'S ENOUGH EVIDENCE
6 TO SUPPORT EACH OF THEM, THEN THE FACT-FINDER FIGURES
7 OUT WHICH ONE IS BETTER SUPPORTED BY THE EVIDENCE, BUT
8 IF THE EVIDENCE SHOWS THAT THE INJURY AND THE
9 VACCINATION CAN INTERACT AND CAUSE SEIZURES, THEN EACH
10 OF THEM MAY BE A SUBSTANTIAL CAUSE, AND SO ON.

11 SO THIS IS SORT OF A BASIC PRINCIPLE THAT'S
12 GUIDING MY THINKING TODAY.

13 I JUST ALSO WANT TO SAY THAT WHAT I'M LISTENING
14 FOR IS NOT WHETHER ANY OF THE EXPERTS ARE RIGHT OR
15 WRONG, BUT WHETHER, UNDER SARGON, THERE'S ENOUGH BASIS
16 IN SCIENCE FOR THE OPINIONS TO RENDER THEM SUFFICIENTLY
17 RELIABLE TO GO TO THE JURY.

18 SO JUST THAT'S WHAT I'M LOOKING FOR, WHAT'S THE
19 UNDERPINNING, WHAT DOES IT SAY AND WHAT HAVE WE GOT?

20 SO ANYWAY, WHO IS GOING TO TAKE THE LEAD TODAY?

21 YOU'RE GOING TO START, MR. WISNER, RIGHT?

22 MR. WISNER: THAT'S CORRECT, YOUR HONOR. I'M
23 GOING TO KICK OFF WITH OUR OPENING STATEMENT TO BE
24 FOLLOWED SHORTLY BY, I THINK, MR. PETROSINELLI, BUT I
25 DON'T KNOW, SOMEONE ON THEIR SIDE GOING NEXT.

26 THE COURT: OKAY.

27 MR. WISNER: THEY SHOULD EACH ABOUT BE A HALF
28 AN HOUR, AND THEN IMMEDIATELY WE'RE GOING TO CALL DR.

1 SHAPIRO FIRST TO THE STAND. OUR GOAL, YOU KNOW, ALL
2 THINGS GOING RIGHT, IS TO HAVE HIM UP AND OFF BEFORE
3 LUNCH. AND THEN IN THE AFTERNOON WE WILL HAVE DR. RITZ
4 AND HOPEFULLY GET THROUGH MOST OF HER DIRECT -- ALL OF
5 HER DIRECT AND MAYBE EVEN START CROSS, DEPENDING ON HOW
6 THE TIMING GOES.

7 THE COURT: OKAY. AND I WILL NEED TO TAKE A
8 BREAK AT 11:00 O'CLOCK, WHICH PROBABLY THE COURT
9 REPORTER ALSO WILL NEED A BREAK AT 11:00 O'CLOCK, I HAVE
10 A VERY QUICK HEARING, BUT OTHERWISE, I WOULD SUGGEST WE
11 JUST GO STRAIGHT FROM NOW TILL 11:00.

12 MR. WISNER: SOUNDS GREAT, YOUR HONOR.

13 WITH THAT, I'M READY TO PROCEED, YOUR HONOR, IF
14 YOU'RE READY AS WELL.

15 THE COURT: I'M READY.

16 MR. WISNER: OKAY. GREAT.

17 MAY IT PLEASE THE COURT, YOUR HONOR, I KNOW WE
18 HAD A CONTENTIOUS HEARING ON FRIDAY ABOUT WHETHER OR NOT
19 WE SHOULD EVEN GO FORWARD TODAY, AND I JUST WANT YOU TO
20 KNOW THAT WE REALLY DO APPRECIATE YOU AND YOUR STAFF
21 TAKING THE TIME TO HEAR US OUT AND TO LOOK AT THE
22 SCIENCE. I THINK THIS IS A REALLY IMPORTANT CASE.

23 AND BEFORE I GET TO THE SARGON ISSUES, I THINK
24 TAKING A MOMENT TO REFLECT SPECIFICALLY ON THE
25 IMPORTANCE OF THIS CASE IS PIVOTAL.

26 WE KNOW IN FEBRUARY OF LAST YEAR WE HAD THIS
27 CONGRESSIONAL REPORT WHICH INDICATED THAT THERE WERE
28 REALLY, REALLY HIGH LEVELS OF LEAD, ARSENIC AND MERCURY

1 FOUND IN BABY FOODS. WE KNOW ARSENIC AND LEAD AND
2 MERCURY ARE NEUROTOXINS. WE KNOW THAT THEY CAUSE BRAIN
3 DAMAGE AND WE KNOW THAT WHEN YOU EXPOSE A BABY WHOSE
4 BRAIN IS STILL DEVELOPING AT A YOUNG AGE TO THOSE
5 NEUROTOXINS, IT CAN CAUSE PERMANENT LIFE-LONG
6 DISABILITIES.

7 NOW, WE'RE GOING TO GO OVER A LOT OF THE
8 SCIENCE THAT UNDERPINS THAT, BUT CONCEPTUALLY AND
9 LOGICALLY, THE CONNECTION IS VERY CLEARLY THERE.

10 AND WHAT'S SO IMPORTANT ABOUT THIS CASE IS
11 SINCE, YOU KNOW, FEBRUARY OF LAST YEAR, THESE PRODUCTS
12 ARE STILL BEING SOLD, AND TODAY MILLIONS OF CHILDREN AND
13 BABIES ARE EATING THESE FOODS, AND ALTHOUGH THE FDA IS
14 TAKING ACTION TO GET THEM CLOSER TO ZERO IS THE PROGRAM,
15 SO THERE'S NO MORE HEAVY METALS IN THEM, THEY ARE NOT
16 GOING TO HAVE ANY REGULATORY ACTION UNTIL -- AT LEAST
17 FOR LEAD UNTIL APRIL OF '24 AND AFTER THAT THEY MIGHT
18 GET TO MERCURY AND ARSENIC SO WE HAVE A VERY LONG
19 RUNWAY, AND DURING THAT TIME A LOT OF PEOPLE ARE GETTING
20 HURT WHICH IS WHY WE BROUGHT THIS CASE AND THAT'S
21 UNPRECEDENTED.

22 BUT THE OTHER REASON FOR IT, YOUR HONOR, AND I
23 THINK THIS GOES FUNDAMENTALLY TO WHY WE'RE HERE IS
24 BECAUSE WE HAVE A CLIENT WHO IS -- SORRY, THERE WE ARE
25 -- WE HAVE A CLIENT NOAH WHO HAS AUTISM, AND YOU KNOW,
26 HE FILED THIS CASE NINE MONTHS AGO, AND TO THIS DAY,
27 WE'RE STILL WAITING TO SORT OF GET THIS CASE GOING.

28 YOU KNOW, HE'S AT A POINT IN HIS AGE IN HIS

1 LIFE WHERE HAVING RESOURCES AND MONEY MAKE A DIFFERENCE,
2 AND SO WHILE WE THINK ABOUT THESE SARGON ISSUES, IT'S
3 HARD -- WE CAN'T FORGET THAT THERE'S REAL PEOPLE BEHIND
4 THIS AND PEOPLE'S WHOSE BRAINS HAVE BEEN DAMAGED BECAUSE
5 OF THIS. I JUST WANT TO KEEP THAT IN CONTEXT.

6 NOW, AUTISM AWARENESS MONTH IS IN OCTOBER.
7 AUTISM AWARENESS DAY IS APRIL. AND THE THEME VERY OFTEN
8 FOR AUTISM IS ACTUALLY THE PUZZLE PIECES, AND SO TODAY
9 WE HAVE PUT TOGETHER THE SARGON PUZZLE TO SORT OF
10 OUTLINE HOW WE'RE GOING TO PROCEED FORWARD TODAY IN THIS
11 OPENING STATEMENT.

12 THE FIRST THING WE'RE GOING TO TALK ABOUT, YOUR
13 HONOR, IS THE LAW. I'M GOING TO SHOW YOU -- DISCUSS
14 THREE IMPORTANT CASES THAT I THINK THE COURT SHOULD PAY
15 VERY CLOSE ATTENTION TO; OBVIOUSLY ONE OF THEM IS
16 SARGON.

17 THEN I WANT TO TALK ABOUT WHAT AUTISM IS, WHAT
18 WE KNOW ABOUT AUTISM, WHEN IT DEVELOPS, HOW IT DEVELOPS,
19 THE INFLUENCES OF GENETICS AND ENVIRONMENT AND WHAT IS
20 KNOWN IN THE LITERATURE ABOUT IT.

21 THEN WE'RE GOING TO TALK ABOUT HEAVY METALS.
22 WE'RE GOING TO TALK ABOUT WHAT WE KNOW ABOUT HEAVY
23 METALS AND WHAT WE DON'T KNOW ABOUT HEAVY METALS, AND
24 IMPORTANTLY, WHAT WE KNOW ABOUT HEAVY METALS AND AUTISM
25 AND ADHD.

26 AND THEN FINALLY, YOUR HONOR, I WANT TO TALK
27 BRIEFLY ABOUT OUR EXPERTS.

28 YOU'RE FIRST GOING TO HEAR THIS WEEK FROM DR.

1 SHAPIRO, THEN FROM DR. RITZ, THEN FROM DR. GARDENER AND
2 THEN FINALLY DR. ASCHNER; ALL OF THESE EXPERTS HAVE VERY
3 WELL REASONED AND THOROUGH REPORTS AND HAVE BEEN WORKING
4 IN THESE AREAS MOST, IF NOT THEIR ENTIRE CAREERS. THEY
5 ARE REALLY SEMINOLE EXPERTS IN THIS AREA.

6 SO WITH THAT SORT OF THE ROADMAP, YOUR HONOR,
7 LET'S START OFF WITH THE FIRST PIECE. START OFF WITH
8 CALIFORNIA LAW.

9 NOW, THE THREE CASES THAT I REALLY THINK THE
10 COURT SHOULD PAY ATTENTION TO, TWO CALIFORNIA COURT OF
11 APPEAL CASES, THE ROBERTI DECISION AND THE COOPER CASE
12 AND OF COURSE SARGON.

13 NOW, ALL THREE OF THESE CASES ACTUALLY INVOLVE
14 TRIAL COURT DECISIONS IN LOS ANGELES COUNTY SO THEY ARE
15 PARTICULARLY ON POINT FOR US.

16 LET'S START WITH OFF WITH ROBERTI.

17 AND THIS CASE IS REALLY IMPORTANT, YOUR HONOR,
18 BECAUSE IT SPECIFICALLY RELATES TO AUTISM.

19 IN THAT CASE A CHILD BROUGHT A CLAIM AGAINST A
20 PESTICIDE SPRAYING COMPANY ALLEGING THAT THE PESTICIDE
21 THAT THEY WERE EXPOSED TO SUBSTANTIALLY CONTRIBUTED TO
22 HIS DEVELOPMENT OF AUTISM. THE DEFENDANTS FILED A
23 MOTION IN LIMINE, THE TRIAL COURT GRANTED IT, AND ONE OF
24 THE REASONS THAT WAS GIVEN IS AS IT SAYS RIGHT HERE:
25 THAT THERE IS A CONSENSUS IN THE MEDICAL COMMUNITY THAT
26 THERE IS NO KNOWN CAUSE OF AUTISM AND THAT THERE IS NO
27 CONSENSUS AMONGST THE SCIENTIFIC COMMUNITY THAT
28 PESTICIDES CAUSE AUTISM.

1 NOW, IN THAT CASE THERE ACTUALLY WASN'T ANY
2 EPIDEMIOLOGY. THE EXPERTS THAT THE PLAINTIFFS HAD
3 PROVIDED ONLY PROVIDED TESTIMONY BASED ON ANIMAL
4 STUDIES. IT WENT UP TO THE COURT OF APPEAL AND THE
5 COURT REVERSED THE TRIAL COURT.

6 AND BASICALLY THE COURT EXPLAINED THAT IF THE
7 EXPERT IS RELYING UPON PEER-REVIEWED LITERATURE AND IF
8 THE CONCLUSION THAT THEY ARE ARRIVING FROM THAT
9 LITERATURE ARE NOT IRRATIONAL OR, YOU KNOW, CRAZY, THEN
10 IT'S REALLY A QUESTION FOR THE JURY.

11 AND ULTIMATELY THE CASE CAME BACK ON APPEAL.
12 THE CASE WENT TO TRIAL AND THE DEFENDANTS ACTUALLY WON.
13 THEY WERE ABLE TO SHOW THE JURY THAT THERE WAS NO CAUSE
14 BETWEEN THAT PESTICIDE EXPOSURE AND AUTISM.

15 WHY THIS IS SO IMPORTANT IS IT'S THE ONLY
16 CALIFORNIA COURT OF APPEAL DECISION THAT SPECIFICALLY
17 LOOKS AT THE CAUSE OF AUTISM. AND THEY MADE IT VERY
18 CLEAR THAT YOU CAN PASS THAT THRESHOLD IF YOU RELY UPON
19 RELIABLE DATA AND HAVE NON CONJECTURE, NON LEAPS OF
20 LOGIC CONCLUSIONS. THAT WAS FORMALIZED, YOUR HONOR,
21 ULTIMATELY IN THE SARGON DECISION.

22 RIGHT, HERE THE COURT LAID OUT SORT OF THE
23 STANDARD OF THE DAY ON HOW THE COURT CONSIDERS EXPERT
24 TESTIMONY. AND REALLY WHAT IT BOILS DOWN TO IS THAT
25 WHETHER THE EXPERT'S OPINION IS FOUNDED ON SOUND LOGIC
26 AND NOT A DECISION ON ITS PERSUASIVENESS, RIGHT, THE
27 COURT MUST SIMPLY DETERMINE WHETHER THE MATTER RELIED ON
28 CAN PROVIDE A REASONABLE FAITHFUL BASIS FOR THE OPINION

1 OR WHETHER THAT OPINION IS BASED ON A LEAP OF LOGIC OR
2 CONJECTURE. THE COURT DOES NOT RESOLVE SCIENTIFIC
3 CONTROVERSY.

4 AND WHAT SARGON IS SAYING AND THIS IS REALLY AT
5 THE HEART AND SOUL OF IT, IS IF YOU'VE GOT REALLY
6 QUALIFIED EXPERTS AND THEY ARE RELYING UPON
7 PEER-REVIEWED LITERATURE, THE ONLY WAY THEY GET EXCLUDED
8 FROM A JURY IS IF THEIR CONCLUSIONS RELY UPON LEAPS OF
9 LOGIC OR CONJECTURE. THERE'S A REASONABLE BASIS,
10 THERE'S PLAUSIBILITY IF IT -- A PERSON CAN MAKE SENSE OF
11 IT, OUT OF THE EXPERT USING STANDARD PROCEDURES, THEN IT
12 GETS TO A JURY AND THEY DECIDE THE CONTROVERSY. YOU
13 DON'T NEED A CONSENSUS WITHIN THE COMMUNITY ABOUT A
14 RESULT OR A BELIEF.

15 THAT SAID HERE, YOUR HONOR, WE KIND OF DO. WE
16 ACTUALLY HAVE A HEAPING AMOUNT OF EVIDENCE AND WE ARE
17 GOING TO GO THROUGH THAT IN A SECOND, BUT THE POINT IS
18 WE DON'T EVEN NEED THAT TO GET OVER SARGON.

19 AND FINALLY, YOUR HONOR, THIS IS AN IMPORTANT
20 CASE OUT OF, AGAIN, OUT THE COMPLEX COURT HERE IN LOS
21 ANGELES, AND IN THIS CASE IT WAS A CANCER CASE. AND THE
22 TRIAL JUDGE LET THE CASE GO TO THE JURY, RETURNED A
23 VERDICT. AND THEN AFTER THE VERDICT WAS RETURNED, THE
24 COURT STRUCK THE EXPERT SAYING THAT IT WAS NOT RELIABLE
25 AND TOOK -- PUT -- SET THE VERDICT ASIDE AND IT WENT UP
26 ON APPEAL.

27 IMPORTANTLY HERE, THERE, THE COURT DID EXACTLY
28 WHAT THE DEFENDANTS ASKED HIM TO; SPECIFICALLY, HE

1 WEIGHED IT INTO THIS SPECIFIC EPIDEMIOLOGICAL STUDIES,
2 HE WEIGHED THE FLAWS AND THE WEAKNESSES OF EACH STUDY,
3 AND IN DOING SO, HE COMMITTED REVERSIBLE ERROR. AND THE
4 COURT OF APPEAL SAID, LISTEN, YOU JUST CAN'T DO THAT,
5 YOU CAN'T ENGAGE IN A PIECE-MEAL ANALYSIS OF THE
6 EPIDEMIOLOGICAL DATA, YOU CAN'T DISAGREE WITH THE
7 CONCLUSIONS IN THE PEER-REVIEWED LITERATURE, YOU HAVE TO
8 LEAVE THAT TO THE JURY, AND THEY ULTIMATELY REINSTATED
9 THE VERDICT AND, YOU KNOW, IT CAME DOWN.

10 AND THIS HAS REALLY BEEN THE LAW OF CALIFORNIA
11 IN THE AREA OF SARGON, PARTICULARLY OF AN AREA OF, LIKE,
12 AUTISM, JUST LIKE IN CANCER IN COOPER WHERE THERE'S
13 MULTIPLE CAUSES, RIGHT, WHERE THERE IS NO SINGLE CAUSE
14 OF CANCER, THERE IS NO SINGLE CAUSE OF AUTISM, THIS IS A
15 MULTI-CAUSAL PHENOMENON.

16 SO WITH LEGAL BACKGROUND IN MIND, LET'S TALK
17 ABOUT AUTISM.

18 NOW, AUTISM IS A SPECTRUM DISORDER, OKAY, AND
19 THIS DIAGRAM HERE KIND OF ILLUSTRATES THAT. YOU HAVE
20 VARIOUS BEHAVIORAL SYMPTOMATIC EXPRESSIONS IN A CHILD
21 AND THOSE EXPRESSIONS MANIFEST IN DIFFERENT WAYS, IT HAS
22 DIFFERENT AMOUNTS, RIGHT, SO YOU MIGHT HAVE A CHILD THAT
23 HAS REALLY BAD REPETITIVE BEHAVIOR, BUT PRETTY GOOD
24 MOTOR SKILLS. HIS EXECUTIVE FUNCTIONING IS VERY
25 DEFECTIVE, BUT HE IS ABLE TO COMMUNICATE, RIGHT. THAT
26 CHILD WOULD BE ON THE SPECTRUM, THE CHILD WOULD BE
27 CONSIDERED AUTISTIC, BUT THEY HAVE DIFFERENT TYPES OF
28 THINGS AND THAT'S WHY THE HISTORICAL LINEAR SORT OF

1 SPECTRUM DOESN'T REALLY APPLY ANYMORE, IT'S SORT OF
2 CONSIDERED THIS SORT OF CIRCULAR AND GLOBAL MISMATCH OF
3 SYMPTOMS, THERE IS NO BIOLOGICAL MARKER FOR AUTISM,
4 THERE IS REALLY NOTHING BEYOND LOOKING AND OBSERVING THE
5 CHILD.

6 AND WHAT WE KNOW IS THAT CAN HAPPEN AT
7 DIFFERENT AGES, RIGHT, YOU CAN OBSERVE THIS PHENOMENA AT
8 DIFFERENT TIMES.

9 NOW, TO GIVE SOME SORT OF BASIC BACKGROUND, I'M
10 GOING TO SHARE WITH THIS COURT THE CDC'S WEBSITE, OKAY.
11 AND THIS, RIGHT, YOU CAN SEE THIS IS THE CDC'S WEBSITE,
12 AND RIGHT HERE WE HAVE SOME DATA ON PREVALENCE, RIGHT,
13 AND WE KNOW THAT ONE IN FOUR CHILDREN HAVE BEEN
14 IDENTIFIED WITH AUTISM SPECTRUM DISORDER, WE KNOW THAT
15 IT OCCURS IN ALL RACIAL, ETHNIC AND SOCIOECONOMIC
16 GROUPS. ASD IS FOUR TIMES MORE COMMON AMONGST BOYS THAN
17 AMONG GIRLS.

18 IT'S KIND OF INTERESTING BECAUSE IT GETS INTO
19 OUR PLAUSIBILITY ARGUMENT, WHICH WE'LL EXPLAIN AS WE GO
20 ON. WE ALSO KNOW THAT ONE IN SIX CHILDREN BETWEEN THREE
21 AND SEVENTEEN WERE DIAGNOSED WITH A DEVELOPMENTAL
22 DISABILITY WHICH INCLUDES STUFF LIKE ADHD.

23 AND THAT'S IMPORTANT. ADHD IS VERY OFTEN
24 ASSOCIATED WITH AUTISM ITSELF; AGAIN, THAT LENDS A LOT
25 MORE EVIDENCE TO OUR THEORY OF PLAUSIBILITY.

26 NOW, IF WE GO DOWN INTO THIS DOCUMENT, WE HAVE
27 ON THE SECTION RIGHT HERE, "WHAT IS ASD?" THEY ACTUALLY
28 HAVE A SECTION DOWN HERE CALLED, "CAUSES AND RISK

1 FACTORS." THIS IS WHAT THE CDC IS SAYING.

2 AND THEY SAY, "WE DO NOT KNOW ALL THE CAUSES OF
3 ASD, HOWEVER, WE HAVE LEARNED THAT THERE ARE
4 MANY CAUSES FOR MULTIPLE TYPES OF ASD, THERE
5 MAY BE MANY DIFFERENT FACTORS THAT MAKE THE
6 CHILD MORE LIKELY TO HAVE AN ASD, INCLUDING
7 ENVIRONMENTAL, BIOLOGIC AND GENETIC FACTORS."

8 AND THAT'S REALLY IMPORTANT, YOUR HONOR,
9 BECAUSE WHEN WE TALK ABOUT AUTISM, IF ANYBODY TELLS YOU
10 IT'S ALL GENETIC, THEY'RE WRONG. IF ANYONE TELLS YOU
11 IT'S ALL ENVIRONMENTAL, IT'S WRONG, RIGHT. NOT ONLY IS
12 THERE A CONFLUENCE OF FACTORS FROM BOTH SIDES, BUT
13 THERE'S SOMETHING CALLED EPI GENETICS WHERE THE GENES
14 ARE ACTUALLY TURNING ON AND OFF IN RESPONSE TO
15 ENVIRONMENTAL INFLUENCES, AND THAT EPI GENETICS IS AT
16 CUTTING-EDGE SCIENCE RIGHT NOW. AND IN THAT CONTEXT,
17 BOTH THE EXPOSURES AND THE GENETICS CAN PLAY A ROLE IN
18 LEADING TO IT.

19 A GREAT EXAMPLE OF THAT, YOUR HONOR, IF A CHILD
20 -- IF AUTISTIC CHILDREN HAVE A GENE THAT MAKES IT HARDER
21 FOR THEM TO METABOLIZE METALS AND EXCRETE THEM, YOU
22 COULD SEE A SITUATION WHERE YOU HAVE TWO CHILDREN WHO
23 WERE EXPOSED TO THE SAME AMOUNT OF METAL, BUT THE ONES
24 THAT AREN'T ABLE TO PROCESS IT SUFFER MORE BRAIN DAMAGE
25 AND THEREFORE, DEVELOP ASD. THERE YOU HAVE A PURE
26 SYNERGY BETWEEN THE GENETIC PREDISPOSITION AS WELL AS
27 THE METALS THAT WOULD BE CAUSING IT.

28 INTERESTING ENOUGH HERE ON THIS WEBSITE WE HAVE

1 CHILDREN, YOU SEE IT'S BULLET POINT NUMBER TWO, IT SAYS:

2 "CHILDREN WHO HAVE A SIBLING WITH ASD ARE AT A
3 HIGHER RISK OF ALSO HAVING ASD."

4 AND IF WE GO DOWN TO THE CITATIONS, YOU'LL SEE
5 THAT THE FIRST CITATION THERE IS TO A STUDY BY
6 HALLMAYER, NUMBER 6.

7 I'D LIKE TO SHOW THE COURT THAT STUDY.

8 SO THIS IS THE HALLMAYER STUDY, AND IT'S REALLY
9 IMPORTANT BECAUSE WHAT THEY DID HERE, YOUR HONOR, IS
10 THEY ACTUALLY LOOK AT TWINS AND WHO HAD CONCORDANCE AND
11 DISCORDANCE; SPECIFICALLY WHAT WE REFER TO THERE IS THEY
12 LOOKED AT CHILDREN WHO ONE OF THE TWINS HAS AUTISM AND
13 THE OTHER ONE DOES NOT AND THEY LOOKED AT BOTH
14 GENETICALLY IDENTICAL TWINS AND FRATERNAL TWINS.

15 AND, YOU KNOW, I CAN GET INTO THE NUANCES HERE,
16 BUT THE RESULTS OF THE STUDY ARE PRETTY STRAIGHTFORWARD,
17 RIGHT, ALTHOUGH THEY ARE KIND OF HARD TO FULLY
18 UNDERSTAND.

19 IT SAYS RIGHT HERE, THE CONCORDANCE FOR MALE
20 TWINS WAS .58 FOR MONOZYGOTIC TWINS.

21 SO WHAT THAT'S REFERRING TO, YOUR HONOR, IS
22 GENETICALLY IDENTICAL TWINS IN THAT THEY WERE BOTH
23 DIAGNOSED WITH AUTISM 58 PERCENT OF THE TIME, SO THAT
24 MEANS 42 PERCENT OF THE TIME ONE OF THE GENETICALLY
25 IDENTICAL TWINS HAD AUTISM AND THE OTHER DID NOT. WE
26 HAVE SIMILAR RESULTS -- AND THAT'S FOR MALES. FOR
27 FEMALES WE HAVE A SIMILAR RESULT. WE HAVE LOOKS LIKE
28 CONCORDANCE OF ABOUT 60 PERCENT; SO AGAIN, A 40 PERCENT

1 DISCORDANCE, YOU CAN SEE RIGHT HERE.

2 AND THEN FOR PATERNAL TWINS WE HAVE AN
3 INTERESTING THING, AND ALTHOUGH THEY DON'T HAVE
4 IDENTICAL GENES, THEY HAVE VERY SIMILAR ONES, THEY COME
5 FROM THE SAME WOMB, AND THERE WE HAVE DISCORDANCE -- WE
6 HAVE CONCORDANCE OF .27, MEANING, WE HAVE DISCORDANCE OF
7 OVER 70 PERCENT, 73 PERCENT, THAT'S AMONGST BOYS. AND
8 AMONGST GIRLS OR WOMEN, THERE WAS A -- OH, SORRY --
9 THERE WAS 31 PERCENT. YOU CAN SEE IT DOWN HERE.

10 OKAY. THE POINT OF THIS, YOUR HONOR, IS THAT
11 WHETHER IT'S A GENETICALLY IDENTICAL OR FRATERNAL TWINS,
12 THERE IS CONSIDERABLE INSTANCES WHERE ONE OF THEM
13 DEVELOPS AUTISM AND THE OTHER DOES NOT.

14 WHAT DOES THAT TELL YOU?

15 THAT TELLS US THAT GENES DON'T TELL THE WHOLE
16 STORY. WHEN TWO TWINS WHO HAVE THE SAME GENES, ONE OF
17 THEM DEVELOPS AUTISM, THE OTHER DOESN'T, GENES OBVIOUSLY
18 CAN'T TELL THE WHOLE STORY. SOMETHING ELSE IS
19 HAPPENING.

20 AND THIS IS WIDELY ACCEPTED WITHIN THE AUTISM
21 COMMUNITY.

22 THE GENERAL IDEA, YOUR HONOR, IS THAT THERE IS
23 A CONNECTION BETWEEN THE GENES AND THE ENVIRONMENT AND
24 ONE OF THOSE ENVIRONMENTAL EXPOSURES IS METAL.

25 NOW, INTERESTING ENOUGH, I'M GOING TO GO BACK
26 TO THE CDC WEBSITE FOR JUST ONE SECOND.

27 AND AS WE SEE HERE UNDER THE GENETIC RISK
28 FACTORS, AND THIS IS IMPORTANT BECAUSE IT SAYS RIGHT

1 HERE, "THERE IS SOME EVIDENCE THAT THE CRITICAL PERIOD
2 FOR DEVELOPING ASD OCCURS BEFORE, DURING AND
3 IMMEDIATELY AFTER BIRTH."

4 AND WHAT'S INTERESTING ABOUT THAT IS THEY ARE
5 SAYING THAT THE CRITICAL WINDOW OF VULNERABILITY ISN'T
6 JUST PRENATAL, RIGHT, IT'S ALSO AFTER BIRTH BECAUSE THE
7 BRAIN IS DEVELOPING AND THERE'S PLASTICITY THAT IS
8 OCCURRING IN THAT -- THOSE YOUNGER YEARS AND THAT CAN
9 LEAD TO WHAT WE KNOW AS AUTISM.

10 AND SO YOU KNOW, NOW LOOKING AT SOME OF THE
11 CDC, YOUR HONOR, IF YOU LOOK AT EXHIBIT 17 OR CITATION
12 17, THE AUTHOR ON HERE IS ACTUALLY DR. GARDENER. IT'S
13 OUR EXPERT IN THIS CASE. AND THAT'S JUST A REFLECTION
14 THAT, YOU KNOW, A LOT OF WHAT OUR EXPERTS ARE DOING IN
15 THIS CASE, AND YOU'LL SEE THIS THROUGHOUT THE WEEK, THEY
16 ALL HAVE OPINIONS THAT THEY DID NOT ARRIVE AT FOR THE
17 FIRST TIME IN LITIGATION, THEY ARE PUBLISHED IN THIS
18 AREA, THEY ARE WIDELY ACCEPTED WITHIN THE SCIENTIFIC
19 COMMUNITY AND I THINK WITHIN THE AUTISM COMMUNITY AS
20 WELL.

21 SO GOING BACK TO THE CONNECTION HERE.

22 THE NEXT STEP, THEN, IS LOOKS LIKE YOU HAVE
23 METALS.

24 NOW, WHAT DO WE KNOW ABOUT METALS, YOUR HONOR?
25 WELL, WE KNOW THEY ARE NEUROTOXIC, THAT'S JUST
26 ESTABLISHED. AND WE KNOW THAT THEY HAVE A DELETERIOUS
27 EFFECT ON THE BRAIN. AND YOU'RE GOING TO HEAR AT LENGTH
28 FROM DR. ASCHNER ABOUT THIS WHO HAS BEEN STUDYING HEAVY

1 METALS AND THEIR EFFECTS ON THE BRAIN SINCE THE
2 BEGINNING OF TIME. HE'S PROBABLY THE MOST RENOWNED
3 EXPERT IN THE WORLD ON THIS AREA. THERE'S MUSEUMS BASED
4 ON HIS WORK. I MEAN, HE REALLY IS INCREDIBLY WELL
5 CREDENTIALLED AND HE'S GOING TO TALK ABOUT WHAT THEY DO.

6 BUT I WANT TO TAKE JUST A QUICK MOMENT TO SHOW
7 YOU AN INTERESTING STUDY, AND I'M JUST GOING TO DO THIS
8 QUICKLY BECAUSE I DON'T WANT TO SPEND TOO MUCH TIME ON
9 IT. BUT THIS IS A STUDY THAT WAS DONE OUT THE CLEVE --
10 I'M SORRY -- THE CINCINNATI LEAD CITE, AND IN THIS STUDY
11 WHAT THEY DID IS THEY LOOKED AT CHILDREN PRE-BIRTH SO
12 WHEN THEY -- WHEN THOSE MOTHERS WERE PREGNANT, AND THEY
13 FOLLOWED THEM FOR 25 YEARS TAKING LEAD MEASUREMENTS OF
14 THEIR BLOOD AT VARIOUS POINTS THROUGHOUT THEIR LIVES
15 WHEN THEY WERE YOUNG, A COUPLE YEARS OLD, ET CETERA.

16 AND WHAT THEY FOUND -- WHAT THEY DID THEN AFTER
17 25 YEARS IS THEY TOOK THESE NOW GROWN ADULTS AND THEY
18 LOOKED AT THEIR BRAIN. THEY LOOKED TO SEE WHAT WAS --
19 WHAT HAD HAPPENED IN THEIR ACTUAL BRAINS. THEY TOOK
20 MRI'S. AND WHAT THEY FOUND WAS PRETTY AMAZING. THEY
21 FOUND THAT IN CHILDHOOD EXPOSURES TO LEAD LED TO THESE
22 SPECIFIC AREAS OF THE BRAIN BEING UNDERDEVELOPED OR
23 DAMAGED. THERE WAS LESS BRAIN VOLUME THERE, RIGHT.

24 AND WHY THIS IS SO KEY IS IF WE LOOK AT --
25 SORRY -- LET ME GO DOWN TO THE BOTTOM PAGE, SORRY, IT'S
26 THE CONCLUSIONS.

27 WHAT THEY FOUND HERE IS THAT IN SUMMARY, WE
28 FOUND THAT EARLY CHILDHOOD LEAD EXPOSURE IS ASSOCIATED

1 WITH STRUCTURAL VOLUME LOSS IN THE BRAIN. THE INJURY
2 AFFECTS BRAIN REGIONS CLASSICALLY CONSIDERED RESPONSIBLE
3 FOR EXECUTIVE FUNCTION, BEHAVIOR REGULATION AND FINE
4 MOTOR CONTROL.

5 THOSE ARE THE VERY PARTS OF THE BRAIN THAT WE
6 SEE DEFECTS IN THAT WE THEN CHARACTERIZE AS AUTISM. AND
7 SO YOU HAVE THIS REALLY ROBUST KNOWLEDGE BASE ABOUT THE
8 EFFECTS OF CHILDHOOD EXPOSURE AND HEAVY METALS. HERE WE
9 HAVE A VERY GOOD ONE ON LEAD AND HOW IT LEADS TO
10 LITERALLY BRAIN DAMAGE IN THE AREA OF THE BRAIN THAT YOU
11 WOULD EXPECT TO HAVE BRAIN DAMAGE FOR ASD.

12 I MEAN, THE CONNECTIONS HERE ARE TRULY
13 UNBELIEVABLE.

14 AND THE THING, YOUR HONOR, IS WHEN YOU ACTUALLY
15 CALL -- LOOK AT THE DATA, RIGHT, AND SO WE'RE GOING TO
16 LOOK AT THIS OBVIOUSLY TODAY WITH DR. RITZ, BUT THIS IS
17 THE BODY, THE CORPUS OF STUDIES ON LEAD.

18 AND AS YOU SEE HERE, EVERYTHING ON THE LEFT
19 THAT'S POSITIVE AND STATISTICALLY SIGNIFICANT. WE HAVE
20 THIS AREA HERE, THESE ARE POSITIVE, BUT NOT SIGNIFICANT,
21 THEN WE HAVE THE NULL STUDIES RIGHT HERE. WE HAVE
22 NEGATIVE AND NOT SIGNIFICANT. WE HAVE NEGATIVE AND
23 STATISTICALLY SIGNIFICANT.

24 AND WHEN YOU, FOR EXAMPLE, JUST TAKE OUT THE
25 NON SIGNIFICANT RESULTS AND YOU COMPARE THE POSITIVE
26 VERSUS THE NEGATIVE, I MEAN, IT'S NOT EVEN CLOSE, RIGHT.
27 AND THIS IS SUPPORTED BY A WHOLE HOST OF LITERATURE THAT
28 WE'RE GOING TO GET INTO OBVIOUSLY WITH THE COURT

1 THROUGHOUT THIS WEEK, OKAY, RIGHT.

2 ONE OF THOSE STUDIES I THINK IS GOING TO BE
3 REALLY POWERFUL AND HELPFUL FOR THE COURT AND THAT IS
4 SPECIFICALLY A STUDY THAT WAS DONE AT THE NIH. AND THIS
5 WAS A STUDY THAT WAS PRETTY COOL.

6 SO LET ME KIND OF WALK YOU THROUGH WHAT THEY
7 DID.

8 SO THEY TOOK SETS OF TWINS THAT HAD
9 DISCORDANCE, MEANING, ONE OF THE TWINS HAD AUTISM AND
10 ONE OF THEM DIDN'T, AND THEY COMPARED THEM TO TWINS THAT
11 HAD CONCORDANCE AND THEY BOTH WERE IN THE SENSE THAT
12 THEY DIDN'T HAVE AUTISM. THEN THEY TOOK THEIR BABY
13 TEETH AND THEY ACTUALLY DRILLED INTO THEM TO FIND OUT
14 EXACTLY WHAT THEIR LEAD EXPOSURES WERE AT PRENATALLY AND
15 POSTNATALLY DOWN TO THE DAY, PRETTY UNBELIEVABLY EXACT
16 EXPOSURES, AND WHAT THEY FOUND WAS PRETTY REMARKABLE.

17 THEY SAID -- THEY FOUND, "WHEN COMPARING ASD
18 DISCORDANT TWINS WITH NON ASD CONTROLLED TWIN
19 PAIRS, WE FOUND THAT LEAD LEVELS WERE
20 CONSISTENTLY HIGHER IN ASD CASES THAN THEIR NON
21 ASD CO-TWINS FROM 20 WEEKS BEFORE BIRTH TO 30
22 WEEKS AFTER BIRTH," RIGHT.

23 AND THEN LATER ON THEY GO ON TO TALK ABOUT HOW
24 THE ASSOCIATION -- AND THIS IS REFERRING TO SEVERITY OF
25 AUTISM -- THAT THE ASSOCIATION WAS STATISTICALLY
26 SIGNIFICANT FROM 10 WEEKS BEFORE BIRTH TO 30 WEEKS AFTER
27 BIRTH. THE STRONGEST ASSOCIATION TO BE 5 WEEKS
28 PRENATALLY.

1 AND WHAT THIS IS SAYING, YOUR HONOR, IS WHEN
2 YOU ACTUALLY LOOK AT THE ACTUAL MEDICAL CONTENT THAT
3 THEY WERE EXPOSED TO AT THAT TIME, CHILDREN WHO
4 DEVELOPED ASD HAD POST-NATAL INCREASED LEVELS OF LEAD,
5 AND THAT, YOUR HONOR, IS 100 PERCENT CONSISTENT, RIGHT,
6 WITH THIS CORPUS OF LITERATURE WHICH SHOWS US THAT THE
7 CHILDREN WHO ARE HAVING ASD, WHETHER IT BE IN THE URINE,
8 WHICH IS THE YELLOW STUDIES OR THE BLOOD, WHICH IS THE
9 RED BIOMARKERS OR WHETHER THEIR HAIR OR WHETHER THEIR
10 TEETH AND TOENAILS OR WHETHER JUST ECOLOGICALLY THE AIR
11 POLLUTION THEY ARE BREATHING HAS MORE LEAD IN IT, WHEN
12 YOU LOOK AT ALL OF THIS, IT'S CONSISTENTLY SHOWING THAT
13 CHILDREN WHO HAVE AUTISM HAVE HIGHER EXPOSURES TO LEAD.

14 AND WHEN YOU ADD THAT TO OUR UNDERSTANDING OF
15 THE BIOLOGICAL PLAUSIBILITY AND WHAT HE KNOW LEAD AT A
16 CHILDHOOD AGE DOES TO THE BRAIN, REACHING THE CONCLUSION
17 THAT EARLY LIFE EXPOSURE TO LEAD IS A CAUSAL FACTOR IN
18 DEVELOPING ADHD -- ASD DOES NOT REQUIRE A LEAP OF LOGIC,
19 IT DOES NOT REQUIRE CONJECTURE, IT JUST REQUIRES COMMON
20 SENSE.

21 AND THE THING IS, YOUR HONOR, AND YOU'LL SEE
22 THIS AS WELL FOR -- AND I'LL QUICKLY GO THROUGH BECAUSE
23 I DON'T WANT TO SPEND TOO MUCH TIME GOING INTO THE
24 STUDY -- THIS IS THE LITERATURE ON ADHD AND LEAD, RIGHT.

25 AGAIN, THERE ISN'T A SINGLE NEGATIVE STUDY
26 THAT'S STATISTICALLY SIGNIFICANT. THERE'S TWO THAT ARE
27 NULL THAT ARE NOT STATISTICALLY SIGNIFICANT, AND THERE
28 IS JUST OVERWHELMING NUMBER OF STUDIES SHOWING THAT IN

1 FACT IT DOES -- IT'S ASSOCIATED.

2 AND A LOT OF THESE STUDIES ARE PROSPECTIVE,
3 YOUR HONOR. THIS IS WHERE THEY ARE MEASURING A CHILD AT
4 A YOUNG AGE AND THEN FOLLOWING THEM FOR YEARS AND
5 MEASURING THEIR LEVELS IN THEIR BLOOD, AND AS LOW AND
6 BEHOLD, THOSE WHO HAVE GREATER EXPOSURES TO LEAD HAVE
7 GREATER INCIDENCE OF ADHD.

8 THE SCIENCE, YOUR HONOR, IS VERY SIMILAR FOR
9 MERCURY, AGAIN, HERE IS THE CORPUS OF DATA. HERE
10 THERE'S DEFINITELY MORE NULL RESULTS AND NOT IN THE
11 SIGNIFICANT RESULTS, BUT THERE'S STILL AN OVERWHELMING
12 AMOUNT OF POSITIVE AND STATISTICALLY SIGNIFICANT DATA,
13 VARIOUS BIOMARKERS AND DIFFERENT POPULATIONS ACROSS THE
14 WORLD.

15 AND FINALLY, WE HAVE VERY STRONG EVIDENCE AS
16 WELL WITH ARSENIC, ALTHOUGH THERE IS AGAIN A LARGER
17 NUMBER OF NOT SIGNIFICANT RESULTS. WHEN YOU TAKE OUT
18 THOSE NON SIGNIFICANT RESULTS, WHICH ARE HARD TO
19 INTERPRET ONE WAY OR THE OTHER, AGAIN, THE LITERATURE IS
20 CLEAR, IT'S CLEARLY SAYING ONE THING.

21 AT THE BEGINNING OF THIS CASE, YOUR HONOR, SIX
22 MONTHS AGO WHEN YOU FIRST SAID, HEY, LET'S DO AN EARLY
23 SARGON, YOU SAID, I TOLD YOU THAT, YOU KNOW, WE REALLY
24 WEREN'T JUST TALKING, YOU KNOW, WE WEREN'T BS'ING YOU,
25 RIGHT, THAT THIS WAS A LEGIT SCIENCE BACKING IT UP.

26 AND I WANT TO SHOW YOU ONE LAST THING THAT I
27 THINK IS PRETTY TELLING, AND I DISCOVERED THIS RECENTLY
28 MOSTLY BECAUSE IT TURNS OUT THAT ONE OF OUR AUTHORS --

1 ONE OF OUR EXPERTS IS AN AUTHOR ON IT.

2 NOW, THIS IS A DOCUMENT BY PROJECT TENDR,
3 "TARGETING ENVIRONMENTAL NEURODEVELOPMENTAL RISKS," AND
4 TENDR CONSENSUS STATEMENT, AND THIS WAS PUBLISHED IN
5 2016 LONG BEFORE ANY LITIGATION, LONG BEFORE ANYONE WAS
6 INVOLVED.

7 AND IF WE GO DOWN TO THE SIGNATORIES HERE,
8 YOU'LL SEE THAT IT'S SIGNED BY A WHOLE HOST OF
9 SCIENTISTS. YOU HAVE PEOPLE FROM UNIVERSITY, UC DAVIS,
10 FROM HARVARD, YOU HAVE THE DIRECTOR OF THE NATIONAL
11 TOXICOLOGY PROGRAM ON HERE, YOU SEE DOWN HERE, AND
12 OBVIOUSLY, YOU KNOW, YOU HAVE DR. RITZ ON HERE AS WELL.
13 GOING DOWN HERE WE HAVE A WHOLE HOST OF PROFESSIONALS.
14 MANY OF THESE AUTHORS ON MANY OF THE EPIDEMIOLOGICAL
15 STUDIES WE'RE TALKING ABOUT.

16 WE HAVE DOWN HERE CHILDREN HEALTH AND
17 DISABILITY ADVOCATES. WE HAVE ALL THESE ADVOCACY GROUPS
18 THAT SUPPORT THIS STATEMENT.

19 AND THEN DOWN HERE WE HAVE ORGANIZATIONS THAT
20 SUPPORT OR ENDORSE THE TENDR CONSENSUS STATEMENT,
21 INCLUDING THE AMERICAN COLLEGE OF OBSTETRICIANS AND
22 GYNECOLOGISTS, WHICH SUPPORTS THIS VALUE WHICH SUPPORTS
23 THIS DOCUMENT AS AN EDUCATIONAL TOOL, CHILD NEUROLOGY
24 SOCIETY, THE ENDOCRINE SOCIETY, THE NATIONAL MEDICAL
25 ASSOCIATION. I MEAN, THESE ARE THE WOLF AND WHARF OF
26 THE AUTISM COMMUNITY.

27 AND HERE'S WHAT THEY SAY BACK IN 2016.

28 IT SAYS, "THE FOLLOWING LIST PROVIDES A PRIME

1 EXAMPLES -- PROVIDES PRIME EXAMPLES OF TOXIC
2 CHEMICALS THAT CAN CONTRIBUTE TO LEARNING,
3 BEHAVIORAL OR INTELLECTUAL IMPAIRMENT AS WELL
4 AS SPECIFIC NEURODEVELOPMENTAL DISORDERS SUCH
5 AS ADHD OR AUTISM SPECTRUM DISORDER."

6 AND THEN IF YOU GO DOWN THIS LIST, IT SAYS
7 RIGHT HERE "LEAD AND MERCURY."

8 SO WE HAVE THIS CONSENSUS STATEMENT FROM FIVE
9 YEARS AGO SAYING WE AGREE THAT THIS IS AN ISSUE THAT
10 THIS IS A PRIME EXAMPLE OF SOMETHING THAT CONTRIBUTES TO
11 THE DEVELOPMENT OF ADHD OR AUTISM RIGHT HERE.

12 AND SO EARLIER IN THIS CASE WHEN YOU WERE TOLD
13 THE AUTISM COMMUNITY DOESN'T SEE THAT, IT'S JUST NOT
14 TRUE.

15 I'D ALSO POINT OUT THAT HERE IN THIS CONSENSUS
16 STATEMENT, AND I'M GOING TO GO OVER THIS WITH DR. RITZ A
17 LITTLE BIT LATER TODAY, IT SAYS, "RESEARCH IN
18 NEUROSCIENCE HAS IDENTIFIED CRITICAL WINDOWS OF
19 VULNERABILITY AND DURING EMBRYONIC AND FETAL
20 DEVELOPMENT, INFANCY, EARLY CHILDHOOD AND
21 ADOLESCENCE, AND DURING THESE WINDOWS OF
22 DEVELOPMENT, TOXIC CHEMICAL EXPOSURES MAY CAUSE
23 LASTING HARM TO THE BRAIN THAT INTERFERES WITH
24 A CHILD'S ABILITY TO REACH HIS OR HER FULL
25 POTENTIAL."

26 AGAIN, THIS IS CONSENSUS LEVEL SCIENTIFIC
27 OPINIONS FROM DOZENS OF THE MOST REPUTABLE
28 EPIDEMIOLOGISTS AND SCIENTISTS IN THE WORLD, THE

1 DIRECTOR OF THE NATIONAL TOXICOLOGY PROGRAM. AT SOME
2 POINT WE ASK OURSELVES IS THE ISSUE OF HEAVY METALS, IS
3 IT EVEN A CONTROVERSY AT ALL? IT SEEMS TO BE GENERALLY
4 ACCEPTED WITHIN THE COMMUNITY.

5 SO THAT'S WHAT WE KNOW ABOUT LEAD AND AUTISM.

6 FINALLY, LET'S BRIEFLY TALK ABOUT OUR EXPERTS.

7 I'M GOING TO LET THEM SPEAK FOR THEMSELVES,
8 YOUR HONOR. YOU'RE GOING TO GET A CHANCE TO ASK THEM
9 QUESTIONS OR GET WHATEVER YOU WANT FROM THEM AND DIG
10 DEEP INTO THEIR METHODOLOGIES AND APPROACHES.

11 AND IMPORTANTLY -- AND THIS IS A BIG PART IN
12 THE BRIEFING -- WAS DISCUSSIONS ABOUT THE BRADFORD HILL
13 FACTORS.

14 I WAS THERE WHEN DR. RITZ WAS QUESTIONED ABOUT
15 THEM AT LENGTH BY MR. PETROSINELLI, AND THERE IS -- YOU
16 KNOW, WE'RE GOING TO GO THROUGH THEM WITH DR. RITZ AND
17 WHAT SHE DID AND DIDN'T DO.

18 BUT SOMETHING THAT I THINK IS REALLY IMPORTANT,
19 AND IT'S THE LAST THING I WANT TO LEAVE THE COURT WITH,
20 IS THIS QUOTE FROM SIR BRADFORD HILL HIMSELF. THIS IS
21 IN THE VERY ARTICLE WHERE HE LISTS OUT THE NINE FACTORS.

22 HE SAYS, "WHAT I DO NOT BELIEVE, AND THIS HAS
23 BEEN SUGGESTED, IS THAT WE CAN LOOSELY LAY DOWN
24 SOME HARD AND FAST RULES OF EVIDENCE THAT MUST
25 BE OBSERVED BEFORE WE ACCEPT CAUSE AND EFFECT.
26 NONE OF MY NINE VIEWPOINTS CAN BRING
27 INDISPUTABLE EVIDENCE FOR OR AGAINST THE CAUSE
28 AND EFFECT HYPOTHESIS AND NONE CAN BE REQUIRED

1 AS A SINE QUA NON.

2 "WHAT THEY CAN DO WITH GREATER OR LESS STRENGTH

3 IS TO HELP US MAKE UP OUR MINDS ON THE

4 FUNDAMENTAL QUESTION, IS THERE ANY OTHER WAY OF

5 EXPLAINING THE SET OF FACTS BEFORE US? IS

6 THERE ANY OTHER ANSWER EQUALLY OR MORE LIKELY

7 THAN CAUSE AND EFFECT?"

8 AT THE END OF DAY, YOUR HONOR, I THINK THAT'S

9 WHAT IT COMES DOWN TO IS OUR EXPERTS HAVE SPENT A LOT OF

10 TIME, THEY HAVE READ HUNDREDS OF STUDIES, THEY HAVE

11 ENGAGED IN A RIGOROUS ANALYTICAL REVIEW OF THE DATA AND

12 THEY HAVE DONE IT CONSISTENT WITH THE WAY THEY ALWAYS DO

13 IT, THEY'VE APPLIED THE BRADFORD HILL FACTORS TO THE

14 EXTENT THEY ARE EPIDEMIOLOGISTS. DR. ASCHNER USES THE

15 PRINCIPLES OF TOXICOLOGY TO GET TO HIS RESULT, BUT

16 ULTIMATELY THE CONCLUSIONS THEY REACH AND THE DATA THEY

17 RELY UPON ARE RELIABLE AND WE HOPE TO SHOW THAT

18 THROUGHOUT THE REST OF THIS PRESENTATION, YOUR HONOR,

19 AND I THANK YOU FOR YOUR TIME.

20 THE COURT: OKAY. THANK YOU VERY MUCH.

21 WHO IS GOING TO SPEAK FOR THE DEFENDANTS?

22 MR. PETROSINELLI: YOUR HONOR, GOOD AFTERNOON.

23 THIS IS -- OR GOOD MORNING FOR YOU -- THIS IS JOE

24 PETROSINELLI FOR GERBER, BUT I'M GOING TO SPEAK ON

25 BEHALF OF THE DEFENDANTS, SO THANK YOU FOR HEARING ME

26 TODAY.

27 YOUR HONOR, I THINK THE QUESTION IN THIS CASE

28 IS -- OR WITH THIS MOTION -- IS HAVE THE PLAINTIFFS PUT

1 FORWARD RELIABLE EVIDENCE THAT PASSES MUSTER UNDER
2 SARGON ON GENERAL CAUSATION? AND GENERAL CAUSATION AT
3 THIS STAGE OF THE CASE MEANS WHETHER LEAD, ARSENIC AND
4 MERCURY CAN CAUSE ASD OR ADHD OR WHETHER LEAD CAN CAUSE
5 ADHD.

6 AND WHEN I USE THE WORD "CAUSE" THERE, YOUR
7 HONOR, TO YOUR POINT AT THE OUTSET, I MEAN IT BOTH WAYS;
8 WHETHER INDIVIDUALLY OR SYNERGISTICALLY. THAT'S THE
9 QUESTION. DO THEY HAVE ENOUGH EVIDENCE UNDER SARGON TO
10 MEET THAT TEST?

11 AS MR. WISNER JUST ALLUDED TO, YOU'RE GOING TO
12 HEAR FROM FOUR EXPERTS THIS WEEK FROM THE PLAINTIFFS. I
13 OUGHT TO SAY THAT, AS YOUR HONOR KNOWS, THAT IS THE
14 FIRST PART OF THIS MOTION HEARING, WE HAVE A DAY SET
15 ASIDE IN MARCH FOR A COUPLE OF THE DEFENSE EXPERTS, AND
16 I'LL TALK ABOUT THAT IN A SECOND AND WHY THAT'S
17 IMPORTANT.

18 BUT THIS WEEK IT'S THE PLAINTIFF'S TURN.

19 THEY HAVE DR. SHAPIRO, WHO IS THE ONLY EXPERT
20 IN THEIR GROUP WHO ACTUALLY TREATS PATIENTS WITH AUTISM.
21 HE DOES NOT OFFER A CAUSATION OPINION. HE DOESN'T COME
22 IN HERE TO SAY THAT AUTISM IS CAUSED BY OR CAN BE CAUSED
23 BY EXPOSURE TO HEAVY METALS. HE HAS A BIOLOGICAL
24 PLAUSIBILITY OPINION; THAT IS, THERE ARE BIOLOGICAL
25 MECHANISMS BY WHICH IT COULD, BUT HE EXPRESSLY DISCLAIMS
26 A CAUSATION OPINION.

27 AND THEN YOU HAVE THE TWO EPIDEMIOLOGISTS,
28 DR. RITZ AND DR. GARDENER, WHO I THINK WILL BE THE FOCUS

1 OF THIS WEEK'S TESTIMONY, BUT THEN YOU HAVE DR. ASCHNER,
2 WHO IS A TOXICOLOGIST WHO ALSO OFFERS A BIOLOGICAL
3 PLAUSIBILITY OPINION AND HE SORT OF TACKS ON A CAUSATION
4 OPINION AT THE END. AND WE WILL GO INTO IT, YOUR HONOR,
5 BUT SORT OF HE DISCLAIMS ANY EXPERTISE IN EPIDEMIOLOGY
6 AND DEFERS TO THE EPIDEMIOLOGISTS ON THAT PARTICULAR
7 QUESTION.

8 SO WE HAVE SARGON.

9 AND FROM OUR PERSPECTIVE, YOUR HONOR, FROM THE
10 DEFENSE'S PERSPECTIVE THERE ARE THREE PRINCIPLES UNDER
11 SARGON THAT ARE THE MOST IMPORTANT HERE, AND MR. WISNER
12 ONLY TALKED ABOUT ONE OF THEM. THE MOST KEY ONE HE
13 DIDN'T TALK ABOUT, WHICH IS THAT -- THIS QUOTE FROM
14 SARGON: "THE COURT CAN INQUIRE INTO NOT ONLY THE TYPE
15 OF MATERIAL THEY RELY ON, BUT WHETHER THAT
16 MATERIAL ACTUALLY SUPPORTS THE EXPERT'S
17 REASONING."

18 AND THE COURT -- AND THIS IS SORT OF THE
19 CALIFORNIA SUPREME COURT QUOTING THE U.S. SUPREME COURT:
20 "IF THERE'S TOO GREAT AN ANALYTICAL GAP BETWEEN
21 THE DATA THEY SAY SUPPORTS THEIR OPINION AND
22 THEIR OPINIONS, THAT IS INADMISSIBLE UNDER
23 SARGON."

24 AND THAT IS PRINCIPALLY WHAT THIS MOTION IS
25 ABOUT AS I'LL TALK ABOUT MORE IN A SECOND.

26 THE ANALYTICAL GAPS HERE ARE MASSIVE,
27 UNEXPLAINED AND UNACCOUNTED FOR.

28 THE SECOND PRINCIPLE IS ONE THAT MR. WISNER

1 FLAGGED, WHICH IS IF THERE'S TOO GREAT A LEAP OF LOGIC
2 OR CONJECTURE, AGAIN, BASED ON THE EVIDENCE THAT IS
3 BEING PRESENTED AS SUPPORTING THE OPINION AND WHAT THE
4 OPINION ACTUALLY IS, THAT'S NOT ADMISSIBLE.

5 AND THEN FINALLY, REALLY IMPORTANT HERE BECAUSE
6 OF WHAT I'M ABOUT TO TALK ABOUT IN A SECOND IS THAT THE
7 EXPERT HAS TO EMPLOY THE SAME LEVEL OF INTELLECTUAL
8 RIGOR INSIDE THE COURT AS EXPERTS DO OUTSIDE THE COURT
9 WHEN EVALUATING WHATEVER THE BODY OF EVIDENCE IS.

10 SO THAT'S -- THOSE ARE THE THREE PRINCIPLES
11 UNDER SARGON THAT ARE MOST IMPORTANT TO OUR MOTION.

12 NOW, WHERE WOULD ONE START TO FIGURE OUT
13 WHETHER THE PLAINTIFFS MEET THESE STANDARDS?

14 WELL, THE FIRST PLACE WE SHOULD START IS WITH
15 AN UNDISPUTED FACT.

16 THERE ARE NO STUDIES, ZERO, STUDYING WHETHER
17 THE CONSUMPTION OF BABY FOOD OR THE INGREDIENTS IN BABY
18 FOOD, FRUITS, VEGETABLES, GRAINS CAN CAUSE AUTISM OR
19 ADHD. ZERO. NOTHING.

20 SO WHY IS THAT IMPORTANT HERE?

21 WE KNOW -- IT'S NOT IMPORTANT BECAUSE OF THE
22 LEVELS IN BABY FOOD. WE'VE TALKED ABOUT THERE HAVE BEEN
23 NO DISCOVERY YET, AND SO WE'RE NOT AT THE POINT IN THIS
24 STAGE OF THE CASE WHERE WE'RE TALKING ABOUT THE LOW
25 LEVELS ACTUALLY THAT ARE IN BABY FOOD. IF WE GET PAST
26 THIS STAGE, WE'D TALK ABOUT THAT, BUT IT'S IMPORTANT
27 BECAUSE IT'S RELEVANT TO THE TIMING OF EXPOSURE. THIS
28 TEMPORALITY QUESTION.

1 CHILDREN EAT BABY FOOD FROM AGES SIX MONTHS TO
2 ABOUT TWO, MAYBE SOMETIMES A LITTLE BIT LATER, BUT IN
3 THAT WINDOW. AND SO TO PASS THE GENERAL CAUSATION STAGE
4 AS ITS FRAMED RIGHT NOW, THE PLAINTIFF'S EXPERTS HAVE TO
5 HAVE RELIABLE SCIENTIFIC EVIDENCE THAT EXPOSURE TO LEAD,
6 ARSENIC AND MERCURY IN THAT WINDOW CAN CAUSE AUTISM OR
7 ADHD. THEY HAVE NO SUCH EVIDENCE.

8 NOW, HOW DO I KNOW THAT? HOW DO WE KNOW THAT?

9 LET'S START WITH THE FACT THAT, AS MR. WISNER
10 ACKNOWLEDGES, THIS SUBJECT OF WHAT CAUSES AUTISM IN
11 GENERAL AND WHETHER ENVIRONMENTAL FACTORS LIKE EXPOSURES
12 TO METALS CAUSE AUTISM HAS BEEN STUDIED ESPECIALLY IN
13 THE PAST COUPLE OF YEARS.

14 THE RESEARCH ON WHAT CAUSES AUTISM IN GENERAL
15 HAS BEEN GOING ON FOR 40 YEARS, AND AS YOU SEE AND AS
16 I'LL SHOW IN A SECOND, MOST PEOPLE, I THINK BASICALLY
17 EVERYONE SAYS, NO ONE KNOWS WHAT THE ACTUAL CAUSES OF
18 AUTISM ARE. I THINK MR. WISNER SHOWED SOME QUOTES TO
19 THAT EFFECT. THE PLAINTIFF'S EXPERTS HAVE TESTIFIED AS
20 SUCH.

21 BUT ESPECIALLY AS TO ENVIRONMENTAL FACTORS,
22 THAT HAS BEEN STUDIED OVER THE PAST COUPLE OF YEARS, AND
23 THE SCIENTIFIC COMMUNITY HAS REVIEWED AND SCRUTINIZED
24 THAT DATA AND WHAT HAS THE COMMUNITY SAID? NO ONE -- NO
25 ONE -- NO GOVERNMENT AGENCY, NO AUTISM RESEARCH
26 INSTITUTION, NO MEDICAL ORGANIZATION HAS CONCLUDED THAT
27 THESE METALS CAN CAUSE AUTISM.

28 I'M GOING TO SHOW YOU, YOUR HONOR, NOW I'VE

1 PICKED OUT THREE FROM AMONG THE MANY EXAMPLES WE CITE IN
2 OUR BRIEF OF POSITION STATEMENTS. THIS IS NOT FOR --
3 THIS IS NOT ABOUT AGENCIES WHO HAVEN'T SAID THINGS, ONE
4 THING -- ONE WAY OR THE ANOTHER. IT IS AGENCIES,
5 ORGANIZATIONS, RESEARCH INSTITUTIONS WHO HAVE SPOKEN ON
6 THE TOPIC.

7 THIS IS WHAT THE NATIONAL INSTITUTES OF HEALTH
8 SAYS. THEY ARE PROBABLY THE PREEMINENT FEDERAL AGENCY
9 IN CONNECTION WITH HEALTH-BASED RESEARCH IN THE UNITED
10 STATES. THEY TALK ABOUT AUTISM. THEY HAVE A FACT SHEET
11 ABOUT AUTISM. IT'S NOT DATED, DATED IN THE SENSE OF
12 IT'S NOT OUTDATED. THEY EDIT THIS ALL THE TIME. IT WAS
13 EDITED LAST IN JANUARY OF 2022, A COUPLE OF WEEKS AGO,
14 AND THIS IS WHAT THEY SAY:

15 OF COURSE THEY RECOGNIZE THE PREEMINENT ROLE OF
16 GENETICS IN THE CAUSE OF AUTISM, AND THEN THEY SAY:

17 "ENVIRONMENTAL FACTORS MAY ALSO PLAY A ROLE IN
18 GENE FUNCTION DEVELOPMENT, BUT NO SPECIFIC
19 ENVIRONMENTAL CAUSES HAVE YET BEEN IDENTIFIED."

20 THAT'S WHAT THE NATIONAL INSTITUTES OF HEALTH
21 SAYS.

22 MEDICAL ORGANIZATIONS: THE AMERICAN ACADEMY OF
23 PEDIATRICS, THE LARGEST ORGANIZATION I THINK IN THE
24 WORLD DEDICATED TO THE PROTECTION OF CHILDREN'S HEALTH,
25 THIS IS THEIR STATEMENT FROM JANUARY OF 2020, AGAIN,
26 FOCUSED ON THE HIGHLY HERITABLE -- THAT'S THE GENETIC
27 PIECE OF AUTISM, BUT THEN, "POTENTIAL ENVIRONMENTAL
28 FACTORS THAT MAY BE RELATED TO AN INCREASED

1 REPORTED PREVALENCE IS AN AREA OF ACTIVE STUDY
2 THAT AS YET IS WITHOUT FIRM CONCLUSIONS."
3 AND THEN FINALLY, THIS IS AN INSTITUTION THAT
4 MR. WISNER MENTIONED JUST NOW IN HIS OPENING, THE
5 AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS,
6 ACOG, OBVIOUSLY THE LARGEST ORGANIZATION IN THE UNITED
7 STATES OF SUCH DOCTORS WHO LOOK AFTER THE HEALTH OF
8 MOTHERS AND THEIR CHILDREN, THEIR NEWBORNS, THIS IS --
9 WAS REAFFIRMED THIS MONTH, JANUARY OF 2022, THIS IS WHAT
10 ACOG SAYS ABOUT THE STATE OF THE LITERATURE ON
11 ENVIRONMENTAL CAUSES, WHICH INCLUDES HEAVY METALS AND
12 AUTISM.

13 "ALTHOUGH THE CAUSE OF AUTISM IS UNCLEAR,
14 STRONG GENETIC PREDISPOSITION..."
15 LOOK AT THAT LAST SENTENCE:

16 "WIDE VARIETY OF EXPOSURES HAVE BEEN LINKED TO
17 AUTISM, BUT THE SUGGESTED ASSOCIATIONS ARE WEAK
18 INCONSISTENT, OR BOTH, AMONG STUDIES AND CANNOT
19 BE EQUATED WITH A CAUSE AND EFFECT
20 RELATIONSHIP."

21 THAT IS WHAT THE ORGANIZATION THAT IS DEDICATED
22 TO THE PROTECTION OF PUBLIC HEALTH AND CHILDREN'S HEALTH
23 SAY RIGHT NOW TODAY ABOUT THE BODY OF LITERATURE THAT
24 THE PLAINTIFF'S EXPERTS RELY ON WITH RESPECT TO HEAVY
25 METALS.

26 IT'S NOT JUST THAT.

27 THE OTHER THING THAT'S REMARKABLE ABOUT THIS
28 CASE IS THAT THE VERY INSTITUTIONS WHERE THE PLAINTIFF'S

1 EXPERTS WORK ALBERT EINSTEIN, UCLA, UNIVERSITY OF MIAMI,
2 THEY ALL HAVE PUBLISHED FACT SHEETS, ANALYSES OF AUTISM
3 AND ITS CAUSES, NONE OF THEM -- ZERO -- IDENTIFY HEAVY
4 METALS AS A -- EVEN A POTENTIAL CAUSE AND CERTAINLY NOT
5 THAT IT CAN CAUSE AUTISM.

6 I FOCUSED -- I FOCUS ON UCLA FOR A SECOND
7 BECAUSE WE ARE IN LOS ANGELES IN THIS CASE.

8 UCLA HAPPENS TO HAVE ONE OF THE PREEMINENT
9 AUTISM RESEARCH CENTERS IN THE ENTIRE WORLD.

10 DR. RITZ, WHO IS AT UCLA, IS NOT IN THAT
11 RESEARCH CENTER. SHE'S IN A DIFFERENT PART OF THE
12 UNIVERSITY.

13 THE AUTISM RESEARCH CENTER AT UCLA, WHICH HAS
14 BEEN STUDYING THE CAUSES OF AUTISM FOR 30 YEARS, NEVER
15 HAS SAID, HAS NOT SAID THAT LOOKING AT THE BODY OF
16 LITERATURE THAT AUTISM CAN BE CAUSED BY EXPOSURE TO
17 HEAVY METALS.

18 THE THING THAT'S REALLY REMARKABLE -- AND BY
19 THE WAY, BEFORE I LEAVE THIS SLIDE, MR. WISNER TALKED
20 ABOUT THE CDC. I DON'T KNOW IF YOU SAW. IT WAS SORT OF
21 FLASHED QUICKLY. THE CDC HAS A FACT SHEET ON AUTISM
22 WHERE THEY SAY, OF COURSE THAT GENETICS AND MAYBE SOME
23 ENVIRONMENTAL FACTORS, WHICH WE'RE STUDYING, COULD BE
24 RELATED TO THE CAUSES OF AUTISM, AND THEN THEY LIST THE
25 FACTORS THAT THEY THINK FALL INTO THAT CATEGORY AND THEY
26 LIST ONE ENVIRONMENTAL FACTOR.

27 "WHEN TAKEN DURING PREGNANCY, THE PRESCRIPTION
28 DRUGS VALPROIC ACID AND THALIDOMIDE HAVE BEEN

1 LINKED WITH A HIGHER RISK OF AUTISM."

2 NOWHERE DOES THE CDC SAY THAT HEAVY METALS CAN
3 CAUSE AUTISM.

4 FINALLY ON THIS POINT, YOUR HONOR, THIS IS
5 WHAT'S TRULY REMARKABLE ABOUT THIS CASE.

6 THE STUDY AUTHORS, THE AUTHORS OF THE VERY
7 STUDIES ON WHICH THE PLAINTIFF'S EXPERTS RELIED, DO NOT
8 SAY -- NOT ONLY DO THEY NOT SAY CAUSATION, THEY SAY THE
9 OPPOSITE OF CAUSATION. I'VE PICKED THREE HERE. THERE
10 ARE A DOZEN. THESE ARE, AGAIN, THE STUDIES ON WHICH THE
11 PLAINTIFF'S EXPERT PRINCIPALLY RELY.

12 YOU SEE ARORA HERE. MR. WISNER JUST TALKED
13 ABOUT THE ARORA STUDY. THAT'S THE ONE WITH THE TEETH
14 AND THE TWINS. THAT'S THE ONE AT THE BOTTOM. BUT LOOK
15 AT THESE STUDIES AND LOOK AT WHAT THE AUTHORS SAY.

16 SKOGHEIM, WHICH IS A 2021 STUDY, LIMITED
17 KNOWLEDGE ON WHETHER EXPOSURE TO METALS IS LINKED TO ASD
18 AND ADHD DIAGNOSES IN CHILDHOOD.

19 A META ANALYSIS, THE ONE IN THE MIDDLE, WANG IS
20 A META ANALYSIS WHOSE SOLE -- WHO VERY PURPOSE IS TO
21 SURVEY THE LITERATURE, THE SAME LITERATURE THAT THE
22 PLAINTIFF'S EXPERTS ARE RELYING ON TO SEE IF THERE'S ANY
23 CAUSAL LINK.

24 YOU CAN SEE THIS META ANALYSIS SAYS "NOT BEEN
25 ESTABLISHED."

26 AND THEN ARORA. THE TOOTH STUDY.

27 "CAUTION SHOULD BE EXERCISED. ADDITIONAL
28 STUDIES ARE NEEDED. WE CAN'T SAY CAUSATION."

1 EVERY SINGLE ONE OF THE STUDIES ON WHICH THE
2 PLAINTIFF'S EXPERTS RELIED IN THAT DIAGRAM MR. WISNER
3 SHOWED YOU WITH THE VARIOUS STUDIES IN DIFFERENT
4 BUCKETS, THEY ALL SAY, "NO CAUSATION/NEED MORE
5 STUDIES/HASN'T BEEN ESTABLISHED."

6 FINALLY, YOUR HONOR, THESE ARE TWO OF OUR
7 EXPERTS WHO YOU'LL HEAR FROM IN MARCH AND WHY I THINK WE
8 TALKED TO THE COURT ABOUT THIS, WHY WE WANTED, YOUR
9 HONOR, TO HEAR FROM THEM IS THESE ARE TWO EXPERTS, TWO
10 DOCTORS, DR. GESCHWIND AND DR. FOMBONNE, WHO ARE TRULY
11 WORLD RENOWNED EXPERTS IN AUTISM AND ITS CAUSES. THEY
12 RUN TWO OF THE MOST RENOWNED AUTISM RESEARCH FACILITIES
13 IN THE WORLD, DR. GESCHWIND BEING THE ONE AT UCLA THAT I
14 JUST MENTIONED, AND THEY WILL COME HERE AND EXPLAIN TO
15 YOU WHY -- WHAT THE MASSIVE ANALYTICAL GAP IS BETWEEN
16 THE BODY OF LITERATURE THAT THE PLAINTIFF'S EXPERTS ARE
17 RELYING ON AND THE CONCLUSIONS THAT THEY ARE DRAWING,
18 AND THEY WILL ALSO EXPLAIN TO YOU WHAT EXPERTS IN THE
19 FIELD, THE INTELLECTUAL RIGOR THOSE EXPERTS IN AUTISM,
20 GO THROUGH BEFORE THEY DECIDE THAT ANYTHING CAUSES
21 AUTISM, WHICH HAS SERIOUS IMPLICATIONS FOR PUBLIC HEALTH
22 AND CHILDREN'S HEALTH WHEN SOMEONE DECIDES THAT
23 SOMETHING IS A CAUSE OF AUTISM. THAT'S WHAT THEY WILL
24 BE HERE TO TALK TO YOU ABOUT.

25 NOW, LET ME SAY THREE THINGS ABOUT WHAT THIS
26 HEARING AND THIS MOTION IS NOT ABOUT BECAUSE IT DIRECTLY
27 RELATES FROM WHAT YOU JUST HEARD FROM MR. WISNER.

28 THE FIRST THING IS THIS HEARING, THIS MOTION IS

1 NOT ABOUT WHETHER GENETIC OR ENVIRONMENTAL FACTORS CAN
2 CAUSE ASD OR ADHD, LIKE WHAT IS THE RELATIVE
3 CONTRIBUTION OF EACH AND ARE THEY SYNERGISTIC OR NOT
4 SYNERGISTIC.

5 THE HEARING IS ABOUT THREE SPECIFIC -- VERY
6 SPECIFIC ENVIRONMENTAL FACTORS; THAT IS LEAD, ARSENIC
7 AND MERCURY.

8 THERE'S BEEN RESEARCH ON DOZENS OF
9 ENVIRONMENTAL FACTORS, THINGS IN THE ENVIRONMENT THAT
10 PEOPLE MIGHT BE EXPOSED TO, PESTICIDES, FOR EXAMPLE,
11 PLASTIC COMPOUNDS, AIR POLLUTION. THERE'S ALL SORTS OF
12 RESEARCH.

13 THE QUESTION IN THIS CASE IS NOT HOW MUCH OF IT
14 IS GENETIC VERSUS HOW MUCH IS ENVIRONMENTAL. IT'S ARE
15 THESE THREE SPECIFIC ENVIRONMENTAL FACTORS, HAVE THEY
16 BEEN SHOWN TO CAUSE OR CAN CAUSE AUTISM?

17 THEN THE SECOND AND RELATED POINT IS YOU HEARD
18 MR. WISNER SAY, OH, THERE'S NO DOUBT THAT LEAD, ARSENIC
19 AND MERCURY HAVE NEUROLOGIC EFFECTS. HE SAID THEY ARE
20 NEUROTOXINS.

21 THIS HEARING, THIS MOTION, THIS CASE IS NOT
22 ABOUT WHETHER LEAD, ARSENIC OR MERCURY CAN CAUSE
23 NEUROLOGICAL EFFECTS OTHER THAN ASD AND ADHD.

24 ADHD AND ASD ARE SPECIFIC DISORDERS. THAT'S
25 WHY THEY ARE ALL AUTISM SPECTRUM DISORDER/ATTENTION
26 DEFICIT HYPERACTIVITY DISORDERS, THEY ARE DSM 5
27 DISORDERS WITH SPECIFIC DIAGNOSTIC CRITERIA.

28 AND THE QUESTION IS WHETHER EXPOSURE TO LEAD,

1 ARSENIC AND MERCURY CAUSES THOSE DISORDERS, NOT SOME
2 OTHER NEUROLOGICAL EFFECT.

3 AND IN THAT REGARD, YOUR HONOR, JUST TO GIVE
4 YOU AN EXAMPLE, MR. WISNER I THINK SAID LEAD EXPOSURE
5 HAS BEEN ASSOCIATED WITH DECREASED IQ, FOR EXAMPLE.

6 IQ, INTELLECTUAL, RIGHT, CAPA- -- IS NOT A
7 DIAGNOSTIC CHARACTERISTIC OF AUTISM, AND IN FACT, MOST
8 AUTISTIC KIDS HAVE NORMAL TO HIGH IQ, AND THAT SHOWS
9 YOU, YOU CAN'T JUST SAY, OH, I THINK MR. WISNER SAID, IT
10 MAKES SO MUCH SENSE, LEAD IS A NEUROTOXIN SO IT'S NOT A
11 GREAT LEAP OF LOGIC TO SAY THAT IT WOULD CAUSE AUTISM.

12 COMPLETELY UNTRUE AND UNSOUND SCIENCE.

13 THERE ARE NEUROLOGICAL DEFICITS THAT HAVE
14 NOTHING TO DO WITH AUTISM OR ADHD, THEY ARE NOT RELATED
15 TO THEM AT ALL.

16 AND THE FINAL THING IS -- THIS WAS REALLY
17 COVERED IN THE PAPERS -- IS WHETHER EXPERTS SHOULD BE
18 EXERCISING THEIR JUDGMENT AS THEY ARE ASSESSING
19 CAUSATION. AND THERE WERE QUOTES IN THE PLAINTIFF'S
20 OPPOSITION BRIEF THAT YOU MAY HAVE SEEN THAT SAID, WELL,
21 OUR EXPERTS EXERCISE THEIR JUDGMENT, SO WHAT'S THE
22 PROBLEM, BASICALLY?

23 THAT IS NOT WHAT THIS HEARING -- OF COURSE
24 EXPERTS HAVE TO EXERCISE JUDGMENT WHEN REVIEWING STUDIES
25 AND APPLYING THE BRADFORD HILL CRITERIA.

26 THE QUESTION IS HOW DID THEY EXERCISE THE
27 JUDGMENT? HOW CAN IT BE REPLICATED? DID THEY EXERCISE
28 IT IN A WAY THAT THERE AREN'T ANALYTICAL GAPS AND LEAPS

1 OF LOGIC?

2 THAT'S WHAT THIS MOTION AND THIS HEARING IS
3 ABOUT.

4 AND THERE'S A REASON FOR THAT.

5 WE CITED TO, YOUR HONOR, IN THE BRIEFS MANY,
6 MANY COURTS HAVE EXCLUDED BRADFORD HILL ANALYZES. THIS
7 COMES UP QUITE FREQUENTLY IN COMPLEX MEDICAL CAUSATION
8 LITIGATION WHERE EPIDEMIOLOGISTS COME IN PURPORTING TO
9 APPLY A BRADFORD HILL METHOD, AND THE COURTS -- MANY
10 COURTS HAVE SAID, THESE ARE TWO EXAMPLES, YOU REALLY
11 HAVE TO SCRUTINIZE THAT, BECAUSE AS YOU SAW FROM THE
12 BRIEFS AND MR. WISNER'S PRESENTATION, THERE ARE THESE
13 NINE FACTORS, AND IT'S NOT A CHECKLIST. WE AGREE WITH
14 THAT, THAT THE METHOD DOESN'T TELL YOU, WELL, IF THE SIX
15 ARE PRESENT AND THREE AREN'T, THEN THERE'S CAUSATION.
16 OR VICE VERSA. THAT'S NOT WHAT IT'S ABOUT.

17 BUT BECAUSE IT'S NOT ABOUT THAT, COURTS HAVE
18 BEEN VERY RIGOROUS IN MAKING SURE THAT THE EXPERTS
19 AREN'T REDEFINING THE FACTORS. THEY AREN'T -- OR THEY
20 EXPLAINED HOW THEY WEIGHTED THE FACTORS. THEY EXPLAIN
21 HOW THEY REACHED THE CONCLUSION ABOUT ANY FACTOR
22 BECAUSE, OTHERWISE, YOU HAVE A CONCLUSION-ORIENTED
23 SELECTION PROCESS AS THIS ONE COURT SAID.

24 SO LET ME START WITH, I WANT TO TALK ABOUT
25 REALLY JUST IN THE OPENING, TWO OF WHAT WE THINK ARE THE
26 MOST IMPORTANT BRADFORD HILL FACTORS AS IT RELATES TO
27 THIS BODY OF LITERATURE, AND THE FIRST ONE IS
28 TEMPORALITY.

1 TEMPORALITY IS THE ONE FACTOR, THE ONLY
2 BRADFORD HILL FACTOR YOU ABSOLUTELY MUST HAVE IN ORDER
3 TO CONCLUDE CAUSATION. IT MUST BE PRESENT, AND OF
4 COURSE THAT'S COMMON SENSE.

5 THIS IS FROM THE REFERENCE MANUAL DISCUSSION OF
6 THE TEMPORALITY FACTOR.

7 "IF AN EXPOSURE IS GOING TO CAUSE AN OUTCOME,
8 IT HAS TO PRECEDE THE OUTCOME."

9 YOU HAVE TO HAVE STUDIES THAT SHOW AND THAT ARE
10 CAPABLE OF SHOWING THAT IN THIS CASE EXPOSURE TO THESE
11 HEAVY METALS OCCURRED BEFORE THE DEVELOPMENT OF AUTISM
12 OR BEFORE THE DEVELOPMENT OF ADHD, AND THAT'S AN
13 ABSOLUTELY REQUIRED THRESHOLD SHOWING.

14 AND THAT IS THE MAIN PROBLEM HERE. THAT IS THE
15 MAIN PROBLEM WITH THE BODY OF STUDIES THAT MR. WISNER
16 REFERRED TO. HE SAID THERE'S HUNDREDS OF STUDIES. I
17 DON'T KNOW IF THERE'S HUNDREDS. THERE'S QUITE A FEW
18 STUDIES, AND THEY GO IN ALL DIFFERENT DIRECTIONS, WHICH
19 IS ANOTHER ISSUE, BUT THE BIGGEST PROBLEM IS WHAT ARE
20 THE TYPE OF STUDIES?

21 IN THE REFERENCE MANUAL, THIS COMES FROM IT AS
22 WELL, THERE'S A HIERARCHY OF HUMAN CLINICAL EVIDENCE, AN
23 ESTABLISHED HIERARCHY THAT EVERYONE, PLAINTIFF'S EXPERTS
24 INCLUDED, AGREES WITH. YOU HAVE AT THE TOP OF THE
25 HIERARCHY THE THING THAT TELLS YOU THE MOST, THE MOST
26 RELIABLE, CLINICAL TRIALS LIKE IN, RIGHT, LIKE IN A
27 PHARMACEUTICAL CONTEXT. IF YOU GIVE ONE GROUP THE DRUG
28 AND THE OTHER A PLACEBO AND YOU SEE WHAT HAPPENS GOING

1 FORWARD. WE DON'T HAVE THAT HERE. YOU COULD HAVE THAT,
2 RIGHT, THERE COULD BE -- THERE ARE NO RANDOMIZED
3 CLINICAL TRIALS. YOU COULD HAVE -- LOOK AT SOME KIDS
4 WHO EAT COMMERCIALY MANUFACTURED BABY FOOD AND SOME WHO
5 DON'T AND FOLLOW THEM, RIGHT, THAT WOULD BE A RANDOMIZED
6 CLINICAL TRIAL. WE DON'T HAVE THAT HERE.

7 WHAT THE PLAINTIFF'S EXPERTS ARE RELYING ON IS
8 THAT MIDDLE LEVEL OF EVIDENCE, OBSERVATIONAL STUDIES,
9 ALSO KNOWN AS EPIDEMIOLOGICAL STUDIES, BUT IMPORTANTLY,
10 THERE ARE THREE KINDS, AND THESE ARE THE THREE KINDS;
11 COHORT STUDIES, CASE CONTROL STUDIES, CROSS-SECTIONAL
12 STUDIES.

13 THERE ARE VERY, VERY FEW COHORT STUDIES IN THIS
14 -- THAT THE PLAINTIFF'S EXPERTS RELY ON, AND THAT'S
15 IMPORTANT BECAUSE THE COHORT STUDIES ARE THE ONES THAT
16 GIVE YOU TEMPORALITY.

17 A COHORT STUDY BRIEFLY IS SIMPLE. IT'S YOU
18 LOOK AT A GROUP OF PEOPLE, YOU MEASURE THEIR LEVEL OF
19 EXPOSURE IN THIS CASE, LET'S SAY LEAD, YOU MEASURE THE
20 LEVEL OF LEAD, AND THEN YOU FOLLOW THAT GROUP, THE
21 COHORT, GOING FORWARD AND USUALLY FOR YEARS AND YOU SEE
22 DO THEY DEVELOP, IN THIS CASE, LET'S SAY, AUTISM. AND
23 THEN YOU LOOK, AND IF THERE'S DIFFERENCES BETWEEN THE
24 KIDS WHO DEVELOPED AUTISM AND THE KIDS WHO DIDN'T IN THE
25 LEAD LEVELS THAT WERE MEASURED BEFORE THE AUTISM
26 DEVELOPED, THEN YOU MIGHT HAVE SOMETHING THAT YOU CAN
27 LOOK AT.

28 WE DON'T HAVE THAT, LARGELY SPEAKING, HERE.

1 THERE ARE A FEW SUCH STUDIES THAT I'LL TALK ABOUT. I
2 WOULD SAY 95 PERCENT OF THE STUDIES THAT THE PLAINTIFF'S
3 EXPERTS RELY ON ARE CASE CONTROL AND CROSS-SECTIONAL
4 STUDIES.

5 AND WHAT IS THE PROBLEM WITH THOSE? THE
6 PROBLEM IS THAT, WITH SOME RARE EXCEPTIONS, YOU CANNOT
7 ESTABLISH TEMPORALITY. AND I'M GOING TO SHOW YOU WHY
8 THAT IS WITH THIS SIMPLE HYPOTHETICAL -- NOT
9 HYPOTHETICAL -- AN ACTUAL EXAMPLE.

10 WE PICKED ONE STUDY THAT THE PLAINTIFF'S
11 EXPERTS RELY ON. IT'S A CASE CONTROLLED STUDY CALLED
12 AL-AYADHI WHERE THEY MEASURED LEAD LEVELS IN CHILDREN
13 WHO HAD ASD VERSUS KIDS WHO DIDN'T. AND HERE'S THE
14 PROBLEM. DOWN AT THE AXIS, THIS IS THE AGE OF THE
15 CHILD. WE KNOW THAT THE DISEASE OCCURS BEFORE AGE
16 THREE. EVERYONE AGREES THAT AUTISM OCCURS -- WE THINK
17 IT OCCURS A LOT EARLIER, THE PLAINTIFF'S EXPERTS SAY IT
18 CAN OCCUR AT AGES TWO OR THREE. IT OCCURS IN THE EARLY
19 CHILDHOOD YEARS.

20 AND SO WHAT THIS STUDY DID IS THEY LOOKED AT
21 KIDS WHO WERE DIAGNOSED WITH AUTISM AND KIDS WHO WEREN'T
22 AND THEY CREATED A CASE AND A CONTROL, RIGHT. THE CASE
23 IS THE KIDS WITH AUTISM. THE CONTROL IS THE KIDS
24 WITHOUT.

25 AND THEN THEY MEASURED THE EXPOSURE, AND AGAIN,
26 THIS IS ONE EXAMPLE, THIS IS TRUE IN ALMOST ALL CASE
27 CONTROL STUDIES, YEARS AFTER THE DEVELOPMENT OF AUTISM,
28 YEARS AFTER THE DEVELOPMENT, THEY MEASURED -- IN THIS

1 CASE THEY MEASURED HAIR, BUT IT COULD BE ANY BIOMARKER.
2 THE AVERAGE AGE AT MEASUREMENT WAS NINE -- ALMOST NINE
3 YEARS OLD, AND THEY FOUND THAT KIDS WITH AUTISM HAD
4 HIGHER -- IN THIS STUDY -- HAD HIGHER LEVELS OF LEAD IN
5 THEIR HAIR THAN KIDS WHO DIDN'T.

6 YOU SEE THE PROBLEM, HOW YOU CANNOT ESTABLISH
7 THE TEMPORALITY, LET ALONE CAUSATION THERE? YOU'VE GOT
8 THIS GAP OF FIVE AND A HALF YEARS, OR WHATEVER IT IS
9 BETWEEN, WHEN THE KIDS ACTUALLY GOT AUTISM AND WHEN
10 THEIR LEVELS OF LEAD WERE MEASURED AND THAT RAISES THE
11 POSSIBILITY OF WHAT EPIDEMIOLOGISTS CALL REVERSE
12 CAUSATION.

13 AND REVERSE CAUSATION MEANS IT'S NOT THE
14 EXPOSURE THAT CAUSED THE DISEASE, IT'S THE DISEASE THAT
15 CAUSED THE EXPOSURE. AND THAT IS A FATAL PROBLEM WITH
16 RELYING ON THESE CASE CONTROL AND CROSS-SECTIONAL
17 STUDIES IN THIS CASE.

18 AND THE PLAINTIFF'S EXPERTS ACKNOWLEDGE IT'S A
19 PROBLEM, THIS REVERSE CAUSATION. AND IT'S NOT
20 THEORETICAL. I SAY THAT BECAUSE THE POPULATION,
21 CHILDREN WITH AUTISM, ARE DIFFERENT. THEY HAVE CERTAIN
22 CHARACTERISTICS ABOUT THEM THAT INCREASE THE LEVELS OF
23 METALS IN THEIR BIOMARKERS, A MASSIVE NUMBER OF CHILDREN
24 HAVE PICA WHO HAVE AUTISM. PICA MEANS YOU EAT THINGS
25 THAT AREN'T FOOD, LIKE DIRT OR PAINT CHIPS OR TOYS THAT
26 HAVE LEAD IN THEM.

27 AND SO IF YOU FIND THAT AGE 8.8 YEARS THAT SOME
28 OF THE ASD KIDS HAVE HIGHER LEVELS OF LEAD THAN THE KIDS

1 WHO DON'T, THEY COULD -- WHAT IF THEY HAD PICA? A
2 DECREASED ABILITY TO METABOLIZE METALS. THERE'S
3 SOMETHING THE RESEARCH SUGGEST GENETICALLY DIFFERENT
4 ABOUT KIDS WITH AUTISM THAT THEY HAVE THE SAME LEVEL OF
5 EXPOSURE AS KIDS WITHOUT BUT THEY CAN'T METABOLIZE THE
6 METALS AS QUICKLY, AND SO WHEN YOU MEASURE THE METALS,
7 THERE'S HIGHER -- THERE MIGHT BE HIGHER THAN IN KIDS
8 WITHOUT AUTISM.

9 AND NUTRITIONAL DEFICITS. KIDS WITH AUTISM
10 HAVE IDIOSYNCRATIC EATING HABITS WHERE THEY OFTEN DON'T
11 GET ZINC, CALCIUM, IRON, THE VITAMINS AND MINERALS THAT
12 DO MANY THINGS, BUT AMONG THE THINGS THEY DO IS HELP
13 EXCRETE METALS FROM THE BODY.

14 AND THIS AUTHOR OF THIS VERY STUDY THAT THE
15 PLAINTIFFS RELY ON RAISED THIS PROPERLY. HERE'S THE
16 QUOTE FROM THE ARTICLE:

17 "THE POSSIBLE EXPLANATION FOR THESE RESULTS IS
18 THAT AUTISTIC CHILDREN MIGHT LACK THE ABILITY
19 TO DETOXIFY TOXINS."

20 THAT IS THE PROBLEM THAT IS SEEN IN ALL THESE
21 CASE CONTROL STUDIES AND WHY TEMPORALITY CAN'T BE SHOWN.

22 THERE ARE, AS I SAID, YOUR HONOR, SOME STUDIES
23 WHERE TEMPORALITY CAN BE SHOWN, AND AS WE'LL SHOW
24 THROUGH THIS HEARING, ALMOST ALL OF THE STUDIES WHERE
25 TEMPORALITY CAN BE SHOWN, THERE'S NO ASSOCIATION BETWEEN
26 EXPOSURE TO THE METALS AND AUTISM.

27 THE COURT: LET ME INTERRUPT YOU FOR ONE
28 SECOND.

1 MR. PETROSINELLI: YES.

2 THE COURT: MY ASSISTANT TELLS ME THAT A
3 GENTLEMAN NAMED CHRISTIAN JOHNSON IS SIGNED INTO L.A.
4 COURT CONNECT AND ASKING FOR THE ZOOM LINK. DOES
5 ANYBODY KNOW WHO THIS PERSON IS?

6 MR. PETROSINELLI: I DO NOT KNOW, NO.

7 MR. WISNER: OUR SIDE EITHER, YOUR HONOR, THAT
8 I'M AWARE OF.

9 THE COURT: HE SAID HE'S A MEMBER OF THE
10 GENERAL PUBLIC.

11 MR. WISNER: OKAY.

12 THE COURT: WELL, I THINK WHAT YOU CAN TELL HIM
13 IS THAT IF HE WISHES TO ATTEND, HE CAN --

14 MR. WISNER: IF HE SENDS AN E-MAIL TO ME, YOUR
15 HONOR, I CAN HAVE A LINK SENT TO HIM THAT HE CAN LISTEN
16 IN ON.

17 THE COURT: I DON'T WANT TO SEND A LINK TO
18 SOMEBODY I DON'T KNOW AND WHO HASN'T SIGNED A ORDER
19 BECAUSE I COULD DO THAT. THAT'S NOT THE PROBLEM.

20 MR. WISNER: FAIR ENOUGH.

21 THE COURT: WE CAN SWOOP HIM INTO ZOOM. THE
22 QUESTION IS WHO IS HE? IS HE GOING TO RECORD? IT
23 DOESN'T MEAN ANYTHING TO ANY OF THE LAWYERS, I GATHER,
24 THIS NAME CHRISTIAN JOHNSON, A MEMBER OF THE PUBLIC?

25 MR. WISNER: NO, YOUR HONOR.

26 MR. PETROSINELLI: NOT TO US, YOUR HONOR.

27 THE COURT: OKAY. I CANNOT BE SIMULTANEOUSLY
28 ON ZOOM AND L.A. COURT CONNECT BECAUSE OF THE CAMERA

1 HOOKUP. WHAT I CAN DO IS LET THIS PERSON -- LET ME JUST
2 THINK THIS THROUGH. THE SOLUTION TO THIS PROBLEM HAS
3 BEEN TO WELCOME PEOPLE TO COME INTO OUR COURTROOM AND
4 SIT AND LISTEN, SO I COULD WELCOME HIM TO COME INTO MY
5 COURTROOM AND SIT AND LISTEN VIA TELEPHONE IF HE WISHES.
6 HE'S NOT LOCAL.

7 MR. WISNER: YOUR HONOR, WE DO HAVE A LINK THAT
8 IS AVAILABLE. THEY CAN'T -- THEY DON'T HAVE TO SPEAK OR
9 INTERRUPT THE PROCEEDINGS, BUT THEY CAN LISTEN TO WHAT'S
10 HAPPENING, AND PROVIDED HE AGREES TO NOT RECORD, THAT
11 COULD PROBABLY SOLVE THE PROBLEM.

12 THE COURT: OKAY.

13 SO, TERESA, TELL HIM THAT WE WILL BRING HIM
14 INTO THE ZOOM AS AN OBSERVER, BUT HE HAS TO SIGN OFF ON
15 THE ORDER THAT I SIGNED THIS MORNING AND THEN E-MAIL IT
16 TO YOU OR SOMETHING OR TO ALFREDO. SO ALFREDO WILL KNOW
17 THE ORDER, I SIGNED IT, LIKE, YOU KNOW, 8:30 THIS
18 MORNING OR SOMETHING. AND SO IF HE WILL CONSENT TO
19 FOLLOWING THE RULE OF NO RECORDING, NO VIDEOTAPING, ET
20 CETERA, THEN ONCE I HAVE A COPY OF THAT SIGNED, I WILL
21 ASK PLAINTIFF'S COUNSEL TO SHARE THE LINK WITH HIM THAT
22 IS OBSERVATION ONLY, OKAY.

23 MR. WISNER: PERFECT.

24 THE COURT: ALL RIGHT.

25 MR. PETROSINELLI: SHALL I PROCEED, YOUR HONOR?

26 THE COURT: YES, PLEASE. SORRY ABOUT THAT.

27 MR. PETROSINELLI: I'M JUST ABOUT DONE. I'M
28 JUST GOING TO WRAP UP SOON.

1 I WANTED TO TALK ABOUT ONE OTHER BRADFORD HILL
2 FACTOR, I TOLD YOU THERE WERE TWO THAT WE THOUGHT WERE
3 PARTICULARLY IMPORTANT HERE. THE OTHER ONE IS
4 CONSISTENCY, AND THIS IS THE DEFINITION IN THE REFERENCE
5 MANUAL, AND IT'S A DEFINITION THAT IS A COMMON SENSE
6 DEFINITION; THAT YOU JUST LOOK AT ALL OF THE STUDIES
7 THAT ARE OUT THERE ON A PARTICULAR TOPIC, EXPOSURE AND
8 THEN OUTCOME, AND YOU SEE ARE THE RESULTS THE SAME OR
9 SIMILAR, CONSISTENT IN DIFFERENT POPULATIONS, DIFFERENT
10 INVESTIGATORS, DIFFERENT STUDY DESIGNS WITH EACH OTHER?
11 IN THIS CASE WOULD THEY SHOW A CONSISTENTLY POSITIVE
12 ASSOCIATION?

13 AND WE KNOW WHAT THE ANSWER HERE IS BECAUSE,
14 AGAIN, HERE ARE THE STUDY AUTHORS, THE AUTHORS OF THE
15 VERY STUDIES ON WHICH PLAINTIFF'S EXPERTS RELY, THIS IS
16 WHAT THEY SAY ABOUT CONSISTENCY TIME AND AGAIN, THEY
17 LOOK BACK WHEN THEY ARE LOOKING BACK AT THE LITERATURE,
18 THEY SAY, INCONSISTENT, INCONCLUSIVE, MIXED RESULTS,
19 CONTRADICTORY EVIDENCE, THESE ARE THE STUDIES THAT THE
20 PLAINTIFF'S EXPERTS RELY ON, AND THEY SAY THE LITERATURE
21 IS ALL OVER THE MAP ON THIS.

22 BY THE WAY, THAT'S WHY, LIKE I SHOWED YOU AT
23 THE BEGINNING, NO GOVERNMENT AGENCY OR REGULATORY
24 ORGANIZATION OR MEDICAL ORGANIZATION HAS CONCLUDED
25 CAUSATION BECAUSE THE RESULTS ARE NOT CONSISTENT.

26 AND SO YOU MIGHT SAY, WELL, HOW COULD THE
27 PLAINTIFF'S EXPERTS HAVE CONCLUDED THIS BRADFORD HILL
28 FACTOR IS SATISFIED?

1 AND THE REASON IS PRETTY SIMPLE. THEY
2 REDEFINED THE FACTOR. I DEPOSED DR. RITZ. I ASKED HER,
3 TELL ME HOW YOU DEFINE CONSISTENCY. THIS IS WHAT SHE
4 SAID.

5 "IT'S CONSISTENT WITH THE EXPECTATION WITH
6 RESPECT TO WHAT I THINK THE ANSWER SHOULD BE IF
7 THIS OR THAT, WHAT I KNOW, WHAT I DON'T KNOW."
8 THEN I ASKED HER AGAIN LATER IN THE DEPOSITION
9 TO GIVE HER ANOTHER CHANCE JUST TO BE SURE, AND SHE
10 SAID:

11 "IT'S NOT CONSISTENCY OF STUDY RESULTS, IT'S
12 NOT CONSISTENCY OF STUDY RESULTS."

13 WHICH OF COURSE IT IS. THAT IS THE BRADFORD
14 HILL FACTOR. IT'S CONSISTENCY OF WHAT YOU WOULD EXPECT.

15 AND YOU CAN SEE, YOUR HONOR, THAT IF THAT IS
16 THE DEFINITION OF CONSISTENCY THAT ONE IS APPLYING, IT
17 WILL ALWAYS BE SATISFIED BECAUSE YOU'LL ALWAYS SAY, I
18 EXPECT A CERTAIN THING, AND IF I SEE A STUDY THAT SHOWS
19 ANOTHER RESULT, WELL, THEN I CAN DISMISS THAT STUDY AS
20 PART OF MY CONSISTENCY ANALYSIS.

21 THAT IS NOT -- THAT IS THE OPPOSITE OF SOUND
22 SCIENCE. IT'S NOT WHAT EXPERTS IN THE FIELD DO. IT'S
23 NOT WHAT ANYONE DOES WHEN APPLYING THE BRADFORD HILL
24 FACTORS.

25 AND SO, YOUR HONOR, THIS IS WHAT I WANT TO
26 LEAVE WITH, THIS QUOTE, WHICH WE CITED IN OUR BRIEF,
27 WHICH HAS BEEN REPEATED DOZENS AND DOZENS OF TIMES, I
28 THINK IT ORIGINATED WITH THIS 7TH CIRCUIT CASE, WHICH IS

1 THAT "LAW MUST LAG SCIENCE, NOT THE OTHER WAY AROUND."

2 AND THAT IS ESPECIALLY -- IT'S IMPORTANT IN
3 EVERY CASE, BUT HERE THE AUTISM COMMUNITY HAS BEEN DOWN
4 THIS ROAD BEFORE.

5 WE CITED THE CASES, YOUR HONOR, IN THE BRIEF
6 WHERE SEVERAL YEARS AGO SOME RESEARCHERS SAID MERCURY
7 THAT WAS IN VACCINES CAUSED AUTISM AND THAT WAS WIDELY
8 DISSEMINATED IN THE PUBLIC AND THE INTERNET AND IT WAS
9 ALL OVER THE PLACE.

10 AND THEN PLAINTIFFS' LAWYERS STARTED FILING
11 LAWSUITS ON BEHALF OF THAT SCIENCE CLAIMING THAT
12 CHILDREN HAD AUTISM BECAUSE MERCURY WAS IN VACCINES.
13 AND HAPPILY, AS YOU SEE FROM THE CASES WE'VE CITED, THE
14 COURTS FOUND THAT TESTIMONY TO BE SCIENTIFICALLY
15 UNRELIABLE, DID NOT PASS MUSTER UNDER DAUBERT, IF THEY
16 WERE FEDERAL COURT CASES, AND THERE ARE SEVERAL STATE
17 COURT CASES. AND THAT'S GOOD. BUT UNFORTUNATELY, THAT
18 TOOK A WHILE AND THAT HURT PUBLIC HEALTH.

19 THERE ARE PARENTS IN THIS COUNTRY WHO READ
20 ABOUT THIS AND STOPPED VACCINATING THEIR CHILDREN. THAT
21 IS WHY IT'S SO IMPORTANT HERE, PARTICULARLY IN THE
22 CONTEXT OF AUTISM WHEN THE COMMUNITY IS SO DESPERATE TO
23 FIND OUT WHAT THE CAUSES ARE BUT NEEDS TO BE CAREFUL
24 ABOUT WHAT THE CAUSES ARE.

25 "LAW MUST LAG SCIENCE."

26 AND HERE THE PLAINTIFF'S EXPERTS BY WHAT THEY
27 HAVE DONE, THE ANALYTICAL GAPS AND THE DATA AND THE
28 CONCLUSIONS THEY DRAW FROM IT, THE LEAPS OF LOGIC THEY

1 ARE ASKING LAW TO LEAD SCIENCE, AND THAT IS NOT WHAT
2 SHOULD HAPPEN, AND THAT IS WHY THEIR OPINIONS SHOULD BE
3 EXCLUDED UNDER SARGON.

4 THANK YOU, YOUR HONOR.

5 THE COURT: THANKS VERY MUCH.

6 OKAY. MR. WISNER, THE BALL'S BACK IN YOUR
7 COURT.

8 MR. WISNER: THANK YOU, YOUR HONOR. I'M GOING
9 TO HAVE MR. ESFANDIARY TAKE THE LEAD WITH DR. SHAPIRO
10 AND THEN I'M GOING TO GO MAKE SURE DR. SHAPIRO'S ROOM IS
11 WORKING. I'LL BE RIGHT BACK.

12 THE COURT: OKAY.

13 GOOD MORNING. I'M JUDGE HOGUE. IT'S NICE TO
14 MEET YOU.

15 THE WITNESS: NICE TO MEET YOU AS WELL.

16 MR. ESFANDIARY: DR. SHAPIRO, ARE YOU READY?

17 THE WITNESS: YES, MR. ESFANDIARY, I AM READY.

18 MR. ESFANDIARY: YOUR HONOR, WITH YOUR
19 PERMISSION, I CAN PROCEED?

20 THE COURT: PLEASE.

21 MR. ESFANDIARY: ALL RIGHT.

22
23 DIRECT EXAMINATION

24 MR. ESFANDIARY:

25 Q GOOD MORNING, DOCTOR.

26 A GOOD MORNING.

27 Q HOW ARE YOU THIS MORNING?

28 A VERY WELL. THANK YOU.

1 Q GOOD. GOOD.

2 AND, DOCTOR, CAN YOU PLEASE INTRODUCE YOURSELF
3 BRIEFLY TO THE COURT AND WHAT IT IS THAT YOU CURRENTLY
4 DO.

5 A YEAH. MY NAME IS KEVIN SHAPIRO. I'M A CHILD
6 NEUROLOGIST. MY --

7 THE COURT: JUST A MOMENT. JUST ONE MOMENT,
8 PLEASE. MY CLERK IS REMINDING US WE NEED TO SWEAR THE
9 WITNESS.

10 SO YOU'LL HEAR MY CLERK IN A MOMENT TO SWEAR
11 YOU IN, DOCTOR. THANK YOU.

12 THE WITNESS: OF COURSE.

13 THE COURT: WE HAVE SO MUCH TROUBLE
14 COMMUNICATING AND HE'S WEARING A MASK. I CAN'T HEAR
15 HIM. THE LUXURY OF ZOOM IS THERE'S NO MASKS.

16 I DON'T THINK HE CAN HEAR YOU, ALFREDO. DID
17 YOU WANT TO COME IN HERE?

18 THE CLERK: YES.

19 THE COURT: HE'LL HEAR YOU. JUST STAND OVER
20 THERE. NO PROBLEM.

21 THE CLERK: MR. SHAPIRO, CAN YOU PLEASE RAISE
22 YOUR RIGHT HAND.

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

27 THE WITNESS: I DO.

28 THE CLERK: PLEASE SPELL YOUR FIRST AND LAST

1 NAME FOR THE RECORD.

2 THE WITNESS: K-E-V-I-N IS MY FIRST NAME. LAST
3 NAME IS S-H-A-P-I-R-O.

4 THE CLERK: THANK YOU.

5 THE COURT: ALL RIGHT. GO AHEAD, COUNSEL.

6 MR. ESFANDIARY: THANK YOU, YOUR HONOR.

7 Q SO LET'S START AGAIN, DOCTOR.

8 CAN YOU PLEASE BRIEFLY INTRODUCE YOURSELF TO
9 THE COURT AND WHAT IT IS THAT YOU CURRENTLY DO.

10 A SURE.

11 AS I SAID, MY NAME IS KEVIN SHAPIRO. I AM
12 CURRENTLY -- I CURRENTLY WORK AT A ORGANIZATION CALLED
13 CORTICA, WHICH IS A HEALTHCARE PROVIDER FOR CHILDREN
14 WITH AUTISM AND OTHER NEURODEVELOPMENTAL DISABILITIES,
15 AND I'M MEDICAL DIRECTOR FOR OUR LOS ANGELES AREA SITES,
16 OF WHICH THERE ARE CURRENTLY THREE, AND ALSO HEAD OF
17 RESEARCH FOR THE ORGANIZATION AS A WHOLE.

18 Q THANK YOU, DOCTOR.

19 AND TO HELP ORIENT US IN OUR DISCUSSION TODAY,
20 I'D JUST LIKE TO PRESENT THIS ROADMAP IF IT WILL POP UP.
21 THERE IT IS.

22 SO, DOCTOR, WE'RE GOING TO START OFF BY
23 DISCUSSING YOUR QUALIFICATIONS AND BACKGROUND, AND WE'RE
24 GOING TO PROCEED TO DISCUSSING WITH WHAT IS ASD THAT
25 WE'RE HERE TO TALK ABOUT, AND THEN WE'RE GOING TO FINISH
26 OFF WITH THE BIOLOGICAL PLAUSIBILITY OPINION; OKAY?

27 A OKAY.

28 Q THANK YOU.

1 NOW --

2 THE COURT: LET ME INTERRUPT YOU, COUNSEL, FOR

3 ONE SECOND.

4 MR. ESFANDIARY: YES, YOUR HONOR.

5 THE COURT: IS THERE ANY DISPUTE AS TO THE

6 QUALIFICATIONS OF ANY OF THE PLAINTIFF'S EXPERTS? I'M

7 WONDERING IF WE CAN GET THROUGH HIS BACKGROUND.

8 THAT QUESTION IS FOR THE DEFENDANTS.

9 MR. ESFANDIARY: IT WILL BE VERY BRIEF, YOUR

10 HONOR. I WOULDN'T EXPECT IT TO TAKE MORE THAN TWO TO

11 THREE MINUTES.

12 THE COURT: OKAY. THAT'S FINE.

13 MR. IMBROSCIO: THAT'S FINE BY US. WE'RE NOT

14 MAKING AN EXPRESS QUALIFICATION CHALLENGE, ALTHOUGH I DO

15 THINK SOME OF DR. SHAPIRO'S QUALIFICATIONS WILL BE

16 RELEVANT AS THE COURT CONSIDERS THE BROADER ISSUES AND

17 WE'LL BE VERY BRIEF AS WELL.

18 THE COURT: NO PROBLEM. I MEAN, I HAVE READ

19 THE EXPERT REPORTS SO I'VE SEEN THEIR QUALIFICATIONS.

20 THANK YOU.

21 GO AHEAD. GO AHEAD, COUNSEL.

22 MR. ESFANDIARY: THANK YOU, YOUR HONOR.

23 Q DOCTOR, VERY BRIEFLY.

24 YOU ARE IN FACT A DOCTOR; CORRECT?

25 A CORRECT.

26 Q AND YOU'RE A CHILD NEUROLOGIST; IS THAT RIGHT?

27 A THAT'S RIGHT, YES.

28 Q OKAY.

1 AND PART OF YOUR WORK CURRENTLY AS A DOCTOR, DO
2 YOU TREAT CHILDREN WITH AUTISM?

3 A I WOULD SAY THAT'S THE BULK OF MY CURRENT
4 CLINICAL WORK.

5 Q YOU ALSO DIAGNOSE CHILDREN WITH AUTISM?

6 A THAT'S RIGHT.

7 Q OKAY.

8 SO WHERE DID YOU RECEIVE YOUR MEDICAL DEGREE,
9 DOCTOR?

10 A I RECEIVED MY MEDICAL DEGREE FROM HARVARD
11 MEDICAL SCHOOL.

12 Q AND YOUR PH.D.?

13 A ALSO FROM HARVARD UNIVERSITY.

14 Q AND, DOCTOR, WHAT WAS THE FOCUS OF YOUR PH.D.
15 THESIS?

16 A MY PH.D. WAS FOCUSED ON BRAIN MECHANISMS
17 IMPORTANT FOR LANGUAGE PLASTICITY.

18 Q AND DO YOU HAVE ANY EXPERIENCE CONDUCTING
19 RESEARCH IN THE FIELD, EITHER EPIDEMIOLOGICAL RESEARCH
20 OR CLINICAL RESEARCH, AS IT PERTAINS TO ASD AND OTHER
21 NEUROLOGICAL DEFICITS IN CHILDREN?

22 A I HAVE NOT -- WELL, I HAVE A LIMITED EXPERIENCE
23 WITH THE EPIDEMIOLOGY RESEARCH. I'VE BEEN INVOLVED IN
24 THE INTERNATIONAL PEDIATRIC STROKE STUDY, WHICH IS A
25 LARGE STUDY LOOKING AT THE DEMOGRAPHIC AND EPIDEMIOLOGIC
26 RISK FACTORS FOR STROKE IN CHILDREN.

27 I HAVE BEEN INVOLVED IN CLINICAL RESEARCH IN
28 THE ORIGIN OF NEUROCOGNITIVE ISSUES AND I'M CURRENTLY

1 ENGAGED IN TWO CLINICAL TRIALS THAT ARE LOOKING AT NOVEL
2 TREATMENT FOR SYMPTOMS OF AUTISM.

3 Q AND, DOCTOR, WHERE DID YOU DO YOUR RESIDENCY?

4 A I DID A RESIDENCY IN PEDIATRICS AT BOSTON'S
5 CHILDRENS HOSPITAL AND RESIDENCY IN NEUROLOGY AND CHILD
6 NEUROLOGY AT MASSACHUSETTS GENERAL HOSPITAL AND BRIGHAM
7 YOUNG'S HOSPITAL.

8 Q AND I UNDERSTAND AT SOMETIME YOU WERE OVER AT
9 UCSF; IS THAT CORRECT?

10 A THAT'S CORRECT. AFTER COMPLETING RESIDENCY, I
11 COMPLETED A FELLOWSHIP IN VASCULAR NEUROLOGY AT UCSF AND
12 WAS ON THE FACULTY THERE FOR A COUPLE OF YEARS
13 AFTERWARDS.

14 Q VERY GOOD.

15 NOW, DOCTOR, I WANT TO GET INTO YOUR PRIMARY
16 OPINIONS IN THIS MATTER, SPECIFICALLY AS IT PERTAINS TO
17 ASD.

18 AND TO HELP US DO THAT, I'D LIKE TO SHOW YOU A
19 DOCUMENT. AND THIS IS EXHIBIT 137.

20 AND AS THE COURT CAN SEE THIS IS A DOCUMENT
21 TITLED "AUTISM SPECTRUM DISORDER AND THE ENVIRONMENT."

22 CAN YOU SEE THAT, DOCTOR?

23 A YES, I CAN.

24 Q AND IT'S A PUBLICATION I OBTAINED FROM THE
25 NATIONAL INSTITUTES OF ENVIRONMENTAL HEALTH SCIENCES.

26 CAN YOU SEE THAT?

27 A YES.

28 Q DOCTOR, HAVE YOU HAD A CHANCE TO REVIEW THIS

1 DOCUMENT?

2 A I HAVE LOOKED AT THAT DOCUMENT.

3 Q AND DO YOU CONSIDER THE NIH A TRUSTED
4 INSTITUTION?

5 A I THINK THAT'S FAIR TO SAY, YES.

6 Q AND WHY IS THAT, DOCTOR? WHY IS THE NIH A
7 TRUSTED INSTITUTION, CONSIDERED A TRUSTED INSTITUTION?

8 A WELL, I -- I THINK THAT NIH SORT OF REPRESENTS
9 THE SCIENTIFIC CONSENSUS ACROSS VARIOUS FIELDS OF STUDY.
10 NOW, HAVING SAID THAT, THERE ARE VARIOUS -- NIH
11 IS NATIONAL INSTITUTES OF HEALTH, WHICH MEANS THAT IT
12 COMPRISES SEVERAL INSTITUTES THAT ARE, YOU KNOW,
13 FUNCTIONALLY SOMEWHAT INDEPENDENT OF EACH OTHER, BUT
14 EACH OF THOSE INSTITUTES IS SORT OF CHARGED WITH THE
15 DEVELOPMENT OF SCIENCE WITHIN A PARTICULAR FIELD.

16 SO IN THIS CASE, IT'S THE INSTITUTE OF
17 ENVIRONMENTAL HEALTH SCIENCES, AND THEY ARE PARTICULARLY
18 FOCUSED ON LOOKING AT ENVIRONMENTAL CONTRIBUTIONS TO
19 HEALTH.

20 Q AND, DOCTOR, I JUST WANT TO ORIENT US HERE.

21 I WANT TO CALL OUT VERY BRIEFLY THAT THIS WAS A
22 PUBLICATION FROM APRIL OF 2019.

23 CAN YOU SEE THAT?

24 A I SEE THAT.

25 Q OKAY. NOW, LET'S DELVE INTO -- OH, SORRY --
26 LET'S DELVE INTO SOME OF THE THINGS THAT THE NIH SAYS IN
27 THIS DOCUMENT.

28 LET'S HAVE --

1 MR. IMBROSCIO: YOUR HONOR.

2 THE COURT: YES.

3 MR. IMBROSCIO: I'M SORRY TO INTERRUPT. I
4 GUESS I'M NOT SURE WHAT THE PURPOSE OF THIS IS. I THINK
5 WE'RE HERE TO GET DR. SHAPIRO'S OPINIONS, NOT TO HAVE
6 HIM READ A DOCUMENT FROM THE NIH. I'M JUST TRYING TO
7 UNDERSTAND WHAT THE -- WHAT'S GOING ON HERE.

8 THE COURT: IT'S ALSO HEARSAY, SO I HAVE A
9 CONCERN ABOUT IT AS WELL.

10 MR. ESFANDIARY: BUT, YOUR HONOR, I'M SIMPLY
11 USING THIS DOCUMENT TO GUIDE US, AND DR. SHAPIRO IS
12 GOING TO PROVIDE HIS OPINION KIND OF USING THIS DOCUMENT
13 AS A SPRINGBOARD AND IT IS SOMETHING THAT HE RELIED UPON
14 IN HIS REFERENCE LIST, AND AS YOU WELL KNOW, EXPERTS ARE
15 PERMITTED TO RELY UPON HEARSAY DOCUMENTS.

16 MR. IMBROSCIO: WELL, THAT'S --

17 THE COURT: THEY ARE -- THEY ARE -- I'M SORRY,
18 COUNSEL. THEY ARE PERMITTED TO RELY, BUT IF IT'S
19 PRESENTED IN DIRECT TESTIMONY, IT'S HEARSAY; CERTAINLY
20 THE OTHER SIDE CAN BRING OUT PARTICULAR DOCUMENTS OR
21 STUDIES, AND THE WORDS IN THOSE DOCUMENTS OR STUDIES,
22 IT'S NOT HEARSAY ON CROSS EXAMINATION, BUT IT IS HEARSAY
23 ON DIRECT EXAMINATION.

24 MR. ESFANDIARY: I THINK I CAN --

25 MR. IMBROSCIO: AND THERE'S ANOTHER PROBLEM
26 HERE, YOUR HONOR, IS THIS IS A DOCUMENT THAT WE
27 CONFIRMED IN THE DEPOSITION HE DID NOT REVIEW PRIOR TO
28 DOING HIS REPORT AND OFFERING HIS OPINIONS, IT'S A

1 DOCUMENT THAT MR. ESFANDIARY SHOWED HIM A FEW DAYS
2 BEFORE HIS DEPOSITION, SO IT'S ALL THE MORE REASON WE
3 THINK THAT LET'S JUST GET TO HIS OPINIONS AND MOVE
4 FORWARD.

5 MR. ESFANDIARY: THAT IS JUST FACTUALLY UNTRUE,
6 AND DR. SHAPIRO SUBMITTED A PREFERENCE LIST, THIS
7 DOCUMENT WAS ON HIS REFERENCE LIST PRIOR -- BEFORE HE
8 WAS DEPOSED SO THIS IS COMPRISED AS PART OF HIS
9 OPINIONS. BUT, YOUR HONOR, IF IT WILL PLEASE THE COURT,
10 IF I CAN DO THIS WITHOUT DIRECT REFERENCE TO THE
11 DOCUMENT, I HAVE NO PROBLEM WITH THAT.

12 THE COURT: THANK YOU.

13 MR. ESFANDIARY: YES.

14 Q DR. SHAPIRO, IS IT FAIR TO CHARACTERIZE AUTISM
15 SPECTRUM DISORDER AS A DEVELOPMENTAL DISORDER THAT
16 APPEARS IN THE EARLY LIFE PERIOD?

17 A I WOULD SAY THAT'S FAIR, YES.

18 Q NOW, WHAT COMPRISES THE EARLY LIFE PERIOD?

19 A WELL, THE EARLY DEVELOPMENTAL PERIOD IS NOT
20 STRICTLY DEFINED, BUT IT'S THE PERIOD OF SORT OF BRAIN
21 MATURATION THAT SORT OF ENCOMPASSES LATE POST-NATAL --
22 SORRY -- LATE PRENATAL/EARLY POST-NATAL DEVELOPMENT UP
23 UNTIL ABOUT TWO OR THREE YEARS OF AGE USUALLY.

24 SO WHAT IT ENCOMPASSES ARE THE TIMES DURING
25 DEVELOPMENT WHERE THE BRAIN IS SORT OF ACTIVELY MATURING
26 AND THERE CONTINUE TO BE STRUCTURAL AND ANATOMICAL
27 CHANGES IN BRAIN NETWORKS.

28 SO THERE ARE, YOU KNOW, VARIOUS SUCH PROCESSES

1 THAT UNFOLD OVER TIME, SO LARGELY IN THE PRENATAL
2 PERIOD, YOU HAVE THE PROCESSES OF NEUROGENESIS OR THE
3 FORMATION OF NEURONS, NEURONAL MIGRATION, SO THE BASIC
4 FORMATION OF THE ARCHITECTURE OF BRAIN TISSUE.

5 BUT IN THE POST-NATAL PERIOD UP UNTIL AROUND
6 ROUGHLY TWO YEARS OF LIFE IS WHEN I SEE SYNAPTIC
7 CONNECTIVITY SYNAPTOGENESIS AND MAINTENANCE OF SYNAPSIS
8 OCCURS.

9 SO SYNAPSIS ARE THE CONNECTIONS BETWEEN BRAIN
10 CELLS AND THOSE CONNECTIONS REALLY MOSTLY GET FORMED
11 POST-NATALLY OR AT LEAST THOSE NETWORKS REALLY DEVELOP
12 AFTER BIRTH WITH ENVIRONMENTAL INPUT.

13 Q I THINK IT'S VERY IMPORTANT, DOCTOR, WHAT YOU
14 JUST SAID. I'D LIKE TO FOCUS IN ON THAT A LITTLE BIT.

15 THE DEFENDANTS IN THIS LITIGATION HAVE SAID
16 THAT EVERYTHING THAT NEEDS TO HAPPEN FOR ASD TO HAPPEN
17 OCCURS PRENATALLY OR IN UTERO.

18 IS THAT TRUE?

19 A I DON'T THINK IT'S TRUE THAT EVERYTHING THAT
20 NEEDS TO HAPPEN OCCURS IN UTERO. THERE ARE CERTAIN --
21 AS I SAID, THERE'S AN UNFOLDING SET OF PROCESSES THAT
22 CONTRIBUTE TO THE DEVELOPMENT OF THE MATURE BRAIN, SOME
23 OF THOSE OF COURSE START IN UTERO, THE FORMATION OF
24 NEURONS, THE, YOU KNOW, BASIC FORMATION OF BRAIN
25 ARCHITECTURE, BUT THERE ARE PROCESSES THAT CONTINUE
26 AFTER BIRTH AND THOSE PROCESSES ARE VERY RELEVANT TO THE
27 DEVELOPMENT OF PATHOLOGY IN OUR EARLY CHILDHOOD.

28 MR. IMBROSCIO: AND, YOUR HONOR, I DON'T PLAN

1 TO MAKE OBJECTIONS ABOUT CHARACTERIZATIONS OF OUR
2 POSITIONS, IDEALLY. MR. ESFANDIARY CAN ASK JUST HIM
3 WHAT HIS OPINIONS ARE WITHOUT TYING HIM TO SOME
4 CHARACTERIZATION OF WHAT WE SAID.

5 THE COURT: OVERRULED. LET'S TRY TO MINIMIZE
6 OBJECTIONS.

7 MR. ESFANDIARY: THANK YOU, YOUR HONOR.

8 Q NOW, DOCTOR, AT WHAT AGE IS ASD TYPICALLY
9 DIAGNOSED?

10 A TYPICALLY ASD IS DIAGNOSED AROUND THREE YEARS
11 OR THREE TO FOUR YEARS OF AGE. BUT, AGAIN, YOU KNOW, TO
12 SOME EXTENT, IT DEPENDS ON THE SEVERITY OF SYMPTOMS AND
13 THE TYPE OF SYMPTOMS THAT ARE PRESENTED.

14 SO THERE ARE CASES WHERE CLINICAL SIGNS AND
15 SYMPTOMS OF AUTISM ARE CLEARLY EVIDENCED, YOU KNOW,
16 PRIOR TO THREE YEARS OF AGE AT 18 MONTHS OR SOMETIMES
17 EVEN EARLIER, AND THERE ARE CASES WHERE SYMPTOMS MAY BE
18 MILD OR UNRECOGNIZED AND THE DIAGNOSIS IS NOT MADE UNTIL
19 LATER IN CHILDHOOD OR ADOLESCENCE OR SOMETIMES EVEN
20 ADULTHOOD.

21 THERE IS A GENERAL CONSENSUS THAT SYMPTOMS
22 SHOULD HAVE BEEN PRESENT IN THE EARLY DEVELOPMENTAL
23 PERIOD, SO THAT MEANS -- BY GENERAL CONSENSUS, I MEAN,
24 THAT'S PART OF THE DSM 5 DEFINITION OF AUTISM.

25 THE EARLY DEVELOPMENTAL PERIOD IS NOT -- YOU
26 KNOW, THERE'S NOT A TIME LIMIT THAT'S SPECIFIED IN THAT
27 DEFINITION, BUT GENERALLY IT'S FELT TO BE BEFORE THE AGE
28 OF THREE YEARS.

1 Q DOCTOR, CAN ASD BE DIAGNOSED AT LATER AGES PAST
2 THE AGE OF FOUR -- LET ME ASK IT IN THIS WAY.

3 A YEAH.

4 Q CAN THE SYMPTOMS OF ASD OR SYMPTOMS THAT ARE
5 RECOGNIZED AS ASD BE IDENTIFIED PAST THE AGE OF FOUR?

6 A YEAH, CERTAINLY. THERE'S NO CUTOFF AS TO WHEN
7 YOU CAN IDENTIFY THE SYMPTOMS OF ASD.

8 Q AND, DOCTOR, IS THERE A BIOLOGICAL MARKER TO
9 ASD?

10 A THERE IS NO BIOLOGICAL TEST THAT CAN DEFINE
11 ASD. IT'S PURELY A SET OF BEHAVIORAL CRITERIA.

12 Q FAIR TO SAY THAT ASD IS RECOGNIZED BY A
13 CONSTELLATION OF SYMPTOMS?

14 A THAT'S RIGHT. SO THE DEFINITION IS BASED ON A
15 CONSTELLATION OF SYMPTOMS.

16 Q OKAY. AND CAN THOSE SYMPTOMS OF ASD BE ALSO
17 IDENTIFIED IN OTHER DISEASES THAT WOULDN'T BE
18 CHARACTERIZED AS ASD?

19 A SOME OF THOSE SYMPTOMS CAN BE IDENTIFIED IN
20 OTHER CONDITIONS. ASD IS SORT OF THE UNIQUE CONFLUENCE
21 OF ALL OF THOSE CRITERIA WITH, AGAIN, WITH ONSET OF AT
22 LEAST SOME SYMPTOMS IN THE EARLY DEVELOPMENTAL PERIOD,
23 SO IF YOU HAVE ALL OF SYMPTOMS OF ASD, YOU HAVE ASD.

24 Q OKAY. WHY CAN A CHILD BE DIAGNOSED AFTER THREE
25 YEARS OLD? IN WHAT CIRCUMSTANCES WOULD THAT HAPPEN?

26 A SO, FOR EXAMPLE, IF YOU HAVE A CHILD WITH --
27 WELL, THERE ARE VARIOUS CIRCUMSTANCES. ONE IS THAT THEY
28 MIGHT NOT COME TO MEDICAL ATTENTION UNTIL AFTER THE AGE

1 OF THREE, SO, YOU KNOW, YOU MIGHT NOT -- YOU MIGHT
2 SIMPLY NOT HAVE HAD A DIAGNOSTIC EVALUATION, BUT YOU MAY
3 HAVE A DIAGNOSTIC EVALUATION AT THE AGE OF THREE AND
4 FOUR AND PERHAPS, YOU KNOW, IT'S UNCLEAR AT THE TIME
5 WHETHER OR NOT THEY MEET CRITERIA FOR AUTISM, BUT ON
6 LATER EVALUATION IT BECOMES CLEAR THAT IN FACT THEY DO
7 MEET THE CRITERIA.

8 Q DOCTOR, IS ASD A CURABLE DISORDER?

9 A I WOULD NOT SAY THAT IT IS A CURABLE DISORDER,
10 AND IN FACT I SORT OF DISPUTE THE ASSERTION THAT IT'S A
11 DISORDER. I THINK IT'S A DIFFERENCE IN BRAIN
12 DEVELOPMENT THAT LEADS TO CERTAIN FUNCTIONAL CHALLENGES,
13 BUT IT IS A SORT OF A PERMANENT DIFFERENCE IN THE WAY
14 THAT THE BRAIN MATURES AND DEVELOPS.

15 Q ARE YOU FAMILIAR WITH THE CONCEPT OF REGRESSION
16 IN THE CONTEXT OF ASD?

17 A YEAH, REGRESSION REFERS TO THE LOSS OF SKILLS
18 THAT WERE PREVIOUSLY ACQUIRED. THIS TYPICALLY OCCURS
19 AROUND THE AGE OF 18 MONTHS TO TWO YEARS AND IS SEEN,
20 DEPENDING ON WHAT STUDY YOU LOOK AT, IN ABOUT A THIRD,
21 30 PERCENT TO A THIRD OR SO OF CHILDREN WITH AUTISM.

22 SO IN THESE CASES CHILDREN ARE TYPICALLY
23 DEVELOPING THROUGHOUT THE FIRST YEAR OF LIFE USUALLY
24 AROUND -- UNTIL AROUND 18 MONTHS OR SO, THEY MAY ACQUIRE
25 SOME LANGUAGE AND SOCIAL SKILLS THAT TYPICALLY THEY WILL
26 HAVE SOME WORDS AND WILL SEEM TO ENGAGE IN TYPICAL
27 SOCIAL INTERACTIONS, AND THEN STARTING, AS I SAID,
28 USUALLY AROUND THE AGE OF 18 MONTHS OR SO, THEY START TO

1 LOSE LANGUAGE AND SOCIAL SKILLS.

2 Q WHAT DOES THE CONCEPT OF THE REGRESSION TELL US
3 ABOUT WHAT THE RELEVANT ETIOLOGICAL TIME FRAME FOR ASD
4 IS?

5 A WELL, IT TELLS US THAT SOMETHING IS HAPPENING
6 IN THE BRAIN AT AROUND THAT AGE THAT CONTRIBUTES TO THE
7 EMERGENCE OF SYMPTOMS, SO, YOU KNOW, THERE'S SOMETHING
8 THAT'S HAPPENING IN BRAIN DEVELOPMENT THAT DOESN'T LEAD
9 TO SYMPTOMS OR AT LEAST NOT TO OVERT SYMPTOMS UNTIL
10 AROUND THAT AGE, NOW IT CAN BE ARGUED THAT, YOU KNOW,
11 THERE ARE STUDIES, IN FACT, THAT SHOW THAT SOME CHILDREN
12 WITH AUTISM HAVE MORE SUBTLE SYMPTOMS EVEN PRIOR TO THE
13 AGE OF 18 MONTHS OF, YOU KNOW, IN SOME CASES THERE ARE
14 MARKERS OF POTENTIAL ABNORMALITIES THAT EXIST PRIOR TO
15 THAT AND OF COURSE NOT ALL CHILDREN WITH AUTISM EXHIBIT
16 REGRESSION, SOME EXHIBIT SYMPTOMS FROM A VERY, VERY
17 EARLY AGE.

18 BUT THE OCCURRENCE OF REGRESSION IN A
19 SUBSTANTIAL PORTION OF CASES IS TELLING YOU THAT THERE'S
20 SOMETHING THAT'S HAPPENING IN THE BRAIN AROUND THAT TIME
21 THAT LEADS TO A BREAKDOWN IN BEHAVIOR AND IN THE
22 ACQUISITION OF DEVELOPMENTAL SKILLS AND FROM THE
23 BIOLOGICAL PERSPECTIVE THAT SORT OF COINCIDES WITH
24 PROCESSES OF SYNAPTIC FORMATION AND MAINTENANCE AND ALSO
25 MYELINATION OF WHITE MATTER TRACTS.

26 Q NOW, WHAT DOES THAT MEAN WHAT YOU JUST
27 EXPLAINED, THE PROCESS OF SYNAPTIC FORMATION IN WHITE
28 MATTER TRACTS?

1 A SO SYNAPSES ARE THE CONNECTIONS BETWEEN
2 NEURONS, SO IN ORDER, YOU KNOW, FOR ANY COGNITIVE
3 PROCESS TO HAPPEN IN THE BRAIN, YOU NEED BRAIN CELLS TO
4 COMMUNICATE WITH EACH OTHER TO, YOU KNOW, TRANSFER
5 INFORMATION, PROCESS SENSORY INFORMATION THAT IS COMING
6 IN FROM THE WORLD, INTEGRATE INFORMATION FROM DIFFERENT
7 SOURCES, INTERPRET IT, AND, YOU KNOW, COME UP WITH A
8 PLAN OR PRODUCE ACTION TO THOSE SPEAKING, MOVING,
9 BEHAVING, AND SO FORTH.

10 SO ALL OF THOSE LINKS ARE MEDIATED BY BRAIN
11 NETWORKS THAT RELY ON CONNECTIONS BETWEEN BRAIN CELLS IN
12 DIFFERENT AREAS TO COMMUNICATE INFORMATION.

13 THE PROCESS OF FORMING THOSE CONNECTIONS IS
14 SYNAPTOGENESIS SO THAT THE ACTUAL THE FORMATION OF THE
15 SYNAPSIS ARE THE LINKS THAT ALLOW COMMUNICATION BETWEEN
16 NERVE CELLS, SO THAT'S WHAT WE MEAN BY SYNAPTOGENESIS.
17 AND THAT IS I THINK UNIVERSALLY REGARDED TO BE AN
18 EXPERIENCE-DEPENDENT PROCESS. CERTAINLY THERE ARE
19 GENETIC FACTORS THAT ARE IMPLICATED IN SYNAPTIC
20 DEVELOPMENT AND THERE ARE GENES THAT CAN -- THE
21 DISRUPTION OF WHICH CAN CAUSE YOU NOT TO BE ABLE TO FORM
22 NORMAL SYNAPSIS, BUT THE ACTUAL SORT OF ENCODING OF
23 INFORMATION IS DEPENDENT ON ASSIMILATING ENVIRONMENTAL
24 INPUTS, BOTH SENSORY, BUT ASSUMING THAT'S WHAT KIND OF
25 GUIDES THE NATURE OF OUR EXPERIENCES, AND THEN OTHER
26 KIND OF EXOGENOUS BIOLOGICAL FACTORS CAN EFFECT THE
27 DEGREE TO WHICH SYNAPSIS ARE STRONGER OR WEAKER OR
28 WHETHER THEY FORM OR DON'T FORM UNDER APPROPRIATE

1 CIRCUMSTANCES.

2 Q DOCTOR, I THINK YOU HIT THE NAIL ON THE HEAD
3 THERE.

4 AS A NEUROLOGIST WHO IS INVOLVED IN TREATING
5 CHILDREN, IS IT YOUR OPINION THAT THERE IS AN
6 ENVIRONMENTAL COMPONENT TO ASD ETIOLOGY?

7 A I THINK THAT THERE IS CERTAINLY AN
8 ENVIRONMENTAL COMPONENT TO ASD ETIOLOGY. I THINK THAT
9 THE -- CERTAINLY THE EXPRESSION OF SYMPTOMS IN ASD HAS A
10 LOT TO DO WITH ENVIRONMENTAL INPUT IN THE EARLY
11 DEVELOPMENTAL PERIOD.

12 Q TO HELP US PUT SOME FLESH ON THAT TESTIMONY,
13 DOCTOR, I'D JUST LIKE TO PULL UP AN EXHIBIT.

14 THIS IS EXHIBIT NUMBER 71.

15 AND IT'S A STUDY TITLED "THE GENETIC
16 INHERITABILITY AND SHARED ENVIRONMENTAL FACTORS AMONG
17 TWIN PAIRS WITH AUTISM," AND AS WE CAN SEE HERE, IT WAS
18 PUBLISHED IN THE ARCHIVES OF GENERAL PSYCHIATRY.

19 CAN YOU SEE THAT, DOCTOR?

20 A YES, I CAN.

21 Q IN 2011.

22 A YES.

23 Q IS THAT CONSIDERED A RESPECTED JOURNAL?

24 A YES, I WOULD SAY SO.

25 Q OKAY. AND IF WE JUST LOOK AT THE AUTHORS OF
26 THIS DOCUMENT, WE HAVE LOT OF AUTHORS HERE, DOCTOR, AND
27 FROM VARIOUS INSTITUTIONS. WE HAVE INDIVIDUALS HERE
28 FROM STANFORD UNIVERSITY SCHOOL OF MEDICINE.

1 CAN YOU SEE THAT, DOCTOR?

2 A YES.

3 Q ALL RIGHT. WE HAVE PEOPLE HERE FROM THE
4 CALIFORNIA DEPARTMENT OF THE PUBLIC HEALTH; CORRECT?

5 A I SEE THAT.

6 Q AND WE ALSO HAVE UC DAVIS?

7 A YES, SIR.

8 Q AND WE HAVE THE INSTITUTION YOU REPRESENTED
9 WITH UCSF AS WELL?

10 A YES, I SEE THAT THERE.

11 Q DO YOU CONSIDER THESE INSTITUTIONS WELL
12 RESPECTED INSTITUTIONS WHEN IT COMES TO UNDERSTANDING
13 ASD AND THE ETIOLOGIES OF ASD AND THE RESEARCH THAT THEY
14 HAVE DONE?

15 A YES, I THINK SO.

16 Q OKAY. NOW, DOCTOR, I'D LIKE TO JUST TAKE A
17 LOOK AT WHAT THEY DID IN THIS STUDY EXACTLY AND AUTHORS
18 THEY PROVIDE, THIS VERY HELPFUL -- WHOOPS -- THEY
19 PROVIDE THIS VERY HELPFUL SUMMARY RIGHT HERE.

20 IT SAYS THAT, "THIS REPORT DESCRIBES THE
21 RESULTS OF A TWIN STUDY OF AUTISM, THE CALIFORNIA AUTISM
22 TWIN STUDY."

23 DOCTOR, WHAT IS A CALIFORNIA AUTISM TWIN STUDY?

24 A WELL, IT WAS ESSENTIALLY A STUDY THAT WAS
25 DESIGNED TO LOOK AT THE GENETIC VERSUS ENVIRONMENTAL
26 CONTRIBUTIONS TO THE PATHOGENESIS OF AUTISM.

27 MR. IMBROSCIO: YOUR HONOR, YOUR HONOR, I'M
28 SORRY TO INTERRUPT AND MINDFUL OF YOUR COMMENT, BUT I

1 BELIEVE THIS IS A STUDY THAT IS NOT EVEN MENTIONED IN
2 HIS REPORT, WAS NOT ON HIS RELIANCE LIST UNTIL I THINK A
3 FEW DAYS AGO, AND SO I'M JUST NOT SURE HE'S THE RIGHT
4 WITNESS IF THEY WANT TO SPONSOR THIS STUDY, WE DON'T
5 REALLY HAVE NOTICE THAT THIS IS SOMETHING HE WAS GOING
6 TO BE TALKING ABOUT AND IT'S NOT IN HIS REPORT, I
7 HAVEN'T DEPOSED HIM ON IT, I HAD NO BASIS TO DEPOSE HIM
8 ON IT. YOU KNOW, GIVEN WHAT HIS LIMITED ROLE IS HERE, I
9 JUST THINK THAT IS NOT AN APPROPRIATE AVENUE.

10 AND IF MR. ESFANDIARY CAN TELL ME THIS WAS IN
11 HIS REPORT OR ON HIS EARLY FIRST RELIANCE LIST, HE CAN
12 CORRECT ME, BUT I DON'T THINK IT WAS.

13 MR. ESFANDIARY: IT'S ON DR. SHAPIRO'S RELIANCE
14 LIST, YOUR HONOR. THE DEFENDANTS HAD A CHANCE TO DEPOSE
15 HIM ABOUT THIS STUDY. MR. IMBROSCIO'S OBJECTIONS I
16 THINK AT THIS POINT IS OBSTRUCTIONIST AND WASTING TIME
17 SERIOUSLY. I WOULD LIKE TO PROCEED WITH EXAMINATION OF
18 THIS WITNESS, WHO IS A NEUROLOGIST TALKING ABOUT A
19 NEUROLOGICAL PAPER DEALING WITH HIS VERY OWN EXPERTISE.

20 MR. IMBROSCIO: BUT I'M SORRY, SIR. IT WAS NOT
21 ON HIS RELIANCE LIST UNTIL A FEW DAYS AGO, I'VE
22 CONFIRMED THAT.

23 THE COURT: GENTLEMAN, GENTLEMAN.

24 MR. IMBROSCIO: AND IT WAS NOT IN HIS REPORT.

25 THE COURT: GENTLEMEN, YOU NEED TO TALK TO ME,
26 NOT TO EACH OTHER, PLEASE.

27 MR. IMBROSCIO: YES.

28 THE COURT: THANK YOU.

1 MR. IMBROSCIO: SORRY ABOUT THAT, YOUR HONOR.

2 THE COURT: THANK YOU. SOMEHOW THE DECORUM
3 FALLS AWAY, I FIND, WHEN WE'RE ON ZOOM, BUT NOT IN THE
4 COURTROOM. SO THANK YOU.

5 WELL, LET'S JUST THINK THIS THROUGH TOGETHER.

6 AS I SAID EARLIER, IT'S HEARSAY TO PULL UP --
7 YOU COULD NOT SHOW THIS ARTICLE TO A JURY AND, IN FACT,
8 IT'S MAKING ME WONDER WHETHER WE HAVE THE ORDER OF PROOF
9 REVERSED FOR THESE PROCEEDINGS AND WHETHER OR NOT IT
10 WOULD BE THE DEFENDANT THAT GOES FIRST WITH THE ADVERSE
11 CROSS EXAMINATION.

12 BUT I THINK THAT WE CAN ANTICIPATE THAT AS TO
13 ANY ARTICLES IDENTIFIED IN THE REPORT AS MATERIALS ON
14 WHICH THE DOCTOR RELIED, THERE IS GOING TO BE VIGOROUS
15 CROSS EXAMINATION. I THINK IT IS A LITTLE UNFAIR TO ASK
16 HIM ABOUT AN ARTICLE ON DIRECT THAT IS HEARSAY,
17 ESPECIALLY IF IT WAS NOT IDENTIFIED PREVIOUSLY, SO I
18 THINK IF IT'S NOT ON THE LIST, THAT'S A PROBLEM.

19 MR. WISNER: BUT, YOUR HONOR, A COUPLE OF
20 THINGS, AND I THINK THIS IS JUST REALLY IMPORTANT, YOU
21 KNOW, THIS IS NOT A JURY TRIAL, THIS IS A SARGON HEARING
22 AND THE DEFENDANTS HAVE LITERALLY PUT THE ISSUE OF THE
23 UNDERLYING STUDIES AT ISSUE AS CLEARLY DEMONSTRATED IN
24 THE LENGTHY DEPOSITIONS ABOUT THESE STUDIES AND EVIDENCE
25 THAT THE DEFENSE WOULD LIKE THE COURT TO EXAMINE, SO I
26 THINK IT WOULD BE A LITTLE BIT DIFFICULT FOR US TO
27 PARTICIPATE IN A MEANINGFUL SARGON HEARING WHICH IS
28 MEANT TO THE GET THE BASIS OF THEIR OPINIONS AND WHAT

1 THEY RELIED UPON WITHOUT SHOWING THE COURT WHAT THEY
2 RELIED UPON.

3 THE COURT: I DON'T DISAGREE WITH THAT, BUT IF
4 IT WASN'T ON LIST, I'M NOT SURE IT'S FAIR.

5 MR. WISNER: WELL, ABOUT THAT, YOUR HONOR, MY
6 UNDERSTANDING IS IT WAS ON HIS RELIANCE LIST, I DON'T
7 KNOW IF IT WAS ON HIS RELIANCE LIST PRIOR TO HIS
8 DEPOSITION, BUT IT HAS BEEN ON HIS RELIANCE LIST AND
9 THEY ARE FREE TO CROSS EXAMINE HIM ABOUT IT TO THE
10 EXTENT THAT THEY WISH. I MEAN, THAT'S WHAT WE'RE HERE
11 TO DO. WE'RE HERE TO GET TO THE TRUTH, NOT RESTRICT
12 OPINIONS NEEDLESSLY.

13 I KNOW YOUR HONOR HAD AN 11:00 A.M. MEETING SO
14 THAT JUST OCCURRED TO ME.

15 THE COURT: I JUST GOT A NOTE ON THAT SO WE
16 NEED TO TAKE ABOUT A FIVE-MINUTE BREAK. THANK YOU.

17 MR. WISNER: YES, YOUR HONOR.

18 MR. IMBROSCIO: THANK YOU, YOUR HONOR.

19 THE COURT: I'M GOING TO LEAVE ALTOGETHER, BUT
20 I'LL COME BACK.

21 (RECESS)

22 THE COURT: OKAY. I AM BACK.

23 I WAS JUST ABOUT TO SAY THAT WE HAVE TWO ISSUES
24 HERE; ONE IS WHETHER ON CROSS -- AND I AGREE WITH YOU
25 MR. WISNER THAT SINCE THE WHOLE POINT OF THIS EXERCISE
26 IS TO LOOK AT THE DATA UNDERLYING THE EXPERT'S REPORTS,
27 IT'S OKAY, AND I WILL NOT BE CONCERNED ABOUT THE HEARSAY
28 OBJECTION FOR THAT PURPOSE, BUT THERE'S A FAIRNESS ISSUE

1 HERE ABOUT IT NOT BEING ON THE LIST.

2 CAN YOU VERIFY WHETHER IT WAS OR IT WASN'T?

3 MR. ESFANDIARY: YES, YOUR HONOR. SO IT WASN'T
4 ON HIS LIST PRIOR TO HIS DEPOSITION. IT WAS PUT ON HIS
5 LIST AFTER WE RECEIVED THE DEFENDANTS' SARGON MOTION
6 BECAUSE THEY MAKE ACCUSATIONS IN THAT MOTION REGARDING
7 THE EXTENT OF GENES AND THE ENVIRONMENT SPECIFICALLY
8 REGARDING DR. SHAPIRO'S OPINION, AND HE HAS A RIGHT TO
9 RESPOND TO THAT. AND WE TOOK A LOOK AT THE MOTION AND
10 WE PUT THIS STUDY ON HIS REFERENCE LIST.

11 DEFENDANTS HAVE HAD WEEKS AND WEEKS --

12 THE COURT: I WILL ALLOW IT. PLEASE CONTINUE.

13 MR. ESFANDIARY: THANK YOU.

14 Q ALL RIGHT. DOCTOR, CAN YOU HEAR ME?

15 A YES, I CAN.

16 Q ALL RIGHT. GREAT. I'D JUST LIKE TO TURN OUR
17 ATTENTION BACK TO THIS DOCUMENT.

18 SO WE WERE TALKING ABOUT THE HALLMAYER STUDY
19 FROM 2011 AND YOU WERE TESTIFYING ABOUT THE CALIFORNIA
20 AUTISM TWIN STUDY.

21 WHAT IS THAT, DOCTOR?

22 A YES. SO THAT WAS SORT OF A BROAD STUDY THAT
23 AIMED TO EXAMINE THE RELATIVE CONTRIBUTIONS OF GENETIC
24 AND ENVIRONMENTAL INFLUENCES TO THE PATHOGENESIS OR TO
25 THE DIAGNOSIS OF AUTISM IN A SORT OF A VERY BROAD
26 COHORT, SO IT WAS A POPULATION-BASED STUDY WITHIN THE
27 STATE OF CALIFORNIA, I THINK THEY SCREENED -- I DON'T
28 HAVE THE STUDY IN FRONT OF ME, BUT I THINK THEY SCREENED

1 SOMETHING LIKE 1,100 TWIN COHORTS AND ENDED UP ENROLLING
2 404 TWINS OR ENDED UP ANALYZING, I THINK WITH GENETIC
3 DATA, SOMETHING LIKE 202 TWIN PAIRS.

4 Q VERY GOOD.

5 AND, DOCTOR, IT'S SAYING THAT THE CHIEF AIMS
6 WERE, NUMBER ONE, COLLECT A SAMPLE OF TWINS WITH
7 VALIDATED DIAGNOSIS OF AUTISM FROM A POPULATION-BASED
8 SAMPLE.

9 WHAT IS A VALIDATED DIAGNOSIS OF AUTISM?

10 A SO A VALIDATED DIAGNOSIS OF AUTISM AS THEY ARE
11 USING IT HERE MEANS A DIAGNOSIS THAT IS MADE CLINICALLY
12 AND CONFIRMED BY TWO STANDARDIZED INSTRUMENTS, THE
13 AUTISM DIAGNOSTIC OBSERVATION SCHEDULE FOR THE ADOS AND
14 THE AUTISM DIAGNOSTIC INTERVIEW REVISED OR THE ADIR, SO
15 THOSE ARE TWO KIND OF STANDARDIZED INSTRUMENTS THAT ARE
16 RECOGNIZED AS AMONG THE GOLD STANDARD FOR MAKING AN
17 AUTISM DIAGNOSIS.

18 Q SO THEY ARE USING THE GOLD STANDARD HERE TO
19 DETERMINE DIAGNOSIS, THEN, IS THAT FAIR TO SAY?

20 A ESSENTIALLY, YES. SO THOSE ARE THE INSTRUMENTS
21 THAT ARE MOST WIDELY USED TO MAKE THAT DIAGNOSIS IN THE
22 UNITED STATES.

23 Q OKAY.

24 AND NUMBER TWO, IT SAYS EXAMINE SET-SPECIFIC
25 CONCORDANCE RATES FOR NARROW AND BROAD DEFINITIONS OF
26 AUTISM.

27 DOCTOR, WHAT ARE THEY GETTING AT HERE? WHAT
28 DOES SET-SPECIFIC CONCORDANCE RATE?

1 A CONCORDANCE RATE MEANS, YOU KNOW, IF ONE TWIN
2 IS DIAGNOSED WITH AUTISM, HOW LIKELY IS IT OR IN WHAT
3 PERCENTAGE OF CASES THE OTHER TWIN DIAGNOSED WITH
4 AUTISM, AND THEY LOOKED AT THAT SEPARATELY FOR MALE/MALE
5 TWINS, MALE/FEMALE TWINS, AND SEX DISCORDANT TWINS, AND
6 THE RELEVANCE OF THAT IS THAT THE RATE OF AUTISM IS
7 KNOWN TO DIFFER BETWEEN MALES AND FEMALES FOR REASONS
8 THAT ARE NOT ENTIRELY UNDERSTOOD.

9 AND WHEN THEY DISTINGUISHED NARROW AND BROAD
10 DEFINITIONS OF AUTISM, WHAT THEY ARE TALKING ABOUT THERE
11 IS THAT SORT OF THE STRICT DEFINITION OF AUTISM, "SO
12 MEETS ALL CRITERIA ON THE ADOS AND ALL CRITERIA ON THE
13 ADIR" FROM SORT OF A WIDER SET OF SYMPTOMS WHERE YOU MAY
14 -- YOU MEET CRITERIA ON THE ADOS BUT YOU MAY NOT
15 COMPLETELY FULFILL ALL THE CRITERIA ON THE OTHER TEST.

16 SO IN OTHER WORDS, THE BROADER DEFINITION
17 ENCOMPASSES PEOPLE WHO WOULD CLINICALLY BE DIAGNOSED
18 WITH AN AUTISM SPECTRUM DISORDER, BUT THEY DON'T
19 STRICTLY MEET CRITERIA ON BOTH OF THOSE INSTRUMENTS.

20 Q DOCTOR, THE PREFACE OF THE STUDY WAS TO
21 DETERMINE THE EXTENT TO WHICH GENETIC SHARED
22 ENVIRONMENTAL FACTORS UNDERLIE SUSCEPTIBILITY.

23 DO YOU SEE THAT, DOCTOR?

24 A YES.

25 Q I THINK IT'S IMPORTANT HERE.

26 THEY ARE ASSUMING THERE ARE ENVIRONMENTAL
27 FACTORS TO SUSCEPTIBILITY, THEY ARE JUST TRYING TO FIND
28 OUT TO WHAT EXTENT THOSE ENVIRONMENTAL FACTORS PLAY A

1 ROLE; CORRECT?

2 A I THINK THAT'S FAIR TO SAY.

3 Q NOW, LET'S TAKE A LOOK AT THE RESULTS HERE,
4 DOCTOR. I THINK THEY PRESENT THEM PAGE 1. I'M JUST
5 GOING TO CALL THIS OUT.

6 UNDER "RESULTS" THEY SAY, "FOR STRICT AUTISM,
7 PROGRAMWIDE CONCORDANCE FOR MALE TWINS WAS .58 FOR 40
8 MONOZYGOTIC PAIRS."

9 DO YOU SEE THAT, DOCTOR?

10 A YES.

11 Q AND CONCORDANCE REFERS TO WHAT IN THIS CONTEXT?

12 A SO IN THIS CONTEXT IT MEANS THAT 58 PERCENT OF
13 THE TIME BOTH TWINS SHARED A DIAGNOSIS OF AUTISM.

14 Q AND THESE ARE IDENTICAL TWINS, CORRECT,
15 MONOZYGOTIC?

16 A CORRECT. MONOZYGOTIC TWINS ARE IDENTICAL TWINS
17 WHO SHARE A HUNDRED PERCENT OF THEIR GENETIC MATERIAL.

18 Q SO IF 58 PERCENT SHARED A DIAGNOSIS OF AUTISM,
19 DOES THAT MEAN THAT 42 PERCENT DID NOT SHARE A DIAGNOSIS
20 OF AUTISM?

21 A THAT IS THE DIRECT IMPLICATION.

22 Q OKAY.

23 AND FOR FEMALE TWINS, THE CONCORDANCE WAS -- IS
24 THAT 60 PERCENT, DOCTOR, FOR IDENTICAL PAIRS?

25 A YES.

26 Q AND DOES THAT MEAN THAT 40 PERCENT DID NOT
27 SHARE THE DIAGNOSIS OF AUTISM? 40 PERCENT OF TWINS DID
28 NOT SHARE THE DIAGNOSIS OF AUTISM; IS THAT CORRECT?

1 A YES.

2 Q OKAY.

3 AND FOR ASD AND THE SPECTRUM DISORDERS, IT SAYS
4 THE PROGRAMWISE FOR CONCORDANCE FOR MALE TWINS WAS
5 77 PERCENT; CORRECT?

6 A THAT'S CORRECT. SO YOU KNOW WHAT THAT IS
7 SAYING IS THAT IF YOU LOOSEN THE CRITERIA A LITTLE BIT,
8 THE CONCORDANCE ACTUALLY GOES UP, AND WHAT THAT IS
9 SUGGESTING IS THAT ONE TWIN HAD MORE SEVERE SYMPTOMS
10 THAN THE OTHER TWIN OR MET MORE CRITERIA FOR THE
11 DIAGNOSIS THAN THE OTHER TWIN; SO EVEN THOUGH THEY BOTH
12 HAVE THE DIAGNOSIS OR MEET THE CUTOFF CRITERIA FOR ASD,
13 ONE TWIN IS MORE SEVERELY AFFECTED THAN THE OTHER.

14 Q IT SAYS HERE THAT THEY CONCLUDE FROM THE BASIS
15 OF THIS DATA THAT A LARGE PROPORTION OF THE VARIANCE IN
16 LIABILITY CAN BE SHARED BY ENVIRONMENTAL FACTORS IN
17 ADDITION TO MODERATE GENETIC HERITABILITY.

18 DO YOU SEE THAT, DOCTOR?

19 A YES.

20 Q OKAY. CAN YOU UNPACK THAT FOR US? WHAT IS
21 YOUR UNDERSTANDING OF WHAT THAT'S REFERRING TO, THAT
22 CONCLUSION?

23 A SO HERITABILITY IS THE DIFFERENCE BETWEEN THE
24 CONCORDANCE RATE IN MONOZYGOTIC AND DIZYGOTIC TWINS, SO
25 THE EXTENT TO WHICH THE VARIATION IN A TRAIT IS
26 ATTRIBUTABLE TO GENETIC FACTORS; SO IF YOU TAKE
27 MONOZYGOTIC TWINS WHO SHARE A HUNDRED PERCENT OF THEIR
28 DNA AND DIZYGOTIC TWINS WHO SHARE 50 PERCENT OF THEIR

1 DNA, THE AMOUNT OF VARIATION IN A PARTICULAR DIAGNOSIS
2 OR SUSCEPTIBILITY TO A DIAGNOSIS THAT CAN BE EXPLAINED
3 BY GENETIC FACTORS CAN BE CALCULATED DIRECTLY FROM THAT
4 DIFFERENCE.

5 SO WHAT THEY ARE SAYING HERE IS THAT, FIRST OF
6 ALL, THAT THE HERITABILITY IN THIS STUDY WAS -- IS LOWER
7 THAN IN THIS OTHER PUBLISHED STUDIES NOT NESS -- PARTLY
8 BECAUSE THE CONCORDANCE RATE IN MONOZYGOTIC TWINS MAY BE
9 LOWER, BUT ALSO BECAUSE THE CONCORDANCE RATE IN
10 DIZYGOTIC TWINS IS HIGHER THAN WHAT HAS BEEN OBSERVED IN
11 OTHER STUDIES.

12 SO THE HERITABILITY IS STILL, YOU KNOW, FOR
13 NEUROBEHAVIORAL DISORDER, IT'S STILL A SUBSTANTIAL
14 HERITABILITY, BUT LESS THAN WHAT HAS BEEN DEMONSTRATED
15 IN OTHER STUDIES. AND TO THE EXTENT THAT THE VARIATION
16 IN DIAGNOSIS OR SUSCEPTIBILITY TO THE DIAGNOSIS CAN'T BE
17 EXPLAINED BY GENETIC FACTORS MUST BE EXPLAINED BY
18 ENVIRONMENTAL FACTORS.

19 AND THOSE -- IN THIS CASE THEY ARE SHARED
20 ENVIRONMENTAL FACTORS BECAUSE THEY ARE TWINS. I BELIEVE
21 IN THIS CASE THEY ARE ALL TWINS WHO WERE RAISED TOGETHER
22 SO THEY SHARED AN ENVIRONMENT. YOU CAN ALSO LOOK AT NON
23 SHARED ENVIRONMENT, BUT IT'S VERY HARD TO DO THAT IN
24 THIS TYPE OF STUDY BECAUSE OF COURSE, YOU KNOW, IN TWINS
25 WHO ARE RAISED TOGETHER THEY ARE SHARING MOST OF THEIR
26 EARLY ENVIRONMENTAL EXPOSURES.

27 Q DOCTOR, TO JUST FOCUS IN ON THAT LAST POINT, I
28 WANT TO JUST LOOK AT THIS PARAGRAPH TOWARDS THE END OF

1 THE PAPER WHERE THEY SAY, "TO OUR KNOWLEDGE THIS STUDY
2 IS THE LARGEST POPULATION BASED TWIN STUDY OF
3 AUTISM THAT USED CONTEMPORARY STANDARDS FOR THE
4 DIAGNOSIS OF AUTISM."

5 DO YOU SEE THAT, DOCTOR?

6 A YES.

7 Q AND THEY SAY HERE THAT THE RESULTS SUGGEST THAT
8 THE ENVIRONMENTAL FACTORS COMMON TO TWINS EXPLAIN ABOUT
9 55 PERCENT OF THE LIABILITY TO AUTISM.

10 DO YOU SEE THAT, DOCTOR?

11 A CORRECT. I SEE THAT.

12 Q AND WHAT DO THEY MEAN WHEN THEY SAY THAT
13 55 PERCENT OF THE ENVIRONMENTAL FACTORS EXPLAIN THE
14 LIABILITY TO AUTISM? WHAT ARE THEY GETTING AT?

15 A SO LIABILITY, AGAIN, THE SUSCEPTIBILITY TO
16 DEVELOP THE DIAGNOSIS OF AUTISM.

17 SO LIABILITY IS WHAT'S CALLED AN UNSEEN TRAIT,
18 SO IT'S THE TRAIT THAT KIND OF DETERMINES YOUR
19 LIKELIHOOD TO HAVE A DIAGNOSIS, AND ABOUT 55 PERCENT OF
20 THE VARIABILITY IN THAT TRAIT IS ATTRIBUTABLE TO
21 ENVIRONMENTAL FACTORS.

22 NOW, AS I SAID THEY USE THE TERM SHARED
23 ENVIRONMENTAL FACTORS. THEY ACTUALLY CAN'T REALLY
24 DISTINGUISH BETWEEN SHARED AND NON SHARED IN THIS CASE.
25 I THINK THE ASSUMPTION IS THAT THEY ARE SHARED
26 ENVIRONMENTAL FACTORS.

27 Q AND WHAT IS IT -- FOR YOU WHAT IS THE PRIMARY
28 TAKEAWAY FROM THE HALLMAYER STUDY?

1 A SO I WOULD SAY THAT THE TAKEAWAY HERE IS THAT
2 THERE IS CERTAINLY AN IMPORTANT GENETIC INFLUENCE ON
3 SUSCEPTIBILITY OR LIABILITY TO AUTISM, AND, YOU KNOW,
4 IT'S CLEARLY THE CASE THAT IF -- THAT GENETICS PLAYS A
5 ROLE IN LIABILITY.

6 BUT IT CAN'T BE THE ONLY FACTOR IN DETERMINING
7 WHETHER OR NOT YOU RECEIVE A DIAGNOSIS BECAUSE, YOU
8 KNOW, A SUBSTANTIAL PROPORTION OF THE TIME TWO CHILDREN,
9 TWO TWINS WITH EXACTLY THE SAME GENETICS MAY NOT HAVE
10 THE SAME DIAGNOSIS, AND EVEN IF THEY HAVE THE SAME
11 CATEGORICAL DIAGNOSIS, THEY MAY NOT HAVE THE SAME
12 SYMPTOMS OR LEVEL OF SEVERITY SO SOMETHING ABOUT THAT
13 DIFFERENCE HAS TO BE EXPLAINED BY ENVIRONMENTAL FACTORS.

14 THE COURT: AND IF I COULD INTERJECT A
15 QUESTION.

16 ENVIRONMENTAL FACTORS IN THIS STUDY MEANS
17 ANYTHING OTHER THAN GENETICS?

18 THE WITNESS: CORRECT. YES. THAT'S WHAT THEY
19 MEAN IN THIS STUDY.

20 THE COURT: ALL RIGHT.

21 MR. ESFANDIARY:

22 Q DOCTOR, DO HEAVY METALS QUALIFY AS
23 ENVIRONMENTAL FACTORS?

24 A THEY DO.

25 Q I'M SORRY?

26 A THEY COULD IF THEY ARE PRESENT IN THE PERIOD
27 THAT IS RELEVANT FOR THE DEVELOPMENT OF SYMPTOMS OF
28 AUTISM, SO THEY OF COURSE DO NOT MENTION HEAVY METALS AS

1 A SPECIFIC ENVIRONMENTAL FACTOR, NOR DO THEY MENTION
2 INGESTION OF BABY FOOD OR EXPOSURE TO OTHER CHEMICALS OR
3 LIVING NEAR A HIGHWAY OR ANY OF THE OTHER, YOU KNOW,
4 EPIDEMIOLOGIC FACTORS THAT HAVE BEEN CITED AS
5 CONTRIBUTING TO AUTISM, SO NONE OF THOSE ARE CALLED OUT
6 SPECIFICALLY, BUT THEY COULD ALL BE INCLUDED.

7 Q NOW, DOCTOR, IS THIS APPROPRIATE TO THINK ABOUT
8 ASD RISK IN ANY GIVEN CASE IN TERMS OF STRICT
9 PERCENTAGES? 60 PERCENT ENVIRONMENTAL/40 GENETIC AND
10 VICE VERSA? IS IT APPROPRIATE TO THINK ABOUT ASD RISK
11 IN INDIVIDUAL CASES THAT WAY?

12 A SO HERITABILITY -- SO IT -- THE WAY IN WHICH WE
13 THINK ABOUT THAT FOR INDIVIDUAL CASES AS OPPOSED TO IN
14 THE POPULATION IS A LITTLE BIT DIFFERENT, SO
15 HERITABILITY IS A POPULATION ESTIMATE, AND IN PART THAT,
16 YOU KNOW, GETS THE QUESTION OF WHY THERE ARE DIFFERENCES
17 IN MEASURED HERITABILITY ACROSS DIFFERENT STUDIES.

18 SO IN THIS HALLMAYER STUDY, FOR EXAMPLE, THEY
19 POINTED OUT THAT A LOT OF OTHER STUDIES LOOKING AT
20 HERITABILITY OF AUTISM WERE DONE IN RELATIVELY
21 HOMOGENOUS POPULATIONS IN NORTHERN EUROPE AND
22 SCANDINAVIA, FOR EXAMPLE; WHEREAS, THIS STUDY WAS DONE
23 IN CALIFORNIA AND INCLUDED SORT OF A BROADER ARRAY OF
24 INDIVIDUALS IN THE POPULATION, SO WIDER VARIATION IN
25 SOCIOECONOMIC STATUS, ETHNICITY, AND SO FORTH.

26 AND THE RELEVANCE OF THAT IS THAT HERITABILITY
27 -- ACTUALLY, THE WAY IN WHICH YOU MEASURE HERITABILITY
28 ALSO DEPENDS A LOT ON ENVIRONMENTAL FACTORS.

1 SO AN ANALOGY THAT YOU COULD USE IS THAT
2 IMAGINE THAT YOU HAVE, LIKE, A GARDEN OR A PLOT OF LAND
3 AND YOU SEED IT WITH GRASS SEED, ASSUMING, YOU KNOW, THE
4 GRASS SEED IS NOT ALL GENETICALLY IDENTICAL AND, YOU
5 KNOW, THE GRASS WILL GROW. AND IF THE ENTIRE PLOT, THE
6 LAND HAS ACCESS TO THE SAME ENVIRONMENTAL RESOURCES,
7 SUNLIGHT, WATER NUTRIENTS, YOU KNOW, THE SAME QUALITY
8 SOIL, THEN THE VARIATION IN THE HEIGHT OF THE GRASS IS
9 GOING TO BE PRIMARILY BASED ON GENETIC FACTORS.

10 SO ALL OF THOSE, YOU KNOW, GRASS PLANTS HAVE
11 ACCESS TO THE SAME ENVIRONMENT, AND SO THE EXTENT TO
12 WHICH ONE IS TALLER THAN THE OTHER IS GOING TO BE
13 EXPLAINED BY GENETIC FACTORS.

14 ON THE OTHER HAND, YOU KNOW, IF YOU COVER PART
15 OF THE PATCH WITH AN UMBRELLA SO THAT SOME OF IT IS IN
16 THE SHADE OR IF YOU TAKE LEAD PELLETS AND SPRINKLE IT ON
17 ANOTHER PART OF THE GRASS, YOU KNOW, THAT THAT'S GOING
18 TO BE AN ADVERSE IMPACT ON GROWTH OF THE PLANTS, THERE'S
19 GOING TO BE A LOT MORE VARIABILITY BECAUSE, YOU KNOW,
20 THESE ENVIRONMENTAL DIFFERENCES THAT YOU'VE INTRODUCED
21 IN THE HERITABILITY, SO THE PROPORTION OF THAT
22 HERITABILITY THIS A DUE STRICTLY TO GENETIC FACTORS IS
23 GOING TO BE LESS.

24 Q DOCTOR, THAT SEGUES PERFECT INTO THE NEXT PART
25 OF OUR DISCUSSION HERE.

26 I WOULD JUST LIKE TO BRING UP THIS WITH THE
27 COURT'S PERMISSION, CAN WE GO BACK TO THE NIH DOCUMENT,
28 YOUR HONOR, SINCE THE HEARSAY ISSUE HAS BEEN RESOLVED?

1 THE COURT: YES.

2 MR. ESFANDIARY: THANK YOU.

3 Q NOW, DOCTOR, THEY SAY HERE THAT, "RESEARCH
4 SHOWS THAT BOTH ENVIRONMENTAL AND GENETIC FACTORS LIKELY
5 PLAY A ROLE IN AUTISM SPECTRUM DISORDER."

6 DO YOU SEE THAT, DOCTOR?

7 A YES.

8 Q AND THAT'S WHAT WE WERE JUST TALKING ABOUT;
9 CORRECT?

10 A CORRECT.

11 Q ALL RIGHT.

12 AND HERE THEY SAY THAT, "NIH IS FINDING NEW
13 WAYS TO RESEARCH FUND RESEARCH TO UNDERSTAND HOW
14 ENVIRONMENTAL FACTORS INTERACT WITH GENES IN WAYS THAT
15 MAY LEAD TO ASD."

16 DO YOU SEE THAT, DOCTOR?

17 A YES.

18 Q DOCTOR, CAN YOU JUST EXPLAIN TO US IN WHAT WAYS
19 CAN ENVIRONMENT INTERACT WITH GENES TO CAUSE ASD?

20 A WELL, SO FOR EXAMPLE, YOUR GENETIC PROFILE MAY
21 LEAD YOU TO HAVE DIFFERENTIAL SUSCEPTIBILITY TO
22 ENVIRONMENTAL INFLUENCES, AND SO, YOU KNOW, ONE OF THE
23 STUDIES THAT LOOKED AT ENVIRONMENTAL CONTRIBUTORS TO
24 AUTISM DIAGNOSIS WAS THE CHARGE STUDY WHICH LOOKED AT
25 AIR POLLUTANTS, AND AMONG THE FINDINGS OF THAT STUDY WAS
26 THAT CHILDREN WITH A PARTICULAR VARIANCE IN THE NAD
27 RECEPTOR KINASE GENE WERE MORE SUSCEPTIBLE TO DEVELOP
28 AUTISM WHEN EXPOSED TO POLLUTANTS.

1 SO IN OTHER WORDS, YOU HAVE THE SAME -- WITH
2 ANY SORT OF THE GIVEN LEVEL OF EXPOSURE TO A POLLUTANT
3 THAT MAY CAUSE -- THAT MAY CAUSE AUTISM, SOME CHILDREN
4 DEVELOP IT AND OTHERS DON'T AND PART OF THE DIFFERENCE
5 THERE HAS TO DO WITH THEIR GENETIC SUSCEPTIBILITY.

6 SAME THING WITH, YOU KNOW, A LOT OF THE GENES
7 THAT PLAY A ROLE IN BRAIN DEVELOPMENT. WE TALKED A
8 LITTLE BIT EARLIER ABOUT THE VARIOUS KIND OF STAGES OF
9 THE BRAIN DEVELOPMENT. IF YOU HAVE A GENETIC RISK
10 FACTOR THAT, YOU KNOW, THAT IMPAIRS THE FORMATION OF
11 CONNECTIONS OF THE GROWTH OF SYNAPSIS, YOU MIGHT BE MORE
12 VULNERABLE TO ANY ADDITIONAL INPUTS THAT ARE GOING TO
13 FURTHER DISRUPT THAT PROCESS.

14 I THINK ONE OF THE THINGS THAT HAS COME UP, FOR
15 EXAMPLE, IN THIS CONTEXT AS WELL IS THE DIFFERENTIAL
16 SORT OF SUSCEPTIBILITY OF -- OR THE DIFFERENT ABILITY OF
17 KIDS WITH AUTISM TO HANDLE AND METABOLIZE METALS, AND
18 THAT IS, YOU KNOW, THE BASIS FOR THAT ARE NOT ENTIRELY
19 UNDERSTOOD. IT COULD MEAN THAT, YOU KNOW, FOR GENETIC
20 REASONS THESE CHILDREN HAVE THE DECREASED ABILITY TO
21 HANDLE AND EXCRETE METALS FROM THEIR SYSTEM, BUT THAT,
22 YOU KNOW, THAT MIGHT ALSO MAKE THEM MORE SUSCEPTIBLE TO
23 DAMAGE CAUSED BY METAL EXPOSURE, THE METALS ARE HANGING
24 AROUND LONGER IN THEIR SYSTEM, AND THEREFORE HAVE MORE
25 OF AN OPPORTUNITY TO INTERFERE WITH THE DEVELOPMENT OF
26 BRAIN CONNECTIVITY AND PROMOTE OXIDATIVE STRESS, AND SO
27 FORTH.

28 Q DOCTOR, IS THERE ONE CAUSE -- WELL, LET ME

1 PHRASE IT THIS WAY: SO EVEN IN CASES WHERE THERE'S A
2 WELL-DEFINED UNDERSTOOD GENETIC COMPONENT, CAN
3 ENVIRONMENTAL TRIGGERS STILL PLAY A ROLE IN CAUSING
4 AUTISM?

5 A I THINK THAT'S CERTAINLY THE CASE.

6 AND, YOU KNOW, EVEN IF YOU HAVE A GENETIC RISK
7 FACTOR THAT IS HIGHLY ASSOCIATED WITH AUTISM, THE DEGREE
8 AND THE SEVERITY OF YOUR SYMPTOMS IS GOING TO BE QUITE
9 DEPENDENT ON ENVIRONMENTAL INPUTS.

10 AND SO, FIRST OF ALL, YOU KNOW, THERE IS THIS
11 QUESTION OF WHETHER YOU MEET CRITERIA FOR A BINARY
12 DIAGNOSIS, AND TO MY KNOWLEDGE I'M NOT AWARE OF ANY
13 GENES THAT CONFER A HUNDRED PERCENT RISK OF AUTISM, EVEN
14 IN THE CONDITIONS THAT ARE MOST CLOSELY GENETICALLY
15 ASSOCIATED WITH AUTISM, YOU KNOW, THE RISKS ARE NOT
16 ABSOLUTE.

17 BUT IN CHILDREN WHO HAVE AUTISM AND HAVE
18 GENETIC SUSCEPTIBILITY EVEN WHEN GENETICS IS RECOGNIZED
19 TO PLAY AN EXTREMELY IMPORTANT ROLE IN BRAIN DEVELOPMENT
20 AND THERE MAY BE, YOU KNOW, OBVIOUS EVEN STRUCTURAL
21 ABNORMALITIES IN THE BRAIN, STILL YOU KNOW, THE
22 ENVIRONMENT TO WHICH THAT CHILD IS EXPOSED HAS A BIG
23 ROLE IN THE EXPRESSION OF SYMPTOMS, AND THAT'S WHY, YOU
24 KNOW, AS CLINICIANS WE ALL THINK IT'S CRITICAL THAT
25 CHILDREN HAVE, YOU KNOW, CERTAIN KINDS OF SUPPORTS THAT,
26 FIRST OF ALL, TO IDENTIFY CONCERNS FOR AUTISM AS EARLY
27 AS POSSIBLE AND NOT TO WAIT.

28 I THINK, SORRY IF THIS IS A DIGRESSION, BUT IN

1 THE CLINICAL WORLD, YOU KNOW, WE DON'T WAIT UNTIL THREE
2 OR FOUR YEARS TO BE CONCERNED THAT A CHILD MIGHT DEVELOP
3 AUTISM. IF YOU -- YOU WANT TO MAKE SURE THAT YOU'RE
4 ADDRESSING ANY CONCERNS BEFOREHAND AND PART OF THAT IS
5 BY OPTIMIZING THE ENVIRONMENT.

6 IF WE DIDN'T THINK THAT CHANGING THE
7 ENVIRONMENT COULD MODULATE THE EXPRESSION OF SYMPTOMS,
8 WE WOULDN'T BOTHER WITH THAT, BUT I THINK EVERYONE
9 AGREES THAT ENVIRONMENTAL INFLUENCES HAVE A BIG ROLE ON
10 YOUR ULTIMATE PROGNOSIS.

11 Q DOCTOR, I WANT TO TALK ABOUT YOUR BIOLOGICAL
12 PLAUSIBILITY OPINION.

13 NOW, OTHER EXPERTS ARE GOING TO COME AND TALK
14 ABOUT CAUSATION. I THINK DR. ASCHNER IS GOING TO TALK
15 ABOUT BIOLOGICAL PLAUSIBILITY IN A LOT MORE DEPTH, BUT I
16 DO WANT TO FOCUS BRIEFLY ON YOUR BIOLOGICAL PLAUSIBILITY
17 OPINION, OKAY?

18 A SURE.

19 Q AND IF WE JUST TAKE A LOOK AT THE NIH DOCUMENT.
20 AND HERE THEY HAVE A SECTION WHERE THEY SAY,
21 "ENVIRONMENTAL FACTORS PLAY A ROLE," AND
22 SPECIFICALLY THEY SAY "PRENATAL AND EARLY
23 CHILDHOOD EXPOSURE TO HEAVY METALS, ALTERED
24 LEVELS OF METALS IN THE BODY, PESTICIDES, AND
25 OTHER CONTAMINANTS MAY BE LINKED TO AUTISM
26 SPECTRUM DISORDER."

27 DO YOU SEE THAT, DOCTOR?

28 A I SEE IT.

1 Q DOES THAT STATEMENT THAT EARLY CHILDHOOD
2 EXPOSURE TO HEAVY METAL MAY BE LINKED TO AUTISM SPECTRUM
3 DISORDER, DOES THAT MAKE BIOLOGICAL SENSE, DOCTOR?

4 A I THINK IT DOES, YEAH. I THINK THAT EXPOSURE
5 TO ANYTHING, AGAIN, THAT ALTERS THE PROCESSES OF BRAIN
6 DEVELOPMENT THAT ARE STILL ONGOING PRIOR TO THE
7 DIAGNOSIS DEFINITELY COULD PLAY A ROLE IN THE
8 SYMPTOMATOLOGY.

9 Q AND LET'S TALK ABOUT IN IT A BIT MORE DEPTH.
10 CAN YOU IDENTIFY SOME OF THE BIOLOGICAL
11 PROCESSES THAT HAVE BEEN RECOGNIZED IN ASD ETIOLOGY?
12 LET START THERE.

13 A SURE.
14 YEAH, THERE ARE A NUMBER, BUT I THINK THAT
15 AMONG THE MOST IMPORTANT ARE DIFFERENCES IN SYNAPTIC
16 CONNECTIVITY AND BRAIN NETWORK FORMATION, INFLAMMATION
17 AND OXIDATIVE STRESS.

18 Q AND WHAT ARE SOME OF THE KNOWN BIOLOGICAL
19 PROCESSES THAT METALS LIKE LEAD, MERCURY AND ARSENIC ARE
20 CAPABLE OF AFFECTING IN THE BRAIN?

21 A SO LEAD AND ARSENIC, FOR EXAMPLE, ARE KNOWN TO
22 DISRUPT THE FUNCTION OF THE N-METHYL-D ASPARTATE
23 RECEPTORS, SO THAT IS A GLUTAMATE RECEPTOR IN THE BRAIN
24 THAT IS REALLY CRITICAL FOR THE PROCESS OF SYNAPTIC
25 FORMATION; SO AGAIN, FORMING THOSE CONNECTIONS IN BRAIN
26 NETWORKS RELIES TO A LARGE EXTENT ON SIGNALLING THROUGH
27 THIS RECEPTOR AND WE KNOW THAT EXPOSURE TO LEAD AND TO
28 ARSENIC INHIBITS INTRACELLULAR SIGNALLING THROUGH THE

1 MNDAR RECEPTOR, IT ALSO RESULTS IN ALTERED EXPRESSION OF
2 MNDAR SUBUNITS SO THAT THE RECEPTORS ARE PROTEINS WITHIN
3 CELL MEMBRANES THAT ARE COMPOSED OF VARIOUS SUBUNITS,
4 EXPOSURE TO LEAD WILL ALTER THE COMPOSITION OF THOSE
5 RECEPTORS IN SUCH A WAY THAT THE NORMAL KIND OF
6 SIGNALLING PROCESSES THAT LEAD TO FORMATION OF BRAIN
7 NETWORKS IS DISRUPTED.

8 SO WE KNOW THAT IF YOU BLOCK OR IMPAIR OR
9 DISRUPT MNDAR RECEPTOR AND MNDAR RECEPTOR FUNCTION, THAT
10 WILL IMPAIR SYNAPTOGENESIS AND IT WILL IMPAIR THE
11 MAINTENANCE OF CONNECTIONS WITHIN BRAIN NETWORKS.

12 SO WE KNOW THAT LEAD HAS THAT EFFECT FROM
13 NUMEROUS STUDIES ON MNDAR RECEPTORS AND WE KNOW THAT
14 PROCESS OF SYNAPTOGENESIS AND SYNAPTIC FORMATION IS
15 ALTERED IN CHILDREN WITH AUTISM.

16 Q WOULD IT BE FAIR TO SAY THAT THE BIOLOGICAL
17 PATHWAYS INVOLVED IN AUTISM, DO THEY OVERLAP TO A GREAT
18 EXTENT WITH HOW METALS -- THE PROCESSES OF METALS
19 AFFECTING THE BRAIN?

20 A YEAH. SO THE VARIOUS, YOU KNOW, THE PATHWAYS
21 THAT SORT OF CONTRIBUTE TO THE EMERGENCE OF SYMPTOMS OF
22 AUTISM ARE THE SAME PATHWAYS THAT ARE DISRUPTED BY
23 EXPOSURE TO METALS DURING THE PERIOD OF BRAIN NETWORK
24 DEVELOPMENT SO, YOU KNOW, SYNAPTOGENESIS AND NETWORK
25 FORMATION.

26 THE OTHERS ARE -- THE OTHER PROCESSES I
27 MENTIONED ARE OXIDATIVE STRESS, SO THAT'S CAUSED BY AN
28 IMBALANCE IN OXYGEN FREE RADICALS THAT HAS DELETERIOUS

1 EFFECTS ON CELLULAR FUNCTION, IT CAN LEAD TO DNA DAMAGE,
2 DISRUPTION IN CELL MEMBRANE FUNCTION AND ALTERATIONS IN
3 MITOCHONDRIAL ENERGY METABOLISM. WE KNOW THAT THOSE
4 PROCESSES ALSO ARE DISRUPTED IN AUTISM AND THE DEGREE OF
5 DESTRUCTION CORRELATES WITH THE SEVERITY OF SYMPTOMS.

6 INTERESTINGLY, YOU KNOW, SOME STUDIES HAVE
7 SHOWN THAT, YOU KNOW, THERE ARE HIGHER LEVELS OF
8 INFLAMMATION AND OXIDATIVE STRESS IN PARENTS AND MOTHERS
9 OF CHILDREN WITH AUTISM, WHICH SUGGESTS THAT THOSE
10 PROCESSES ARE, YOU KNOW, PLAYING A ROLE PRENATALLY AS
11 WELL, BUT THE EXTENT TO WHICH THEY CAN INJURE THE
12 DEVELOPING BRAIN DOES NOT, YOU KNOW, SORT OF DEPEND ON
13 TIMING IN THAT WAY, YOU KNOW, IN THE SAME WAY THAT THEY
14 -- THAT OXIDATIVE STRESS CAN CAUSE DAMAGE TO THE DNA AND
15 CELL MEMBRANES PRIOR TO BIRTH, THE SAME THING CAN BE
16 OCCURRING POSTNATALLY IN THE FACE OF AN EXPOSURE TO
17 SOMETHING THAT WILL INDUCE STRESS.

18 Q NOW, TALKING ABOUT ONE OF THE METALS,
19 SPECIFICALLY MERCURY, DEFENSE COUNSEL DURING HIS OPENING
20 STATEMENT SAID THAT WE'VE BEEN DOWN THIS ROAD BEFORE
21 WITH VACCINES AND MERCURY.

22 DOCTOR, IS IT YOUR UNDERSTANDING THAT THE
23 MERCURY FOUND IN VACCINES IS THE SAME MERCURY THAT IS
24 PRESENT THROUGH ENVIRONMENTAL FOOD SOURCES AND
25 ENVIRONMENT GENERALLY?

26 A NO. MY UNDERSTANDING IS THAT IT'S A DIFFERENT
27 FORM OF MERCURY THAN, YOU KNOW, IN FOODS AND
28 ENVIRONMENTAL SOURCES. WE'RE TALKING ABOUT METHYL

1 MERCURY, AND FURTHERMORE, THE TIMING OF EXPOSURE IS A
2 LITTLE BIT DIFFERENT.

3 SO YOU KNOW, VACCINES ARE GIVEN AT, LET'S SAY,
4 THE TWO YEARS OF AGE OR AT LEAST THE ONES ALLEGED TO
5 CAUSE AUTISM ARE GIVEN 18 MONTHS TO TWO YEARS OF AGE SO
6 AT THE TIME THAT SYMPTOMS EMERGE WHEN REGRESSION IS
7 HAPPENING.

8 BUT I THINK AS WE'VE TALKED ABOUT THAT BY THE
9 TIME THAT HAPPENS, THE PROCESSES THAT LEAD TO THAT HAVE
10 ALREADY UNFOLDED, AND I THINK THAT THE CRITICAL WINDOW
11 IS REALLY THE PERIOD BETWEEN BIRTH AND AROUND TWO YEARS
12 OF AGE THAT, YOU KNOW, AN EXPOSURE AT TWO YEARS OF AGE
13 MAY CAUSE -- I MEAN, IN THIS CASE IT'S A DIFFERENT FORM
14 OF MERCURY, AND I THINK IT'S, YOU KNOW, ALREADY KIND OF
15 UNRELATED ON THAT BASIS.

16 BUT ALSO WITH RESPECT TO SPECIFICALLY TO AUTISM
17 THAT I THINK, YOU KNOW, YOU DON'T CAUSE AUTISM AT THE
18 VERY TIME THAT AUTISM IS DIAGNOSED. IT HAS TO BE
19 SOMETHING TO WHICH YOU WERE EXPOSED TO BEFOREHAND.

20 Q DOCTOR, DO YOU -- OR HAVE YOU EVER OPINED THAT
21 THE TYPE OF MERCURY FOUND IN VACCINES CAN CAUSE AUTISM?

22 A NO, I HAVEN'T.

23 Q OKAY. WHY HAVEN'T YOU OPINED THAT?

24 A I DON'T BELIEVE THAT THERE'S ANY EVIDENCE THAT
25 THAT'S THE CASE.

26 Q NOW, DOCTOR, I JUST WANTED TO FINISH OFF A
27 COUPLE OF LAST POINTS. I WANTED TO JUST GO BACK TO THE
28 NIH DOCUMENT. THEY SAY IN HERE THAT NEARLY HALF OF THE

1 CHILDREN WITH AUTISM HAVE AVERAGE OR ABOVE AVERAGE
2 INTELLECTUAL ABILITY.

3 DO YOU SEE THAT, DOCTOR?

4 A YES, I DO.

5 Q I JUST WANT TO PAUSE THERE FOR A SECOND BECAUSE
6 IF IT'S TRUE THAT EXPOSURE TO METALS CAN AFFECT
7 INTELLECTUAL DEVELOPMENT, PARTICULARLY LEAD CAN HAVE AN
8 EFFECT ON IQ, AND SO FORTH, HOW DOES THAT MAKE SENSE
9 THAT NEARLY HALF OF ASD CHILDREN HAVE AN AVERAGE OR
10 ABOVE AVERAGE INTELLECTUAL ABILITY? CAN YOU RECONCILE
11 THAT FOR US?

12 A YES, CERTAINLY.

13 SO, FIRST OF ALL, NOT ALL CASES OF CHILDREN
14 WITH AUTISM ARE GOING TO HAVE LEAD EXPOSURE, AND SO I
15 THINK, YOU KNOW, IF HALF HAVE AVERAGE OR ABOVE AVERAGE
16 INTELLECTUAL ABILITY, IT ALSO MEANS THAT HALF HAVE
17 AVERAGE OR BELOW AVERAGE -- OR HAVE BELOW AVERAGE
18 INTELLECTUAL ABILITY.

19 Q UM-HMM.

20 A AND SO, YOU KNOW, THERE IS A SUBSTANTIAL
21 PROPORTION OF CHILDREN WHO HAVE AUTISM WHO ALSO HAVE
22 INTELLECTUAL DISABILITY. ALSO, YOU KNOW, WE'RE DEALING
23 WITH A KIND OF A BINARY -- THE CUTOFF HERE IS BINARY, SO
24 YOU KNOW, INTELLECTUAL DISABILITY OR NOT. WELL, THAT
25 DOESN'T MEAN THAT THERE'S NOT SOME IMPACT ON
26 INTELLECTUAL ABILITY AND COGNITIVE CONSCIOUS, SO WE KNOW
27 FROM LATER CHILDHOOD STUDIES OF LEAD EXPOSURE THAT LEAD
28 RESULTS IN A LOSS OF IQ POINTS, LET'S SAY, ANYWHERE IN

1 THE RANGE OF 1 TO 10 POINTS OR MORE DEPENDING ON HOW
2 MUCH LEAD YOU'RE EXPOSED TO AND OVER WHAT PERIOD OF
3 TIME.

4 SO YOU KNOW, IF HYPOTHETICALLY IN THE ABSENCE
5 OF LEAD EXPOSURE YOUR IQ MIGHT HAVE BEEN 115 AND NOW
6 IT'S 110, YOU'RE NOT INTELLECTUALLY DISABLED, BUT IT
7 DOES HAVE AN IMPACT ON YOUR LIFE AND YOUR ABILITY TO
8 FUNCTION.

9 Q AND LASTLY, DOCTOR, THE DEFENDANTS HAVE SAID
10 THAT ANY STUDIES THAT ADDRESS THE EFFECT OF METALS ON
11 DEVELOPMENT OF ASD SYMPTOMS SHOULD BE DISCOUNTED BECAUSE
12 THAT'S SYMPTOMS OF ASD, THAT'S NOT ASD.

13 IS THAT AN APPROPRIATE DISTINCTION?

14 A I MEAN, SYMPTOMS OF ASD ARE ASD, IT'S A
15 SYMPTOM-BASED DIAGNOSIS.

16 NOW, THE OTHER THING THAT I WOULD SAY ABOUT
17 LEAD JUST TO FINISH MY PREVIOUS THOUGHT IS THAT, YOU
18 KNOW, CERTAIN TYPES OF BRAIN FUNCTIONS MAY BE MORE
19 LIKELY TO BE AFFECTED BY IT THAN OTHERS; SO FOR EXAMPLE,
20 EXECUTIVE FUNCTION, COGNITIVE CONTROL FUNCTIONS THAT
21 DEPEND ON THE PREFRONTAL CORTEX, WHICH IS ACTUALLY THE
22 PART OF THE BRAIN THAT IS LAST TO DEVELOP SO THE
23 CONNECTIVITY WITHIN SORT OF THAT FRONT PART OF THE
24 BRAIN, THE PREFRONTAL CORTEX, DEVELOPS LATER THAN
25 CONNECTIVITY IN THE BACK PART OF THE BRAIN THAT IS
26 RESPONSIBLE FOR SORT OF BASIC LEVEL VISION AND HEARING,
27 AND SO FORTH.

28 AND IT'S THAT PREFRONTAL CORTEX THAT IS

1 RESPONSIBLE, YOU KNOW, FOR ATTENTION, EMOTIONAL CONTROL,
2 EXECUTIVE CONTROL AND INHIBITION, AND SO FORTH, AND
3 THOSE PROCESSES ARE NOT NECESSARILY DIRECTLY RELATED TO
4 IQ, SO WE ALL KNOW THAT THERE MAY BE, YOU KNOW,
5 INDIVIDUALS WHO ARE -- HAVE EXTREMELY HIGH IQ'S, BUT
6 HAVE DIFFICULTY WITH REGULATING THEIR EMOTION OR MAY
7 HAVE -- MAY MEET CRITERIA FOR ADHD.

8 SO THAT'S A, YOU KNOW, HAS TO DO WITH
9 DIFFERENTIAL EFFECTS ON DIFFERENT BRAIN AREAS AND THAT
10 MIGHT BE RELATED TO THE SORT OF WINDOW OF SUSCEPTIBILITY
11 WITH RESPECT TO WHEN THOSE BRAIN AREAS ARE DEVELOPING.

12 Q LASTLY, DOCTOR, DEFENSE COUNSEL IN OPENING
13 STATEMENT THAT SAID THAT YOU EXPLICITLY REJECT CAUSATION
14 BETWEEN METALS AND ASD.

15 FIRST OF ALL, HAVE YOU BEEN ASKED TO LOOK AT
16 CAUSATION BETWEEN METALS AND ASD IN THIS LITIGATION?

17 A THAT HAS NOT BEEN MY CHARGE. I HAVE NOT
18 REJECTED THAT CLAIM, BUT MY -- MY UNDERSTANDING IS THAT
19 THE PURPOSE OF MY TESTIMONY IS NOT TO SPEAK TO
20 CAUSATION.

21 Q OKAY. AND YOU HAVEN'T REVIEWED THE VAST BODY
22 OF EPIDEMIOLOGICAL DATA ADDRESSING EXPOSURE TO METALS
23 AND ASD SPECIFICALLY IN THIS CASE; CORRECT?

24 A I HAVE LOOKED AT IT.

25 Q DOCTOR, THAT'S -- GIVE ME ONE SECOND.

26 THAT'S ALL I HAVE FOR YOU. THANK YOU SO MUCH
27 FOR YOUR TIME. I'M GOING TO PASS THE WITNESS.

28 THE WITNESS: THANK YOU.

1 THE COURT: OKAY. EXAMINATION FROM THE
2 DEFENSE, PLEASE.

3 MR. PETROSINELLI: YES, YOUR HONOR. IT LOOKS
4 LIKE THEY WENT ABOUT 55 MINUTES. I WILL BE SHORTER THAN
5 THAT, BUT I ASSUME WE SHOULD GO TO ABOUT NOON AND THEN
6 WE'LL BREAK FOR LUNCH.

7 THE COURT: I HAVE TO BREAK FOR LUNCH TO GIVE
8 MY STAFF A BREAK, YES.

9 MR. PETROSINELLI: OF COURSE. YES, I WILL
10 PROCEED.

11 THE COURT: THANK YOU.

12
13 CROSS EXAMINATION

14 MR. IMBROSCIO:

15 Q LET ME -- FIRST OF ALL, GOOD MORNING. IT'S
16 NICE TO SEE YOU AGAIN, SIR.

17 A LIKEWISE.

18 Q I WANT TO TRY TO BEGIN WITH SOME POINTS THAT I
19 DON'T THINK WE'RE GOING TO HAVE DISAGREEMENT ON AND PICK
20 UP RIGHT WHERE YOU LEFT OFF.

21 YOU ARE NOT OFFERING AN OPINION IN THIS
22 LITIGATION THAT EXPOSURE TO HEAVY METALS CAUSES AUTISM;
23 RIGHT?

24 A CORRECT.

25 Q YOU'VE LOOKED AT THE EPI, BUT YOU'RE NOT GOING
26 TO OFFER THAT OPINION.

27 SAME WITH ADHD; RIGHT?

28 A YES.

1 Q OKAY.

2 NOW, TO BE CLEAR, YOU'RE CURRENTLY A CLINICIAN
3 AND NOT AN EPIDEMIOLOGIST; RIGHT?

4 A I AM -- THAT'S CORRECT. I'M NOT AN
5 EPIDEMIOLOGIST.

6 Q AND WE'RE GOING TO BE TALKING ABOUT YOUR
7 BIOLOGIC PLAUSIBILITY OPINIONS PROBABLY AFTER THE LUNCH
8 BREAK.

9 BUT JUST TO BE CLEAR, YOU WOULD AGREE THAT
10 BIOLOGIC PLAUSIBILITY DOES NOT DISPENSE WITH THE NEED TO
11 ESTABLISH A VALID EPIDEMIOLOGICAL ASSOCIATION; CORRECT?

12 A IN WHAT CONTEXT?

13 Q WELL, LET ME ASK YOU AGAIN.

14 DO YOU AGREE, QUOTE, "THAT BIOLOGIC
15 PLAUSIBILITY DOES NOT DISPENSE WITH THE NEED TO
16 ESTABLISH A VALID EPIDEMIOLOGICAL ASSOCIATION IN THIS
17 CONTEXT," HEAVY METALS AND AUTISM?

18 A YEAH, I DO THINK WE -- YOU NEED TO ESTABLISH
19 EVIDENCE FROM A VARIETY OF SOURCES, INCLUDING
20 EPIDEMIOLOGIC EVIDENCE.

21 Q ANOTHER WAY TO MAYBE SAY IT IS THAT BIOLOGIC
22 PLAUSIBILITY, THOSE KINDS OF ARGUMENTS MAY HELP RULE OUT
23 BUT NOT NECESSARILY RULE IN CAUSALITY IN ASSOCIATIONS.

24 WOULD YOU AGREE WITH THAT?

25 A I THINK THAT'S FAIR.

26 Q OKAY.

27 NOW, YOU TALKED A LOT ABOUT THIS.

28 YOU DON'T DISPUTE THE GENERAL PROPOSITION THAT

1 GENETICS PLAYS A SIGNIFICANT ROLE IN THE DEVELOPMENT OF
2 AUTISM; RIGHT?

3 A NO, I WOULD NOT.

4 Q AND I THINK IN YOUR REPORT YOU CITE SOME
5 ARTICLES THAT SUGGEST THAT CONCORDANCE MIGHT BE AS HIGH
6 AS 83 PERCENT, BUT YOU AT LEAST IN YOUR REPORT CITED
7 SOME OF THOSE ARTICLES; CORRECT?

8 A YES.

9 Q OKAY.
10 YOU UNDERSTAND THAT AUTISM IS ONE OF THE MOST,
11 IF NOT THE MOST, HERITABLE DISEASE; IS THAT YOUR
12 UNDERSTANDING?

13 A IT -- WELL, PSYCHIATRIC OR BEHAVIORAL DISEASES,
14 YES.

15 Q OKAY. BEAR WITH ME.

16 NOW, YOU TALKED A LITTLE BIT ABOUT AUTISM ON
17 DIRECT. LET ME JUST ASK YOU A LITTLE BIT MORE ABOUT
18 YOUR BACKGROUND.

19 YOU SAID CURRENTLY YOU'RE A CLINICIAN AT A
20 PRIVATE CLINIC; CORRECT? CORTICA?

21 A CORRECT, YES.

22 Q AND WHEN YOU WERE IN ACADEMIA, IS IT FAIR TO
23 SAY THAT YOUR FOCUS WAS NOT ON AUTISM RESEARCH; RIGHT?

24 A NOT SPECIFICALLY.

25 Q AND YOU WERE AT UCSF. YOU LEFT UCSF IN 2017;
26 RIGHT?

27 A THAT IS CORRECT.

28 Q AND UCSF, THEY HAVE GOT AN AUTISM CENTER THERE.

1 YOU WEREN'T PART OF IT; CORRECT?

2 A I WAS NOT PART OF IT, BUT I COLLABORATED WITH
3 THE AUTISM RESEARCHERS IN UCSF.

4 Q YOU WERE NOT IN THAT GROUP, CORRECT, SIR?

5 A YEAH, I WAS NOT IN THE GROUP. THAT GROUP IS IN
6 THE DEPARTMENT OF PSYCHIATRY. I WAS IN NEUROLOGY.

7 Q AND THROUGHOUT YOUR CAREER IN ACADEMIA UP UNTIL
8 THE TIME YOU LEFT UCSF, YOU ACTUALLY HAD NOT DONE ANY
9 PUBLICATIONS, PAPERS OR PRESENTATIONS ON ASD; RIGHT?

10 A NOT SPECIFICALLY ON ASD.

11 Q AND SITTING HERE TODAY AS OF THIS MOMENT,
12 YOU'VE NOT WRITTEN ANY PAPERS ON THE CAUSES OF ASD;
13 CORRECT?

14 A NO, I DON'T BELIEVE SO.

15 Q OKAY. AND --

16 A WELL, I MEAN, I HAVE CONTRIBUTED TO GENETIC
17 STUDIES LOOKING AT GENES THAT ARE IMPLICATED IN ASD.

18 Q WELL, LET ME ASK YOU THIS QUESTION: ARE YOU --
19 ARE THERE ANY PAPERS THAT YOU'VE WRITTEN THAT HAVE
20 ANYTHING TO DO WITH THE CAUSES OF AUTISM?

21 A WELL, SO I HAVE BEEN A CO-AUTHOR ON PAPERS THAT
22 LOOK AT SPECIFIC GENETIC ALTERATIONS THAT MAY BE
23 IMPLICATED IN AUTISM.

24 Q THOSE PAPERS DIDN'T DEAL WITH AUTISM
25 SPECIFICALLY, DID THEY, SIR?

26 A WELL, SO THEY WERE MORE FOCUSED ON THE GENETIC
27 ALTERCATIONS, PER SE, AND NOT ON AUTISM; BUT, IN FACT,
28 THE CHILDREN WHO ARE REPORTED IN THOSE PAPERS DID HAVE

1 AUTISM.

2 Q DO YOU REMEMBER ON DECEMBER 15TH YOU AND I
3 TALKED, YOU WERE DEPOSED?

4 A YES.

5 Q DO YOU REMEMBER BEING ASKED THIS QUESTION:
6 "YEAH, WELL, THERE -- ARE THERE ANY PAPERS THAT
7 YOU'VE WRITTEN THAT HAVE ANYTHING TO DO WITH
8 THE CAUSE OF AUTISM?"

9 "ANSWER: NO."

10 DO YOU REMEMBER ME ASKING THAT QUESTION, YOU
11 GIVING THAT ANSWER?

12 A I DON'T REMEMBER, BUT I BELIEVED -- I BELIEVE
13 IT IF YOU TELL ME THAT. IT'S A PARTICULAR PAPER THAT
14 HAS TO DO WITH IT THAT I'M THINKING OF THAT HAS TO DO
15 WITH THE TRAP 7 MUTATION THAT MAY NOT HAVE COME TO MIND
16 WHEN I WAS ANSWERING.

17 THE COURT: LET'S MOVE ON.

18 MR. PETROSINELLI: YES, YOUR HONOR.

19 Q AND TO BE CLEAR, AT CORTICA YOU'RE NOT DOING
20 ANY RESEARCH OR STUDIES ON POTENTIAL CAUSES OF AUTISM;
21 RIGHT?

22 A NO, I'M NOT.

23 Q OKAY. AND YOU MADE REFERENCE TO -- YOU HAVE
24 PUBLISHED A FEW PAPERS DEALING WITH NOVEL TREATMENTS OF
25 AUTISM; CORRECT?

26 A CORRECT. I DON'T KNOW THAT THOSE ARE
27 PUBLISHED, BUT THERE ARE SOME CONFERENCE PRESENTATIONS.

28 Q YEAH, I MISSPOKE. YOU'RE RIGHT.

1 YOU PRESENTED SOME PAPERS ABOUT I THINK SOME OF
2 THE CRANIAL ELECTROTHERAPY STIMULATION TREATMENT OF THE
3 BRAIN; CORRECT?

4 A YEAH, I PRESENTED SOME PAPERS AT CONFERENCES OF
5 THAT AND ALSO ABOUT THE UTILITY OF DEVELOPMENTAL
6 THERAPIES LIKE SPEECH AND OCCUPATION THERAPY IN THE
7 TREATMENT OF AUTISM.

8 Q OKAY. DOCTOR, WOULD YOU AGREE WITH ME THAT THE
9 NOTION OF EXPOSURE TO HEAVY METALS CAUSING AUTISM IS A
10 NOTION THAT'S NOT IN WIDE CURRENCY?

11 A I THINK IT IS A NOTION THAT HAS -- I THINK IT
12 IS IN WIDE CURRENCY. I'M NOT SURE THAT, YOU KNOW, IT IS
13 SOMETHING THAT IS UNIVERSALLY AGREED, BUT I DON'T THINK
14 THAT IT'S FAIR TO SAY THAT IT IS SOMETHING THAT IF YOU
15 SPOKE TO A CLINICIAN ABOUT IT, THEY WOULD SAY, OH, THEY
16 HAVE NEVER HEARD ANYTHING LIKE THAT BEFORE.

17 Q ALL RIGHT.

18 WELL, DO YOU REMEMBER, AGAIN, BACK TO YOUR
19 DEPOSITION -- CAN YOU PULL THIS UP, EXHIBIT 8, PAGE 240,
20 LINES 4 TO 10.

21 DOCTOR, YOU WERE ASKED THIS QUESTION:

22 "AND SO BY DEFINITION AT LEAST CURRENTLY, IT'S
23 NOT GENERALLY ACCEPTED IN THE SCIENTIFIC
24 COMMUNITY THAT AUTISM -- HEAVY METALS CAUSE
25 AUTISM?"

26 AND YOU SAID, "IT'S NOT A NOTION THAT'S IN WIDE
27 CURRENCY."

28 THOSE WERE YOUR WORDS AT THE DEPOSITION.

1 A YEAH, SO HERE WE'RE REFERRING TO THE SCIENTIFIC
2 COMMUNITY. BUT, YEAH, SO I THINK IF YOU ASKED
3 CLINICIANS WHO TREAT AUTISM OR PARENTS OR FAMILIES, AND
4 AGAIN, YOU KNOW, IT'S NOT NECESSARILY ACCEPTED THAT AS A
5 FACT THAT HEAVY METALS CAUSE AUTISM, BUT I THINK THAT
6 THE NOTION THAT THERE MIGHT BE A RELATIONSHIP IS NOT
7 NOVEL, LET'S SAY THAT.

8 Q OKAY. THANK YOU.

9 SO AT LEAST, AS YOU SAID, WITHIN THE SCIENTIFIC
10 COMMUNITY THAT'S NOT BEEN ESTABLISHED?

11 A YES.

12 Q OKAY.

13 NOW, DOCTOR, YOU MENTIONED YOU TRAINED AT
14 HARVARD AND YOU SPENT TIME IN ACADEMIA AND YOU NOW TREAT
15 KIDS WITH AUTISM.

16 I THINK YOU TOLD ME THAT THE IDEA THAT HEAVY
17 METALS IN BABY FOOD MIGHT BE CAUSING AUTISM, THAT WAS
18 SOMETHING THAT WAS NOT ON YOUR RADAR, AT LEAST AT THE
19 TIME OF YOUR DEPOSITION OR BEFORE YOU BECAME INVOLVED IN
20 THIS CASE; RIGHT?

21 A YEAH, I HAD NOT BEEN AWARE OF THE SPECIFIC
22 ISSUE OF BABY FOOD UNTIL I CAME ACROSS THE CONGRESSIONAL
23 REPORT.

24 Q OKAY.

25 AND YOU WERE NOT AWARE OF ANY CLAIM, ANY
26 PUBLICATION THAT MADE THAT CLAIM THAT HEAVY METALS IN
27 BABY FOOD CAUSED AUTISM; RIGHT?

28 A NO, I'M NOT.

1 Q NOW, I WANT TO, BEFORE THE LUNCH BREAK IN ABOUT
2 A FEW MINUTES, TALK VERY BRIEFLY ABOUT YOUR WORK AT
3 CORTICA, AND I THINK YOU MAY HAVE ANSWERED SOME OF THESE
4 ALREADY, BUT IT SOUNDS LIKE, I THINK YOU TOLD ME IN YOUR
5 DEPOSITION ABOUT 60 TO 70 PERCENT OF YOUR TIME IS SPENT
6 IN CLINICAL CARE?

7 A THAT'S ABOUT RIGHT.

8 Q AND ABOUT ROUGHLY HALF THE PATIENTS YOU SEE ARE
9 ALREADY DIAGNOSED WITH AUTISM?

10 A THAT SOUNDS RIGHT.

11 Q YEAH.

12 AND THEN FOR THOSE WHO HAVEN'T BEEN DIAGNOSED,
13 YOU SOMETIMES MAKE THOSE DIAGNOSES, OBVIOUSLY IF IT'S
14 APPROPRIATE; RIGHT?

15 A YES.

16 Q AND AGAIN, I THINK YOU SAID THIS, BUT LET ME
17 JUST ASK IT PRECISELY.

18 THERE IS A DIFFERENCE BETWEEN AUTISM AND
19 GENERALIZED NEURODEVELOPMENTAL SYMPTOMS; CORRECT?

20 A WELL, AUTISM IS A SPECIFIC CONSTELLATION OF
21 SYMPTOMS, SO NOT ALL THE CHILDREN WITH
22 NEURODEVELOPMENTAL ISSUES WILL HAVE A DIAGNOSIS OF
23 AUTISM.

24 Q AND I THINK YOU MADE REFERENCE TO THE DSM 5.
25 TELL THE JUDGE WHAT DSM 5 VERSION IS.

26 A YEAH, SO THE DSM IS THE DIAGNOSTIC AND
27 STATISTICAL MANUAL OF MEDICAL DISORDERS, 5 REFERS TO
28 FIFTH VERSION OF THAT MANUAL AND THAT IS BASICALLY THE

1 COMPENDIUM THAT LAYS OUT THE DIAGNOSTIC CRITERIA FOR
2 VARIOUS CONDITIONS, INCLUDING AUTISM, ALSO MAJOR
3 DEPRESSION, GENERALIZED ANXIETY DISORDER, SO ANYTHING
4 THAT IS SORT OF FELT BY THE AMERICAN PSYCHIATRIC
5 ASSOCIATION TO BE WITHIN THEIR WHEELHOUSE IS DEFINED IN
6 THE DSM 5.

7 Q OKAY. YEAH, THAT'S HELPFUL.

8 SO I JUST WANT TO -- SINCE YOU DIDN'T GET INTO
9 THE DETAIL THERE, I WANT TO JUST RUN THROUGH IT PRETTY
10 QUICKLY, THEN WE'LL TAKE THE LUNCH BREAK.

11 CAN YOU -- AND, IAN, CAN YOU PLEASE PULL UP,
12 YEAH, SLIDE 5.

13 SO WHAT I'VE -- YOU'RE CERTAINLY FAMILIAR WITH
14 THE DSM 5, YOU USE IT EVERY DAY; CORRECT?

15 A YES.

16 Q AS IT RELATES TO AUTISM?

17 A WELL, CORRECT. I USE THESE CRITERIA EVERY DAY,
18 YEAH.

19 Q YEAH, FAIR ENOUGH.

20 AND SO THERE ARE -- AS I UNDERSTAND IT THERE
21 ARE FIVE TOP LINE CATEGORIES FOR AUTISM -- FOR AN AUTISM
22 DIAGNOSIS THAT WE'VE JUST EXTRACTED HERE.

23 A YES.

24 Q "PERSISTENT DEFICITS IN COMMUNICATION
25 INTERACTION, RESTRICTIVE, REPETITIVE BEHAVIORS,
26 AND THEN THE SYMPTOMS IN EARLY DEVELOPMENT
27 PERIOD, SYMPTOMS THAT CAN CAUSE CLINICALLY
28 SIGNIFICANT IMPAIRMENT AND DISTURBANCES THAT

1 AREN'T BETTER EXPLAINED BY INTELLECTUAL
2 DISABILITY."
3 THAT'S A FAIR SUMMARY OF THE DSM 5 CATEGORIES;
4 RIGHT?

5 A YES.

6 Q OKAY.

7 LET'S GO TO THE NEXT SLIDE.

8 SO I JUST WANT TO BREAK THOSE DOWN.

9 UNDER CATEGORY 1, THERE ARE ACTUALLY THREE --
10 NEXT SLIDE -- THERE ARE ACTUALLY THREE SUB COMPONENTS.
11 I WON'T READ THEM ALL.

12 BUT TO QUALIFY FOR AN AUTISM DIAGNOSIS, YOU
13 NEEDED TO MEET EACH OF THESE THREE SUB COMPONENTS WITHIN
14 PART 1. SO EMOTIONAL RECIPROCITY, NONVERBAL
15 COMMUNICATION BEHAVIORS, AND, YOU KNOW, DEVELOPING AND
16 UNDERSTANDING RELATIONSHIPS; TRUE?

17 A THAT'S TRUE.

18 Q AND THEN IF YOU'VE GOT THOSE THREE AREAS OF
19 PERSISTENT DEFICITS IN SOCIAL COMMUNICATION, YOU GO TO
20 STEP 2 -- NEXT SLIDE -- WHERE YOU'VE GOT TO HAVE TWO OF
21 THESE FOUR CATEGORIES OF BEHAVIORS; CORRECT?

22 A YES.

23 Q AND I WON'T READ ALL OF THOSE, BUT IF A CHILD
24 HAS TWO OR MORE OF THOSE, THEN THEY WOULD MEET THIS
25 SECOND CATEGORY OF DSM 5; CORRECT?

26 A CORRECT.

27 Q OKAY.

28 AND THEN TO SKIP AHEAD TO THE THIRD ONE NOW AND

1 THE REST OF THEM.

2 SO THREE REALLY -- AND YOU SAID THIS -- THE
3 SYMPTOMS HAVE TO BE PRESENT, NOT NECESSARILY THE
4 DIAGNOSIS, BUT THE SYMPTOMS HAVE TO BE PRESENT IN THE
5 EARLY DEVELOPMENTAL PERIOD; CORRECT?

6 A RIGHT.

7 Q AND I THINK YOU SAID THREE IS SORT OF THE
8 GENERAL -- THREE YEARS OF AGE -- IS THE GENERAL
9 THRESHOLD BY WHICH THE SYMPTOMS SHOULD HAVE TO HAVE
10 MANIFESTED EVEN IF SOMEONE DIDN'T PICK UP ON THEM.

11 IS THAT FAIR?

12 A YEAH. THREE IS NOT AN ABSOLUTE THRESHOLD. IT
13 COULD BE, YOU KNOW, FOUR OR FOUR AND A HALF.

14 Q YEAH.

15 I THINK THE DSM 4, WHICH I THINK YOU ARE
16 PROBABLY FAMILIAR WITH, I THINK THEY DID HAVE THREE
17 YEARS OLD AND NOW THEY'VE CHANGED IT TO EARLY
18 DEVELOPMENT PERIOD; RIGHT?

19 A CORRECT.

20 Q OKAY.

21 AND THEN THE SYMPTOMS HAVE TO BE SIGNIFICANT.
22 THEY HAVE TO CAUSE CLINICALLY SIGNIFICANT IMPAIRMENT,
23 YOU KNOW, FOR THESE -- FOR THIS CHILD; CORRECT?

24 A YES.

25 Q AND FINALLY, THE SYMPTOMS HAVE TO NOT BE BETTER
26 EXPLAINED BY INTELLECTUAL DISABILITY OR GLOBAL
27 DEVELOPMENTAL DELAY; CORRECT?

28 A YES.

1 Q AND I THINK YOU SAID THIS. A CHILD COULD HAVE
2 ONE OR MORE OF THESE SYMPTOMS AND NOT NECESSARILY
3 QUALIFY AS HAVING AUTISM; RIGHT?

4 A RIGHT. WELL, UNLESS THEY MEET ALL OF THESE
5 CRITERIA AS THEY DON'T BY DEFINITION HAVE AUTISM.

6 Q AND WE TALKED ABOUT DECREASED IQ AND I HAD SOME
7 CDC NUMBERS I'LL JUST SKIP THROUGH.

8 YOU AGREE THAT A FAIR NUMBER OF CHILDREN, MORE
9 THAN HALF WITH AUTISM, HAVE EITHER HIGHER OR NORMAL IQ;
10 CORRECT?

11 A YES.

12 Q OKAY.

13 REALLY QUICKLY, LAST POINT I'LL MAKE BEFORE THE
14 LUNCH BREAK.

15 YOU'RE FAMILIAR WITH SOME OF THE SCREENING
16 QUESTIONNAIRES FOR AUTISM, LIKE THE SOCIAL COMMUNICATION
17 QUESTIONNAIRE, THE SOCIAL RESPONSIVENESS SCALE.

18 YOU'RE FAMILIAR WITH THOSE GENERALLY, ARE YOU
19 NOT, SIR?

20 A YES.

21 Q AND THOSE QUESTIONNAIRES OR SCREENING TOOLS,
22 THEY ARE NOT DIAGNOSTIC INSTRUMENTS; CORRECT?

23 A NOT GENERALLY, ALTHOUGH THEY CAN BE USED TO
24 SUPPORT A CLINICAL DIAGNOSIS.

25 Q FAIR ENOUGH.

26 THEY ARE SCREENING INSTRUMENTS TO IDENTIFY
27 PERSONS WHO HAVE AT LEAST SOME OF THESE CHARACTERISTICS
28 OF AUTISM; CORRECT?

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A YES.

MR. PETROSINELLI: SO, YOUR HONOR, I WAS GOING TO MAYBE BREAK HERE, THIS IS PROBABLY A GOOD NATURAL BREAKING POINT, BUT THREE MINUTES BEFORE. IS THAT OKAY?

THE COURT: PERFECT. WE WILL RESUME AT 1:30, PLEASE.

MR. PETROSINELLI: THANK YOU, YOUR HONOR.

THE COURT: ALL RIGHT. THANK YOU, DOCTOR. THANKS EVERYBODY.

MR. ESFANDIARY: THANK YOU, YOUR HONOR.

THE COURT: 1:30, PLEASE.

MR. PETROSINELLI: AND I ASSUME THAT THERE'S A RULE IN PLACE, YOUR HONOR, WHERE THEY CANNOT TALK TO THE WITNESS DURING THE EXAMINATION. I DON'T KNOW WHAT THE COURT'S RULES ARE ON THAT.

THE COURT: WELL, I DON'T HAVE ANY ORDER TO THAT EFFECT.

MR. WISNER: WE HAVE NO INTENTION OF TALKING TO THE WITNESS BEYOND MAYBE MAKING SURE HE GETS FED.

THE COURT: OKAY.

MR. PETROSINELLI: NO OBJECTION TO THE DIETARY DISCUSSION, YOUR HONOR.

THE COURT: ALL RIGHT. TERRIFIC. THANKS.

MR. PETROSINELLI: THANK YOU.

{LUNCHEON RECESS}

1 CASE NUMBER: 21STCV22822
2 CASE NAME: NC VS. HAIN, ET AL.
3 LOS ANGELES, CALIFORNIA MONDAY, JANUARY 31, 2022
4 DEPARTMENT 7 HON. AMY D. HOGUE, JUDGE
5 APPEARANCES: (AS HERETOFORE NOTED.)
6 REPORTER: JEANESE JOHNSON, CSR 11635
7 TIME: 1:30 P.M.
8

9 --000--

10
11 AFTERNOON SESSION

12
13 THE COURT: GOOD AFTERNOON. THIS IS JUDGE
14 HOGUE SPEAKING.

15 MR. PETROSINELLI: LET ME KNOW WHEN YOU'RE
16 READY.

17 THE COURT: I'M READY.

18 MR. PETROSINELLI: OKAY. I WAS WAITING FOR A
19 CUE FROM YOU.

20 Q OKAY. THANK YOU. WELCOME BACK, DR. SHAPIRO.

21 A YEAH, HI.

22 Q BEFORE THE BREAK WE WERE TALKING ABOUT SOME OF
23 THE SCREENING MECHANISMS. I WANT TO TALK ABOUT THAT.

24 BUT JUST SO I UNDERSTAND YOUR TESTIMONY, DID I
25 HEAR YOU TO SAY THAT JUST BECAUSE YOU'RE POSITIVE ON ONE
26 OF THOSE SCREENING MECHANISMS, THAT DOESN'T EQUATE WITH
27 A DIAGNOSIS OF AUTISM; CORRECT?

28 A THAT'S TRUE. AUTISM IS A CLINICAL DIAGNOSIS SO

1 YOU NEED TO PUT TOGETHER MULTIPLE SOURCES OF
2 INFORMATION.

3 Q UNDERSTOOD.

4 OKAY. SO IN CORTICA, YOU DO HAVE AN INTAKE
5 QUESTIONNAIRE THAT YOU USE IN -- WITH PROSPECTIVE
6 PATIENTS; CORRECT?

7 A CORRECT.

8 Q AND YOUR COUNSEL WAS GRACIOUS ENOUGH TO SHARE
9 IT WITH ME. I JUST WANT TO ASK YOU A FEW QUESTIONS
10 ABOUT IT.

11 I IMAGINE YOU'RE FAMILIAR WITH IT AND PROBABLY
12 LOOKED AT IT A LOT; RIGHT?

13 A YES.

14 Q OKAY.

15 AND IT'S DESIGNED TO BE COMPREHENSIVE; CORRECT?

16 A WELL, IT'S DESIGNED TO BE COMPREHENSIVE, BUT
17 NOT EXHAUSTIVE.

18 Q FAIR ENOUGH. FAIR ENOUGH.

19 AT LEAST -- I KNOW IT'S ADMINISTERED
20 ELECTRONICALLY, BUT AT LEAST WHEN I PRINTED IT OUT, IT
21 WAS 30 PAGES LONG.

22 SO HERE'S WHAT I'D LIKE TO DO, FIRST I WANT TO
23 PULL UP THE CDC'S STATEMENT OF RISK FACTORS THAT MR.
24 ESFANDIARY SHOWED YOU.

25 CAN YOU PULL IT UP. IT'S SLIDE 8.

26 DO YOU RECALL GOING OVER THIS LIST WITH MR.
27 ESFANDIARY?

28 MR. ESFANDIARY: WE DID NOT GO OVER THIS.

1 THE WITNESS: I --
2 MR. PETROSINELLI: I'M SORRY. IT WAS USED IN
3 OPENING.
4 Q WE TALKED ABOUT THIS IN YOUR DEPOSITION; RIGHT?
5 A I BELIEVE SO, YES.
6 Q OKAY.
7 A I'VE SEEN THIS BEFORE.
8 Q OKAY. FAIR ENOUGH.
9 SO I WANT TO WALK THROUGH THIS AND MAYBE LINE
10 IT UP AGAINST YOUR QUESTIONNAIRE.
11 SO FOR INSTANCE, THE FIRST LINE IT SAYS:
12 "MOST SCIENTISTS AGREE THAT GENES ARE ONE OF
13 THE RISK FACTORS THAT CAN MAKE A PERSON MORE
14 LIKELY TO DEVELOP ASD."
15 YOU AGREE WITH THAT; CORRECT?
16 A YES.
17 Q AND LET'S GO TO SLIDE 9 IF WE COULD.
18 AND SO, IN FACT, YOUR INTAKE FORM ASKED ABOUT
19 WHETHER THE PATIENT HAS SEEN A GENETICIST AND ANY
20 GENETIC RESULTS THEY HAVE SEEN, THAT THEY HAVE GOTTEN;
21 CORRECT?
22 A YES, WE DO ASK ABOUT THAT.
23 Q OKAY. NEXT SLIDE.
24 THE CDC SAYS, "CHILDREN WHO HAVE A SIBLING WITH
25 ASD ARE AT A HIGHER RISK OF HAVING AUTISM."
26 YOU AGREE WITH THAT; RIGHT?
27 A YES.
28 Q AND YOUR INTAKE FORM ASKS ABOUT FAMILY HISTORY

1 INCLUDING HISTORY OF SIBLING; CORRECT?

2 A YES.

3 Q ALL RIGHT. NEXT SLIDE.

4 YOUR QUESTIONNAIRE ASKS ABOUT CERTAIN GENETIC
5 AND CHROMOSOMAL CONDITIONS, AND AGAIN, YOUR INTAKE FORM
6 TALKS ABOUT THAT AND SEEKS THAT INFORMATION; CORRECT?

7 A YES.

8 Q AND NEXT SLIDE.

9 THEN IT TALKS ABOUT CERTAIN MEDICINES TAKEN
10 DURING PREGNANCY VALPROIC ACID AND THALIDOMIDE HAVE BEEN
11 LINKED AND YOUR INTAKE FORM REASONABLY ASKS WHAT
12 MEDICINES THE BIRTH MOTHER MIGHT HAVE TAKEN; CORRECT?

13 A WE DO ASK THAT, YES.

14 Q OKAY.

15 AND THE NEXT SLIDE, PLEASE.

16 IT SAYS THAT THERE'S SOME EVIDENCE THAT THE
17 CRITICAL PERIOD FOR DEVELOPING AUTISM OCCURS BEFORE,
18 DURING AND IMMEDIATELY AFTER BIRTH.

19 THAT'S SOMETIMES CALLED THE PERINATAL PERIOD;
20 CORRECT?

21 A YES.

22 Q AND YOUR INTAKE FORM ASKS, AMONG OTHER THINGS,
23 WERE THERE ANY PROBLEMS WITH PREGNANCY, LABOR OR BIRTH;
24 CORRECT?

25 A CORRECT.

26 Q AND THEN FINALLY, THE CDC RISK FACTOR LISTS
27 CHILDREN BORN TO OLDER PARENTS ARE AT A HIGHER RISK.

28 YOU AGREE WITH THAT; CORRECT?

1 A CORRECT.

2 Q AND ONE OF THE FIRST THINGS YOU ASK ON YOUR
3 INTAKE FORM IS, WHAT WAS THE MOTHER'S AGE, THE
4 BIOLOGICAL MOTHER, AND THE FATHER'S AGE AT THE TIME OF
5 BIRTH; CORRECT?

6 A IT'S -- I DON'T KNOW IF IT'S ONE OF THE FIRST
7 THINGS, BUT IT'S DEFINITELY ON THERE.

8 Q YEAH, SURE.

9 LET ME JUST DO A QUICK THING OF TERMINOLOGY
10 HERE JUST SO I HAVE IT.

11 SO THE WORD "ENVIRONMENTAL FACTORS" HAS BEEN
12 USED A LOT.

13 SO I UNDERSTAND HOW IT'S USED BY YOU AND IN THE
14 LITERATURE, THE THINGS WE JUST WENT OVER, LIKE AGE OF
15 THE MOTHER OR SIBLINGS, THOSE ARE ACTUALLY TECHNICALLY
16 CONSIDERED ENVIRONMENTAL FACTORS. IT MEANS NON GENETIC;
17 RIGHT?

18 A SIBLING, NO. BUT THE AGE OF THE PARENTS ARE --
19 IS CONSIDERED AN ENVIRONMENTAL OR NONGENETIC RISK
20 FACTOR. BUT THE SIBLING FAMILY HISTORY SPEAKS TO THE
21 GENETIC RISK FACTORS.

22 Q FAIR ENOUGH.

23 I GUESS MY POINT IS MORE SIMPLE IS, AS A LAY
24 PERSON I HEAR "ENVIRONMENTAL FACTOR," I THINK ABOUT
25 THINGS FLOATING AROUND IN THE ENVIRONMENTAL OR THINGS --
26 IT'S USED MORE BROADLY THAN THAT WHEN IT'S USED IN THIS
27 CORRECT; CORRECT?

28 A YEAH. GENERALLY, IT MEANS NONGENETIC IN THIS

1 CONTEXT.

2 Q THAT'S HELPFUL. THANK YOU.

3 WE TALKED ABOUT THIS IN YOUR DEPOSITION, BUT TO
4 BE CLEAR, YOUR QUESTIONNAIRE DOESN'T MENTION ANYTHING
5 ABOUT HEAVY METALS; CORRECT?

6 A IT DOES NOT.

7 Q OKAY. DOES IT -- WELL, LET'S SKIP THAT.

8 BEAR WITH ME FOR A SECOND, YOUR HONOR.

9 YOU DON'T ASK YOUR PROSPECTIVE PATIENTS WHETHER
10 THEY HAVE EATEN FRUITS OR VEGETABLES OR GRAINS AS SOME
11 SCREENING MECHANISM FOR POTENTIAL HEAVY METALS; CORRECT?

12 A I THINK WE ASK GENERALLY ABOUT DIET, BUT WE
13 DON'T ASK SPECIFICALLY ABOUT THAT WITH THAT INDICATION.

14 Q AND, IN FACT, YOU'VE NEVER WARNED A PATIENT OR
15 A PATIENT'S FAMILY NOT TO EAT CERTAIN KINDS OF FOODS
16 BECAUSE OF THE RISK OF HEAVY METALS; CORRECT?

17 A WELL, I DO COUNSEL -- I MEAN, I -- I HAVEN'T
18 WARNED FAMILIES NOT TO EAT BABY FOODS BECAUSE OF RISK OF
19 HEAVY METALS. I HAVE TALKED ABOUT THE IMPORTANCE OF
20 DIET AND THE PREFERENCE FOR FOODS THAT ARE, YOU KNOW,
21 FREE OF PESTICIDES AND CONTAMINANTS AND THAT SORT OF
22 THING.

23 Q OKAY. WELL, LET'S TALK ABOUT THE NUTRITIONAL
24 ISSUES.

25 IT'S FAIR TO SAY THAT MANY CHILDREN WITH AUTISM
26 HAVE PROBLEMS RELATING TO EATING, INCLUDING FOOD
27 SELECTIVITY, RITUALS AROUND EATING AND CERTAIN OTHER
28 COMPULSIVE EATING HABITS; CORRECT?

1 A THAT IS TRUE.

2 Q OKAY.

3 AND ONE OF THOSE EATING PROBLEMS IS SOMETHING
4 CALLED PICA OR PICA, I DON'T KNOW HOW -- THE RIGHT WAY
5 TO PRONOUNCE. IT IS THAT TRUE?

6 A YEAH, I USUALLY SAY PICA, BUT --

7 Q OKAY.

8 A -- SOME PEOPLE MAY PRONOUNCE IT DIFFERENTLY.
9 BUT THAT'S TRUE. IT'S NOT SO MUCH AN EATING
10 PROBLEM AS INGESTING OR MOUTHING NONEDIBLE OBJECTS.

11 Q FAIR ENOUGH.

12 I WAS USING THAT, I THINK, BROADLY.

13 SO PICA -- I'LL USE YOUR PRONUNCIATION -- PICA
14 IS WHEN A CHILD EATS NON FOOD ITEMS, DIRT, PAINT CHIPS,
15 VARIOUS OTHER THINGS; CORRECT?

16 A YES, CORRECT.

17 Q OKAY.

18 AND I THINK YOU MENTIONED THAT ON YOUR DIRECT.
19 AS TO THE ABNORMAL EATING PATTERNS OF FOOD,
20 SOMETIMES KIDS WITH AUTISM WILL ONLY EAT CERTAIN TYPES
21 OF FOODS AND NOT OTHERS; CORRECT?

22 A YES.

23 Q AND THAT FOOD SELECTIVITY ISSUE CAN SOMETIMES
24 CREATE MALNUTRITION PROBLEMS WHERE THEY DON'T GET MAYBE
25 CERTAIN NUTRIENTS THAT THEY SHOULD OTHERWISE BE GETTING;
26 RIGHT?

27 A YEAH, IT CAN LEAD TO CERTAIN NUTRITIONAL
28 DEFICITS.

1 Q AND I BELIEVE ON YOUR WEBSITE YOU POINT OUT THE
2 PROSPECT THAT MAYBE A PATIENT MIGHT NEED NUTRITIONAL
3 SUPPLEMENTS OR OTHER MEDICATIONS TO HELP ON THESE
4 DEFICIENCIES; CORRECT?

5 A YEAH, I DIDN'T AUTHOR THE WEBSITE, BUT I WOULD
6 GENERALLY AGREE WITH THAT.

7 Q YEAH, OKAY.

8 AND THEN FINALLY, THESE -- KIDS WITH AUTISM CAN
9 SOMETIMES HAVE METABOLIC DIFFERENCES, AND I THINK YOU
10 ALLUDED TO THIS IN HOW THEY -- I THINK WHAT YOU SAID HOW
11 THEY PROCESSED HEAVY METALS; TRUE?

12 A THAT HAS BEEN SUGGESTED IN SOME RESEARCH, YES.

13 Q YEAH.

14 OKAY. NEXT TOPIC: QUICKLY, WE TALKED A LITTLE
15 BIT ABOUT THE CDC EARLIER. I JUST WANT TO RUN THROUGH
16 TWO MORE OR THREE MORE QUICKLY.

17 CAN WE GO TO SLIDE 15, PLEASE, IAN.

18 SO THE AMERICAN ACADEMY OF PEDIATRICS -- WHAT
19 I'M GOING TO DO IS I'M GOING TO RUN THROUGH JUST A FEW
20 OF THEM QUICKLY.

21 CAN YOU PULL THAT UP.

22 THE AMERICAN ACADEMY OF PEDIATRICS, THEY
23 PUBLISHED A PAPER ON AUTISM.

24 AND THAT'S EXHIBIT 8. RIGHT? NO, I'M SORRY.
25 51. 651.

26 I DON'T THINK THIS IS CONTROVERSIAL.

27 YOU AGREE, DOCTOR, THAT THE AMERICAN ACADEMY OF
28 PEDIATRICS, THEY DON'T LIST HEAVY METALS AS A RISK

1 FACTOR FOR AUTISM; CORRECT?

2 A DOES NOT SEEM TO BE LISTED HERE, YES.

3 Q YEAH.

4 AND IT SAYS, "THE POTENTIAL ENVIRONMENTAL
5 FACTORS THAT MAY BE RELATED TO INCREASED
6 PURPORTED PREVALENCE OF ASD IS AN INTERACTIVE
7 STUDY THAT AS YET IS WITHOUT FIRM CONCLUSION."
8 YOU WOULD AGREE WITH THAT; RIGHT?

9 A I AGREE THAT IT'S AN AREA OF ACTIVE STUDY,
10 YEAH.

11 Q YOU DISAGREE WITH THE "WITHOUT FIRM
12 CONCLUSION"?

13 A WELL, I THINK IT -- AGAIN, IT DEPENDS ON WHAT
14 SPECIFICALLY YOU'RE REFERRING TO.

15 Q OKAY.

16 A BUT AS A BROAD AREA, I WOULD SAY THERE'S NOT
17 ONE SPECIFIC OR A LIST OF SPECIFIC ENVIRONMENTAL RISK
18 FACTORS THAT ARE WELL ESTABLISHED.

19 Q OKAY.

20 MR. ESFANDIARY: I'D JUST LIKE TO INTERPOSE AN
21 OBJECTION TO THE EXTENT THAT MR. IMBROSCIO HASN'T
22 CLARIFIED WHETHER THE WITNESS HAS SEEN THE DOCUMENT, IT
23 SEEMS TO BE IMPEACHMENT BY EXTRINSIC EVIDENCE.

24 THE COURT: WELL, HE CAN DO THAT. I HAVE
25 ANOTHER CONCERN, THOUGH, WHICH IS THAT EVERYBODY'S
26 MARKING AND SHOWING ME EXHIBITS AND WE'RE NOT OFFERING
27 THEM INTO THE RECORD, SO AT THE END OF THE HEARING OR
28 HEARINGS, YOU ALL NEED TO SOMEHOW PUT THOSE INTO COURT

1 SO IT'S VERY CLEAR WHAT WAS USED OR NOT USED.

2 MR. ESFANDIARY: YOUR HONOR, AT THE END OF EACH
3 DAY WE'RE GOING TO ENTER INTO THE RECORD OFFICIALLY, THE
4 EXHIBITS THAT WE USED DURING THE DAY.

5 THE COURT: OKAY. BUT WE'LL NEED COPIES OF
6 THEM TOO.

7 MR. PETROSINELLI: YEAH, WE TALKED ABOUT THAT.
8 WE HAVE AN AGREEMENT.

9 THE COURT: ALL RIGHT. GOOD.

10 MR. PETROSINELLI:

11 Q SO LET'S GO TO THE NEXT SLIDE.

12 THIS IS THE AMERICAN PSYCHIATRIC ASSOCIATION,
13 AND I THINK I SHOWED THIS TO YOU IN YOUR DEPOSITION.

14 IT'S EXHIBIT 635. THANK YOU.

15 DO YOU RECALL SEEING THIS IN YOUR DEPOSITION?

16 A YES.

17 Q ALL RIGHT. AND TO BE CLEAR, THE AMERICAN
18 PSYCHIATRIC ASSOCIATION, THEY DON'T LIST HEAVY METALS AS
19 A RISK FACTOR FOR AUTISM; CORRECT?

20 A NOT TO MY KNOWLEDGE.

21 Q OKAY.

22 AND LET'S GO TO EXHIBIT 674.

23 I THINK YOU WERE SHOWN A PUBLICATION FROM THE
24 NATIONAL INSTITUTES OF HEALTH, ONE OF THE SUBDIVISIONS,
25 BUT I WANT TO SHOW YOU THIS IS THE NIH, THE BIG NIH,
26 THEIR PUBLICATION ON AUTISM SPECTRUM DISORDER, THE FACT
27 SHEET.

28 THAT'S EXHIBIT 674.

1 LET'S GO TO PAGE 3, IAN.

2 A SO ACTUALLY, THIS IS A DIFFERENT SUBDIVISION.
3 THIS IS THE NATIONAL INSTITUTE OF NEUROLOGIC DISORDERS
4 AND STROKE, SO IT'S ANOTHER SUB-INSTITUTE.

5 Q I APOLOGIZE. YOU'RE ABSOLUTELY RIGHT ABOUT
6 THAT. SORRY, I MISSED THAT.

7 IAN, COULD WE BLOW UP THAT SECTION ON WHAT
8 CAUSES AUTISM.

9 SO AS I THINK WE HAVE -- YOU'VE AGREED IN YOUR
10 DEPOSITION, NIH DOESN'T LIST HEAVY METALS AS A FACTOR --
11 AS A RISK FACTOR FOR AUTISM; CORRECT?

12 A CORRECT. SO THIS PARTICULAR NIH FACT SHEET
13 DOES NOT LIST HEAVY METALS, BUT THE OTHER ONE WHICH WE
14 SAW EARLIER DOES.

15 Q WELL, IT LISTS IT AS SOMETHING THAT MAY BE
16 LINKED TO RESEARCH THAT'S ONGOING; CORRECT?

17 A THAT'S RIGHT.

18 Q I THINK IT CITED THE ARORA STUDY AS THE SINGLE
19 STUDY CITED; CORRECT?

20 A YES, THAT -- AT LEAST THAT STUDY.

21 Q OKAY. WELL, THE RECORD WILL SPEAK TO WHAT IT
22 SHOULD CITE.

23 A YEAH.

24 Q THE NIH SUBDIVISION HERE SAYS, "ENVIRONMENTAL
25 FACTORS MAY ALSO PLAY A ROLE IN GENE FUNCTION
26 AND DEVELOPMENT, BUT NO SPECIFIC ENVIRONMENTAL
27 CAUSES HAVE YET BEEN IDENTIFIED."

28 THAT'S AT LEAST WHAT THIS DIVISION OF NIH SAYS

1 ABOUT OTHER ENVIRONMENTAL RISK FACTORS; CORRECT?

2 A THAT'S WHAT IT SAYS. BUT IT ALSO CONTRADICTS
3 THE OTHER DOCUMENTS WE JUST REVIEWED WHICH LIST, FOR
4 EXAMPLE, EXPOSURE TO GALPORATE AND FLORDIMIDE AS RISK
5 FACTORS.

6 Q YEAH.

7 ALL RIGHT. LET'S MOVE ON.

8 NOW, HERE -- I -- NOW I WANT TO SPEND THE REST
9 OF OUR TIME TALKING ABOUT YOUR OPINIONS IN THIS CASE
10 THAT YOU'VE OFFERED IN YOUR REPORT.

11 JUST SO I CAN SET THE FRAMEWORK: YOUR OPINION
12 IS ESSENTIALLY THAT THERE ARE NEUROBIOLOGICAL PATHWAYS
13 OF HEAVY METALS THAT ARE IMPLICATED -- EXCUSE ME -- LET
14 ME STRIKE THAT AGAIN. I WANT TO GET THIS EXACTLY RIGHT.

15 THERE ARE NEUROBIOLOGICAL PATHWAYS OF HEAVY
16 METAL TOXICITY THAT ARE SIMILAR TO MECHANISMS THAT HAVE
17 BEEN CONNECTED TO SOME OF THE SYMPTOMS OF AUTISM.

18 IS THAT A FAIR SUMMARY OF YOUR ESSENTIAL
19 OPINION HERE?

20 A WELL, I -- YEAH, I THINK THAT -- I THINK THAT
21 MY OPINION IS LITTLE BIT STRONGER THAN THAT, WHICH IS
22 THAT THE MECHANISMS OF HEAVY METAL TOXICITY OVERLAP
23 SUBSTANTIALLY WITH THE PATHOGENETIC MECHANISMS OF
24 AUTISM.

25 Q RIGHT.

26 AND THAT'S WHAT I WANT TO TALK ABOUT TO YOU
27 ABOUT.

28 FIRST, YOU WOULD AGREE THAT THERE ARE MANY

1 THEORIES ABOUT THE MECHANISMS THAT ARE IMPLICATED WITH
2 AUTISM; CORRECT?

3 A YES, I -- AS A GENERAL STATEMENT, YES.

4 Q OKAY.

5 AND YOU'RE NOT HERE TO SAY THAT BECAUSE HEAVY
6 METALS IMPLICATE PATHWAY X AND PATHWAY X IS ALSO
7 IMPLICATED WITH AUTISM, THAT THEREFORE HEAVY METALS ARE
8 A DEMONSTRATED CAUSE OF AUTISM, RIGHT? THAT'S NOT WHY
9 YOU'RE HERE?

10 A YEAH, I'M NOT OFFERING AN OPINION ON CAUSATION.

11 Q OKAY.

12 AND I THINK YOU SAID THIS ON DIRECT.

13 YOU WOULD AGREE THERE'S NO BIOLOGICAL SIGNATURE
14 OF AUTISM THAT WOULD ALLOW US TO CONNECT ANY ONE OF
15 THESE MECHANISMS TO AUTISM; TRUE?

16 A WELL, THAT -- THE WAY YOU PHRASED THAT, I DON'T
17 AGREE WITH IT.

18 SO THERE'S NO SPECIFIC BIOMARKER FOR AUTISM AND
19 THERE'S NO -- THERE'S NO BIOLOGICAL TEST THAT CAN TELL
20 YOU YOU HAVE AUTISM OR DON'T.

21 BUT THERE ARE BIOLOGICAL SIGNATURES IN AUTISM,
22 SO GENE EXPRESSION PROFILES, PROFILES OF -- MARKERS OF
23 INFLAMMATION THAT CAN, YOU KNOW, DISTINGUISH AUTISM FROM
24 NON AUTISTIC POPULATIONS RELATIVELY RELIABLY AND SOME OF
25 THOSE ACTUALLY -- SOME OF THOSE GENE EXPRESSION CHANGES
26 AND INFLAMMATORY ACTIVATION OF INFLAMMASONE CAN ALSO BE
27 TRIGGERED BY HEAVY METAL EXPOSURE.

28 Q OKAY.

1 AND JUST SO I UNDERSTAND THIS: AS YOU KNOW,
2 DR. GESCHWIND IS ONE OF OUR EXPERTS. HE'S AT UCLA.

3 YOU'RE FAMILIAR WITH DR. GESCHWIND; RIGHT?

4 A YES.

5 Q AND I BELIEVE YOU SAID HE ACTUALLY INTERVIEWED
6 YOU FOR MEDICAL SCHOOL AT SOME POINT IN TIME; RIGHT?

7 A I -- I -- YEAH, I THINK IT WAS FOR MEDICAL
8 SCHOOL, I'M PRETTY SURE.

9 Q OKAY. NO WORRIES.

10 YOU WOULD AGREE THAT HE'S ONE OF THE LEADING
11 RESEARCHERS WHEN IT COMES TO AUTISM AND GENETICS AND THE
12 LIKE; TRUE?

13 A HE'S VERY WELL KNOWN IN THAT AREA.

14 Q FAIR ENOUGH.

15 AND JUST SO I UNDERSTAND, THE WORK THAT YOU DID
16 IN ACADEMIA, IT ACTUALLY WAS NOT LOOKING INTO THESE
17 MECHANISMS OF AUTISM, RIGHT, THAT'S NOT -- THAT WASN'T
18 YOUR RESEARCH AREA OF EX -- OF SPECIALTY; CORRECT?

19 A MY RESEARCH WAS ON BRAIN DEVELOPMENT MORE
20 GENERALLY AND PARTICULARLY ON THE DEVELOPMENT OF
21 COGNITION AND LANGUAGE.

22 Q OKAY.

23 SO WE TALK ABOUT THESE MECHANISMS THAT YOU'VE
24 DISCUSSED.

25 IN FACT, MANY OF THESE MECHANISMS THAT YOU
26 DISCUSS ARE ACTUALLY THINGS THAT CAN HAPPEN IRRESPECTIVE
27 OF METAL EXPOSURE; CORRECT?

28 A THEY DON'T REQUIRE METAL EXPOSURE.

1 Q OKAY.

2 AND JUST SO I MAKE SURE I HAVE THIS.

3 YOU'RE NOT HERE TODAY TO SAY THAT ANY ONE OF
4 THESE PARTICULAR MECHANISMS IS IN FACT A DEMONSTRATED
5 MECHANISM THAT CONNECTS HEAVY METALS WITH AUTISM; TRUE?

6 A WELL, I'M SAYING THAT THEY ARE DEMONSTRATED
7 MECHANISMS THAT AREN'T INVOLVED IN AUTISM AND IN THE
8 BRINGING ABOUT THE CHANGES IN THE BRAIN AND THE NERVOUS
9 SYSTEM FUNCTION THAT CAUSE AUTISM AND THERE ARE ALSO
10 CHANGES THAT CAN BE TRIGGERED BY A HEAVY METAL EXPOSURE.

11 Q SO THESE ARE -- THESE ARE HYPOTHESES OF HOW
12 THIS MIGHT BE GOING ON IN YOUR VIEW; CORRECT?

13 A ESSENTIALLY, THEY ARE --

14 Q OKAY.

15 A -- THERE'S THESE BIOLOGICAL PATHWAYS ARE THE
16 SAME.

17 Q AND SO AS I UNDERSTAND YOUR REASONING, FIRST
18 YOU REVIEWED SOME ARTICLES ON THE BIOLOGICAL EFFECTS OF
19 HEAVY METAL FROM ANIMAL STUDIES OR EXPERIMENTAL HUMAN
20 STUDIES, RIGHT, THAT WAS SORT OF STEP ONE; TRUE?

21 A WELL, THE HUMAN STUDIES ARE -- I MEAN, WE DON'T
22 EXPERIMENT ON HUMANS. BUT OBSERVATIONAL HUMAN STUDIES,
23 YES.

24 Q YEAH, THAT'S WHAT I MEANT. I'M SORRY. I WAS
25 NOT CLEAR THERE.

26 AND THE STUDIES THAT YOU LOOKED AT LOOKING AT
27 THE BIOLOGICAL EFFECTS OF HEAVY METALS, TO BE CLEAR,
28 THESE AREN'T STUDIES THAT YOU YOURSELF HAVE CONDUCTED;

1 CORRECT?

2 A I DID NOT CONDUCT THOSE STUDIES.

3 Q AND AS WE SAID, THAT WAS NOT YOUR AREA OF
4 RESEARCH IN ACADEMIA; TRUE?

5 A YOU MEAN THE PHYSIOLOGIC STUDIES OF HEAVY METAL
6 EXPOSURE?

7 Q YEAH.

8 A THAT WAS NOT MY AREA OF RESEARCH.

9 Q YEAH, YEAH.

10 AND THEN THE SECOND STEP WAS YOU REVIEWED SOME
11 OTHER STUDIES THAT LOOKED AT AUTISM AND POTENTIAL
12 PATHWAYS IMPLICATED IN AUTISM; CORRECT?

13 A YES.

14 Q AND THEN KIND OF WHAT YOU DID, I THINK YOU USED
15 THE WORD SUBSTANTIAL OVERLAP, BUT YOU POINTED OUT THERE
16 ARE SOME COMMONLY CITED MECHANISMS THAT ARE IMPLICATED
17 IN BOTH; CORRECT?

18 A RIGHT.

19 Q OKAY.

20 AND THOSE INCLUDED, IF I GET THEM ALL DOWN FROM
21 YOUR REPORT, INFLAMMATORY ACTIVATION, CELEPROCTOSIS,
22 OXIDATIVE STRESS AND MITOCHONDRIAL DISFUNCTION, THOSE
23 ARE AT LEAST FOUR OF THE ONES THAT YOU'VE MENTIONED
24 EITHER TODAY OR IN YOUR REPORT; CORRECT?

25 A THOSE ARE SOME OF THEM, YES.

26 Q YEAH.

27 AND BECAUSE THERE'S THIS SIMILARITY, THIS
28 OVERLAP, THAT'S ESSENTIALLY THE BASIS OF YOUR BIOLOGIC

1 PLAUSIBILITY OPINION; CORRECT?

2 A YEAH. I MEAN, I WOULD SAY THERE'S SORT OF A
3 COMMON PATHWAY THAT IS FIGURED BOTH BY GENETIC CHANGES
4 AND BY A CERTAIN ENVIRONMENTAL INFLUENCE INCLUDING HEAVY
5 METALS.

6 Q AND JUST SO WE'RE CLEAR, THE BIOLOGIC PATHWAY
7 MECHANISMS, THEY ARE NOT SPECIFIC TO HEAVY METAL
8 EXPOSURE, THEY ARE GENERAL BIOLOGIC PROCESSES THAT OCCUR
9 AS A RESULT OF DIFFERENT ENVIRONMENTAL INSULTS, OF
10 PHYSIOLOGICAL ABNORMALITIES OR GENETIC VARIATIONS; TRUE?

11 A WELL, I WOULD SAY THERE ARE NUMEROUS CAUSES. I
12 WOULDN'T SAY THAT, YOU KNOW, THEY ARE EXTREMELY COMMON
13 OR NORMAL. SO, YOU KNOW, SEVERE INFECTIONS FOR EXAMPLE,
14 MIGHT CAUSE EXPOSURE TO PHOSPHATES OR OTHER PESTICIDES,
15 THAT ARE VARIOUS AGENTS THAT CAN CAUSE THESE CHANGES
16 APART FROM HEAVY METALS, BUT -- SO I'M NOT -- I AGREE IN
17 THE SENSE THAT IT'S NOT SPECIFIC TO HEAVY METAL
18 TOXICITY.

19 Q AND THAT'S ALL THAT I WAS GETTING AT.

20 THESE MECHANISMS THAT YOU'RE TALKING ABOUT, NOT
21 SPECIFIC TO HEAVY METAL TOXICITY.

22 OKAY. ONE MOMENT.

23 SO THESE ARE THINGS THAT CAN HAPPEN IN THE BODY
24 IRRESPECTIVE OF METAL EXPOSURE; TRUE?

25 A WELL, I MEAN, THEY DON'T HAPPEN WITHOUT A
26 TRIGGER, BUT THE TRIGGER DOESN'T HAVE TO BE METAL
27 EXPOSURE.

28 Q YEAH, FAIR ENOUGH.

1 AND YOU CAN'T POINT ME TO A SINGLE STUDY THAT
2 SAYS THESE HEAVY METALS TRIGGER ANY OF THESE MECHANISMS
3 AND THEREFORE MAY CAUSE ASD? YOU --

4 A I'M NOT AWARE OF A SINGLE STUDY THAT PUTS IT
5 TOGETHER IN THAT WAY.

6 Q THAT'S WHAT YOU'RE DOING HERE; CORRECT?

7 A ESSENTIALLY.

8 Q YEAH.

9 AND I LOOKED AT SOME OF THE STUDIES YOU CITED
10 ON PAGE 16 AND 17 OF YOUR REPORT. I WON'T READ THEM ALL
11 FOR THE COURT REPORTER BECAUSE THEY WILL BE LENGTHY.

12 BUT NONE OF THEM ACTUALLY MENTION AUTISM
13 SPECIFICALLY; CORRECT?

14 A THAT'S PROBABLY TRUE. I WOULD NEED TO REVIEW
15 THEM TO BE SURE.

16 Q OKAY.

17 AND BY THE SAME TOKEN THESE MECHANISMS AREN'T
18 SPECIFIC TO HEAVY METALS. THESE MECHANISMS ARE ALSO NOT
19 SPECIFIC TO ASD DEVELOPMENT EITHER; CORRECT?

20 A MANY OF THE ONES WE TALKED ABOUT ARE NOT
21 SPECIFIC TO ASD.

22 Q YEAH.

23 AND, IN FACT, SOME OF THESE PATHWAYS THAT
24 YOU'VE IDENTIFIED IMPLICATED IN PARKINSON'S AND
25 ALZHEIMER'S FOR SURE; CORRECT?

26 A YEAH, THAT'S CORRECT. AND THAT HAS TO DO WITH
27 THE -- SORT OF THE TIMING WITH RESPECT TO BRAIN
28 DEVELOPMENT AND MATURATION, SO THEY ARE CLEARLY

1 PROCESSES THAT ARE INVOLVED IN NEURODEGENERATION AND
2 ABNORMAL NERVE CELL FUNCTION, BUT IF THE ONSET IS LATE
3 IN LIFE, THEY CAN LEAD TO NEURODEGENERATIVE DISORDERS.
4 IF IT'S EARLY IN LIFE, THEY CAN LEAD TO
5 NEURODEVELOPMENTAL DISORDERS.

6 Q AND YOU MENTIONED NM -- NMDA, THAT'S BEEN
7 IMPLICATED IN STROKE AND SCHIZOPHRENIA AND EPILEPSY;
8 CORRECT?

9 A WELL, THEY ARE ABNORMALITIES IN NMDA RECEPTOR
10 FUNCTION IN THOSE CONDITIONS. IN STROKE IT'S MORE OF AN
11 -- IT'S A, YOU KNOW, THAT'S NOT THE PRIMARY ETIOLOGIC --
12 THAT IS NOT WHAT KICKS OFF THE PROCESS IN STROKE, BUT
13 CERTAINLY AN NMDA RECEPTOR DYSFUNCTION IS A FEATURE OF
14 OTHER PSYCHIATRIC DISORDERS --

15 Q YEAH.

16 A -- AND EPILEPSY.

17 Q SURE.

18 AND --

19 A AND THEY TO SOME EXTENT EXPLAIN THE GENETIC
20 OVERLAP BETWEEN SCHIZOPHRENIA AND AUTISM SO THERE'S SORT
21 OF SHARED GENETIC RISK BETWEEN THOSE DISORDERS.

22 Q ONE FINAL MECHANISM I WANT TO MENTION BRIEFLY
23 IS YOU MENTIONED PROTEIN KINASE C, SOMETIMES CALLED PKC
24 AS ONE POTENTIAL MECHANISM GOING ON HERE IN YOUR REPORT.

25 A RIGHT. THE ALTERATION OF PROTEIN KINASE C
26 SIGNALLING, YES.

27 Q YEAH.

28 AND TO BE CLEAR, THAT PATHWAY HAS BEEN

1 IMPPLICATED IN CERTAIN CANCERS, RENAL DISEASE,
2 CARDIOVASCULAR DISEASE, AMONG OTHERS; TRUE?

3 A THAT'S TRUE. SOME OF THESE PATHWAYS ARE, YOU
4 KNOW, RATHER GENERAL, AND IT DEPENDS, AGAIN, ON WHAT
5 CELLS ARE EXPOSED AT WHAT TIME DURING DEVELOPMENT THEY
6 ARE EXPOSED, AND, YOU KNOW, WHAT THE REST OF THE
7 SUBSTRATE IS.

8 Q AND AS I UNDERSTAND IN YOUR REPORT YOU DON'T
9 OPINE ON WHETHER AND HOW THE EFFECT OF THESE SPECIFIC
10 BIOLOGICAL MECHANISMS YOU DESCRIBE, HOW THEY VARY
11 BETWEEN POTENTIAL PRENATAL AND POST-NATAL ENVIRONMENT;
12 TRUE?

13 A I AM NOT -- I'M NOT SURE WHAT EXACTLY YOU'RE
14 REFERRING TO.

15 Q YEAH. THAT'S A FAIR -- THAT WAS NOT A GREAT
16 QUESTION.

17 AS I READ YOUR REPORT, DOCTOR, YOU DESCRIBE
18 THESE PATHWAYS, BUT YOU DON'T TEASE OUT WHICH ONES ARE
19 PRE-NATAL PATHWAYS WHICH ONES MAY BE IN THE EARLY
20 DEVELOPMENT PHASE AS YOU SAID.

21 A YEAH, SO THAT'S A GOOD QUESTION. I DON'T GO
22 INTO MUCH DETAIL ON THAT IN THE REPORT.

23 SO THAT THERE ARE A COUPLE OF, I THINK,
24 CLARIFICATIONS THAT MIGHT BE RELEVANT. SO THAT THERE
25 ARE SORT OF GENERAL -- MORE GENERAL PROCESSES AND MORE
26 SPECIFIC PROCESSES, SO THINGS LIKE DISRUPTION OF
27 MITOCHONDRIAL FUNCTION, OXIDATIVE STRESS, INFLAMMATION,
28 THOSE ARE SYSTEMIC ISSUES THAT CAN OCCUR, YOU KNOW, PRE-

1 OR POST-NATALLY AND IN FACT, YOU KNOW, THERE'S A BODY OF
2 RESEARCH LOOKING AT INFLAMMATION AND OXIDATIVE STRESS, I
3 THINK I EVEN REFERRED TO THIS EARLIER, IN THE MOTHER
4 AFFECTING RISK OF AUTISM AND DEVELOPMENTAL DISORDERS IN
5 THE CHILD.

6 Q YES.

7 A SO THOSE ARE KIND OF SYSTEMIC CHANGES IN THE
8 SORT OF THE DEVELOPMENTAL AREA THAT CAN AFFECT HOW THE
9 BRAIN FORMS.

10 AND THEN THERE ARE RATHER SPECIFIC PROCESSES
11 LIKE SYNAPTOGENESIS WHICH OCCUR AT A STAGE IN THE
12 DEVELOPMENT OF BRAIN AND THE NERVOUS SYSTEM THAT IS, YOU
13 KNOW, POTENTIALLY A VULNERABLE PERIOD WITH RESPECT TO
14 THE DEVELOPMENT OF AUTISM AND OTHER NEURODEVELOPMENTAL
15 CONDITIONS, SO SYNAPTOGENESIS IS SOMETHING THAT'S
16 OCCURRING IN, YOU KNOW, MOSTLY IN POST-NATAL LIFE, AT
17 LEAST THE FORMATION OF -- AND REFINEMENT OF FRAME
18 NETWORKS.

19 AND THE FUNCTION OF NMDA RECEPTORS, AS I SAID
20 EARLIER, IS IMPORTANT FOR ENSURING THAT THAT HAPPENS IN
21 AN APPROPRIATE MANNER. SO IF YOU INTERFERE WITHIN NMDA
22 RECEPTOR FUNCTION AT THIS KIND OF CRITICAL JUNCTURE FOR
23 SYNAPTOGENESIS, YOU'LL GET A CERTAIN -- A PARTICULAR
24 KIND OF ARRAY OF ANOMALIES.

25 IF YOU INTERFERE WITH THAT RECEPTOR FUNCTION AT
26 A DIFFERENT AGE OR A DIFFERENT STAGE OF BRAIN
27 DEVELOPMENT, YOU MAY SEE SOMETHING ELSE.

28 Q OKAY. THAT'S HELPFUL.

1 LAST TOPIC I JUST WANT TO PICK UP THE --
2 SOMETHING THAT YOU TALKED ABOUT ON DIRECT, THAT'S THE
3 HALLMAYER STUDY.

4 AND JUST SO THE RECORD IS CLEAR, YOU DON'T
5 DISCUSS THE HALLMAYER STUDY IN YOUR REPORT THAT YOU GAVE
6 TO US; CORRECT?

7 A I DON'T THINK I DISCUSS IT SPECIFICALLY IN THE
8 REPORT.

9 Q YEAH.

10 AND WE'VE GOTTEN, I THINK, FOUR DIFFERENT LISTS
11 OF THE MATERIALS THAT YOU'VE RELIED ON, ONE WITH YOUR
12 REPORT, ONE ON NOVEMBER 24TH, ONE ON DECEMBER 13TH, AND
13 ONE FIVE DAYS AGO, LAST WEDNESDAY, JANUARY 26TH.

14 TO BE CLEAR, THE FIRST TIME THAT YOU'VE LISTED
15 HALLMAYER AS SOMETHING THAT YOU'RE RELYING ON WAS LAST
16 WEDNESDAY; CORRECT?

17 A THAT MIGHT BE TRUE. I WAS AWARE OF THE STUDY
18 AND IT HAD COME UP IN DISCUSSION, AND I DON'T REMEMBER
19 EXACTLY WHEN I PROVIDED THE REFERENCE, BUT IT WAS AT
20 SOME POINT -- WELL, AT SOME POINT PRIOR TO THIS HEARING.

21 Q YEAH.

22 SO THAT'S WHY I WANTED TO ASK YOU. I'M JUST
23 CURIOUS.

24 DID YOU GIVE THE REPORT -- THE STUDY TO MS. --
25 TO THE LAWYERS OR DID THEY GIVE IT TO YOU THAT REMINDED
26 YOU ABOUT THE STUDY?

27 A NO, I GAVE IT --

28 MR. ESFANDIARY: I'M GOING TO OBJECT ON THE

1 GROUND OF PRIVILEGE HERE, PURSUANT TO THE PARTIES'
2 AGREEMENT THAT COMMUNICATION BETWEEN THE COUNSEL AND THE
3 EXPERTS ARE PRIVILEGED. WE HAVE A STIPULATION TO THAT
4 EFFECT.

5 MR. PETROSINELLI: I DON'T WANT TO GET INTO
6 THAT. I DON'T THINK IT IS, BUT I'LL WITHDRAW THE
7 QUESTION.

8 Q IN ANY EVENT, FAIR TO SAY THAT YOU LOOKED AT
9 THE STUDY RECENTLY IN ANTICIPATION OF YOUR TESTIMONY;
10 CORRECT?

11 A WELL, I'VE BEEN FAMILIAR WITH THE STUDY FOR A
12 WHILE. I MAY NOT HAVE CITED IT IN MY REPORT. I CITED
13 OTHER STUDIES THAT, YOU KNOW, ESTIMATE GENETIC
14 HERITABILITY OF AUTISM AND HALLMAYER WAS ONE THAT I WAS
15 FAMILIAR WITH, AND I THINK IT --

16 Q OKAY.

17 A -- MAY HAVE BEEN, YOU KNOW, JUST AN OVERSIGHT
18 IN THAT I DIDN'T MENTION IT IN MY REPORT, BUT IT'S ALONG
19 THE LINES OF SOME OTHER STUDIES THAT I DID MENTION.

20 Q WELL, THAT'S WHAT I WANT TO ASK YOU ABOUT.

21 CAN WE PULL THAT UP, HALLMAYER. WHAT EXHIBIT
22 IS IT?

23 EXHIBIT 71.

24 AND CAN YOU GO TO PAGE 10.

25 SO THERE WAS A DISCUSSION ABOUT WHAT WERE THE
26 ENVIRONMENTAL FACTORS THAT WERE DISCUSSED IN HALLMAYER,
27 AND I THINK THE HALLMAYER STUDY ITSELF ACTUALLY LISTS
28 WHAT ENVIRONMENTAL FACTORS WERE FOCUSSED -- CAN YOU PULL

1 UP THE BOTTOM PARAGRAPH, PLEASE, IAN. THERE WE GO.
2 AND LOOKING AT THE MIDDLE SENTENCE.
3 IT SAYS, "THE NONGENETIC RISK FACTORS THAT MAY
4 INDEX ENVIRONMENTAL INFLUENCES INCLUDE PARENTAL
5 AGE, LOW BIRTH WEIGHT, MULTIPLE BIRTHS AND
6 MATERNAL INFECTIONS DURING PREGNANCY."
7 DO YOU SEE THAT?
8 A YEAH, THOSE ARE THE ONES THAT ARE LISTED THERE.
9 Q AND THOSE ARE THE ONES THAT ARE LISTED IN CDC
10 WEBSITE; CORRECT?
11 A THEY ARE -- YEAH, THERE ARE AT LEAST PARTIALLY
12 OVERLAPPING WITH THAT.
13 Q AND THEY ARE THE ONES THAT YOUR INTAKE FORM AT
14 CORTICA DESIGNS TO GET INFORMATION ABOUT; CORRECT?
15 A YEAH, I THINK THE INTAKE FORM DOES ASK ABOUT
16 THOSE, MOST OF THOSE THINGS.
17 Q AND IT DOESN'T SAY ANYTHING ABOUT HEAVY METALS
18 THERE; CORRECT?
19 A ON THE INTAKE FORM OR IN THE PAPER?
20 Q WELL, I'M SORRY, IN THE HALLMAYER PAPER.
21 A YEAH. RIGHT. THE -- YEAH.
22 Q OKAY.
23 AND THEN I GUESS LET ME ASK YOU THIS: HAVE YOU
24 SINCE BEING PREPARED TO COME AND TESTIFY ABOUT THIS
25 ARTICLE HERE BEFORE JUDGE HOGUE, DID YOU DO ANY WORK TO
26 FIGURE OUT WHAT THE SCIENTIFIC COMMUNITY HAS SAID ABOUT
27 THE HALLMAYER PAPER SINCE IT WAS PUBLISHED IN 2011?
28 A NOT SPECIFICALLY.

1 Q OKAY. WELL, LET'S PULL UP EXHIBIT 661.
2 THIS IS AN ARTICLE WHERE THE FIRST AUTHOR IS
3 DR. TICK, BEATA TICK.

4 MR. ESFANDIARY: I'M GOING TO OBJECT TO THE
5 EXTENT THAT YOU HAVEN'T ESTABLISHED WHETHER THE WITNESS
6 HAS ACTUALLY RECEIVED THIS DOCUMENT BEFORE.

7 THE COURT: OVERRULED.

8 MR. PETROSINELLI: YEAH.

9 Q AND THEN ONE -- THANK YOU, YOUR HONOR -- ONE OF
10 THE AUTHORS IS MICHAEL RUTTER.

11 DO YOU KNOW WHO DR. RUTTER IS?

12 A NOT PERSONALLY, BUT I'M FAMILIAR WITH THE NAME.

13 Q YEAH.

14 AND HE'S SORT OF KNOWN AS THE FATHER OF -- WHAT
15 IS HE THE FATHER OF? FATHER THE CHILD PSYCHIATRY.

16 DOES THAT RING A BELL?

17 A I DON'T KNOW THAT I'VE HEARD THAT REFERRAL, BUT
18 I'LL TAKE YOUR WORD FOR IT.

19 Q THAT'S FINE.

20 CAN WE BLOW UP THE BACKGROUND SECTION, PLEASE,
21 IAN.

22 SO THE ISSUE HERE IN THIS STUDY IS LIKE IT WAS
23 IN HALLMAYER, WHICH IS WHAT IS THE IMPACT OF
24 ENVIRONMENTAL FACTORS VERSUS GENETIC FACTORS AND MAYBE
25 JUST HIGHLIGHT THE CONCLUSION.

26 IN THIS STUDY THEY DEMONSTRATE THAT AUTISM,
27 ASD, IS DUE TO STRONG GENETIC EFFECTS, B, A SHARED
28 ENVIRONMENTAL EFFECTS BECOMES SIGNIFICANT AS A FUNCTION

1 OF LOWER PREVALENCE RATE, AND C, PREVIOUSLY REPORTED
2 SIGNIFICANT SHARED ENVIRONMENTAL INFLUENCES ARE LIKELY A
3 STATISTICAL ARTIFACT OF OVER-INCLUSION OF CONCORDANT
4 DIZYGOTIC TWINS.

5 WE'LL GET TO THAT IN A MOMENT.

6 BUT LET'S GO TO THE CONCLUSION OF THE ARTICLE
7 WHICH IT SAYS IT IN SOMEWHAT PLAINER ENGLISH.

8 IF YOU CAN BLOW UP PAGE 593 AT THE BOTTOM OF
9 THE CONCLUSION OR ALL THE CONCLUSION.

10 THANK YOU, SIR.

11 AND THE NEXT PARAGRAPH TOO.

12 ALL RIGHT. DOCTOR, I HAVE IN FRONT OF YOU THE
13 CONCLUSION FROM THE TICK STUDY. AND LET'S JUST READ IT
14 TOGETHER.

15 IT SAYS IT USED AN APPROPRIATE META ANALYTIC
16 STATISTICAL APPROACH, THEY DEMONSTRATED THAT THE
17 ETIOLOGY OF AUTISM SPECTRUM DISORDER IN A COMBINED
18 SAMPLE IS MORE CONSISTENT WITH STRONG GENETIC
19 INFLUENCES.

20 AND JUST TO BE CLEAR, WHEN YOU TALKED ABOUT
21 HALLMAYER, YOU SAID THE HALLMAYER DATA SEEMED TO BE --
22 SHOW LESS CONNECTION WITH GENETICS THAN OTHER STUDIES.

23 I THINK THAT'S WHAT YOU SAID; CORRECT?

24 A SOMETHING LIKE THAT. YES. THE HERITABILITY
25 ESTIMATES IN THE HALLMAYER STUDY WERE LOWER THAN IN SOME
26 OTHER STUDIES.

27 Q YEAH.

28 AND THEN IT GOES ON, THIS STUDY SAYS, "WE CAN

1 REJECT THE CLAIM THAT THERE IS A STRONG SHARED
2 ENVIRONMENTAL EFFECT ON AUTISM SPECTRUM
3 DISORDERS ACCOUNTING FOR THE MAJORITY OF
4 VARIANCE AND ALERT TO THE DANGER OF PLACING TOO
5 MUCH WEIGHT ON FINDINGS FROM A SINGLE STUDY
6 SUCH AS HALLMAYER, ET AL., 2011."

7 THAT'S THE STUDY YOU LOOKED AT WITH MR.
8 ESFANDIARY; CORRECT?

9 A THAT WAS THE HALLMAYER STUDY, YES.

10 Q AND THEN IT GOES ON TO SAY, "AT THE SAME TIME
11 WE DO NOT EXCLUDE THE POSSIBILITY THAT
12 ENVIRONMENTAL OR AT LEAST NONGENETIC EFFECTS
13 INFLUENCE AUTISM SPECTRUM DISORDER, BUT UNLESS
14 A SUITABLY POWERED AND WELL DESIGNED NEW STUDY
15 COMES FORWARD, THIS CLAIM SHOULD BE PUT TO ONE
16 SIDE FOR NOW."

17 THAT'S THE CONCLUSION OF THE TICK STUDY IN
18 2015; CORRECT?

19 A THAT IS WHAT THEY SAY.

20 Q OKAY.

21 MR. PETROSINELLI: I DON'T HAVE ANY FURTHER
22 QUESTIONS, YOUR HONOR. THANK YOU.

23 THE COURT: ALL RIGHT.

24 DOES THE PLAINTIFF WANT TO FOLLOW UP WITH ANY
25 QUESTIONS?

26 MR. ESFANDIARY: JUST A COUPLE OF VERY SHORT
27 QUESTIONS, YOUR HONOR. IT WON'T TAKE VERY LONG AT ALL.

28 THE COURT: THANK YOU.

1 REDIRECT EXAMINATION

2 MR. ESFANDIARY:

3 Q DR. SHAPIRO, THANK YOU FOR BEING WITH US HERE
4 THIS AFTERNOON. I JUST HAVE A COUPLE FOLLOW-UP
5 QUESTIONS FOR YOU.

6 DO YOU REMEMBER MR. IMBROSCIO ASKING YOU
7 WHETHER IT WAS GENERALLY ACCEPTED IN THE SCIENTIFIC
8 COMMUNITY WHETHER METALS CAN CAUSE ASD? DO YOU REMEMBER
9 THAT QUESTION?

10 A YES.

11 Q PUTTING ASIDE THE QUESTION OF WHETHER IT'S
12 GENERALLY ACCEPTED, DOES IT MAKE LOGICAL SENSE BASED ON
13 WHAT WE KNOW ABOUT HEAVY METALS AND WHAT THEY DO TO THE
14 BRAIN?

15 A I THINK IT IS GENERALLY ACCEPTED IN THE
16 SCIENTIFIC COMMUNITY THAT HEAVY METALS ARE NEUROTOXIC,
17 AND IF YOU INTRODUCE A TOXIC AGENT TO THE BRAIN AT A
18 CRITICAL DEVELOPMENTAL PERIOD, IT CERTAINLY MAKES SENSE
19 THAT IT COULD LEAD TO AN EARLY DEVELOPMENTAL
20 DISTURBANCES INCLUDING ASD.

21 Q MR. IMBROSCIO ALSO ASKED YOU ABOUT THE SPECIFIC
22 MECHANISMS THAT METALS INDUCE IN THE BRAIN AND HE ASKED
23 QUESTIONS ABOUT WHETHER THERE ARE GENERAL MECHANISMS
24 THAT HAPPEN IN THE BRAIN IRRESPECTIVE OF THE HEAVY METAL
25 PRESENCE. I BELIEVE YOU ALSO TALKED ABOUT THIS DURING
26 YOUR DEPOSITION.

27 IS IT JUST THAT METALS OR THESE PROCESSES IN
28 THE BRAIN HAPPEN GENERALLY OR IS IT THAT METALS CAN

1 CAUSE A PATHOLOGICAL AMOUNT OF THESE PROCESSES TO HAPPEN
2 THAT OVERLAPS WITH THE SYMPTOMS OF ASD?

3 MR. PETROSINELLI: OBJECTION; LEADING.

4 THE COURT: OVERRULED.

5 THE WITNESS: SO THESE ARE PATHOLOGICAL
6 PROCESSES, AND I THINK WHAT I TRIED TO SAY IN MY ANSWER
7 EARLIER WAS THESE ARE NOT SORT OF PROCESSES THAT UNFOLD
8 WITHOUT PROVOCATION AND WE HAVE NO IMPACT ON BRAIN
9 DEVELOPMENT. THEY ARE, YOU KNOW, CLEARLY PATHOLOGICAL,
10 THE MORE INTENSE THEY ARE, THE MORE PATHOLOGY THEY
11 CAUSE.

12 AND THEY CAN, YOU KNOW, BE TRIGGERED BY A
13 VARIETY OF DIFFERENT CAUSES OF WHICH METALS ARE ONE, BUT
14 JUST BECAUSE THEY HAVE MANY POTENTIAL CAUSES DOESN'T
15 MEAN THAT THEY ARE BENIGN.

16 SO, FOR EXAMPLE, A FLU-LIKE ILLNESS COULD BE
17 CAUSED BY COVID OR FLU OR ANY NUMBER OF DIFFERENT
18 VIRUSES OR INFECTIOUS AGENTS, IT'S NOT SPECIFIC TO A
19 PARTICULAR INFECTIOUS AGENT, BUT IT'S NOT A BENIGN
20 CONDITION.

21 MR. ESFANDIARY:

22 Q AND LASTLY, DOCTOR, AND WE'RE GOING TO END ON
23 THIS: I WANT TO SHOW YOU, IF WE CAN JUST INSERT THIS
24 HERE, DOCTOR, JUST GOING BACK TO THE HALLMAYER STUDY
25 BRIEFLY, CAN YOU -- OOPS -- JUST GOING BACK TO THE
26 HALLMAYER STUDY BRIEFLY.

27 COUNSEL JUST SHOWED YOU THE PART OF THIS
28 DOCUMENT TALKING ABOUT NONGENETIC RISK FACTORS SUCH AS

1 PARENTAL AGE, LOW BIRTH WEIGHT AND PREMATURE BIRTHS.

2 DO YOU REMEMBER TALKING TO HIM ABOUT THAT?

3 A YES.

4 Q I JUST WANT TO TAKE A LOOK AT WHAT PAPER THE
5 HALLMAYER STUDY CITES FOR THIS PROPOSITION VERY QUICKLY.
6 AND IF WE GO DOWN TO THEIR CITATIONS, I BELIEVE IT'S
7 CITATION 24 THEY CITE DR. GARDENER, DON'T THEY?

8 A SEEMS TO BE THE CASE.

9 SO, YOU KNOW, IF I COULD SAY SOMETHING ABOUT
10 THE HALLMAYER STUDY.

11 Q SURE.

12 A AND THE PREVIOUS STUDY THAT WAS REFERENCED.

13 SO, AGAIN, THIS GETS TO AN ISSUE THAT WE TALKED
14 ABOUT A LITTLE BIT EARLIER, WHICH IS THE DIFFERENCE
15 BETWEEN HERITABILITY AS A POPULATION RISK AND INDIVIDUAL
16 RISKS OF DEVELOPING DISORDER AND SEVERITY OF THAT
17 DISORDER, WHICH ARE ALSO IMPORTANT.

18 AND I THINK THAT, YOU KNOW, I CERTAINLY WOULD
19 AGREE WITH THE STATEMENT THAT GENETICS PLAYS A VERY
20 STRONG ROLE IN A POPULATION BASIS IN THE PATHOGENESIS OF
21 AUTISM AND THAT THE PURE ENVIRONMENTAL VARIABLES ARE AT
22 PLAY, BUT THE MORE THE INFLUENCE OF GENETICS WILL BE
23 EVIDENT. SO IF YOU KIND OF EQUALIZE THE ENVIRONMENT,
24 THEN GENETICS IS GOING TO ACCOUNT FOR ALMOST ALL OF, YOU
25 KNOW, WHAT'S LEFT IN TERMS OF VARIABILITY.

26 IF YOU HAVE MORE ENVIRONMENTAL VARIABILITY,
27 THEN, YOU KNOW, THE GENETIC COMPONENT IS GOING TO APPEAR
28 TO BE WEAKER.

1 AGAIN, AT THE POPULATION LEVEL. AT THE
2 INDIVIDUAL LEVEL I THINK IT'S SORT OF, YOU KNOW, IT'S A
3 DIFFERENT STORY.

4 SO AT THE INDIVIDUAL LEVEL YOU MAY HAVE GENETIC
5 SUSCEPTIBILITY BASED ON, YOU KNOW, EITHER ONE, YOU KNOW,
6 GENE THAT IS VERY A STRONG GENETIC RISK FACTOR OR A
7 COMBINATION OF GENES THAT TOGETHER CONTRIBUTE TO RISK,
8 BUT THE QUESTION OF WHETHER YOU'RE GOING TO DEVELOP A
9 DISORDER AND HOW SEVERE THAT DISORDER IS IS GOING TO
10 DEPEND ON ENVIRONMENTAL INFLUENCE.

11 SO I THINK WE NEED TO BE CAREFUL NOT TO
12 CONFLATE THE POPULATION LEVEL DESCRIPTION AND THE
13 INDIVIDUAL DESCRIPTION.

14 BUT IN THE HALLMAYER AND THESE OTHER STUDIES
15 ARE POPULATION STUDIES, BUT IF YOU JUST LOOK AT THE
16 DATA, THE FACT IS THAT THERE ARE TWIN PAIRS THAT ARE
17 DISCORDANT FOR AUTISM, AND THAT IS NOT EXPLAINED AWAY BY
18 A META ANALYSIS.

19 MR. ESFANDIARY: THANK YOU, DOCTOR. THAT'S A
20 GREAT PLACE TO END IT. I HAVE NO FURTHER QUESTIONS.

21 THE COURT: ALL RIGHT.

22 MR. PETROSINELLI: YEAH, NO QUESTIONS, YOUR
23 HONOR.

24 THE COURT: THANK YOU. WOULD YOU LIKE TO TAKE
25 A BREAK NOW OR DO YOU WANT TO LAUNCH INTO THE NEXT
26 WITNESS?

27 MR. ESFANDIARY: WE CAN TAKE A FIVE-MINUTE
28 BREAK, YOUR HONOR.

1 THE COURT: OKAY. WE'LL COME BACK IN FIVE
2 MINUTES. THANK YOU.

3 MR. ESFANDIARY: THANK YOU.

4 MR. PETROSINELLI: THANK YOU, YOUR HONOR.
5 (RECESS)

6 THE COURT: OKAY. WE'LL NEED TO SWEAR THE
7 WITNESS IN AGAIN, MR. WISNER. MY CLERK IS COMING
8 AROUND.

9 HI, DR. RITZ. MY NAME IS AMY HOGUE. IT'S NICE
10 TO MEET YOU.

11 THE WITNESS: IT'S NICE TO MEET YOU, JUDGE.

12 THE CLERK: CAN YOU PLEASE RAISE YOUR RIGHT
13 HAND.

14 THE WITNESS: OKAY. YOU NEED TO SEE ME.

15 THE CLERK: I SEE YOU.

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

20 THE WITNESS: I DO.

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

23 THE WITNESS: DR. BEATE RITZ. B-E-A-T-E, FIRST
24 NAME. AND LAST NAME R-I-T-Z.

25 THE CLERK: THANK YOU.

26

27

28

1 DIRECT EXAMINATION

2 MR. WISNER:

3 Q GOOD AFTERNOON, DR. RITZ. THANK YOU SO MUCH
4 FOR BEING HERE.

5 BEFORE WE GET STARTED, THOUGH, I JUST WANTED TO
6 ASK THE COURT, IS THERE ANYTHING SPECIFICALLY YOUR HONOR
7 WOULD LIKE ME TO ADDRESS BECAUSE I HAVE MY SCRIPT AND I
8 HAVE MY OUTLINE, BUT I WANT TO MAKE SURE I GET ALL THE
9 THINGS YOU CARE ABOUT, YOUR HONOR.

10 THE COURT: WELL, AS DISCUSSED, I WANT TO HEAR
11 ABOUT IS THE UNDERLYING RESEARCH AND THE STRENGTH OF THE
12 CONNECTION AND SUPPORT THAT IT GETS TO THE OPINIONS OF
13 DR. RITZ.

14 MR. WISNER: OKAY. WE'RE DEFINITELY GOING TO
15 COVER THAT.

16 THE COURT: YES.

17 MR. WISNER: OKAY. GREAT.

18 Q ALL RIGHT. WELL, DR. RITZ, THANK YOU FOR
19 JOINING US. I UNDERSTAND YOU HAVE A ACCENT.

20 WHERE ARE YOU FROM?

21 A I'M FROM GERMANY.

22 Q HOW LONG HAVE YOU BEEN HERE IN L.A.?

23 A 30 -- 33 YEARS NOW, I GUESS.

24 Q OKAY. SO AND IN HOMAGE TO THE FACT THAT YOU'RE
25 GERMAN AND THE FACT WE'RE GOING TO HAVE TO BLITZ THROUGH
26 ALL OF THIS TESTIMONY BECAUSE THERE'S A LOT TO COVER, WE
27 PUT TOGETHER WHAT I'M GOING TO CALL THE RITZ AUTOBAHN
28 AND THIS IS THE ROADMAP THAT WE'RE GOING TO USE FOR YOUR

1 TESTIMONY TODAY; ALL RIGHT?

2 A SO NO SPEED LIMITS, RIGHT.

3 Q EXACTLY. EXACTLY.

4 SO WE'RE GOING TO START OF WITH YOUR
5 QUALIFICATIONS AND EXPERIENCE AND WE'RE GOING TO TALK
6 ABOUT SOME BASIC EPI PRINCIPLES. WE'LL PROBABLY GO
7 THROUGH THAT QUICKER THAN I ANTICIPATED JUST BECAUSE I
8 THINK THE COURT IS FAMILIAR WITH A LOT OF THAT ALREADY.

9 THEN WE'RE GOING TO TALK ABOUT YOUR
10 METHODOLOGY THAT YOU USED. WE'RE GOING TO TALK ABOUT
11 THE DATA ABOUT LEAD AND ASD AND THEN WE'RE GOING TO END
12 ON THE DATA REGARDING LEAD AND ADHD; OKAY?

13 A GOOD.

14 Q ALL RIGHT. SO LET'S START OFF WITH YOUR
15 QUALIFICATIONS.

16 WHERE DO YOU CURRENTLY WORK?

17 A WELL, I WORK AT UCLA IN THE SCHOOL OF PUBLIC
18 HEALTH AND THE SCHOOL OF MEDICINE. I HAVE DOUBLE
19 APPOINTMENTS.

20 Q WHAT DO YOU DO AT UCLA?

21 A WELL, I AM WHAT'S CALLED A MEMBER OF THE CENTER
22 FOR OCCUPATIONAL AND ENVIRONMENTAL HEALTH, BUT I AM THE
23 CURRENTLY SOLE EPIDEMIOLOGIST IN THAT CENTER, SO MY
24 FACULTY APPOINTMENT IT IS EPIDEMIOLOGY, THAT'S WHAT I
25 TEACH. BUT MY DESIGNATED JOB FOR THE STATE OF
26 CALIFORNIA, BECAUSE THESE SPECIFIC FACULTY POSITIONS
27 WERE GIVEN TO UCLA BY THE STATE OF CALIFORNIA, AS EXTRA
28 POSITIONS ARE TO DO RESEARCH AND OUTREACH AND

1 INFORMATION PROVIDING FOR THE COMMUNITY OF CALIFORNIA IN
2 TERMS OF OCCUPATIONAL AND ENVIRONMENTAL HEALTH.

3 Q WHAT IS OCCUPATIONAL EPIDEMIOLOGY OR
4 ENVIRONMENTAL EPIDEMIOLOGY?

5 A WELL, RIGHT, SO EPIDEMIOLOGISTS OFTEN DEFINE
6 THEMSELVES ACCORDING TO A SPECIFIC DISEASE THEY ARE
7 STUDYING, SO YOU MIGHT HEAR THAT SOMEBODY SAYS I'M A
8 CANCER EPIDEMIOLOGIST OR, YOU KNOW, I'M AN HIV
9 EPIDEMIOLOGIST.

10 WELL, FOR OCCUPATIONAL AND ENVIRONMENTAL
11 EPIDEMIOLOGY, IT'S ACTUALLY SPECIFIC TO THE EXPOSURES
12 THAT WE ARE STUDYING, SO I OFTEN, WHEN I TEACH MY
13 STUDENTS, WOULD SAY, WELL, YOU KNOW, THERE IS DEFINITELY
14 FOR SURE ONE TYPE OF DISEASE YOU CAN PREVENT AND THAT IS
15 OCCUPATIONAL AND ENVIRONMENTAL INDUCED DISEASE BECAUSE
16 IF YOU TAKE THOSE TOXINS OR WHATEVER THE EXPOSURES ARE
17 AWAY, YOU WOULD NOT SEE THE DISEASE, AND THEREFORE, IN A
18 WAY OUR JOB IS EASIER, BUT OUR JOB IS ALSO HARDER
19 BECAUSE WE HAVE A VERY BROAD SPECTRUM OF DISEASES WE ARE
20 STUDYING AND OF EXPOSURES.

21 Q LET ME SHOW YOU EXHIBIT 3. THIS IS A COPY OF
22 YOUR C.V.

23 DO YOU SEE THAT?

24 A YES.

25 Q AND I SEE HERE IN YOUR EDUCATION THAT YOU
26 RECEIVED YOUR PH.D. AND MASTERS IN PUBLIC HEALTH IN
27 EPIDEMIOLOGY FROM UCLA.

28 DO YOU SEE THAT?

1 A YES.

2 Q BUT IT LOOKS LIKE BEFORE THAT YOU HAD AN
3 EARLIER CAREER IN MEDICINE AT THE MEDICAL SCHOOL
4 UNIVERSITY OF HAMBURG.

5 DO YOU SEE THAT?

6 A YES.

7 Q CAN YOU PLEASE DESCRIBE TO THE COURT WHAT THAT
8 BACKGROUND WAS?

9 A YEAH, ACTUALLY I HAVE A MEDICAL DEGREE, AN M.D.
10 FROM THE UNIVERSITY OF HAMBURG AND A PH.D. ACTUALLY ALSO
11 SO I BASICALLY HAVE TWO PH.D.'S IN MEDICAL SOCIOLOGY.

12 MY MEDICAL EDUCATION AT THE UNIVERSITY OF
13 HAMBURG WAS VERY BROAD, BUT I DID MY SPECIALTY IN
14 PSYCHIATRY SO I WAS A RESIDENT IN PSYCHIATRY AND I WAS A
15 RESEARCHER AND THEN A ASSISTANT PROFESSOR IN MEDICAL
16 SOCIOLOGY WHICH WAS AT THE TIME THE BRANCH WHERE WE WERE
17 STUDYING WORK-RELATED AND ENVIRONMENTAL EXPOSURES AND
18 THAT WAS PRIOR TO ME COMING TO UCLA TO GET A FORMAL
19 TRAINING IN EPIDEMIOLOGY.

20 AND BY THE WAY, THAT WAS FUNDED BY THE GERMAN
21 STATE WITH A FELLOWSHIP SPECIFICALLY TO GET PEOPLE
22 EDUCATED IN EPIDEMIOLOGY BECAUSE THAT BRANCH OF SCIENCE
23 AT THE TIME WAS NOT TAUGHT IN GERMANY.

24 Q LET ME GET THIS STRAIGHT. GERMANY PAID FOR
25 YOUR EPIDEMIOLOGICAL TRAINING AND CALIFORNIA GETS THE
26 BENEFIT; IS THAT RIGHT?

27 A YES. EXACTLY.

28 Q OKAY.

1 DOCTOR, ONE OF THE THINGS I WANT TO ASK YOU AND
2 I THINK THIS IS IMPORTANT FOR ANY EXPERT: WHY DID YOU
3 GET INTO EPIDEMIOLOGY? WHY GO FROM THIS CAREER IN
4 MEDICINE FOCUSING ON PSYCHIATRY AND START LOOKING AT THE
5 CAUSES OF DISEASES?

6 A YEAH, I WAS VERY FASCINATED BY THE CAUSE OF
7 DISEASE FROM THE VERY BEGINNING OF MY MEDICAL STUDIES;
8 IN FACT, I WOULD ALWAYS, YOU KNOW, I'M ONE OF THESE
9 PEOPLE WHO LIKES DETECTIVE STORIES AND I'D WANT TO KNOW
10 THE "WHO DONE IT" THAN ANYTHING ELSE. SO IN MEDICINE IT
11 REALLY INTERESTED ME WHO DONE IT. AND I REALIZED THAT A
12 LOT OF MEDICINE NEVER REALLY ASKED THAT QUESTION OR
13 ASKED THE QUESTION TOO LATE, MEANING, HAD I KNOWN WHO
14 DONE IT, I COULD HAVE PREVENTED THE OUTCOME.

15 OF COURSE THAT WOULD MAKE ME WITHOUT A JOB
16 BECAUSE I WOULDN'T TREAT PEOPLE ANYMORE, BUT HONESTLY, I
17 WOULD RATHER LOSE MY JOB BECAUSE OF THAT THAN SEE WHAT I
18 SAW IN A LOT OF FIELDS OF MEDICINE WHERE, YOU KNOW, THE
19 EFFECTS OF A LOT OF THINGS WERE JUST REALLY HORRIBLE,
20 ESPECIALLY NEUROLOGY AND PSYCHIATRY WHERE WE HAVE VERY
21 LITTLE TREATMENT OPPORTUNITIES. YOU BASICALLY ARE
22 WATCHING PEOPLE GET WORSE OR YOU ARE WATCHING PEOPLE
23 BEING TAKEN CARE OF, BUT YOU REALLY CAN'T HELP THEM.
24 IT'S NOT LIKE CANCER WHERE YOU CAN CUT SOMETHING OUT.

25 Q BECAUSE OF YOUR TRAINING AND BACKGROUND
26 SPECIFICALLY IN MEDICINE AS IT RELATES TO PSYCHIATRY AND
27 NEUROLOGICAL DISEASE, HAS THE STUDY OF THE CAUSE OF
28 THOSE DISEASES PLAYED A PRIMARY ROLE IN YOUR RESEARCH AS

1 AN EPIDEMIOLOGIST?

2 A ABSOLUTELY. I VERY EARLY AT UCLA FIGURED OUT
3 THAT ONE OR TWO OF THE MOST IMPORTANT THINGS IN
4 ENVIRONMENTAL EPIDEMIOLOGY AT UCLA FOR ME WAS TO STUDY
5 EXPOSURES THAT ARE VERY WIDESPREAD IN THE STATE OF
6 CALIFORNIA, AND THAT'S AIR POLLUTION AND PESTICIDE
7 EXPOSURES, SO I CONCENTRATED ON THOSE. AND
8 INTERESTINGLY THE PESTICIDE EXPOSURES ARE KNOWN
9 NEUROTOXINS AND ACTUALLY A LOT OF THEM HAVE METALS IN
10 THEM.

11 AND OF COURSE AIR POLLUTION, WE ARE CURRENTLY
12 DOING A STUDY SPECIFICALLY ON THE METAL COMPONENTS IN
13 AIR POLLUTION BECAUSE WE BELIEVE THAT THEY ARE POSSIBLY
14 THE MOST TOXIC.

15 AND WHEN YOU LOOK AT MY C.V., I ACTUALLY LED IN
16 2012 OF THE LARGEST STUDY IN THE U.S. STILL EXISTING, I
17 THINK, ON AUTISM AND AIR POLLUTION.

18 Q LET'S LOOK AT YOUR C.V.

19 SO WE HAVE HERE THE AREA RELATED TO RESEARCH,
20 AND LET'S LOOK AT PAGE 6.

21 SO HERE WE ARE.

22 IS THAT THE -- TELL ME WHEN YOU SEE THE ONE ON
23 -- IS THIS THE AIR -- THE ONE DOWN HERE?

24 A YEAH, DOWN THERE IS THE ONE WITH CALIFORNIA
25 DATA.

26 Q OKAY.

27 A THE ONE UP TOP IS ACTUALLY EVEN MORE
28 INTERESTING IN A WAY BECAUSE IT'S A LONGER RUNNING STUDY

1 IN DENMARK WHERE YOU HAVE UNBELIEVABLY GOOD
2 OPPORTUNITIES TO LINK DATA SETS AND THEY ALSO HAVE A
3 NATIONAL BIRTH COHORT AND I'VE DONE A LOT OF STUDIES IN
4 DENMARK BECAUSE THEY HAVE THIS WEALTH OF DATA AND THEY
5 ALSO HAVE A NATIONAL HEALTH SYSTEM SO YOU CAN ACTUALLY
6 GET DIAGNOSIS DONE REALLY WELL AND YOU CAN PICK OUT
7 DISEASES FROM THESE REGISTRIES QUITE WELL.

8 AND THE NATIONAL INSTITUTE OF ENVIRONMENTAL
9 HEALTH SCIENCES FUNDED ME TO DO THIS BIG STUDY IN
10 DENMARK.

11 Q NOW, DOCTOR, THERE'S BEEN SOME DISCUSSION
12 EARLIER TODAY ABOUT DIFFERENT PROGRAMS AT UCLA. I
13 BELIEVE THERE IS A SPECIFIC PROGRAM THAT LOOKS AT AUTISM
14 CALLED CART.

15 ARE YOU FAMILIAR WITH THAT PROGRAM?

16 A YES. ABSOLUTELY.

17 Q WHAT'S YOUR FAMILIARITY WITH THAT GROUP?

18 A WELL, IT'S A GROUP THAT SPECIALIZED ON -- IT'S
19 SITUATED WITHIN NEUROLOGY, AND BY THE WAY, I HAVE A
20 CO-APPOINTMENT OF COURSE IN NEUROLOGY AT UCLA, SO I KNOW
21 ALL THOSE COLLEAGUES. BUT IT IS CENTERED SPECIFICALLY
22 FOR THE TREATMENT AND STUDIES OF AUTISM. IT IS MORE
23 HEAVILY TREATMENT-ORIENTED THAN REALLY ETIOLOGIC
24 RESEARCH ORIENTED, BUT IT HAS BOTH COMPONENTS.

25 Q AND IF WE LOOK BACK AT YOUR C.V. HERE, I SEE
26 THAT -- I MEAN, IT'S A FAIRLY LONG C.V., IT'S 50 PAGES
27 LONG SO I WOULD ACTUALLY HAVE TO SPEND ALL DAY IN IT,
28 BUT I SEE RIGHT HERE THAT THERE WAS AN AUTISM

1 EPIDEMIOLOGY INVITED SPEAKER AT THE ANNUAL CART MEETING
2 AT UCLA IN 2014.

3 DO YOU SEE THAT?

4 A YES.

5 Q SO CAN YOU PLEASE -- SO WOULD IT BE FAIR TO
6 SAY, THEN, THAT THIS PROGRAM ACTUALLY INVITED YOU TO
7 COME AND PRESENT ON AUTISM AND EPIDEMIOLOGY TO THEIR
8 PROGRAM?

9 A YES. THEY HAVE A REGULAR SPEAKER SERIES THAT I
10 ALSO ATTEND WHENEVER I CAN, AND IN 2014 THEY RECOGNIZED
11 ME AS ONE OF THE EPIDEMIOLOGISTS IN AUTISM AND
12 ENVIRONMENT AND I GAVE THAT INVITED SPEECH.

13 Q WERE YOU INVITED BY DR. GESCHWIND?

14 A YES.

15 Q OKAY. ALL RIGHT.

16 ON PAGE 49 OF YOUR C.V. THERE IS -- LET ME GO
17 TO IT -- THERE IS A BUNCH OF LETTERS AND OTHER
18 PUBLICATIONS.

19 DO YOU SEE THAT?

20 A YES.

21 Q AND DOWN HERE AT THE BOTTOM, THERE'S A
22 PUBLICATION NUMBER 10 AND IT APPEARS TO BE PROJECT
23 TENDR, "TARGETING ENVIRONMENTAL NEURODEVELOPMENTAL RISKS
24 AND THE TENDR CONSENSUS STATEMENT."

25 DO YOU SEE THAT?

26 A YES, I SEE THAT.

27 Q WHAT IS TENDR, DOCTOR?

28 A WELL, IT'S A GROUP OF SCIENTISTS, I BELIEVE WE

1 ARE BETWEEN 60 AND A HUNDRED DEPENDING ON WHEN YOU
2 COUNT, WHO HAVE COME TOGETHER, WE'RE ALL FUNDED BY THE
3 NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES,
4 ACTUALLY THE FORMER DIRECTOR DR. BONBAUM IS ONE OF THE
5 CO-AUTHORS OF THIS STATEMENT. WE COME TOGETHER ON A
6 REGULAR BASIS WITH SOME FUNDING FROM FOUNDATIONS IN
7 ORDER TO DISCUSS WHAT WE KNOW ABOUT THE SCIENCE IN
8 NEURODEVELOPMENT, ESPECIALLY THE SCIENCE WHERE WE HAVE
9 -- WHERE WE CAN ENCOURAGE PREVENTATIVE ACTION WHICH ARE
10 ENVIRONMENTAL FACTORS AND, YOU KNOW, OCCUPATIONAL RISK
11 FACTORS, BEHAVIORAL RISK FACTORS, AND WE EVALUATE THE
12 SCIENCE AND THEN COME UP WITH A CONSENSUS STATEMENT THAT
13 WE PUBLISH IN A PEER-REVIEWED JOURNAL, IN THIS CASE THIS
14 ONE WAS PUBLISHED IN ENVIRONMENTAL HEALTH PERSPECTIVES,
15 WHICH IS THE OFFICIAL JOURNAL PUBLISHED BY THE NATIONAL
16 INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES.

17 Q NOW, JUST FOR THOSE OF US WHO AREN'T FAMILIAR
18 WITH THE VARIOUS ALPHABET SOUP OF AGENCIES, WHAT IS THE
19 NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH, NIEH?

20 A NIEHS IS THE NATIONAL INSTITUTE OF
21 ENVIRONMENTAL HEALTH SCIENCES AND IT IS SPECIFICALLY
22 TASKS JUST LIKE I AM IN THE COEH AT UCLA IN THAT CENTER
23 TO INVESTIGATE ENVIRONMENTAL CAUSES OF DISEASE, AND
24 ENVIRONMENT IN THIS CASE REALLY EXCLUDES BEHAVIORS LIKE
25 SMOKING BUT INCLUDES EVERYTHING ELSE THAT WE CAN CALL
26 ENVIRONMENTAL.

27 Q NOW, I WANT TO TAKE A LOOK AT THAT VERY
28 DOCUMENT THAT'S LISTED RIGHT HERE.

1 YOU SEE THAT WAS PUBLISHED IN 2016?

2 A YES.

3 Q WOULD YOU RECOGNIZE A COPY OF THAT DOCUMENT IF
4 YOU SAW IT TODAY?

5 A YES.

6 Q ALL RIGHT. I'M SHOWING YOU WHAT HAS BEEN
7 MARKED AS EXHIBIT 32 IN THE RECORD.

8 DOCTOR, DO YOU RECOGNIZE THIS DOCUMENT?

9 A YES.

10 Q IS THIS THAT CONSENSUS STATEMENT THAT WE WERE
11 JUST DISCUSSING?

12 A YES, IT IS.

13 Q ALL RIGHT. NOW, IF WE GO DOWN TO THE BOTTOM
14 THE BACK OF IT THERE IS A LIST OF VARIOUS AUTHORS.

15 DO YOU SEE THAT?

16 A YES.

17 Q YOU HAVE A GROUP OF SCIENTISTS; RIGHT?

18 A YES.

19 Q AND YOU HAVE SCIENTISTS FROM ALL OVER. YOU
20 HAVE UC DAVIS, HARVARD, NIEHS, BERKELEY, CINCINNATI
21 COLLEGE OF MEDICINE, UNIVERSITY OF ROCHESTER MEDICAL
22 SCHOOL.

23 DO YOU SEE ALL THAT?

24 A YES.

25 Q AND THEN THIS SORT OF BROAD GROUP OF SCIENTISTS
26 ALL COMING TOGETHER AS PART OF THIS TENDR GROUP, IS THAT
27 SOMETHING THAT YOU FREQUENTLY SEE IN THE AREA OF
28 ENVIRONMENTAL EPIDEMIOLOGY?

1 A IT'S ACTUALLY RATHER UNUSUAL. AND WHAT IS EVEN
2 MORE UNUSUAL IS THAT IT'S DIFFERENT DISCIPLINES ACTUALLY
3 TALKING TO EACH OTHER, SO EPIDEMIOLOGISTS AND YOU SEE A
4 FEW PEOPLE HERE WHO HAVE THE TITLE TOXICOLOGY AND
5 NEUROSCIENCE, AND THAT IS REALLY THE UNUSUAL PART, BUT
6 SOMETHING THAT THE NATIONAL INSTITUTE OF ENVIRONMENTAL
7 HEALTH SCIENCES HAS BEEN FOSTERING OVER THE LAST DECADE
8 THAT WE ACTUALLY TALK TO BASIC SCIENTISTS WHO DO ANIMAL
9 STUDIES, TOXICOLOGY STUDIES, AND WE GO ALL THE WAY FROM
10 HUMAN RESEARCH TO CELL MODELS.

11 AND EVEN MORE IMPORTANT WE ALSO HAVE HEALTH
12 PROFESSIONALS AND PROVIDERS, AND YOU'RE POINTING THAT
13 OUT RIGHT HERE, SO WE HAVE ACTUALLY REPRESENTATIVES OF
14 THE CLINICAL SCIENCES WHO CARE ABOUT CHILDREN'S HEALTH
15 IN THIS CASE, ESPECIALLY CHILDREN'S NEURODEVELOPMENTAL
16 HEALTH.

17 Q NOW, OBVIOUSLY YOU ARE ONE THE SIGNATORIES ON
18 THIS.

19 DO YOU SEE THAT?

20 A YES.

21 Q OKAY. AND IF WE GO DOWN TO THE NEXT PAGE,
22 MORE SCIENTISTS, AND THEN THERE'S A GROUP OF CHILDREN'S
23 HEALTH AND DISABILITY ADVOCATES.

24 DO YOU SEE THAT?

25 A YES.

26 Q AND THAT'S THE THIRD GROUP OF INTERESTING
27 INDIVIDUALS WHO PARTICIPATE IN THIS WHO KEEP US HONEST
28 AND ON TARGET IN TERMS OF REALLY CARING ABOUT WHAT'S

1 HAPPENING TO THE AFFECTED POPULATION AND THEY ARE REALLY
2 ADVOCATES FOR THE FAMILIES AND FOR, YEAH, THE
3 COMMUNITIES.

4 Q THAT'S WHAT I WAS GOING TO GET AT.

5 THESE ARE GROUPS THAT REPRESENT THE AUTISM
6 COMMUNITY.

7 IS THAT FAIR?

8 A THAT'S CORRECT. NOT JUST AUTISM, BUT, YOU
9 KNOW, GENERAL NEURODEVELOPMENT AND HEALTH OF CHILDREN,
10 HEALTHY DEVELOPMENT OF THE BRAIN, BASICALLY.

11 Q AND THEN DOWN HERE THERE'S A SECTION THAT SAYS,
12 "ORGANIZATIONS THAT ENDORSE OR SUPPORT THE TENDR
13 CONSENSUS STATEMENT."

14 DO YOU SEE THAT?

15 A YES.

16 Q AND THERE'S BEEN SOME DISCUSSION ABOUT THIS
17 INSTITUTION. THERE'S THE AMERICAN COLLEGE OF
18 OBSTETRICIANS AND GYNECOLOGISTS.

19 DO YOU SEE THAT?

20 A YES. ACOG.

21 Q YEAH.

22 AND DID YOU SEE THAT THEY SPECIFICALLY HAVE
23 SUPPORT THE USE OF THIS DOCUMENT AS AN EDUCATIONAL TOOL?
24 DO YOU SEE THAT?

25 A YES. AND THAT'S ACTUALLY HOW SOME OF THESE
26 DOCUMENTS ARE SPECIFICALLY MEANT TO BE USED.

27 Q CAN YOU EXPLAIN?

28 A SO WHAT WE ARE DOING AS SCIENTISTS IS OFTEN WE

1 SIT IN OUR SO-CALLED IVORY TOWER, WE DO OUR RESEARCH, WE
2 COMMUNICATE THAT TO OUR COLLEAGUES, BUT WE ARE NOT
3 COMMUNICATING IT MORE BROADLY TO THE PUBLIC OR TO
4 STAKEHOLDERS. AND IN THIS CASE STAKEHOLDERS COULD BE,
5 FOR EXAMPLE, COLLEAGUES WHO WORK WITH FAMILIES AND WORK
6 WITH WOMEN AND CHILDREN AND WHO NEED TO FIND OUT MORE
7 ABOUT THE CAUSES OF CERTAIN DISEASES AND THE WAY HOW WE
8 CAN PREVENT THEM AND WHO ALSO CAN THEN EDUCATE THOSE
9 AFFECTED ABOUT, YOU KNOW, POSSIBLE PREVENTIVE MEASURES
10 OR POSSIBLE ACTIONS THEY COULD BE TAKING.

11 Q SO IF WE GO UP TO THE TOP OF THE PAPER, THIS IS
12 ON THE FIRST PAGE, AND WE LOOK AT THE PARAGRAPH DOWN
13 HERE AT THE BOTTOM.

14 A YES.

15 Q THERE'S A SECTION THAT READS, "PRIME EXAMPLES
16 OF NEURODEVELOPMENTALLY TOXIC CHEMICALS."

17 A RIGHT.

18 Q AND IT GOES ON TO SAY, "THE FOLLOWING LIST
19 PROVIDES PRIME EXAMPLES OF TOXIC CHEMICALS THAT
20 CAN CONTRIBUTE TO LEARNING BEHAVIORAL OR
21 INTELLECTUAL IMPAIRMENT AS WELL AS THE SPECIFIC
22 NEURODEVELOPMENTAL DISORDERS SUCH AS ADHD OR
23 AUTISM SPECTRUM DISORDER."
24 DO YOU SEE THAT?

25 A YES.

26 Q NOW, WE SEE DOWN HERE SOME STUFF THAT YOU KIND
27 OF MENTIONED ALREADY. WE'VE GOT PESTICIDES. WE HAVE
28 AIR POLLUTION. FLAME RETARDANTS.

1 DO YOU SEE THAT?

2 A YES.

3 Q AND THEN --

4 A ACTUALLY MY STUDY IS ONE OF THOSE.

5 Q THAT'S RIGHT. THAT'S RIGHT.

6 AND THEN IF WE LOOK ON THE NEXT PAGE, THEY
7 SPECIFICALLY MENTION LEAD AND MERCURY.

8 DO YOU SEE THAT?

9 A YES.

10 Q AND SOME OF THESE PEOPLE THAT ARE HIGHLIGHTED
11 HERE LIKE, FOR EXAMPLE, DR. LAMPIER, THESE ARE PEOPLE
12 WHO ARE ACTUALLY PART OF TENDR; CORRECT?

13 A THAT'S CORRECT. AS WELL AS DR. KARGAR WHO IS
14 UNDER MERCURY.

15 Q OH, YES. THANK YOU.

16 AND SO I MEAN, TO BE CLEAR, DOCTOR, THIS
17 DOCUMENT THAT YOU SIGNED AND APPARENTLY OTHER PEOPLE DID
18 AS WELL, THIS WAS ISSUED BEFORE YOU WERE INVOLVED IN
19 THIS LITIGATION; IS THAT RIGHT?

20 A YES, IN 2016.

21 Q OKAY.

22 SO, I MEAN, I GUESS ONE OF THE THINGS THAT I'M
23 TRYING TO GET AT IS THERE'S BEEN SOME DISCUSSION, SOME
24 FIGHTING REALLY, ABOUT WHETHER OR NOT THERE IS AN AUTISM
25 COMMUNITY AND WHETHER OR NOT HEAVY METALS HAS A
26 POTENTIAL ETIOLOGICAL FACTOR AND WHETHER THAT IS
27 ACCEPTED OR NOT.

28 FROM YOUR PERSPECTIVE WHO WORKS SPECIFICALLY IN

1 ENVIRONMENTAL EPIDEMIOLOGY, SPECIFICALLY IN
2 NEURODEVELOPMENTAL DISABILITY ISSUES AND SPECIFICALLY IN
3 EPIDEMIOLOGY, WHAT IS YOUR VIEW ABOUT WHETHER OR NOT THE
4 RELATIONSHIP BETWEEN HEAVY METALS AND ASD AND ADHD IS
5 SOMETHING THAT IS GENERALLY ACCEPTED?

6 A IT'S ABSOLUTELY ACCEPTED AND THAT'S WHAT THIS
7 TENDR STATEMENT IS ALL ABOUT.

8 IN FACT, WHEN WE CAME TOGETHER TO WRITE THIS
9 STATEMENT, WE ALL THOUGHT, OH, WE HAVE TO GO AFTER THE
10 NEXT REALLY IMPORTANT EXCITING NEUROTOXIN, AND REALLY
11 THE METALS ARE AN OLD HAT, WE KNOW SO MUCH ABOUT THEM,
12 RIGHT, IT WAS ALMOST LIKE UNDER, OKAY, YES, OF COURSE
13 METALS, BUT WE ALREADY KNOW THIS, NOW LET'S MOVE ON TO
14 THIS EXCITING NEW PESTICIDE.

15 Q ALL RIGHT. WELL, LET'S GO BACK TO YOUR
16 AUTOBAHN.

17 WE'VE COVERED YOUR QUALIFICATIONS AND
18 EXPERIENCE I THINK PRETTY WELL.

19 LET'S GET INTO SOME EPI 101 ISSUES.

20 I UNDERSTAND WE'VE PREPARED A DEMONSTRATIVE TO
21 SORT OF HELP WALK THROUGH SOME OF THESE CONCEPTS.

22 THIS IS EXHIBIT 140.

23 DO YOU SEE THE SCREEN IN FRONT OF YOU, DOCTOR?

24 A YES.

25 Q ALL RIGHT. NOW, WE DON'T NEED TO SPEND TOO
26 MUCH TIME ON THIS. I'M SURE THE COURT IS FAMILIAR
27 GENERALLY WITH SOME OF THESE STUDIES.

28 BUT THERE WERE SOME THINGS SAID ABOUT THE

1 HIERARCHY OF STUDIES DURING THE OPENING STATEMENTS, AND
2 I KIND OF WANT TO EXPLORE THAT WITH YOU SINCE THIS IS
3 LITERALLY WHAT YOU TEACH.

4 SO, FIRST OF ALL, WITH IS A COHORT STUDY?

5 A WELL, A COHORT STUDY IS A STUDY OF HUMANS IN
6 WHOM I ASSESS EXPOSURE RIGHT AT THE ONSET AT BASELINE,
7 AND THEN I FOLLOW PEOPLE, I CATEGORIZE THEM ACCORDING TO
8 EXPOSED/UNEXPOSED OR I HAVE A MEASURE OF THE LEVEL OF
9 EXPOSURE, AND THEN I FOLLOW THEM FOR THE OUTCOME OF
10 INTEREST.

11 SO IF IT'S CANCER, I ASSESS THEM FOR CANCER.
12 IF IT'S AUTISM, IT MIGHT BE A FIRST COHORT AND I FOLLOW
13 THAT UP FOR AUTISTIC -- THE AUTISM DIAGNOSIS LATER ON.

14 Q DOCTOR -- OH.

15 A BUT WHAT IS -- YEAH, WHAT IS IMPORTANT IS THAT
16 I ASSESS MY EXPOSURES RIGHT AT THE OUTSET.

17 Q WHY? WHY IS THAT IMPORTANT?

18 A BECAUSE THAT ESTABLISHES TEMPORALITY VERY
19 CLEARLY AND SO WE HAVE -- WE DON'T HAVE TO USE ANY --
20 ANY OTHER TYPES OF MEASURES REALLY BECAUSE, YOU KNOW,
21 EVERYTHING WE MEASURE IN TERMS OF EXPOSURE THEN AT THE
22 BEGINNING IS DEFINITELY PRIOR TO THE ONSET OF THE
23 DISEASE BECAUSE I'M MEASURING IT BEFORE THE DISEASE EVEN
24 OCCURRED.

25 HOWEVER, THERE ARE PROBLEMS WITH THIS IF THE
26 EXPOSURE IS ACTUALLY A CUMULATIVE EXPOSURE, THEN I HAVE
27 TO KEEP MEASURING.

28 SO ONE SINGLE MEASURE AT BASELINE IN A COHORT

1 MAY OR MAY NOT BE SUFFICIENT AND MAY NOT TELL ME THE
2 WHOLE STORY.

3 Q NOW, LET'S SAY, FOR EXAMPLE, YOU TAKE A
4 MEASUREMENT HERE AT THE ONSET OF THE STUDY. I'LL MARK
5 THIS WITH SOME RED LINES.

6 DO YOU SEE THAT?

7 A YES.

8 Q OKAY.

9 AND THERE YOU HAVE A MEASURE OF WHO WAS EXPOSED
10 TO, LET'S SAY, LEAD AND WHO ISN'T, OKAY.

11 A (INDICATING).

12 Q AND THEN, LET'S SAY, AS YOU MOVE ALONG, THERE
13 IS EXPOSURES, YOU KNOW, LATER ON AT DIFFERENT POINTS,
14 MAYBE THROUGH FOOD OR THE ENVIRONMENT OR WHATEVER; OKAY?

15 A YES.

16 Q IF YOU DON'T CAPTURE THOSE EXPOSURES, WHAT
17 HAPPENS TO YOUR DATA ON THE END?

18 A SO THIS IS A QUESTION OF ADEQUATE EXPOSURE
19 ASSESSMENT, AND IF I DON'T BELIEVE THAT THE ONLY
20 EXPOSURE OF INTEREST FOR THE OUTCOME IS THE ONE THAT I
21 MEASURE AT BASELINE, IF, IN FACT, THERE ARE DIFFERENT
22 SENSITIVE PERIODS DURING WHICH THE EXPOSURE IS
23 PARTICULARLY IMPORTANT, I MAY ACTUALLY, IF I DON'T
24 CONTINUE TO MEASURE THE EXPOSURES THROUGHOUT THE FOLLOW
25 UP UNTIL THE DIAGNOSIS HAPPENED, THEN I MAY ACTUALLY
26 HAVE MISSED THE MOST IMPORTANT EXPOSURES.

27 Q OKAY. WELL, COHORT STUDY. SO IF YOU'RE GOING
28 TO LOOK AT PEOPLE AND FOLLOW THEM FOR A LONG TIME, YOU

1 HAVE TO HAVE A REALLY BIG GROUP OF PEOPLE TO STUDY A
2 RARE DISEASE.

3 A ABSOLUTELY. THAT'S WHY IT'S ACTUALLY QUITE
4 RARE TO SEE THESE KIND OF STUDY FOR RARE DISEASES, AND
5 AUTISM IS CERTAINLY A RARE DISEASE, LUCKILY.

6 Q ALL RIGHT. WELL, LET'S LOOK AT CASE CONTROL
7 STUDIES.

8 WHAT ARE THOSE?

9 A WELL, IN THIS CASE WE'RE ACTUALLY STARTING WITH
10 CASES. SO THIS IS MORE OR LESS THE MORE EFFICIENT WAY
11 OF DOING THE SAME KIND OF RESEARCH THAT WE'RE DOING WHEN
12 WE DO A COHORT STUDY, BUT YOU'RE STARTING WITH PEOPLE
13 WHO ARE ALREADY DIAGNOSED. AND WHY IS THAT MORE
14 EFFICIENT? BECAUSE YOU CAN GO TO A CLINIC OR YOU CAN GO
15 TO SOME REGISTRY OR SOME WAY OF FINDING CASES AND THEY
16 HAVE ALREADY DIAGNOSED THE CASES FOR YOU, THEY HAVE
17 FOUND THE CASES FOR YOU, AND NOW YOU HAVE TO KIND OF GO
18 BACK IN TIME, YOU WALK YOUR WAY BACKWARDS AND YOU SAY AT
19 WHAT POINT IN THE LIFE SPAN OF THESE INDIVIDUALS DID
20 EXPOSURES OCCUR?

21 AND YOU MAY HAVE RECORDS THAT TELL YOU ABOUT
22 THIS AND THAT'S VERY GOOD. OR YOU MAY HAVE BLOOD
23 SAMPLES THAT ARE STORED SOMEWHERE THAT SOMEBODY USED.

24 AND YOU DO THE SAME THING FOR WHAT WE CALL THE
25 CONTROL SUBJECTS, WHO ARE BASICALLY A SAMPLE OF PEOPLE
26 WHO DON'T HAVE THE DIAGNOSIS, BUT OTHERWISE, IF THEY HAD
27 GOTTEN THE DIAGNOSIS, WOULD HAVE ALSO BEEN PICKED UP IN
28 THE SAME SYSTEM THAT GAVE YOU THE CASES.

1 AND THEN YOU WALK BACK IN TIME WITH THE
2 CONTROLS IN THE SAME WAY. YOU FIND THE SAME RECORDS FOR
3 THEM, AND YOU BASICALLY DETERMINE THE EXPOSURE
4 DISTRIBUTION IN THE CONTROLS AS KIND OF THE REFERENCE
5 SET BECAUSE THE CONTROLS NEVER GOT DIAGNOSED, MEANING,
6 WHATEVER THEIR EXPOSURES WERE DID NOT HARM THEM, AND NOW
7 YOU'RE COMPARING THIS REFERENCE EXPOSURE TO THE EXPOSURE
8 IN THE CASES, AND YOU THEN DETERMINE WHETHER THE
9 EXPOSURE IN THE CASES WAS HIGHER OR LOWER.

10 Q NOW, DOCTOR, IS IT ALWAYS THE CASE THAT A
11 COHORT STUDY IS BETTER THAN A CASE CONTROL STUDY?

12 A ABSOLUTELY NOT.

13 I KNOW THAT PEOPLE WHO ARE NOT EDUCATED AS
14 EPIDEMIOLOGISTS EVEN ENVIRONMENTAL HEALTH SCIENTISTS AND
15 PHYSICIANS WHO ARE VERY SMART PEOPLE OFTEN HAVE SAID
16 THIS STORY THAT, YOU KNOW, COHORT STUDIES ARE THE BEST
17 OBSERVATIONAL, COHORT STUDIES ARE THE BEST STUDIES
18 DESIGNED IN EPI AND THEN, YOU KNOW, DOWNGRADING YOU'RE
19 GOING TO CASE CONTROL STUDIES, CROSS SECTIONAL STUDIES,
20 TIME SERIES, ET CETERA; ACTUALLY I USE A SLIDE IN MY
21 TEACHING WHERE I SHOW A PICTURE LIKE THAT OF THIS, YOU
22 KNOW, FUNNEL KIND OF AND --

23 Q A PYRAMID.

24 A YEAH. AND THEN I EXPLAIN TO MY STUDENTS WHY
25 THAT IS THE WRONG WAY OF THINKING ABOUT STUDY DESIGN
26 BECAUSE STUDY DESIGNS HAVE ADVANTAGES AND DISADVANTAGES.

27 AND, FOR EXAMPLE, IN A CASE CONTROL STUDY, I
28 CAN GET BETTER DATA THAN IN A COHORT STUDY BECAUSE I CAN

1 SPEND MORE EFFORT AND MORE MONEY ON MUCH SMALLER GROUPS
2 OF PEOPLE. IT'S A MUCH MORE EFFICIENT STUDY DESIGN THAN
3 A COHORT STUDY.

4 IF YOU IMAGINE THAT I HAVE TO COLLECT DATA FROM
5 A HUNDRED THOUSAND PEOPLE AND NOT ONLY COLLECT DATA AT
6 BASELINE, BUT I THEN HAVE TO FOLLOW THEM OVER MANY,
7 MANY, MANY YEARS, THAT'S REALLY EXPENSIVE, SO ALL I
8 MIGHT BE ABLE TO AFFORD IS A QUESTIONNAIRE THAT PEOPLE
9 FILL OUT BY THEMSELVES.

10 IN A CASE CONTROL STUDY, I CAN SIT DOWN WITH
11 THESE PEOPLE, I CAN TAKE BLOOD SAMPLES, I CAN TAKE A LOT
12 OF TIME RECONSTRUCTING EXPOSURE HISTORIES. I CAN ASK
13 THEM ABOUT RECORDS THAT EXIST. I CAN GO BACK TO RECORD
14 SYSTEMS. I CAN MAKE A LOT MORE EFFORT TO ACTUALLY
15 CHARACTERIZE EXPOSURES IN A MUCH BETTER WAY.

16 SIMILARLY, THESE CASES WERE ALREADY DIAGNOSED.
17 THEY USUALLY COME FROM VERY CREDIBLE SOURCES. THEY COME
18 FROM MEDICAL CENTERS. THEY COME FROM REGISTRIES THAT
19 ARE CERTIFIED. SO THERE'S A LOT OF EFFORT THAT WENT
20 INTO CASE ASCERTAINMENT AND CASE DIAGNOSING AND GETTING
21 IT RIGHT.

22 AND IN A COHORT STUDY WHERE YOU HAVE TO LIKE
23 FOLLOW UP OVER AND OVER AGAIN, YOU REALLY NEED TO SET UP
24 THIS KIND OF DIAGNOSTIC SYSTEM ON YOUR OWN AND MAKE SURE
25 THAT EVERY COHORT MEMBER IS SUBJECTED TO IT, AND THAT
26 MAY NOT BE POSSIBLE SO YOU NEED TO USE LESS VALID OR
27 LESS SENSITIVE MEASURES THAN WHAT YOU GET IN A CASE
28 CONTROL STUDY.

1 Q WOULD IT BE FAIR TO SAY THAT SOMETIMES CASE
2 CONTROL STUDIES ARE BETTER AND SOMETIMES COHORT STUDIES
3 ARE BETTER, IT JUST DEPENDS?

4 A ABSOLUTELY. AND WHAT I USUALLY TEACH MY
5 STUDENTS IS THAT WE WANT -- IDEALLY, WE WANT BOTH TYPES
6 OF STUDY AND WE WANT TO SEE WHETHER THEY AGREE AND HOW
7 THEY AGREE AND, YOU KNOW, EVALUATE FOR WHAT THEY ARE.

8 Q NOW, DOCTOR, HOW LONG HAVE YOU BEEN TEACHING
9 YOUR EPIDEMIOLOGY PH.D. STUDENTS AT UCLA THE FALLACY OF
10 THIS HIERARCHY? HOW LONG HAVE YOU BEEN DOING THAT FOR?

11 A WELL, I'VE BEEN TEACHING SINCE 1995, AND I
12 THINK THIS HIERARCHY I'VE BEEN TEACHING FOR THE LAST 20
13 YEARS BECAUSE THERE WAS ONE PAPER THAT REALLY EXPLAINED
14 THIS VERY NICELY AND I THOUGHT IT WAS A GREAT EXAMPLE.

15 Q NOW, REGARDING THE APPROACH YOU TOOK IN THIS
16 CASE, DID YOU APPLY THAT SAME INTELLECTUAL RIGOR,
17 LOOKING AT EACH STUDY ON ITS OWN MERITS AND NOT JUST
18 CATEGORIZING THEM ON A HIERARCHY?

19 A ABSOLUTELY. I MEAN, THAT'S WHAT WE
20 EPIDEMIOLOGISTS ARE REALLY TAUGHT. WE ARE TAUGHT TO BE
21 EXTREMELY CRITICAL. WE ARE TAUGHT TO FIND THE FAULT IN
22 EVERYTHING AND WE ARE BARELY EVER TAUGHT TO SEE THE
23 POSITIVE BECAUSE WE ARE ALWAYS DOUBTING FIRST AND IT
24 NEEDS A LOT OF DATA TO OVERCOME THAT.

25 Q NOW, SINCE WE'RE SITTING HERE ON A CASE
26 CONTROL, I JUST WANT TO ASK ABOUT THE NATURE OF THESE
27 STUDIES.

28 LET'S SAY, FOR EXAMPLE, THERE IS WE'LL SAY,

1 WE'LL CALL THEM GENES; OKAY?

2 A OKAY.

3 Q AND LET'S SAY GENES CAN CAUSE WHETHER OR NOT
4 SOMEONE DEVELOPS A DISEASE OR DOES NOT DEVELOP A
5 DISEASE.

6 DOES THAT CONSIDERATION BOTHER YOU IN THE
7 CONTEXT OF THIS STUDY?

8 A ABSOLUTELY NOT.

9 Q WHY?

10 A WELL, BECAUSE IN THE END GENES ARE ALL
11 BLUEPRINTS AND GENES ARE THERE TO, YOU KNOW, GENERATE
12 THE ORGANISMS WE ARE AND PROGRAMMING US FOR THE
13 ENVIRONMENT THAT WE ARE ENCOUNTERING, SO OUR GENETICS IS
14 BASICALLY WHAT SETS US UP TO ENCOUNTER WHAT WE LIVE
15 THROUGH IN EVERY SENSE.

16 SO WE COULD BE GENETICALLY SUSCEPTIBLE TO
17 CERTAIN TYPES OF EXPOSURES OR WE MAY HAVE A LOT OF
18 GENETIC RESILIENCE TO OTHER TYPES OF EXPOSURES, AND IN
19 FACT, THAT'S CALLED THE STUDY OF GENE ENVIRONMENT
20 INTERACTION THAT I'VE BEEN ENGAGING IN FOR THE LAST 20
21 YEARS TRYING TO EXACTLY LOOK AT, YOU KNOW, HOW DO THESE
22 TWO COMPONENTS COME TOGETHER BECAUSE WE ALL KNOW NOT
23 EVERYBODY WHO SMOKES GETS LUNG CANCER, RIGHT.

24 Q RIGHT.

25 A THERE'S A LARGE SUB GROUP OF HEAVY SMOKERS WHO
26 DO, BUT IT'S 10 PERCENT OF ALL HEAVY SMOKERS.

27 Q YEAH, THOSE ARE ALWAYS THE PEOPLE THAT, YOU
28 KNOW, SMOKERS TELL YOU, WELL, MY GRANDFATHER SMOKED FOR

1 40 YEARS AND WAS PERFECTLY HEALTHY, RIGHT?

2 A EXACTLY.

3 Q ALL RIGHT. SO I DON'T WANT TO GO THROUGH ALL
4 THESE OTHER STUDY DESIGNS. WE DON'T REALLY HAVE TIME
5 FOR THAT. AND IF WE NEED TO GET INTO IT, WE WILL. BUT
6 I DO WANT TO TALK BRIEFLY ABOUT HOW TO INTERPRET
7 STATISTICAL SIGNIFICANCE AND WHAT DO YOU EVERY AS AN
8 EPIDEMIOLOGIST.

9 SO WHAT ARE WE LOOKING AT HERE?

10 A WELL, WE'RE LOOKING AT A GRAPH WITH A STUDY
11 RESULT THAT WE CALL A SUMMARY ESTIMATE. WE WOULD CALL
12 -- SO THAT SUMMARY ESTIMATE IS THE DOT IN THE MIDDLE.

13 AND BASICALLY THAT ESTIMATE TELLS YOU SOMETHING
14 ABOUT WHAT THE DISEASE RISK IN THE EXPOSED IS COMPARED
15 TO THE UNEXPOSED AND THAT WOULD BE A RISK RATIO. THE
16 RISK IN THE EXPOSED OVER THE RISK IN THE UNEXPOSED. OR
17 THE DISEASE RATE IN THE EXPOSED OVER THE DISEASE RATE IN
18 THE UNEXPOSED.

19 AND SINCE THAT'S A RATIO MEASURE, IF IT'S ABOVE
20 ONE, IT MEANS THAT THE RISK OF DISEASE IS HIGHER IN
21 THOSE EXPOSED THAN UNEXPOSED, AND IF IT'S BELOW ONE, IT
22 WOULD BE LOWER.

23 SO THAT'S ALL OUR CENTRAL ESTIMATE HERE, OUR
24 SUMMARY ESTIMATE IN THE MIDDLE OF THE DOT.

25 AND THEN WE HAVE THESE LINES, THESE WHISKERS
26 GOING OUT THERE, AND THAT'S WHAT WE USUALLY -- I DON'T
27 KNOW WHAT YOU USED HERE, BUT THE CONVENTION IS THAT IT'S
28 A 95 PERCENT CONFIDENCE INTERVAL, AND AT THE END OF IT

1 YOU FIND THE CONFIDENCE LIMITS. IN THIS CASE IT WOULD
2 BE SOMETHING LIKE 1.423 AND YOUR CENTRAL ESTIMATE WOULD
3 BE 2.

4 SO THIS STUDY WOULD TELL ME THAT WHATEVER THE
5 EXPOSURE WAS THERE'S PROBABLY A TWO-FOLD INCREASED RISK
6 IN THE EXPOSED OVER THE UNEXPOSED WITH A 95 PERCENT
7 CONFIDENCE INTERVAL OF 1.423 EXCLUDING THE 1 WHICH IS
8 THE NULL VALUE BECAUSE IF THIS RATIO, THE NUMBER ON TOP
9 AND THE BOTTOM IS THE SAME, THEN THE RATIO MEASURE IS 1.

10 Q NOW, DOCTOR, WHEN YOU SAY THE STATISTICAL
11 SIGNIFICANCE, WHAT DOES THAT ACTUALLY MEAN?

12 A THAT MEANS THAT THE 95 PERCENT CONFIDENCE
13 INTERVAL ACTUALLY EXCLUDES THAT NULL VALUE THAT I SET
14 WHICH IS THE 1, AND THAT IF I WERE TO DO THIS KIND OF
15 STUDY AGAIN, THIS EXPERIMENT AGAIN, THAT A HUNDRED MORE
16 OR 99 MORE TIMES, THEN IN 95 PERCENT OF THE --
17 95 PERCENT OF THE RESULTS WOULD BE WITHIN THAT FRAMEWORK
18 OF 1.423, WOULD LEND MY ESTIMATE IN THAT RANGE.

19 Q NOW, WHAT IF YOU HAVE ANOTHER RESULT THAT LIKE
20 WE HAVE HERE, SAME POINT ESTIMATE, BUT THE CONFIDENCE
21 INTERVAL JUST PASSES NULL? IS THAT CONSIDERED A
22 STATISTICALLY SIGNIFICANT RESULT?

23 A NO, THIS -- ACCORDING TO THE P VALUE OF LESS
24 THAN .05 OR THE 95 PERCENT CONFIDENCE INTERVAL, IN THIS
25 CASE STATISTICIANS AND EPIDEMIOLOGISTS WOULD AGREE THAT
26 YOU CALL THIS STUDY NOT STATISTICALLY SIGNIFICANT.

27 YOU CAN SEE THAT THE POINT ESTIMATES ARE
28 EXACTLY THE SAME. THEY TELL YOU EXACTLY THE SAME STORY

1 THAT, YOU KNOW, THE EXPOSURE INCREASED THE RISK OF
2 TWO-FOLD BECAUSE THAT'S THE DISEASE RISK IN THE EXPOSED
3 OVER THE UNEXPOSED, BUT THESE WHISKERS ARE WIDER. WHY
4 ARE THEY WIDER? VERY SIMPLY THE STUDY MAY HAVE BEEN
5 SLIGHTLY SMALLER.

6 SO THE STUDY OF NUMBER 1 MAY HAVE ENROLLED
7 200 CASES IN CONTROLS AND THE STUDY NUMBER 2 100 CASES
8 AND CONTROLS AND I'M GETTING THESE WIDER CONFIDENCE
9 INTERVAL LIMITS BECAUSE I DON'T HAVE ENOUGH INFORMATION
10 TO EXCLUDE THE SMALL CHANCE THAT 2 ISN'T 2, THAT IT'S
11 TRULY SOMEWHERE CLOSER TO 1.

12 Q AND THE FACT THAT THIS CROSS THAT BLUE LINE
13 RIGHT THERE, DOES THAT MEAN YOU IGNORE IT?

14 A ABSOLUTELY NOT. AND THAT'S ACTUALLY SOMETHING
15 I ALSO TEACH MY STUDENTS, JUST TAUGHT IT TWO WEEKS AGO,
16 THAT YES, IF YOU SEE NUMBER -- STUDY NUMBER 2 AND THE
17 ONLY STUDY IN THE WORLD, YOU SCRATCH YOUR HEAD AND SAY
18 INTERESTING, SUGGESTIVE, I'D BETTER GO AND DO ANOTHER
19 BIGGER STUDY.

20 IF YOU, HOWEVER, SEE STUDY NUMBER 2 AFTER YOU
21 SEE Q STUDY RESULTS NUMBER 1, THEN YOU SAY, AHH, GREAT,
22 IT'S CONSISTENT AND NOW I CAN ADD THE TWO STUDIES
23 TOGETHER AND CONCLUDE THAT GIVEN THAT THEY ARE
24 CONSISTENT AND GIVEN THAT THEY ARE BOTH TELLING ME THE
25 SAME STORY, MY STUDY NUMBER 2 IS KIND OF CONFIRMATIVE OF
26 STUDY NUMBER 1.

27 Q WHAT IF WE ADDED A THIRD STUDY HERE? NOW THIS
28 ONE'S MUCH SMALLER POINT ESTIMATE, MUCH SMALLER

1 CONFIDENCE INTERVAL, BUT TO THE RIGHT OF 1, WHAT DOES
2 THAT TELL YOU AS AN EPIDEMIOLOGIST?

3 A WELL, FIRST OF ALL, IT'S CONSISTENT WITH AN
4 EFFECT, HOWEVER, THE EFFECT SIZE IS MUCH SMALLER. THIS
5 MUST BE A MUCH LARGER STUDY BECAUSE OTHERWISE WE
6 WOULDN'T HAVE THIS VERY TIGHT CONFIDENCE INTERVAL. AND
7 IT TELLS ME THAT MY TWO-FOLD RISK ESTIMATE WAS POSSIBLY
8 AN OVERESTIMATION AND THAT THE TRUE RISK IS MAYBE
9 SOMEWHERE BETWEEN 1.4 AND 1.5 AS MY CONFIDENCE INTERVAL
10 OF STUDY 3 SUGGESTS, BUT THAT OVERALL THERE IS AN
11 INCREASE THIS RISK AND OVERALL ALL THREE STUDIES ARE
12 INCREDIBLY CONSISTENT WITH AN ADVERSE EFFECT OF THIS
13 EXPOSURE.

14 Q DOCTOR, BEFORE YOU COULD SAY THIS IS CONSISTENT
15 OR CONFIRMATORY OR EVEN MAKE A CONCLUSION ABOUT
16 CAUSATION, WOULD YOU NEED TO INDIVIDUALLY LOOK AT THE
17 STRENGTHS AND WEAKNESSES OF EACH OF THESE STUDIES TO SEE
18 IF THEY WERE BEING CAUSED BY ANY SYSTEMIC BIAS?

19 A ABSOLUTELY. THAT'S, YOU KNOW, THAT'S WHERE WE
20 AS EPIDEMIOLOGISTS START. WE LOOK AT THESE DATA AND
21 THEN WE SAY, OH, HOW WAS THE STUDY DONE? WHY IS STUDY 1
22 AND 2 SUGGESTING A TWO-FOLD RISK INCREASE AND STUDY 3
23 ONLY A 1.4 FOLD?

24 FOR EXAMPLE, I SAY, WELL, EXPOSURE OR RISK IN
25 THE EXPOSED. WHEN I SAY THAT, I DIDN'T TELL YOU WHAT IS
26 THE EXPOSURE. THE EXPOSURE COULD BE HIGH. THE EXPOSURE
27 COULD BE LOW. SO IF I NOW LOOK AT STUDY 1 AND 2 AND I
28 SEE THAT THE EXPOSURE WAS ACTUALLY TWO-FOLD OR

1 THREE-FOLD HIGHER IN THOSE STUDY SUBJECTS THAN IN STUDY
2 NUMBER 3, THEN IT'S EVEN MORE CONSISTENT.

3 IF I DON'T SEE THAT, THEN I HAVE TO SAY, WELL,
4 WHAT ELSE WAS IT THAT GAVE ME A TWO-FOLD WHEN MAYBE THE
5 TRUTH IS CLOSER TO THE THIRD STUDY.

6 Q NOW, LET'S SAY, I THROW IN A NEW SCENARIO,
7 RIGHT, WHERE WE HAVE THE SAME CONFIDENCE INTERVALS JUST
8 ALL SHIFTED OVER SO THAT NONE OF THEM ARE STATISTICALLY
9 SIGNIFICANT.

10 THE APPROACH YOU JUST DESCRIBED LOOKING AT THE
11 STRENGTHS AND WEAKNESSES OF THE STUDIES AND THINKING
12 ABOUT BIASES OR WHATNOT, WOULD YOU APPLY THAT SAME
13 APPROACH REGARDLESS OF THE RESULTS THAT YOU'RE SEEING?

14 A ABSOLUTELY. BY THE WAY, STUDY 3 IS STILL
15 STATISTICALLY SIGNIFICANT, IT'S JUST ON THE LEFT
16 SUGGESTING NEGATIVE EFFECTS. SO -- NEGATIVE
17 ASSOCIATION.

18 SO WHAT YOU WOULD SAY HERE IS STUDY 1 AND 2
19 SUGGESTED NO ASSOCIATION, BUT NOW A MUCH LARGER STUDY,
20 STUDY 3 SUGGESTS A NEGATIVE ASSOCIATION SO YOU HAVE TO
21 DEFINITELY LOOK INTO WHAT THE DIFFERENCES ARE BETWEEN
22 STUDY NUMBER 1 AND 2 AND WHY THEY WOULD NOT SEE THE SAME
23 OUTCOME -- ASSOCIATION OUTCOME AS IN STUDY 3.

24 Q IF WE'RE TALKING ABOUT SOMETHING LIKE HEAVY
25 METALS THAT HAVE BEEN STUDIED PRETTY RIGOROUSLY FOR
26 DECADES AND YOU SEE A RESULT THAT IT'S HIGHLY PROTECTIVE
27 OF SOME INJURY THAT IT'S KNOWN TO PROBABLY CAUSE, HOW DO
28 YOU DEAL WITH THAT?

1 A WELL, THIS KIND OF RESULT ARE NOT UNUSUAL
2 ESPECIALLY WHEN -- I STUDY A LOT OF PREGNANCY-RELATED
3 OUTCOMES AND WE KNOW THAT THERE IS ONE ACTUALLY WEIRD
4 BIAS THAT WE CALL THE LIFE FIRST BIAS WHERE IF YOU
5 REALLY HAVE HIGH -- VERY HIGH EXPOSURE IN PREGNANCY,
6 THAT CHILD NEVER COMES TO BE BORN ALIVE. WE HAVE EARLY
7 ABORTION. AND IN THOSE KIND OF STUDIES YOU CAN SEE
8 EXACTLY THIS KIND OF EFFECT WHERE ALL OF A SUDDEN A
9 HIGHLY TOXIC EXPOSURE THAT IN ANIMAL STUDIES IN OTHER
10 HUMAN STUDIES HAS BEEN PROVEN TO BE QUITE TOXIC SO YOU
11 WOULDN'T ASSUME THAT A VITAMIN IS HELPFUL AND YOU SHOULD
12 FEED IT TO PREGNANT WOMEN.

13 THAT IN THIS CASE YOU WOULD SEE A STUDY
14 NUMBER 3 RESULT BECAUSE THE MOST AFFECTED INDIVIDUALS,
15 THE MOST AFFECTED CHILDREN, FETUSES ARE ACTUALLY LOST
16 BEFORE THEY COME TO A LIVE BIRTH, SO -- AND THOSE ARE
17 ALSO THE ONES WHO LATER WOULD BE DIAGNOSED WITH THE
18 DISORDER, AND YOU SYSTEMATICALLY LOST EXACTLY THESE
19 INDIVIDUALS. AND THAT HAS ACTUALLY BEEN DESCRIBED VERY
20 NICELY IN THE EPI LITERATURE AS THE SO-CALLED LIFE FIRST
21 BIAS OF PREGNANCY EXPOSURES.

22 Q AND WOULD IT BE FAIR TO SAY, THEN, DOCTOR, THAT
23 WHEN YOU'RE LOOKING AT SOMETHING LIKE A PROTECTIVE
24 EFFECT FOR HEAVY METALS, THAT YOU DON'T LEAVE YOUR
25 KNOWLEDGE ABOUT THE MECHANISMS AND BIOLOGY OF THE METALS
26 AT THE DOOR, THAT YOU HAVE TO BRING THAT INTO THE
27 ANALYSIS?

28 A ABSOLUTELY. THAT'S -- EVERY EPIDEMIOLOGIST

1 WOULD NOT DO THEIR JOB IF THEY WOULDN'T READ THE
2 LITERATURE, IF THEY WEREN'T EDUCATED ENOUGH ABOUT WHAT
3 PREVIOUS STUDIES HAVE SHOWN, WHAT BIOLOGY TELLS YOU; IN
4 FACT, YOU KNOW, IT'S A LITTLE SAD THAT NOT MORE PEOPLE
5 WITH A MEDICAL AND BIOLOGIC DEGREE TAKE UP EPIDEMIOLOGY
6 BECAUSE I THINK IT'S ABSOLUTELY IMPORTANT THAT WE KNOW
7 ABOUT THESE KIND OF MECHANISTIC AND TYPE OF CONTEXTS AND
8 THAT WE PUT EVERYTHING, AS A SCIENTIST AT LEAST, PUT
9 EVERYTHING INTO THE CONTEXT OF BIOLOGIC PLAUSIBILITY AND
10 OF EVERYTHING ELSE WE KNOW ABOUT THE AGENTS.

11 Q NOW, ONE OF THE THINGS THAT I WANT TO ASK YOU
12 ABOUT IS ACTUALLY I'M GOING TO GO BACK TO THIS CASE
13 CONTROL STUDY. AND THIS IS REALLY IMPORTANT BECAUSE
14 THIS HAS BEEN THE FOCUS OF THE DEFENDANTS' OPENING
15 STATEMENT, AND THIS IS THE CONCEPT OF THE REVERSE
16 CAUSATION.

17 ARE YOU FAMILIAR WITH THAT CONCEPT, DOCTOR?

18 A ABSOLUTELY.

19 Q WHAT IS REVERSE CAUSATION?

20 A SO REVERSE CAUSATION WOULD BE IF THE EXPOSURE
21 DID NOT CAUSE THE OUTCOME, BUT THE OUTCOME CAUSED THE
22 EXPOSURE OR THE LEVEL OF EXPOSURE.

23 SO THE WAY THAT I USUALLY EXPLAIN THAT IN MY
24 CLASSROOM IS THAT IF YOU WANT TO KNOW WHETHER COFFEE
25 DRINKING, AND I LOVE COFFEE, CAUSES MYOCARDIAL
26 INFARCTION AND YOU STUDY PEOPLE WITH MYOCARDIAL
27 INFARCTION YOU MAY REALIZE THAT THEY DRINK LESS COFFEE.
28 AND NOW, WHY, RIGHT, COMPARED TO OTHER PEOPLE WHO

1 HAVEN'T HAD A MI. AND MORE LIKELY THAN NOT, THEY HAVE
2 EITHER FIGURED OUT THAT THEY START HAVING HEART -- A
3 RACING HEART OR THEIR DOCTOR HAD TOLD THEM, WELL, YOU
4 KNOW, CAFFEINE INCREASES YOUR BLOOD PRESSURE OR
5 CARDIOVASCULAR DISEASE, INCREASES YOUR RISK OF MI, MAYBE
6 YOU SHOULD NOT DRINK COFFEE.

7 SO IN THIS CASE BEING DIAGNOSED WITH
8 CARDIOVASCULAR DISEASE HAVING HAD AN MI ACTUALLY CAUSES
9 THE EXPOSURE LEVEL AND NOT THE OTHER WAY AROUND, SO YOU
10 HAVE -- YOU DRINK LESS COFFEE BECAUSE YOU'RE A CASE.

11 Q AND WHEN YOU'RE -- LET'S TALK ABOUT IT IN THE
12 CONTEXT OF SOME OF THESE HEAVY METAL STUDIES.

13 NOW, I UNDERSTAND THAT A LOT OF STUDIES -- AND
14 WE'RE GOING TO GET INTO THEM IN A MINUTE MORE
15 SPECIFICALLY -- BUT A LOT OF THEM, NOT ALL, BUT SOME OF
16 THEM LOOK AT CHILDREN WITH AUTISM AND CHILDREN WITHOUT
17 AUTISM AFTER THEY HAVE BEEN DIAGNOSED AND THEN TAKE
18 THEIR BIOMARKERS, WHETHER IT BE BLOOD, URINE, HAIR,
19 WHATEVER IT BE, AT THAT TIME.

20 YOU'RE FAMILIAR WITH THOSE TYPES OF STUDIES?

21 A YES. ABSOLUTELY.

22 Q YOU KNOW, WHEN YOU WERE THINKING ABOUT THE
23 EPIDEMIOLOGICAL EVIDENCE IN THIS CASE, DID YOU CONSIDER
24 AND REALLY THINK THROUGH WHETHER OR NOT THE AUTISM WAS
25 CAUSING THESE CHILDREN TO HAVE HIGHER LEVEL OF THESE
26 METALS VERSUS THE HEAVY METALS CAUSING THEM TO HAVE
27 AUTISM?

28 A ABSOLUTELY. THAT'S THE FIRST THING YOU THINK

1 ABOUT, YOU KNOW, IS THERE ANY KIND OF BEHAVIOR THAT
2 AUTISM MAY ACTUALLY CAUSE OR, YEAH, ENGAGE IN KIDS WITH
3 AUTISM OR AUTISM SPECTRUM DISORDER ENGAGE IN THAT COULD
4 ACTUALLY CAUSE THE EXPOSURE TO BE INCREASED.

5 SO DO -- ARE THEY VERY THIRSTY AND THEY DRINK
6 LEAD FROM LEAD PIPES FOR SOME REASON? OR YOU KNOW, ARE
7 THEY HAVING MORE HAND/MOUTH BEHAVIOR AND THAT HAND/MOUTH
8 BEHAVIOR EXPOSES THEM TO MORE LEAD BECAUSE THERE'S LEAD
9 IN THE PAINT OR THERE'S LEAD IN THE SOIL?

10 Q NOW, DOCTOR, ARE YOU FAMILIAR WITH SOMETHING
11 CALLED PICA?

12 A YES.

13 Q AND PICA, THAT'S A MANIFESTATION OF CHILDREN
14 PUTTING INEDIBLE OBJECTS IN THEIR MOUTH?

15 A YES, THAT'S WHAT IT'S USUALLY DEFINED AS, AND
16 BETTER, YOU KNOW, CHEWING ON DIRT.

17 Q OKAY.

18 A AND WHATEVER.

19 Q SURE. SURE.

20 NOW, DID YOU -- LET'S BREAK IT DOWN BY METAL.
21 LET'S FIRST TALK ABOUT LEAD.

22 A UM-HMM.

23 Q WHEN YOU LOOKED AT LEAD IN AUTISM, DID YOU
24 CONSIDER WHETHER OR NOT WHAT YOU WERE SEEING IN THE DATA
25 WAS SIMPLY AUTISTIC CHILDREN PUTTING LEAD INTO THEIR
26 MOUTH AND THAT'S WHY THEY HAD ELEVATED LEVELS AS OPPOSED
27 TO HAVING HISTORICAL LEVELS OF EXPOSURE THAT LED TO
28 THEIR AUTISM?

1 A RIGHT. SO THAT'S OF COURSE SOMETHING YOU NEED
2 TO CONSIDER.

3 IN THIS CASE YOU WOULD HAVE TO HAVE AN
4 ENVIRONMENT IN WHICH THERE ACTUALLY IS A EXPOSURE THAT
5 YOU CAN INCREASE THROUGH PICA; MEANING, THESE KIDS ALL
6 HAVE TO LIVE IN ENVIRONMENTS WHERE THERE'S LOTS OF LEAD
7 DUST OR LOTS OF THINGS THAT CONTAIN LEAD THAT THEY
8 ACTUALLY CAN PUT IN THEIR MOUTH AND CHEW ON, AND
9 HOPEFULLY, YOU KNOW, THAT MIGHT BE THE CASE IN SOME
10 COMMUNITIES WHERE WE HAVE HIGH LEAD LEVELS DUE TO, LET'S
11 SAY, A BATTERY RECYCLING FACILITY AROUND THE CORNER OR,
12 YOU KNOW, SOME KIND OF COMMUNITY BUILT ON A TOXIC WASTE
13 DUMP OR SOME KIND OF COMMUNITY WHERE A LOT OF LEAD PAINT
14 HAS BEEN USED IN THE HOUSES. THOSE ARE COMMUNITIES
15 WHERE YOU'RE WORRIED ABOUT THIS.

16 BUT THEN HOPEFULLY, THERE ARE ALSO STUDIES THAT
17 ARE DONE IN COMMUNITIES WHERE IT'S HIGHLY UNLIKELY THAT
18 THESE ARE THE ONLY OR THE MAJOR SOURCES OF EXPOSURE
19 BECAUSE WE DO KNOW THERE ARE VERY DIFFERENT SOURCES OF
20 EXPOSURE FOR LEAD, RIGHT, COULD BE DIET. IT COULD BE
21 WATER.

22 Q YEAH.

23 SO HOW DO YOU THEN GO ABOUT TRYING TO DETERMINE
24 IF -- SO, FOR EXAMPLE, IF YOU'RE DOING A STUDY AND YOU
25 SEE THAT THE AUTISTIC HAVE MUCH HIGHER LEVELS OF BLOOD,
26 URINE AND HAIR LEAD AS WE SEE IN THE DATA HERE, HOW CAN
27 YOU DETERMINE IF THAT'S A FUNCTION OF, YOU KNOW, IF THE
28 PRIOR EXPOSURE CAUSING THE DISEASE OR IF IT'S JUST A

1 FUNCTION OF THEM PUTTING STUFF IN THEIR MOUTH?

2 A WELL, ONE WAY OF AT LEAST GETTING CLOSER TO
3 THIS WOULD BE TO CONDUCT A STUDY IN WHICH YOU
4 INVESTIGATE ABOUT THESE KIND OF BEHAVIORS THAT WOULD
5 EXPOSE THE CHILDREN.

6 SO YOU ASK THE PARENTS TO DESCRIBE THESE KIND
7 OF BEHAVIORS IN THEIR KIDS AND TELL YOU HOW MUCH THEY
8 ARE ACTUALLY DOING THIS. AND IF YOU DON'T KNOW WHETHER
9 -- THAT THEN ALSO THIS KIND OF BEHAVIOR ACTUALLY EXPOSES
10 THEM TO LEAD, THEN YOU MEASURE THEIR BLOOD LEAD, AND
11 THEN YOU COMPARE THE BLOOD LEAD IN ALL OF THE KIDS WITH
12 THIS KIND OF EXPOSURE TO THE BLOOD LEAD IN THE KIDS
13 WITHOUT THAT KIND OF EXPOSURE, AND IF IT'S PRETTY
14 SIMILAR, THEN IT PROBABLY WASN'T THE BEHAVIOR.

15 Q SO, FOR EXAMPLE, IF YOU GET A GROUP OF AUTISTIC
16 CHILDREN AND SOME OF THEM HAD PICA AND SOME OF THEM
17 DIDN'T AND YOU LOOKED AT TO SEE WHAT THEIR LEAD LEVELS
18 WERE AND SEE IF THE KIDS WITH PICA HAD HIGHER LEAD
19 LEVELS THAN THE KIDS WITHOUT PICA. WOULD THAT BE A FAIR
20 WAY OF DOING IT?

21 A RIGHT. THAT'S HOW WOULD YOU DO IT.

22 Q WHAT ABOUT LOOKING AT HISTORICAL EXPOSURE DATA?

23 A THAT'S ALWAYS A GOOD IDEA.

24 Q HOW --

25 A SO --

26 Q GO AHEAD.

27 A -- SO IF YOU HAVE BLOOD SPOTS OR IF YOU HAVE --
28 THAT OF COURSE WOULD BE BIOMARKER, BUT IF YOU HAD LIKE

1 MEASUREMENTS IN THE SOIL, MEASUREMENTS IN THE AIR,
2 MEASUREMENTS OF THE WATER THAT WOULD ALSO BE QUITE
3 HELPFUL.

4 AND I THINK THE STUDIES THAT ARE REALLY
5 INTERESTED IN, YOU KNOW, THESE KIND OF QUESTIONS, THEY
6 OFTEN ARE WORRIED ABOUT SOURCES, SPECIFIC SOURCES, SO
7 YOU CAN ACTUALLY GO BACK AND SEE WHAT THE AUTHORS
8 THOUGHT THE MAJOR SOURCE FOR THE EXPOSURE WAS.

9 FOR EXAMPLE, IF IT WAS LEAD IN THE WATER, THEN
10 IT WOULD BE HIGHLY UNLIKELY THAT PICA MAKES ANY
11 DIFFERENCE.

12 Q OKAY. BECAUSE BOTH PEOPLE WOULD BE EXPOSED?

13 A YES.

14 Q OKAY.

15 A WATER EXPOSES EVERYONE.

16 Q OKAY. AS THE JUDGE TAKES A DRINK OF WATER.
17 GOOD TIMING, DR. RITZ.

18 THE COURT: CHEERS.

19 THE WITNESS: HOPEFULLY THERE'S NOT LEAD IN IT.

20 MR. WISNER: YOUR HONOR, WE'VE BEEN GOING FOR A
21 LITTLE BIT. DO YOU THINK TAKING A FIVE-MINUTE BREAK NOW
22 AND THEN FINISHING UP MAKES SENSE?

23 THE COURT: YEAH. I THINK THAT MAKES SENSE.

24 LET'S TAKE TEN MINUTES, PLEASE, SO ABOUT 3:30.

25 MR. WISNER: OKAY.

26 THE COURT: THANK YOU.

27 THE WITNESS: THANK YOU.

28 (RECESS)

1 THE COURT: OKAY. IT LOOKS LIKE WE'RE ALL
2 READY TO GO AGAIN. THANK YOU.

3 MR. WISNER: THANK YOU, YOUR HONOR. MAY I
4 PROCEED?

5 THE COURT: YES, PLEASE.

6 MR. WISNER: GREAT.

7 Q ALL RIGHT. DOCTOR, WE SPENT SOME TIME SORT OF
8 GOING OVER SOME EPI 101 PRINCIPLES. I WANT TO GET INTO
9 YOUR SPECIFIC METHODOLOGY AND THEN GET INTO LEAD AND
10 ASD.

11 SO LET'S MOVE ON TO METHODOLOGY.

12 NOW, I WANT TO SHOW YOU YOUR -- WELL, LET'S NOT
13 SHOW YOUR REPORT JUST YET. LET'S JUST ASK YOU SOME
14 QUESTIONS.

15 CAN YOU PLEASE DESCRIBE TO THE COURT WHAT
16 METHODOLOGY YOU USED TO ASSESS THE CAUSAL ASSOCIATION,
17 IF ANY, BETWEEN LEAD AND ASD AND ADHD?

18 A WELL, I DO WHAT YOU USUALLY WOULD DO IN ORDER
19 TO GET YOURSELF ACQUAINTED WITH THE LITERATURE, WHICH IS
20 SCOURED THE LITERATURE FOR THE KIND OF EPIDEMIOLOGY
21 PAPERS THAT REFERRED TO THE SUBJECT MATTER AND THEN KIND
22 OF SORT THEM AND READ THEM. AND WHILE YOU'RE READING
23 THEM, ASSESSING THEM FOR WEAKNESSES AND STRENGTHS. AND
24 THEN FINALLY, YOU KNOW, PUTTING THEM ALL TOGETHER,
25 RE-READING THEM USUALLY AND THEN COMING UP WITH AN
26 EVALUATION OF THE OVERALL LITERATURE IN EPIDEMIOLOGY,
27 AND THEN GOING BACK TO -- I AT LEAST LIKE TO DO THAT TO
28 SOME OF THE BASIC SCIENCE LITERATURE ON THE SUBJECT AND

1 THE EXPOSURE AND THEN SEE HOW THAT FITS TOGETHER.

2 Q NOW, I UNDERSTAND THAT YOU RELIED ALMOST
3 EXCLUSIVELY ON PEER-REVIEWED LITERATURE, IS THAT RIGHT?

4 A YES.

5 Q WHY? WHY DO YOU DO THAT?

6 A WELL, THEY DO A LITTLE BIT OF THE WORK FOR YOU,
7 MEANING, I'VE BEEN, YOU KNOW, AN EDITOR FOR SEVERAL
8 JOURNALS AND I'M A REVIEWER OF PAPERS, LIKE I THINK I
9 GET ONE A DAY SENT TO ME TO REVIEW AND I SAY NO TO MOST
10 OF THEM. BUT I DO PICK AND CHOOSE THE PAPERS THAT
11 INTEREST ME, OF COURSE, OR WHERE I THINK I, YOU KNOW, A
12 GOOD EPIDEMIOLOGIST HAS TO ACTUALLY READ THIS BECAUSE
13 IT'S AN IMPORTANT SUBJECT, AND SO I KNOW WHAT KIND OF
14 CRITERIA A REVIEWER AND AN EDITOR WOULD APPLY TO THESE
15 STUDIES AND YOU READ THEM WITH A VERY CRITICAL EYE BUT
16 ALSO AN EYE TO WHAT'S POSSIBLE AND WE ARE AN APPLIED
17 SCIENCE. WE CANNOT TOX CHILDREN WITH METALS AND WAIT
18 FOR THEM TO HAVE NEURO DEVELOPMENTAL DEFECTS. THAT'S
19 NOT WHAT WE DO. AND SO WE HAVE TO LIVE WITH WHAT'S
20 GIVEN TO US. WE HAVE TO LIVE WITH THE OBSERVATIONAL
21 KIND OF DATA THAT'S PRESENTED AND WE HAVE TO TAKE IT AT
22 FACE VALUE AND SAY, OKAY, THIS IS MAYBE THE BEST WE CAN
23 DO IN THIS INSTANCE.

24 BUT IF I LOOK AT DIFFERENT STUDIES AND, YOU
25 KNOW, WITH CASE CONTROL STUDY AND A COHORT STUDY AND A
26 CROSS SECTIONAL STUDY AND A CASE REPORT, THEY ARE ALL
27 TELLING ME KIND OF SAME STORY, THEN I'M MUCH MORE
28 CONFIDENT THAT THIS IS A STORY THAT HAS SOME TRUTH TO

1 IT.

2 Q NOW, AFTER YOU'VE DONE THAT LITERATURE REVIEW,
3 ARE YOU FAMILIAR WITH THE BRADFORD HILL CRITERIA OR
4 FACTORS?

5 A YES. ABSOLUTELY.

6 Q OKAY.

7 NOW, IF WE LOOK HERE AT, WE'RE LOOKING AT YOUR
8 REPORT, THIS IS EXHIBIT 3.

9 AND RIGHT HERE AFTER YOU REVIEWED ALL THAT
10 LITERATURE, YOU WRITE, "THE AVAILABLE EPIDEMIOLOGICAL
11 LITERATURE DEMONSTRATES A CONSISTENT
12 ASSOCIATION BETWEEN LEAD EXPOSURE AND THE
13 DEVELOPMENT OF CHILDHOOD ASD.

14 I WILL NOW TURN TO THE BRADFORD HILL CRITERIA
15 TO MAKE AN ASSESSMENT CAUSALITY."

16 DO YOU SEE THAT?

17 A YES.

18 Q IS IT IN YOUR EXPERIENCE THAT THE FACTORS OR
19 CONSIDERATIONS THAT BRADFORD HILL, SIR BRADFORD HILL
20 CREATED, HELPED GUIDE YOU IN ASSESSING WHETHER THE
21 ASSOCIATION OF WHAT YOU'RE SEEING IS IN FACT CAUSAL?

22 A YES, THAT'S GENERALLY WHAT IS ACCEPTED IN
23 SCIENCE AND ESPECIALLY IN EPIDEMIOLOGY AS THE PROPER WAY
24 TO GO ABOUT THIS. IT'S NOT A CHECKLIST. IT'S ACTUALLY
25 APPLYING YOUR EXPERTISE, YOUR SCIENCE, KNOWLEDGE IN A
26 VERY CONSISTENT AND ALSO A VERY TRANSPARENT MANNER.

27 SO WHY BRADFORD HILL IS STILL, YOU KNOW, THE
28 KIND OF STANDARD BEARER FOR CAUSALITY IN OUR SCIENCE IS

1 BECAUSE HE MADE IT CLEAR WHAT KIND OF "CRITERIA" YOU'RE
2 USING AND YOU HAVE TO ACTUALLY TELL YOUR COLLEAGUES WHAT
3 YOU THINK ABOUT THESE DIFFERENT GUIDELINES CRITERIA AND
4 HOW THEY FIT TOGETHER OVERALL IN COMING UP WITH YOUR
5 EVALUATION IN THE END.

6 Q DOCTOR, CAN TWO EPIDEMIOLOGISTS WHO ARE
7 EMINENTLY QUALIFIED APPLY THE SAME BRADFORD HILL FACTORS
8 AND REACH DIFFERENT CONCLUSIONS?

9 A IT HAS HAPPENED. BUT IF -- YOU KNOW, IF THE
10 LITERATURE IS VERY DIVERSE, DIVERGENT AND, I MEAN,
11 PEOPLE HAVE BIASES, THEY BELIEVE IN CERTAIN SUBJECT
12 MATTER; FOR EXAMPLE, PEOPLE WHO STUDY A CERTAIN SUBJECT
13 THEIR WHOLE LIFE, THEY HAVE A VERY STRONG BIAS ABOUT
14 WHAT MIGHT BE CAUSING THIS OUTCOME BECAUSE THEY HAVE
15 BEEN WORKING ON IT SO HARD AND I DON'T FAULT THEM FOR
16 IT, AND THEN YOU NEEDED A LOT OF DATA TO OVERCOME THAT
17 BIAS. BUT OTHERWISE IF YOU STEP BACK FROM YOUR OWN
18 BIAS, IF YOU EVALUATE THE LITERATURE IN ITS ENTIRETY, I
19 WOULD HOPE THAT TWO EPIDEMIOLOGISTS WOULD COME TO THE
20 SAME CONCLUSIONS USING THESE KIND OF GUIDELINES.

21 Q NOW, DOCTOR, I UNDERSTAND THERE'S NINE
22 DIFFERENT BRADFORD HILL FACTORS. I DON'T WANT TO GO
23 THROUGH ALL OF THEM. I DON'T THINK THERE'S BEEN ANY
24 CHALLENGE OR ARGUMENT THAT THEY ARE ALL AT ISSUE. I
25 THINK THERE'S REALLY BEEN TWO THAT WE'RE GOING TO FOCUS
26 ON.

27 THE FIRST IS GOING TO BE THE FACTOR OF
28 TEMPORALITY, AND THE OTHER ONE IS GOING TO BE THE FACTOR

1 OF CONSISTENCY; OKAY?

2 A YES.

3 Q ALL RIGHT. I'M GOING TO SHOW YOU EXHIBIT 159.
4 DO YOU RECOGNIZE THIS DOCUMENT?

5 A YES, IT'S THE ORIGINAL ONE.

6 Q THE ORIGINAL ONE. THIS IS THE BRADFORD HILL
7 ARTICLE; IS THAT RIGHT?

8 A CORRECT. YES, UM-HMM.

9 Q AND IT LOOKS LIKE THIS WAS FROM A MEETING IN
10 JANUARY 1965; RIGHT?

11 A RIGHT.

12 Q SO IT'S SORT OF IN THE ANNALS OF EPIDEMIOLOGY.

13 A RIGHT.

14 Q SO AS WE GO INTO THIS HE IDENTIFIES THE FIRST
15 ONE. THERE'S THE STRENGTH OF ASSOCIATION.

16 DO YOU SEE THAT?

17 A UM-HMM. YES, I SEE IT.

18 Q AND THEN HE GOES ON. AND LET'S LOOK AT
19 CONSISTENCY FIRST.

20 SO WHAT HE WRITES HERE IS, "CONSISTENCY: NEXT
21 ON MY LIST OF FEATURES TO BE SPECIALLY
22 CONSIDERED I WOULD PLACE THE CONSISTENCY OF THE
23 OBSERVED ASSOCIATION. HAS IT BEEN REPEATEDLY
24 OBSERVED BY DIFFERENT PERSONS IN DIFFERENT
25 PLACES, CIRCUMSTANCES AND TIMES?"

26 DO YOU SEE THAT?

27 A YES, AND THAT'S ACTUALLY REALLY IMPORTANT
28 BECAUSE IF -- REPEATING STUDIES IN THE SAME POPULATION,

1 DOING IT IN THE SAME WAY, THAT'S USUALLY WHAT WE THINK
2 ABOUT WHEN HE WE DO EXPERIMENTS AND COMPARE EXPERIMENTS,
3 WE ARE THINKING, OH, YOU HAVE TO DO THEM IN EXACTLY THE
4 SAME WAY, YOU HAVE TO GET THEM JUST RIGHT TO SHOW YOU
5 THE RIGHT RESULT, RIGHT.

6 ACTUALLY IN EPIDEMIOLOGY IT'S MUCH MORE
7 IMPRESSIVE IF PEOPLE ALL OVER THE WORLD HAVE USED
8 DIFFERENT METHODS AND FOUND THE SAME THING.

9 AND THAT -- THE REASON FOR THAT IS THAT WE
10 CAN'T CONTROL THE ENVIRONMENT, WE CAN'T -- WE'RE NOT
11 PUTTING HUMANS IN CAGES AND FEEDING THEM LEAD. WE JUST
12 HAVE TO OBSERVE THEM, SO THERE ARE BIASES. WE ALL KNOW
13 THERE ARE LOTS OF BIASES WE HAVE TO WORRY ABOUT IN
14 OBSERVATIONAL STUDIES. I TEACH THAT. AND WE ARE VERY
15 GOOD AT PICKING OUT THE BIASES.

16 EVERY EPIDEMIOLOGIC STUDY HAS A BIAS. THERE'S
17 NO WAY AROUND IT. BUT IF ALL OF THE STUDIES DONE WITH
18 DIFFERENT DESIGNS THAT WOULD HAVE DIFFERENT BIASES AND
19 THAT WOULD BE DONE BY DIFFERENT PEOPLE ON DIFFERENT
20 CONTINENTS IN DIFFERENT ENVIRONMENTS, IN DIFFERENT
21 CLIMATES WITH DIFFERENT GENETIC FACTORS, ALL KIND OF
22 SHOW YOU THE SAME RESULT, THEN YOU'RE MUCH MORE
23 CONFIDENT. THAT'S WHAT WE CALL CONSISTENCY. NOT
24 SOMETHING THAT'S REPEATED IN EXACTLY THE SAME WAY IN THE
25 SAME PLACE BY THE SAME PERSON.

26 Q I WANT TO FOCUS IN ON EACH OF THESE.

27 HE SAYS DIFFERENT PERSONS?

28 A RIGHT.

1 Q DIFFERENT PLACES. DIFFERENT CIRCUMSTANCES.
2 AND DIFFERENT TIMES.

3 LET'S START OFF WITH PERSONS.

4 WHY DOES A VARIATION OF PEOPLE IN SCIENTISTS
5 MATTER? OR IT MAY BE THE STUDY POPULATION. I DON'T
6 KNOW WHAT PERSONS REFERS TO.

7 A IT'S ACTUALLY BOTH.

8 Q OKAY.

9 A IT'S THE SCIENTISTS BECAUSE, YOU KNOW, AS I
10 SAID, I COULD BE A VERY BIASED INDIVIDUAL AND ALL I
11 WANT TO SHOW YOU IS ONE THING AND, YOU KNOW, I'M JUST
12 SHOWING THAT YOU OVER AND OVER AGAIN, AND BECAUSE OF,
13 YOU KNOW, I'M NOT LOOKING AT THE DATA ANYMORE, I'M KIND
14 OF GENERATING THE DATA THAT SHOWS.

15 SO IF IT'S JUST ONE GROUP WHO'S EVER BEEN SHOWN
16 THAT, THEN I WOULD WORRY AND SAY, WELL, I WOULD LIKE TO
17 SEE THAT DONE BY SOMEONE ELSE.

18 BUT IT'S ALSO DEFINITELY DIFFERENT INDIVIDUALS
19 WHO ARE IN THIS STUDY BECAUSE IF IT GENERALIZES AND IF
20 IT'S GENERALIZED BIOLOGY, I SHOULD BE ABLE TO SEE THOSE
21 IN DIFFERENT KINDS OF PEOPLE. I SHOULD BE ABLE TO SEE
22 AN EFFECT IN CHILDREN OF DIFFERENT RACES OF DIFFERENT
23 ETHNICITIES. I SHOULD BE ABLE TO SEE THAT IN CHILDREN
24 WHO LIVE IN DIFFERENT PLACES, ARE RAISED IN DIFFERENT
25 CULTURES, SO IT MAKES ME MUCH MORE TRUSTING THE RESULTS
26 IF THAT SHOWS CONSISTENCY.

27 Q ALL RIGHT. DIFFERENT PLACES.

28 HOW DOES THAT PLAY INTO IT?

1 A WELL, THAT'S GENERALLY CONSIDERED GEOGRAPHY,
2 AND ENVIRONMENTAL EPIDEMIOLOGY THAT'S REALLY IMPORTANT
3 BECAUSE THE GEOGRAPHY IS PARTIALLY WHAT EXPOSE PEOPLE.
4 YOU COULD BE LIVING IN A PLACE WHERE THERE'S HIGH
5 ARSENIC WATER CONTAMINATION OR YOU COULD BE LIVING IN A
6 PLACE WHERE THERE'S LEAD SMELTING.

7 SO THESE DIFFERENT PLACES ARE IMPORTANT BECAUSE
8 OF THEIR POTENTIAL FOR DIFFERENT EXPOSURES AND DIFFERENT
9 EXPOSURE LEVELS BUT ALSO FOR DIFFERENT SUSCEPTIBILITIES
10 OF THE POPULATION THAT LIVES THERE.

11 Q WHAT ABOUT DIFFERENT CIRCUMSTANCES? WHAT'S
12 THAT GETTING AT?

13 A WELL, CIRCUMSTANCES COULD JUST MEAN THE WAY THE
14 STUDY IS COMING ABOUT. LIKE, YOU KNOW, WHAT IS THE
15 DESIGN? IS THERE A SPECIALTY CLINIC THAT, YOU KNOW, ALL
16 OF A SUDDEN GETS INTERESTED IN ONE OUTCOME AND DOES THE
17 STUDY, DO I TRUST THAT ONE STUDY THAT, YOU KNOW, WAS
18 DONE AT A SPECIALTY CLINIC OR WOULD I LIKE TO SEE THIS
19 REPEATED BY A GENERAL PRACTITIONER KIND OF SAMPLE? WHAT
20 ARE THE CIRCUMSTANCES THAT LED TO THIS STUDY OR TO THAT
21 STUDY POPULATION BEING ASSEMBLED?

22 Q AND THEN TIMES. WHY IS HAVING DIFFERENT
23 STUDIES AT DIFFERENT TIMES IMPORTANT?

24 A WELL, FOR AIR POLLUTION IT'S OBVIOUS BECAUSE
25 AIR POLLUTION CHANGES WITH SEASON AND CHANGES OVER TIME,
26 BUT IT'S ACTUALLY THE CASE FOR LOTS OF ENVIRONMENTAL
27 EXPOSURES, THEY COME AND GO, LUCKILY THEY SOMETIMES GO,
28 BUT THEY ALSO OFTEN COME; SO YOU DEFINITELY WANT TO LOOK

1 OVER TIME WHAT THE EXPOSURE SOURCES ARE AND WHAT THE
2 EXPOSURE LEVELS ARE AND ARE THEY INCREASING OR
3 DECREASING OR IN WHAT WAY ARE THEY CHANGING OVERALL.

4 Q I WANT TO LOOK AT THIS PARAGRAPH HERE AT THE
5 BOTTOM. IT FLOWS ON TO THE NEXT PAGE.

6 HE WRITES -- SIR BRADFORD HILL WRITES, "WE HAVE
7 THEREFORE THE SOMEWHAT PARADOXICAL POSITION
8 THAT THE DIFFERENT RESULTS OF A DIFFERENT
9 INQUIRY CERTAINLY CANNOT BE HELD TO REFUTE THE
10 ORIGINAL EVIDENCE, YET THE SAME RESULTS FROM
11 PRECISELY THE SAME FORM OF INQUIRY WILL NOT
12 INVARIABLY GREATLY STRENGTHEN THE ORIGINAL
13 EVIDENCE. I MYSELF WOULD PUT A GOOD DEAL OF
14 WEIGHT UPON SIMILAR RESULTS REACHED IN QUITE
15 DIFFERENT WAYS; FOR EXAMPLE, PROSPECTIVELY AND
16 RETROSPECTIVELY."

17 DO YOU SEE THAT?

18 A YES. HE'S BASICALLY EXPLAINING WHAT I JUST
19 SAID. YOU KNOW, YOU WANT -- ACTUALLY IN MORE RECENT
20 LITERATURE THAT IS -- THERE'S A TERM FOR THIS, IT'S
21 CALLED TRIANGULATION, AND IT IS A WAY OF COMING TO A
22 CAUSAL CONCLUSION AND IT'S USED FOR CAUSAL EVALUATIONS
23 SAYING THAT NO STUDY, NO OBSERVATION IS EVER PERFECT.
24 EVERY STUDY HAS A SLIGHT LIMITATION OR A LARGE
25 LIMITATION IN ONE WAY OR ANOTHER.

26 BUT IF I COME AT THE SAME PROBLEM FROM
27 DIFFERENT ANGLES AND I STILL HAVE THE SAME ANSWER, AS,
28 YOU KNOW, YOU WOULD EXPECT UNDER, YOU KNOW, A CERTAIN

1 CIRCUMSTANCE THAT, YOU KNOW, THIS HIGH EXPOSURE SHOULD
2 SHOW YOU MORE EFFECT AND LOW EXPOSURE SHOULD SHOW YOU
3 LESS EFFECT, IN THIS POPULATION THAT'S MORE VULNERABLE
4 YOU SHOULD SEE MORE DISEASE. IN A POPULATION THAT IS
5 LESS VULNERABLE, YOU SHOULD SEE LESS DISEASE. CHILDREN
6 WHO ARE EXPOSED AT A CERTAIN AGE WHERE, YOU KNOW, IT'S
7 IRRELEVANT SHOULD NOT HAVE THE DISEASE, WHILE CHILDREN
8 EXPOSED AT THE RELEVANT AGE SHOULD HAVE THE DISEASE, ET
9 CETERA.

10 SO THIS IS WHAT WE USE, THESE DIFFERENT STUDIES
11 WITH DIFFERENT OUTCOMES IN THIS CASE, BUT ACCORDING TO A
12 HYPOTHESIS, HYPOTHESIS OF A, FOR EXAMPLE, SENSITIVE
13 PERIOD THAT IS BEING AFFECTED, A EXPOSURE THAT REALLY
14 NEEDS TO HIT THE RIGHT TIMING OF NEURODEVELOPMENT, FOR
15 EXAMPLE; ALL OF THAT IS BROUGHT TOGETHER AND IS MORE
16 THAN JUST ONE STUDY AND MORE JUST -- MORE THAN JUST ONE
17 PIECE OF EVIDENCE.

18 SO YOU NEVER CONCLUDE ANYTHING ON ONE PIECE OF
19 EVIDENCE. HOPEFULLY, YOU HAVE A LOT, AND HOPEFULLY YOU
20 HAVE A LOT OF DIFFERENT ONES.

21 Q NOW, DO YOU HAVE TO HAVE PROSPECTIVE AND
22 RETROSPECTIVE STUDIES TO HAVE CONSISTENT RESULTS?

23 A NOT NECESSARILY. THERE ARE SITUATIONS WHERE
24 YOU ONLY HAVE ONE TYPE OR ONLY THE OTHER AND YOU HAVE TO
25 ACT BECAUSE WE HAVE PUBLIC HEALTH, YOU KNOW, MINDED
26 INDIVIDUALS IN OUR DISCIPLINE. AND IF I HAVE ANIMAL
27 DATA AND MECHANISTIC DATA AND ONE TYPE OF EPIDEMIOLOGIC
28 STUDY IT CAN BE ENOUGH TO BE COMPELLED TO SAY, WELL, WE

1 NEED TO ACT, WE CANNOT WAIT FOR THE NEXT STUDY TO
2 HAPPEN. WE HAVE TO BE PROTECTING PUBLIC HEALTH.

3 Q LET'S LOOK AT WHAT YOU DID SPECIFICALLY IN YOUR
4 REPORT.

5 RIGHT DOWN HERE, YOU'RE GOING TO THE BRADFORD
6 HILL CRITERIA SPECIFICALLY AS IT RELATES TO LEAD AND
7 ASD, AND WRITE UNDER, "CONSISTENCY: THIS CRITERION IS
8 MET SINCE POSITIVE ASSOCIATIONS HAVE BEEN
9 REPORTED FOR DIFFERENT POPULATIONS IN
10 DIFFERENT GEOGRAPHIC REGIONS AND DIFFERENT TIME
11 PERIODS AS WELL AS DIFFERENT BIOLOGICAL
12 MATRICES WHICH STRENGTHENS THE LIKELIHOOD OF A
13 TRUE EFFECT."

14 DO YOU SEE THAT?

15 A YES.

16 Q THIS PRECISE THING THAT YOU STATE HERE,
17 DIFFERENT POPULATIONS, REGIONS, TIME PERIODS, BIOLOGICAL
18 MATRICES, IS THIS EXACTLY THE TYPE OF CONSISTENCY
19 ANALYSIS THAT SIR BRADFORD HILL MENTIONED BACK IN 1965?

20 A THAT'S WHAT I IMAGINE HE WANTED ME TO DO, YES.

21 Q NOW, DOCTOR, I WANT TO BE CLEAR BECAUSE DEFENSE
22 COUNSEL HAS TOLD THIS COURT THAT YOUR DEFINITION OF
23 CONSISTENCY IS SOMEWHERE ALONG THE LINES OF IF IT
24 DOESN'T MEET WHAT YOU WANT IT TO -- IF THE RESULTS OF
25 THE STUDY DON'T SHOW YOU WHAT YOU WANT, THEN IT'S NOT
26 CONSISTENT.

27 FIRST OF ALL, IS THAT EVEN REMOTELY ACCURATE
28 ABOUT HOW YOU GO ABOUT APPROACHING THE SCIENTIFIC

1 APPROACH AND SPECIFICALLY THE CONSISTENCY CRITERIA?

2 A NO, ABSOLUTELY NOT.

3 SO CONSISTENCY MEANS OF COURSE COMPARISON AND
4 IT MEANS COMPARISON OF DIFFERENT WAYS OF KNOWING THINGS
5 AND THAT MEANS DIFFERENT KINDS OF STUDIES AND IT DOESN'T
6 MEAN THAT EVERY STUDY HAS TO SHOW EXACTLY THE SAME
7 THING.

8 FOR EXAMPLE, IF I HAVE A POPULATION THAT'S VERY
9 HIGHLY EXPOSED, I MAY EXPECT A STRONGER EFFECT THAN IN A
10 POPULATION THAT IS LOW EXPOSED, RIGHT. SO I'M EXPECTING
11 DIFFERENT THINGS BASED ON WHAT THE EXPOSURE LEVELS ARE.
12 BUT THAT I SEE A STRONG EFFECT IN ONE POPULATION AND A
13 WEAK EFFECT IN ANOTHER IS NOT INCONSISTENT. IT'S
14 ACTUALLY CONSISTENT WITH MY EXPECTATION GIVEN THE LEVEL
15 OF EXPOSURE.

16 Q I GUESS THAT'S MY QUESTION.

17 SO IF -- I MEAN, WHEN YOU'RE LOOKING AT WHETHER
18 OR NOT DATA OR RESULTS ARE CONSISTENT, DO YOU FRAME
19 WHETHER IT'S CONSISTENT BASED UPON WHAT YOU ALREADY
20 KNOW?

21 A OF COURSE. YOU ALWAYS, YOU KNOW, THAT'S WHY WE
22 GET EDUCATED IN EPIDEMIOLOGY AND THAT'S WHY, YOU KNOW,
23 THERE'S A JOKE ABOUT HOW MANY TIMES CAN YOU DO A
24 STATISTICAL TEST AND, YOU KNOW, HAVE TO CORRECT FOR ALL
25 YOUR PREVIOUS STATISTICAL TESTS? THE OLDER YOU GET, THE
26 HARDER IT IS TO SHOW ANYTHING.

27 BUT THAT ASIDE, ACTUALLY, YES, YOU ALWAYS AS A
28 SCIENTIST YOU LEARN -- HOPEFULLY, YOU LEARN YOUR WHOLE

1 LIFE. HOPEFULLY YOU ARE FLEXIBLE ENOUGH TO CHANGE YOUR
2 MIND. HOPEFULLY YOUR BIASES WILL BE OVERWRITTEN BY THE
3 ACTUAL DATA THAT YOU'RE COLLECTING IF IT'S SHOWING YOU
4 SOMETHING ELSE.

5 AND BASICALLY, WE CALL THIS UPDATING OUR
6 PRIORS. SO WE HAVE A PRIOR -- PRIOR PROBABILITY THAT
7 SOMETHING IS AN EXPOSURE, IT CAUSES AN EFFECT, THEN I GO
8 OUT THERE, I COLLECT MORE DATA AND I UPDATE MY PRIORS;
9 MEANING, THE DATA ACTUALLY IS MEANINGFUL AND I ACTUALLY
10 USE IT TO CHANGE MY MIND.

11 Q NOW, I WANT TO SHOW YOU THIS CHART THAT WE'VE
12 PUT TOGETHER, AND THIS IS A FAIRLY COMPLEX CHART SO LET
13 ME WALK THROUGH IT ALL.

14 SO WHAT WE HAVE HERE IS EVERY STUDY WITH A
15 BIOMARKER RESULT THAT WE COULD DIG OUT OF YOUR REPORT.

16 AND BEFORE WE GO INTO WHAT THIS IS SHOWING,
17 DOCTOR, CAN I JUST ASK YOU SOMETHING: BEFORE YOU GOT
18 INVOLVED IN THIS LITIGATION, HAD YOU EVER SYSTEMATICALLY
19 WENT THROUGH ALL THE LITERATURE TO LOOK AT ALL OF THE
20 DATA ON METALS AND ASD?

21 A NO.

22 Q AND WHEN YOU DID, WERE YOU SURPRISED?

23 A I -- I WAS NOT REALLY SURPRISED, I HAVE TO SAY,
24 BECAUSE I'VE READ SO MUCH ABOUT LEAD AND THE BRAIN IN MY
25 LIFE, AND, YOU KNOW, LEAD IS A KNOWN NEUROTOXIN.

26 WHAT I WAS SURPRISED IS THAT SO MANY STUDIES
27 ACTUALLY STARTED TO EXIST AND SHOW THIS BECAUSE FOR THE
28 LONGEST TIME THE GENERAL BELIEF, AND I HAD THE SAME

1 BELIEF, WAS THAT IT'S GENETICS THAT CAUSES AUTISM, AND
2 IT'S LIKE ONE OF THOSE STORIES WHERE, YOU KNOW, YOU
3 DON'T LOOK BECAUSE YOU THINK YOU KNOW THE REASON, AND
4 THEN ALL OF A SUDDEN SOMEBODY SAYS, "BUT, BUT," YOU
5 KNOW, AND WE START ACTUALLY LOOKING AT -- WE ARE LOOKING
6 AT THE ENVIRONMENT AND WE ARE ACTUALLY INVESTING -- WE
7 START INVESTING THE ENVIRONMENT.

8 AND MY FAVORITE FUNDING AGENCY, THE NIEHS HAS
9 NOT INVESTED IN AUTISM STUDIES MUCH AT ALL BEFORE THE
10 YEAR 2000, AND THAT'S WHEN, YOU KNOW, EVERYBODY BELIEVED
11 IT'S GENETICS. AND THEN SLOWLY BUT SURELY THEY STARTED
12 INVESTING. NOW THEY RUN WHOLE AUTISM CENTERS. I MEAN,
13 THEY FUND AUTISM CENTERS.

14 AND YES, THERE'S A LOT OF DATA ACCUMULATING,
15 AND THESE LAST 20 YEARS REALLY CHANGED MY MIND.

16 Q NOW, LET'S LOOK AT THIS.

17 SO WE HAVE THIS DATA HERE. THIS IS ALL THE
18 POSITIVE AND STATISTICALLY SIGNIFICANT RESULTS, AND THIS
19 IS -- LOOKS LIKE SIX BY FIVE, SO IT LOOKS LIKE THERE'S
20 ABOUT 30 STUDIES HERE.

21 DO YOU SEE THAT, DOCTOR?

22 A YES.

23 Q ALL RIGHT. AND WE HAVE HERE DIFFERENT COLORS.
24 WE HAVE THE YELLOW, THE RED, THE BROWN, THE WHITE AND
25 THE BLUE.

26 DO YOU SEE THAT?

27 A YES.

28 Q AND JUST SO THAT THERE'S A KEY UP HERE. THE

1 BLOOD RE -- THE YELLOW REFERS TO URINE; RIGHT?

2 A UM-HMM YES.

3 Q RED IS BLOOD. BROWN IS HAIR. WHITE IS TEETH
4 AND NAILS. AND BLUE IS AIR STUDIES OR AIR POLLUTION
5 STUDIES.

6 DO YOU SEE THAT?

7 A YES.

8 Q ALL RIGHT. SO LOOKING HERE AT THIS CORPUS OF
9 STATISTICALLY SIGNIFICANT RESULTS, I SEE THAT THERE IS A
10 WHOLE HOST OF DIFFERENT STUDY DESIGNS.

11 DO YOU SEE THAT?

12 A YES.

13 Q YOU HAVE COHORT DESIGNS, YOU HAVE CASE CONTROL
14 STUDY DESIGNS. YOU HAVE CROSS SECTIONAL DESIGNS AND YOU
15 HAVE ECOLOGICAL STUDIES.

16 DO YOU SEE THAT?

17 A YES.

18 Q THE FACT THAT YOU HAVE SO MANY DIFFERENT
19 DESIGNS AND ALL SHOWING STATISTICALLY SIGNIFICANT
20 ELEVATED LEVELS OF LEAD IN ASD PATIENTS, WHAT, IF ANY,
21 SIGNIFICANCE DOES THAT HAVE TO YOU?

22 A WELL, THAT DISTRIBUTES TO CONSISTENCY ACROSS
23 DIFFERENT STUDY DESIGNS, AND NOT ONLY DIFFERENT STUDY
24 DESIGNS, BUT ALSO DIFFERENT BIOLOGIC MATRICES.

25 Q AND I SEE HERE THAT, YOU KNOW, SOME OF THESE
26 STUDIES ARE A LITTLE BIT OLDER. WE HAVE SOME FROM 2008
27 AND WE HAVE SOME FROM 2020.

28 DO YOU SEE THAT?

1 A YES.

2 Q WHAT, IF ANYTHING, DOES THAT PLAY INTO YOUR
3 UNDERSTANDING OF CONSISTENCY?

4 A THAT ACTUALLY CONTRIBUTES AGAIN BECAUSE WE KNOW
5 THAT OVERALL LEAD LEVELS IN THE ENVIRONMENT HAVE BEEN
6 DECREASING EXCEPT OF COURSE IN SPECIAL ENVIRONMENTS
7 WHERE WE HAVE LEAD PIPES AND WHERE WE HAVE LEAD SMELTERS
8 OR LEAD CONTAMINATION OF COMMUNITIES THAT WE KNOW OF.

9 BUT THE OVERALL LARGEST LEAD EXPOSURE IN
10 CHILDREN WAS PROBABLY THROUGH LEADED GASOLINE THAT
11 LUCKILY IN THE U.S. WAS STOPPED IN THE EARLY '80S, IN
12 EUROPE SLIGHTLY LATER, BUT WE STILL HAVE LEADED GASOLINE
13 IN QUITE A FEW OF THE COMMUNITIES THAT THESE CHILDREN
14 ARE LIVING IN.

15 Q NOW, OF THESE STUDIES, WHICH ONES DID YOU FIND
16 -- WELL, LET ME JUST DIRECT YOU TOWARDS THEM.

17 I WANT TO TALK ABOUT A FEW OF THESE JUST TO
18 GIVE SOME CONTEXT. I WANT TO TALK ABOUT THE ARORA
19 STUDY.

20 DO YOU SEE THAT, DOCTOR?

21 A YES.

22 Q I ALSO WANT TO TALK ABOUT THE FILON STUDY.

23 A YES.

24 Q AND I WANT TO TALK ABOUT THE KIM STUDY, OKAY?
25 DO YOU SEE THAT?

26 A YES.

27 Q AND ONE IS BLOOD, ONE IS HAIR, ONE IS TEETH;
28 RIGHT?

1 A RIGHT.

2 Q TWO OF THEM ARE COHORT STUDIES OR PROSPECTIVE
3 STUDIES, AND ONE OF THEM IS A CASE CONTROL STUDY.

4 DO YOU SEE THAT?

5 A YES.

6 Q ALL RIGHT. WHY DON'T WE START OFF WITH THE
7 ARORA STUDY.

8 WHY DON'T WE START OFF BY YOU DESCRIBING TO THE
9 COURT YOUR UNDERSTANDING OF WHAT THE ARORA STUDY WAS.

10 A YEAH, MANISH ARORA IS REALLY A STAR IN THIS
11 FIELD IN MANY WAYS BECAUSE HE IS PIONEERING THESE NEW
12 TECHNOLOGIES THAT HE APPLIES TO TEETH AND TO STUDY
13 METALS IN TEETH, AND NOT ONLY TO STUDY METALS IN TEETH,
14 BECAUSE THAT'S BEEN DONE BEFORE, PEOPLE HAVE GROUND UP
15 TEETH FOR A LONG TIME TO LOOK WHAT'S IN THERE, BUT HE
16 ACTUALLY DOES SOME KIND OF MEASUREMENTS WHERE HE KNOWS
17 EXACTLY DURING WHAT TIME OF THE DEVELOPMENTAL PERIOD
18 THAT PART OF THE TOOTH WAS ACTUALLY FORMED, AND
19 THEREFORE, INCLUDES EXPOSURES LIKE LEAD IN THE TOOTH
20 MATERIALS. SO HE CAN ACTUALLY STAGE REALLY WELL WHAT'S
21 HAPPENED AT WHAT TIME PERIOD OF DEVELOPMENT IN CHILDREN,
22 AND THAT'S OF COURSE IN THE TEETH THAT THE KIDS THEN
23 SHED BETWEEN AGE 6 AND 10 OR 12.

24 AND THE OTHER REALLY IMPORTANT PART ABOUT THE
25 STUDY WAS THAT HE USED THE SWEDISH TWIN REGISTRY AND
26 THAT'S ANOTHER REALLY AMAZING RESOURCE THAT SWEDEN HAS
27 THE KORALINSKA INSTITUTE IS RUNNING.

28 AND BASICALLY WHAT THEY ARE DOING IS THEY

1 REGISTER ALL THE TWINS THAT ARE BORN IN SWEDEN, AND
2 BECAUSE THEY HAVE A NATIONAL HEALTH SYSTEM, THEY CAN
3 ACTUALLY FIND THE ONES DIAGNOSED WITH CERTAIN DISORDERS
4 EASILY AND THEN THEY CAN ENROLL THEM IN SPECIAL STUDIES.
5 AND THAT'S WHAT THIS STUDY DID. THEY FOUND THE AUTISTIC
6 DIAGNOSED CHILDREN AND THEY ENROLLED THEM IN THIS STUDY
7 AND ASKED THEM TO HELP THEM BY GIVING THEM THEIR SHED
8 TEETH.

9 AND SO THAT'S A INCREDIBLY INTERESTING DESIGN
10 BECAUSE BASICALLY YOU HAVE MONOZYGOTIC AND DIZYGOTIC
11 TWINS, MEANING THE INTRAUTERINE ENVIRONMENT WAS EXACTLY
12 THE SAME AND THEN THE EARLY LIFE ENVIRONMENT PROBABLY
13 WAS THE SAME AS WELL. AND YOU HAVE THESE VERY DETAILED
14 MEASURES OF THE EXPOSURES IN THESE CHILDREN ACCORDING TO
15 THIS TOOTH MARKER.

16 AND THAT'S WHAT HE APPLIED, AND HE FOUND THAT
17 DEFINITELY LEAD IN THE LATE PREGNANCY BUT EVEN MORE IN
18 EARLY INFANCY WAS MUCH HIGHER IN THE AUTISTIC CHILDREN
19 THAN THE SIBLINGS.

20 Q NOW, LET'S TAKE A LOOK AT THAT STUDY VERY
21 QUICKLY.

22 IT STATES HERE IN THE INTRODUCTION, IT SAYS,
23 "FETAL AND EARLY CHILDHOOD EXPOSURE TO TOXIC
24 METALS AND DEFICIENCIES OF NUTRITIONAL ELEMENTS
25 HAVE BEEN LINKED WITH SEVERAL ADVERSE
26 DEVELOPMENTAL OUTCOMES FREQUENTLY ASSOCIATED
27 WITH ASD, INCLUDING INTELLECTUAL DISABILITY
28 IN LANGUAGE, ATTENTIONAL AND BEHAVIORAL

1 PROBLEMS."

2 THEN HE GOES ON TO TALK ABOUT, "ANIMAL STUDIES

3 HAVE DEMONSTRATED THAT THE EFFECTS OF VARIOUS

4 METALS ON BRAIN DEVELOPMENT COULD BE MEDIATED

5 THROUGH DISREGULATION OF NEUROTRANSMISSION AND

6 ALTERATIONS IN THE FRONTAL AND SUBCORTICAL

7 BRAIN STRUCTURES SEVERAL OF WHICH HAVE ALSO

8 BEEN IMPLICATED IN ASD."

9 AND SO HE SAYS, "THEREFORE ENVIRONMENTAL AND

10 DIETARY EXPOSURES TO METAL ARE IMPORTANT

11 ETIOLOGICAL FACTORS IN ASD."

12 LET ME JUST MAKE SURE I UNDERSTAND WHAT THAT

13 MEANS.

14 "THEREFORE" -- WHAT DOES THAT SENTENCE MEAN?

15 "THEREFORE ENVIRONMENTAL AND DIETARY EXPOSURES

16 TO METALS ARE POTENTIALLY IMPORTANT ETIOLOGICAL

17 FACTORS."

18 WHAT DOES THAT MEAN?

19 A WELL, WHAT HE'S REFERRING TO HERE IS THE

20 EXPERIMENTAL LITERATURE THAT ACTUALLY CAN LOOK AT

21 MECHANISMS IN THE BRAIN, RIGHT. WE CAN OPEN UP ANIMALS'

22 BRAINS AND WE CAN LOOK AT WHAT IS HAPPENING DURING

23 NEURODEVELOPMENT WHEN WE EXPOSE THESE ANIMALS TO METALS

24 AND THAT'S ACTUALLY BEEN DONE EXTENSIVELY, AND SO WE

25 KNOW A LOT ABOUT THESE METALS AND THAT'S WHY I WASN'T SO

26 SURPRISED WHEN I SAW FINALLY THESE STUDIES WHEN I WAS

27 ASKED TO LOOK AT THEM BECAUSE WE KNOW SO MUCH ABOUT WHAT

28 IS ACTUALLY HAPPENING WITH METALS IN THE BRAIN OF

1 ANIMALS AND WHAT KIND OF DISREGULATION THERE IS.

2 SO HE'S GOING BACK AS AN EXPERIMENTAL
3 SCIENTIST, AND A REALLY GOOD ONE, HE SAYS, WELL, THIS
4 GIVES ME ENOUGH CLUE TO SAY I HAVE TO LOOK INTO THIS
5 MORE CLOSELY AT ENVIRONMENT BECAUSE THAT'S WHERE THE
6 METAL COMES FROM THERE'S NO, YOU KNOW, WE -- LEAD IS NOT
7 IN THE BODY UNLESS IT GETS IN THERE THROUGH THE
8 ENVIRONMENT, AND POSSIBLY DIETARY EXPOSURES ARE ONE WAY
9 OF GETTING THESE METALS INTO YOUR BODY PROBABLY RELEVANT
10 FOR ASD.

11 Q YOU GO ON TO STATE OVER HERE, AGAIN, IN THIS
12 INTRODUCTION THAT, "THEY TESTED THE HYPOTHESIS THAT
13 PRENATAL AND EARLY LIFE EXPOSURE TO METAL
14 TOXICANTS OR DEFICIENCIES OF ESSENTIAL ELEMENTS
15 DURING CRITICAL DEVELOPMENTAL WINDOWS ARE
16 ASSOCIATED WITH ASD."
17 IT READS, "OUR PRIMARY FOCUS WAS ON LEAD AN
18 ESTABLISHED NEUROTOXICANT THAT HAS BEEN
19 IMPLICATED IN ASD."
20 DO YOU SEE THAT?

21 A YES, UM-HMM. YEAH, HE BASICALLY SAYS THAT WE
22 ALREADY KNOW THAT IT'S IMPLICATED IN ASD, BUT WHAT I
23 REALLY WANT TO DO IS KNOW THE TIMING OF THESE EVENTS,
24 AND THEREFORE, THE TEETH ARE A GREAT MATRIX FOR ME
25 BECAUSE I CAN MEASURE WHAT THESE ELEMENTS DO AT SPECIFIC
26 TIME PERIODS IN DEVELOPMENT.

27 Q EXACTLY.

28 A AND THAT'S --

1 Q EXACTLY.

2 HE SAYS RIGHT HERE. "BOTH THESE ELEMENTS HAVE
3 BEEN ASSOCIATED WITH ATTENTIONAL AND BEHAVIORAL
4 OUTCOMES RELATIVE TO ASD."

5 SO LET'S GO INTO SEE WHAT HIS ACTUAL
6 CONCLUSIONS WERE AFTER -- I MEAN, WHAT WE KNOW HERE --
7 AND I JUST THINK THIS IS PRETTY COOL. THEY ACTUALLY HAD
8 A LASER GO INTO THEIR TEETH TO MEASURE THE EXACT TIMING
9 OF EXPOSURES; IS THAT RIGHT?

10 A YES.

11 Q AND, DOCTOR, I MEAN, I THINK WHEN YOU HAVE A
12 STUDY LIKE THIS THAT'S THIS SPECIFIC AND THIS DETAILED
13 OF THE AMOUNT OF EXPOSURES THE PARTICIPANTS WERE
14 EXPERIENCING AT THIS EARLY STAGE IN THEIR LIFE, DO YOU
15 HAVE ANY CONCERNS HERE ABOUT REVERSE CAUSATION?

16 A ABSOLUTELY NOT.

17 Q WHY IS THAT?

18 A WELL, BECAUSE THE TOOTH, WE KNOW SO MUCH ABOUT
19 TOOTH DEVELOPMENT AND BIOLOGY, YOU KNOW, WHAT WE KNOW
20 FROM BIOLOGY IS REALLY HARD FACTS, HOW THE TOOTH
21 DEVELOPS AT WHAT POINT OF TIME WHICH LAYER OF THIS TOOTH
22 WAS ACTUALLY FORMED, AND, YEAH, WE MAY BE WRONG A FEW
23 DAYS, BUT WE'RE NOT WRONG MONTHS OR YEARS. AND WE
24 DEFINITELY, WITH THIS KIND OF METHOD, CAN TIME THE
25 EXPOSURE VERY WELL.

26 Q NOW, DOCTOR, THE DR. ARORA HAS SET UP THIS
27 HYPOTHESIS, HE SAYS THIS IS WHAT WE'RE GOING TO TEST,
28 OKAY, LET'S LOOK AT SEE WHAT THE CONCLUSION OF THAT

1 HYPOTHESIS WAS.

2 HE WRITES, "TAKEN TOGETHER THIS SUPPORTS THE
3 HYPOTHESIS THAT PRE-NATAL AND EARLY CHILDHOOD
4 DISRUPTION, EXCESS OR DEFICIENCIES OF MULTIPLE
5 METALS DURING CRITICAL DEVELOPMENTAL PERIODS"
6 -- SORRY -- "DEVELOPMENTAL WINDOWS IS
7 ASSOCIATED WITH ASD AND SUGGESTS A ROLE FOR
8 ELEMENTAL DYSREGULATION IN THE ETIOLOGY OF
9 ASD."

10 DO YOU SEE THAT?

11 A YES.

12 Q SO HE SETS THIS HYPOTHESIS. HE RUNS AN
13 EXPERIMENT AND HE CONCLUDES THAT IT, TAKEN TOGETHER,
14 THAT THAT HYPOTHESIS IS ESTABLISHED, THAT, IN FACT,
15 DURING THESE EARLY DEVELOPMENTAL WINDOWS, IT APPEARS TO
16 BE A RELEVANT TO THE ETIOLOGY OF ASD.

17 DO YOU SEE THAT?

18 A YES.

19 Q WHAT ROLE DOES THIS STUDY WHICH SUFFERS FROM NO
20 ISSUES RELATED TO REVERSE CAUSATION HAVE IN YOUR
21 ANALYSIS?

22 A WELL, IT WAS ONE OF THE VERY IMPORTANT STUDIES
23 THAT I CONSIDERED AND THAT, YOU KNOW, INFORMED MY
24 OPINION OF CAUSALITY.

25 Q OKAY. GREAT.

26 I WANT TO LOOK AT ANOTHER STUDY THAT
27 SPECIFICALLY I MENTIONED EARLIER.

28 LET'S LOOK AT THE FILON STUDY. THIS IS THAT

1 CASE CONTROL STUDY THAT WE DISCUSSED A MINUTE AGO.

2 DO YOU RECALL?

3 A UM-HMM.

4 Q OKAY. SO I'M SHOWING HERE EXHIBIT 57.

5 AND THIS IS, YOU CAN SEE HERE A STUDY BY A
6 DR. FILON, AN ANALYSIS OF LEAD, ARSENIC AND CALCIUM
7 CONTENT IN THE HAIR OF CHILDREN WITH AUTISM SPECTRUM
8 DISORDER.

9 DO YOU SEE THAT?

10 A YES.

11 Q OKAY.

12 AND THIS IS A CASE CONTROL STUDY. SO THIS IS
13 ONE OF THOSE SITUATIONS -- WELL, EXPLAIN TO US WHAT THEY
14 DID HERE, IF YOU RECALL.

15 A YEAH, SO WHAT THEY DO HERE IS THEY ASSEMBLE
16 CHILDREN WITH AUTISM FIRST AND THEN THEY MATCH THEM TO A
17 CONTROL POPULATION AND THEY ASK THEM TO SHARE SOME HAIR,
18 SOME MATRIX, IN THIS CASE HAIR, AND THEY THEN APPLIED
19 THE SAME MEASUREMENTS TO THE HAIR OF ALL THE CHILDREN,
20 THE CASES AND CONTROLS, AND THEN COMPARE THE LEVELS IN
21 CASES TO THE LEVELS IN CONTROLS.

22 Q AND SO WHEN THEY DID THAT AND THEY MEASURED IT,
23 THEY SHOW HERE THAT THE LEAD LEVELS WERE STATISTICALLY
24 SIGNIFICANTLY GREATER IN THE CASE, IN THE AUTISTIC KIDS,
25 THAN IN THE CONTROL GROUP.

26 DO YOU SEE THAT?

27 A YES, UM-UM.

28 Q AND IT LOOKS LIKE IT'S ABOUT DOUBLE OF AMOUNT

1 OF HAIR LEAD.

2 DO YOU SEE THAT?

3 A YES, UM-HMM.

4 Q AND THEY ALSO ACTUALLY INTERESTINGLY ENOUGH
5 FOUND A STATISTICALLY SIGNIFICANT RESULT FOR ARSENIC AS
6 WELL.

7 DO YOU SEE THAT?

8 A YES, CORRECT.

9 Q AND THAT'S ABOUT THREE AND A HALF TIMES MORE
10 ARSENIC; RIGHT?

11 A RIGHT.

12 Q OKAY.

13 NOW, WHAT I FOUND FASCINATING ABOUT THIS IS IF
14 YOU GO TO THE CONCLUSION -- WELL, LET'S ACTUALLY LOOK AT
15 THE DISCUSSION FIRST.

16 YOU SEE DOWN HERE THERE'S A DISCUSSION ABOUT
17 LEAD.

18 DO YOU SEE THAT?

19 A YES.

20 Q TALKS ABOUT LEAD BEING ONE OF THE MOST
21 DANGEROUS METALS DUE TO ITS COMMON OCCURRENCE IN THE
22 ENVIRONMENT.

23 YOU'D AGREE WITH THAT, RIGHT, DOCTOR?

24 A ABSOLUTELY.

25 Q IT'S HIGHLY TOXIC, HAS THE ABILITY TO EASILY
26 CROSS BIOLOGICAL BARRIERS AND ACCUMULATES IN THE
27 INTERNAL ORGANS.

28 YOU AGREE WITH THAT?

1 A OH, YES, WE HAVE IT ALL IN OUR BONES.

2 Q "MAY AFFECT THE FUNCTIONS OF BOTH THE CENTRAL
3 AND PERIPHERAL NERVOUS SYSTEMS AS WELL AS THE
4 SENSES."
5 DO YOU SEE THAT?

6 A YES. ABSOLUTELY.

7 Q IT SAYS THAT, "NUMEROUS STUDIES HAVE CONFIRMED
8 THAT EXCESS EXPOSURE TO LEAD RESULTS IN AMONG
9 OTHER THINGS CONVULSIONS, CHANGES OF BRAIN
10 FUNCTIONS AND THEN ENCEPHALOGRAM CHANGES AS
11 WELL ACUTE ENCEPH --
12 ENCEPHALOPATHY.

13 Q THANK YOU.
14 "AND OTHER BRAIN DISORDERS."
15 DO YOU SEE THAT, DOCTOR?

16 A YES, YES.

17 Q AND IT GOES ON AND ON.
18 AND THEN ON THE NEXT PAGE IN THIS DISCUSSION IT
19 CONTINUES.
20 IT SAYS, "THE NERVOUS SYSTEM OF FETUSES AND
21 SMALL CHILDREN SHOW HIGHER SENSITIVITY TO LEAD
22 INTOXICATION COMPARED TO ADULTS."
23 DO YOU SEE THAT?

24 A YES.

25 Q "THIS RESULTS FROM A GREATER SUSCEPTIBILITY OF
26 THE BRAIN TO DISORDERS ESPECIALLY IN THE PERIOD
27 OF FAST GROWTH."
28 DO YOU SEE THAT?

1 A YES.

2 Q ALL RIGHT.

3 AND THEN IT GOES ON, I MEAN, I'M SHOWING THIS
4 BECAUSE I WANT TO GIVE THE COURT SOME CONTEXT OF WHAT
5 THE CURRENT LITERATURE IS SAYING.

6 IT SAYS HERE, "IN OUR REACH RESEARCH MEAN
7 ARSENIC AND LEAD CONTENT IN THE HAIR OF
8 CHILDREN WITH ASD WAS STATISTICALLY
9 SIGNIFICANTLY HIGHER COMPARED TO THE MEAN
10 CONTENT OF THESE ELEMENTS IN THE HAIR OF
11 CHILDREN FROM THE CONTROL GROUP. NUMEROUS
12 STUDIES HAVE CONFIRMED THAT HEAVY METALS PLAY A
13 CRUCIAL ROLE IN THE DEVELOPMENT OF AUTISM
14 SPECTRUM DISORDERS."

15 DO YOU SEE THAT?

16 A YES.

17 Q AND THERE'S A BUNCH OF CITATIONS. AND THEN IT
18 GOES ON TO DISCUSS SOME OF THEM LIKE YASUDA AND FIDO AND
19 ASAD.

20 DO YOU SEE THAT?

21 A YES.

22 Q AND THEN AT THE VERY END OF THIS HAVING
23 REVIEWED ALL THAT LITERATURE, THE BIOLOGICAL
24 PLAUSIBILITY, THE AUTHORS OF THIS STUDY STATE:

25 "NOTWITHSTANDING EVIDENCE LIMITATIONS, THE
26 STUDY SUGGESTS THAT ABNORMAL CONCENTRATIONS OF
27 THE ANALYZED ELEMENTS MAY INDICATE A
28 PATHOPHYSIOLOGICAL ROLE OF HEAVY METALS AND

1 TRACE ELEMENTS IN THE GENESIS OF SYMPTOMS OF
2 SYMPTOMS OF AUTISM SPECTRUM DISORDER."

3 DO YOU SEE THAT?

4 A YES.

5 Q NOW, DOCTOR, IS IT NORMAL FOR AN EPIDEMIOLOGIST
6 PUBLISHING A CASE CONTROL STUDY LIKE THIS TO REACH SUCH
7 SWEEPING CONCLUSIONS IN ISOLATION?

8 A NO, THEY WOULDN'T DO IT IN ISOLATION AND THEY
9 WOULDN'T DARE DOING IT UNLESS THERE WAS SO MUCH PREVIOUS
10 EVIDENCE AND THEY WANT TO KIND OF TELL YOU THAT, WELL,
11 NOT ONLY IS THERE SO MUCH EVIDENCE, OUR STUDY IS
12 ACTUALLY RIGHT THERE WITH EVERYBODY ELSE.

13 Q BETTER WAY TO PUT IT; CONSISTENT?

14 A IT'S CONSISTENT, YES. AND YOU'RE ALWAYS HAPPY
15 WHEN YOU CAN SAY MY STUDY RESULTS ARE CONSISTENT WITH
16 PREVIOUS LITERATURE, MEANING I HAVE NOT MADE IT UP.

17 Q NOW, DOCTOR, THIS STUDY, WE LOOKED AT AN
18 EARLIER ONE ON TEETH, AND WE TALKED ABOUT HOW RELIABLE
19 THAT WAS AS A BIOMARKER.

20 WHAT ABOUT HAIR? IS HAIR A PRETTY RELIABLE
21 BIOMARKER FOR MEASURING PAST EXPOSURES?

22 A IT IS. IT IS A LITTLE HARDER BECAUSE HAIR CAN
23 BE MORE EASILY CONTAMINATED AND IT DEPENDS ON WHERE ON
24 THE SCALP YOU TAKE THE HAIR OR, YOU KNOW, HOW LONG THE
25 HAIR IS, HOW OLD THE CHILD IS, BUT IT IS ONE OF THOSE
26 MATRICES THAT DEFINITELY TELLS YOU A LITTLE BIT MORE
27 ABOUT THE PAST DEPENDING ON HOW LONG THE HAIR IS, THE
28 SAMPLE IS THAT YOU TAKE, IT TELLS YOU SOMETHING ABOUT

1 THE PAST EXPOSURE BECAUSE OF COURSE THE LEAD GETS IN
2 THERE WHILE THE HAIR IS GROWING.

3 Q NOW, YOU SAID IT CAN EASILY GET CONTAMINATED,
4 BUT IS THERE ANY REASON TO BELIEVE THAT THE HAIR OF
5 AUTISTIC CHILDREN WOULD BE CONTAMINATED DIFFERENTLY THAN
6 THE HAIR OF THE NON AUTISTIC CONTROLS?

7 A ABSOLUTELY NOT. BECAUSE IF THEY BOTH WOULD BE
8 EXPOSED TO THE SAME DUST OR, YOU KNOW, CONCENTRATIONS IN
9 THE ENVIRONMENT, UNLESS THERE IS, YOU KNOW, A -- YOU
10 HAVE TO COME UP WITH SOME REALLY WEIRD REASON WHY THE
11 HAIR IN AUTISTIC -- OF AUTISTIC CHILDREN WOULD BE
12 TREATED DIFFERENTLY FROM THE NON AUTISTIC CHILDREN.

13 Q AND WHEN YOU DO -- WHEN YOU LOOK AT HAIR HERE
14 AND, LET'S SAY, FOR A SECOND THAT BOTH THE AUTISTIC
15 CHILDREN AND THE NON AUTISTIC CHILDREN HAD SIMILAR
16 AMOUNTS OF LEAD CONTAMINATION OR ARSENIC CONTAMINATION
17 IN THEIR HAIR, WHAT AFFECT WOULD THAT HAVE ON THE
18 RESULTS, IF ANY?

19 A YOU KNOW, MEANING, IT IS ACTUALLY IN THE HAIR
20 SAMPLE OR THE HAIR SAMPLE IS CONTAMINATED?

21 Q WELL, I GUESS WHAT I'M TRYING TO SAY IS IF THE
22 HAIR IS -- IF THERE'S EQUAL AMOUNT OF ADDITIONAL LEAD OR
23 METALS IN THE HAIR FOR BOTH THE CASES AND CONTROLS --

24 A OH, YES.

25 Q -- WHAT EFFECT DOES THAT HAVE ON THE RESULTS?

26 A SO IF MY EXPERIMENTER WHO TOOK THE HAIR SAMPLE
27 WAS NOT CAREFUL AND CONTAMINATED THE HAIR, IN THE END I
28 WOULDN'T SEE A DIFFERENCE BECAUSE IT IS A NOISE TO

1 SIGNAL RATIO, SO IF I CONTAMINATE EVERYTHING, I DON'T
2 SEE THE SIGNAL ANYMORE.

3 Q AND THAT'S KIND OF GETTING TO WHERE I THINK
4 IT'S REALLY IMPORTANT.

5 JUST BECAUSE THE RESULT IS NULL, MEANING IT'S
6 NOT SHOWING ANY DIFFERENCE, DOES THAT MEAN THAT THERE'S
7 NO RISK?

8 A NO. THAT MEANS THAT YOU HAVE TO REALLY LOOK AT
9 HOW WAS IT MEASURED AND, YOU KNOW, WHO MEASURED IT AND
10 IS THERE A CHANCE THAT IN THIS MATRIX THERE IS A PROBLEM
11 LIKE IN HAIR OR URINE THERE MAY BE MORE THAN IN BLOOD,
12 ET CETERA.

13 Q SO FOR EXAMPLE, WHEN WE LOOK AT THE STUDY CHART
14 HERE, WE'VE LOOKED AT A CASE CONTROL STUDY, WE'VE LOOKED
15 AT A RETROSPECTIVE TOOTH STUDY, WE LOOKED AT A HAIR
16 STUDY.

17 THE FACT THAT YOU HAVE, FOR EXAMPLE, SOME
18 NEGATIVE STATISTICALLY SIGNIFICANT RESULTS, DOES THAT
19 MEAN THAT THERE'S INCONSISTENCY THAT PREVENTS YOU FROM
20 FINDING CAUSATION?

21 A NO, IT DOESN'T DO THAT. IT MEANS THAT I HAVE
22 TO LOOK AT THESE STUDIES VERY CAREFULLY AND SEE WHY THEY
23 WOULD TELL ME THAT YOU SHOULD SPRINKLE LEAD ON YOUR
24 CEREAL IN ORDER TO PREVENT AUTISM BECAUSE WE WOULDN'T
25 BELIEVE THAT AS A PRIOR, YOU KNOW, THAT SEEMS KIND OF
26 UNLIKELY.

27 I'M NOT SAYING THAT THESE STUDIES DID ANYTHING
28 WRONG ON PURPOSE, BUT IT WOULD MAKE ME LOOK CLOSER AT

1 THEM TO AT LEAST SEE, FIND SOME EXPLANATION FOR WHY THEY
2 SAW STATISTICALLY SIGNIFICANT NEGATIVE RESULTS.

3 IT COULD JUST BE RANDOM BECAUSE, YOU KNOW,
4 RANDOM THINGS HAPPEN JUST BY CHANCE, BUT IT COULD ALSO
5 MEAN THERE'S A BIAS, AND JUST LIKE I LOOK AT POSITIVE
6 STUDIES CAREFULLY TO FIND A BIAS AND CONVINCED MYSELF
7 WHETHER OR NOT THAT POSITIVE RESULT SHOULD BE TAKEN
8 SERIOUSLY OR NOT, I DEFINITELY LOOK AT THE NEGATIVE ONES
9 IN THE SAME WAY, BUT I DON'T USE THEM AS AN ARGUMENT FOR
10 INCONSISTENCY. THEY IN FACT MAY MAKE THE WHOLE PICTURE
11 MORE CONSISTENT IF I DISCOVER CERTAIN TYPES OF BIASES
12 THAT WOULD EXPLAIN WHY I SEE WHAT I SEE.

13 Q NOW, DOCTOR, IF I WERE TO JUST WHITE OUT ALL OF
14 THE NONSIGNIFICANT RESULTS AND JUST LOOK AT THE
15 STATISTICALLY SIGNIFICANT RESULTS, WOULD THAT BE A FAIR
16 WAY OF SAYING, WELL, LOOK HOW MANY POSITIVE STUDIES
17 THERE ARE, CLEARLY IT'S CAUSAL?

18 A NO, WE -- WE DON'T -- WE DON'T ARGUE THAT WAY.
19 I ALWAYS TELL MY STUDENTS DON'T JUST DO STUDY COUNTING.
20 BUT IT IS KIND OF IMPRESSIVE HOW MANY STUDIES IN HOW
21 MANY DIFFERENT PLACES ALL OVER THE WORLD SHOWED POSITIVE
22 RESULTS.

23 Q AND THAT'S EXACTLY WHAT I WAS GOING TO GET AT,
24 DOCTOR.

25 WHEN YOU SEE THIS LARGE NUMBER OF DIFFERENT
26 TIME PERIODS, WE HAVE STUDIES HERE IN THE '80S, WE HAVE
27 STUDIES HERE LIKE THE FIDO STUDY, THE FILON STUDY WE
28 JUST LOOKED AT WAS A YEAR AND A HALF OLD.

1 WHAT DOES THAT TELL YOU AS A SCIENTIST INSOFAR
2 AS -- WELL, LET ME ASK YOU THIS, LET ME ASK YOU A BETTER
3 QUESTION.

4 WHEN YOU'VE CONCLUDED THAT THERE IS CONSISTENCY
5 IN THE DATA TO SUPPORT CAUSATION, DID YOU USE ANY
6 CONJECTURE OR LEAPS OF LOGIC TO GET THERE?

7 A I DON'T BELIEVE SO BECAUSE THERE'S SO MUCH
8 EVIDENCE THAT IT'S NOT REALLY NECESSARY TO MAKE ANY
9 CONJECTURES AND LEAPS OF FAITH HERE, I DON'T EVEN HAVE
10 TO GO TO OTHER TYPES OF STUDIES, MECHANISM OR ANIMALS,
11 WHEN I HAVE SO MUCH HUMAN DATA IN FRONT OF ME.

12 Q NOW, DOCTOR, I WANT TO ASK YOU ONE OTHER
13 QUESTION AND I'M NOT GOING TO PULL IT OUT. I JUST WANT
14 TO ASK YOU ABOUT IT. I WANT TO TALK ABOUT THIS KIM
15 STUDY.

16 I SEE THAT IT IS A COHORT STUDY IN BLOOD; IS
17 THAT RIGHT?

18 A YES.

19 Q AND COULD YOU JUST BRIEFLY DESCRIBE TO THE
20 COURT WHAT THEY DID AND WHAT THEY FOUND.

21 A YEAH.

22 SO KIM IS AN INTERESTING STUDY THAT WAS DONE
23 THIS KOREA BY SOME COLLEAGUES OF OURS WHO WENT TO
24 SCHOOLS AND ENROLLED I THINK FROM AT LEAST TEN DIFFERENT
25 CITIES AND EVEN MORE SCHOOLS, SCHOOL CHILDREN AT THE AGE
26 7 TO 8 AND THEN TOOK BLOOD MEASURES, BLOOD SAMPLES, IN
27 WHICH THEY THEN MEASURED THE BLOOD LEAD LEVELS. AND
28 THEY ASKED THE CHILDREN AT THE BASELINE 7 TO 8 YEARS, OR

1 BETTER THEIR PARENTS, WHETHER ANY OF THEIR KIDS HAVE
2 BEEN DIAGNOSED WITH AUTISM SPECTRUM DISORDER, AND THOSE
3 KIDS WERE EXCLUDED, SO THEY ONLY WENT WITH THE ONES THAT
4 DID NOT HAVE A DIAGNOSIS AT AGE 7 TO 8.

5 AND THEY FOLLOWED THEM UP INTO THE FUTURE.
6 THEY TOOK ANOTHER BLOOD SAMPLE WHEN THEY WERE 10 AND
7 THEN ANOTHER BLOOD SAMPLE WHEN THEY WERE ABOUT 12, 11 OR
8 12.

9 AND AT THE TIME WHEN THEY WERE 11 OR 12, THEY
10 ALSO ASKED THE PARENTS AGAIN TO REPORT SYMPTOMS
11 ACCORDING TO A VALIDATED SYMPTOM QUESTIONNAIRE FOR
12 AUTISM SPECTRUM DISORDER AND COMPARED THE BLOOD -- AND
13 THEN ANALYZED THE BLOOD LEAD LEVELS FROM THE ORIGINAL
14 BASELINE WHICH WAS IN FIVE, YEAH, ABOUT FIVE YEARS PRIOR
15 TO THE ASSESSMENT BY THE PARENTS OF THE KIDS, AND THEY
16 FOUND THAT THE BLOOD LEAD LEVEL PREDICTED THE OUTCOME
17 ASD BEHAVIOR TYPES VERY WELL AND EVEN AT THE RELATIVELY
18 LOW LEVEL THAT IN THIS REGULAR CHILD POPULATION IN
19 KOREA, ALL OVER KOREA, TEN DIFFERENT CITIES, IT
20 DESCRIBED THE CORRELATION, THE ASSOCIATION BETWEEN THOSE
21 EARLY MEASURES AT 7 TO 8 YEARS AND THE OUTCOMES AT AGE
22 11/12.

23 Q SO THE KIM STUDY AND I'M JUST GOING TO POP IT
24 UP REALLY QUICKLY. THIS IS EXHIBIT 87 FOR THE RECORD.

25 AND THIS IS THE CONCLUSION HERE, IT SAYS:

26 "EVEN LOW BLOOD LEVEL CONCENTRATIONS AT 7 TO 8
27 YEARS OLD OF AGE ARE ASSOCIATED WITH MORE
28 AUTISTIC BEHAVIORS AT 11 TO 12 YEARS OF AGE

1 UNDERSCORING THE NEED FOR CONTINUING EFFORTS TO
2 REDUCE LEAD EXPOSURES."

3 DO YOU SEE THAT?

4 A YES.

5 Q NOW, BECAUSE THIS IS A --

6 A AND BY THE WAY, THIS IS A STUDY OF THOUSANDS OF
7 KIDS, VERY BIG.

8 Q SO I GUESS THE QUESTION IS, DOCTOR, I HAVE TWO
9 QUESTIONS HERE, AND THE FIRST IS ARE YOU CONCERNED ABOUT
10 REVERSE CAUSALITY IN THIS STUDY?

11 A NO.

12 Q AND THAT'S BECAUSE THEY MEASURED THEIR BLOOD
13 ALONG THE WAY JUST LIKE YOU SAID YOU COULD DO TO SEE IN
14 A COHORT STUDY IF THAT'S WHAT'S HAPPENING; RIGHT?

15 A RIGHT. AND THEY DIDN'T ONLY MEASURE IT ONCE,
16 THEY MEASURED IT THREE DIFFERENT TIMES AND THEY FOUND
17 THAT IT'S REALLY THESE FIVE YEARS PRIOR THAT WERE
18 PREDICTIVE.

19 Q OKAY.

20 NOW, THERE'S TWO OTHER QUESTIONS ABOUT THOSE
21 THAT I THINK WE'VE GOT TO MAKE SURE WE UNDERSTAND.

22 I MEAN, THE FIRST IS WE'RE TALKING ABOUT 7 AND
23 8 YEAR OLDS AND THEN FOLLOWING THEM UNTIL THEY ARE 11
24 AND 12. I MEAN, I THOUGHT BY THAT POINT AUTISM WAS
25 ESTABLISHED AND SET IN STONE. HOW CAN THIS TELL US
26 ANYTHING ABOUT THE EARLIER EXPOSURES AND THE EFFECTS
27 THEY HAVE ON ASD?

28 A WELL, IT DOESN'T TELL US SOMETHING ABOUT THE

1 EARLIER EXPOSURES. BUT WHAT IT DOES TELL US IS AUTISM
2 OF COURSE IS A SPECTRUM AND NONE OF THESE CHILDREN THAT
3 AT AGE 11/12 HAD THE AUTISTIC BEHAVIORS WERE REALLY
4 AUTISTIC CHILDREN. BUT WE KNOW, AND IT'S NOW VERY WELL
5 ACKNOWLEDGED, THAT AUTISM IS A SPECTRUM DISORDER AND
6 THAT CERTAIN BEHAVIORS CATEGORIZE -- NOT CATEGORIZE YOU
7 -- THEY PUT YOU CLOSER TO THAT PHENOTYPE OF AUTISM.

8 SO IF LEAD AT AGE 7/8, AND THAT'S ABOUT THAT
9 TIMING OF EXPOSURE -- AT THE LOW LEVELS THAT IT WAS IN
10 THIS POPULATION HAS AN EFFECT ON THESE KIND OF
11 BEHAVIORS, THAT'S ACTUALLY VERY WORRISOME BECAUSE THE
12 BRAINS AND AS VULNERABLE ANYMORE AS THEY WOULD HAVE BEEN
13 MUCH EARLIER IN LIFE. AND WE ARE STARTING WITH A
14 POPULATION WHERE, YOU KNOW, NONE OF THESE KIDS WAS
15 AUTISM SPECTRUM AT 7 OR 8 BECAUSE THE PARENTS HAD BEEN
16 ASKED ABOUT IT, PLUS THESE ARE NORMAL SCHOOLS. AND
17 ACTUALLY I THINK THE AUTHORS EVEN SAY THAT IN THEIR
18 DISCUSSION THAT REAL AUTISTIC CHILDREN WOULD BE NOT IN
19 THESE TYPES OF SCHOOLS, ENROLLED IN THESE SCHOOLS, SO
20 THE AUTISM BEHAVIOR THEY ARE SHOWING IS HIGHLY
21 FUNCTIONAL, THEY ARE AT THE VERY FUNCTIONAL END OF
22 AUTISM.

23 BUT EVEN AT THAT AGE YOU CAN SEE LEAD EFFECTS
24 AT THE LOW LEVELS OF LEAD AND THAT'S REALLY WORRISOME.

25 Q IF THEY ARE TELLING THAT LOW LEVELS OF LEAD CAN
26 INDUCE AUTISTIC BEHAVIORS AT THIS LATER STAGE IN BRAIN
27 DEVELOPMENT --

28 A RIGHT.

1 Q -- DOES THAT INFORM YOUR ANALYSIS OF WHAT KIND
2 OF LEAD EXPOSURES WHEN YOU'RE SIX MONTHS YEAR OLD WOULD
3 HAVE?

4 A ABSOLUTELY. I MEAN, WE KNOW THAT YOU'RE MUCH
5 MORE VULNERABLE TO TOXINS, TO NEUROTOXINS AT AN EARLIER
6 AGE, AND YOU KNOW, IF YOU SEE THOSE IN 7 TO 8 YEAR OLDS,
7 THEN YOU'RE DEFINITELY WORRY MORE ABOUT THE YOUNGER KIDS
8 AND THEIR EXPOSURES.

9 Q ALL RIGHT. WE'RE RUNNING OUT OF TIME QUICKLY,
10 SO I WANT TO -- SORRY, THAT WAS THE WRONG EXHIBIT. I
11 WANT TO GO BACK TO THE HILL FACTORS. I WANT TO TALK
12 ABOUT TEMPORALITY VERY QUICKLY. I THINK WE'VE COVERED
13 IT MOSTLY ALREADY, AND THEN I WANT TO FINISH UP ON ADHD
14 WHICH SHOULDN'T TAKE TOO LONG.

15 SO IF WE GO BACK TO THE HILL ARTICLE AND WE GO
16 TO THE TEMPORALITY CRITERIA, IT STARTS HERE AT THE
17 BOTTOM.

18 HE WRITES, "MY FOURTH CHARACTERISTIC IS THE
19 TEMPORAL RELATIONSHIP OF THE ASSOCIATION, WHICH
20 IS THE CART AND WHICH IS THE HORSE? THIS IS A
21 QUESTION WHICH MIGHT BE PARTICULARLY RELEVANT
22 WITH DISEASES OF SLOW DEVELOPMENT, DOES A
23 PARTICULAR DIET LEAD TO DISEASE OR TO THE EARLY
24 STAGES OF DISEASE LEAD TO THOSE PARTICULAR
25 DIETARY HABITS?

26 DOES A PARTICULAR OCCUPATION OR OCCUPATIONAL
27 ENVIRONMENT PROMOTE INFECTION BY THE
28 TUBERCULOBACULUS OR ARE THE MEN AND WOMEN WHO

1 SELECT THAT KIND OF WORK MORE LIABLE TO
2 CONTRACT TUBERCULOSIS, WHATEVER THE ENVIRONMENT
3 OR INDEED HAVE THEY ALREADY CONTRACTED IT?
4 THIS TEMPORAL PROBLEM MAY NOT ARISE OFTEN, BUT
5 IT CERTAINLY NEEDS TO BE REMEMBERED,
6 PARTICULARLY WITH SELECTIVE FACTORS AT WORK IN
7 INDUSTRY."

8 DO YOU SEE THAT, DOCTOR?

9 A YES.

10 Q AND HERE IN YOUR REPORT YOU STATE, AND I'LL
11 JUST PULL IT UP SINCE WE CAN KEEP IT -- KEEP THE RECORD
12 CLEAR.

13 YOU WRITE: "TEMPORALITY. THAT DISEASE
14 OCCURRED AFTER EXPOSURE AND THAT THERE'S AN
15 EXPECTED DELAY BETWEEN THE CAUSAL FACT HAS ALSO
16 BEEN REPORTED, I.E., EXPOSURES WERE ASSESSED
17 AND RECORDED FOR EARLY INFANCY IN BABY TEETH."
18 THAT'S THE ARORA STUDY; RIGHT?

19 A RIGHT.

20 Q AND THE KOREAN CHILD COHORT STUDY AND THE
21 NORWEIGIAN MOBA COHORT.

22 DO YOU SEE THAT?

23 A YES.

24 Q BECAUSE YOU'VE SEEN STUDIES THAT SHOW
25 TEMPORALITY AND WHEN YOU COMBINE THAT WITH THIS VERY
26 LARGE DATA OF OTHER STUDIES, DO YOU BELIEVE AS AN
27 EPIDEMIOLOGIST THAT THE TEMPORALITY REQUIREMENT IS
28 SATISFIED?

1 A YES. AND THAT'S WHY I SAID IT IN THIS WAY. IF
2 I HAD ONLY HAD THE CASE CONTROL STUDIES, I WOULD
3 PROBABLY NOT HAVE BEEN CONVINCED. BUT GIVEN THE CASE
4 STUDIES, GIVEN THE COHORT STUDIES, I THINK WE HAVE A
5 VERY CLEAR AND VERY CONSISTENT PICTURE ON TEMPORALITY.

6 Q NOW, WE DISCUSSED PICA ALREADY.
7 I WANT TO SHOW YOU A STUDY.
8 THIS IS EXHIBIT 15. THE ADAMS STUDY FROM 2006.
9 DO YOU SEE THAT, DOCTOR?

10 A YES.

11 Q AND IF WE GO DOWN HERE THEY ACTUALLY MEASURED
12 THE HAIR OF CHILDREN WITH AUTISM VERSUS CONTROL.
13 DO YOU SEE THAT?

14 A YES.

15 Q AND THEY DID A PICA SUB GROUP ANALYSIS.
16 DO YOU SEE THAT?

17 A YES. BEAUTIFUL.

18 Q AND RIGHT HERE WE HAVE LEAD. THAT'S PB; RIGHT?

19 A RIGHT.

20 Q AND THEY COMPARED THE AVERAGE AMOUNT OF LEAD
21 FOUND IN CHILDREN WITH -- AUTISTIC CHILDREN WITH PICA
22 VERSUS AUTISTIC CHILDREN WITHOUT PICA TO SEE HOW MUCH
23 LEAD WAS IN THEIR SYSTEMS.

24 DO YOU SEE THAT?

25 A YES.

26 Q AND HERE IT SHOWS A VERY SLIGHT DIFFERENCE
27 BETWEEN THEM.

28 DO YOU SEE THAT?

1 A YES.

2 Q THEY ARE DEFINITELY NOT STATISTICALLY
3 SIGNIFICANT; RIGHT?

4 A NO. AND IF IT WERE STATISTICALLY SIGNIFICANT,
5 THEY WOULD HAVE TOLD YOU BECAUSE THEY DID A T TEST FOR
6 PICA VERSUS CONTROLLED.

7 Q RIGHT.

8 A YEAH. AND THEY SAW THAT FOR ARSENIC AND
9 URANIUM BUT NOT FOR LEAD.

10 Q YEAH. IN FACT, FOR ARSENIC CHILDREN WITH PICA
11 HAD STATISTICALLY SIGNIFICANT LESS ARSENIC IN THEIR
12 SYSTEM THAN THE NON PICA KIDS.

13 DO YOU SEE THAT?

14 A YES.

15 Q AND THIS DATA IS OBVIOUSLY JUST ONE STUDY, BUT
16 DOES THIS STUDY ADD TO THE WEIGHT OF EVIDENCE WE'VE
17 ALREADY DISCUSSED REGARDING WHETHER OR NOT PICA IS
18 EXPLAINING ALL OF THIS DATA?

19 A YES. ABSOLUTELY.

20 I MEAN, THIS IS A BRILLIANT APPROACH THAT THESE
21 AUTHORS TOOK BY, YOU KNOW, ASKING ABOUT PICA AND THEN
22 DOING EXACTLY THE KIND OF COMPARISON THAT YOU WOULD CALL
23 A SENSITIVITY ANALYSIS TO SEE WHETHER IT IS REALLY PICA
24 THAT INCREASES THE LEVEL OF LEAD VERSUS HAVING NOTHING
25 TO DO WITH THE LEAD LEVELS.

26 Q DO YOU THINK IT'S APPROPRIATE, DOCTOR, TO
27 SPECULATE ABOUT POTENTIAL REVERSE CAUSATIONS THAT DON'T
28 HAVE ANY SUPPORT IN THE EVIDENCE?

1 A WELL, YOU CAN ALWAYS SPECULATE AND YOU CAN
2 ALWAYS QUESTION. AND, YOU KNOW, AS EPIDEMIOLOGISTS WE
3 ALWAYS QUESTION. THAT'S NOT A -- THAT'S NOT A SIN.
4 IT'S ACTUALLY A VIRTUE. BUT YOU THEN USE YOUR DATA TO
5 FIND AN ANSWER.

6 AND THAT'S WHAT THESE AUTHORS HAVE ACTUALLY
7 DONE. THEY CONSIDERED THE QUESTION OF PICA. THEY DID
8 THIS SUB ANALYSIS OF PICA CHILDREN VERSUS NON PICA AND
9 THEY GOT THEIR ANSWER AND I REALLY APPLAUD THEM FOR
10 THAT.

11 Q ALL RIGHT. DOCTOR, I REALLY APPRECIATE GOING
12 THROUGH ALL OF THAT. WE'VE COVERED YOUR METHODOLOGY.
13 WE'VE COVERED LEAD AND ASD. I DO WANT TO DO A FINAL
14 QUESTION ON THAT AT THE END OF YOUR TESTIMONY.

15 I WANT TO QUICKLY COVER LEAD AND ADHD IN THE
16 LAST FEW MINUTES THAT WE HAVE HERE, AND THEN I'LL
17 PROBABLY HAVE YOU COME BACK TOMORROW MORNING AND WE'LL
18 WRAP YOU UP; OKAY?

19 A OKAY.

20 Q ALL RIGHT. SO HERE'S THE CHART FOR LEAD AND
21 ADHD THAT WE PUT TOGETHER.

22 DO YOU SEE THAT, DOCTOR?

23 A YES.

24 Q WHAT IS THE FIRST THING THAT YOU OBSERVED ON
25 THIS CHART?

26 A WELL, WE HAVE LOTS OF BLOOD STUDIES AND LOTS OF
27 POSITIVE AND STATISTICALLY SIGNIFICANT RESULTS AND NONE
28 THAT ARE IN THE NEGATIVE STATISTICALLY SIGNIFICANT

1 COLUMN.

2 AND FROM WHAT I SEE A LOT OF THESE STUDIES ARE
3 FROM GOOD OLD COLLEAGUES OF MINE.

4 Q I SEE HERE THERE'S ALSO QUITE A FEW COHORT
5 STUDIES.

6 DO YOU SEE THAT?

7 A YES. ABSOLUTELY. UM-HMM.

8 Q YOU HAVE KANDOR MOLLY, THE HAUS STUDY, THE G
9 STUDY, PROBABLY THE KANDOR MOLLY, THE HAU, THE G STUDY.

10 DO YOU HAVE ANY CONCERNS AS IT RELATED TO LEAD
11 AND ADHD OF TEMPORALITY?

12 A ABSOLUTELY NOT BECAUSE THERE WERE MULTIPLE
13 COHORT STUDIES THAT CLEARLY ESTABLISHED TEMPORALITY FOR
14 ADHD. HAVING BLOOD STAMPS SAMPLES FROM EARLY LIFE,
15 DOING MULTIPLE BLOOD SAMPLES ACROSS DIFFERENT PERIODS OF
16 EARLY LIFE AND THEN ASSESSING THE OUTCOME LATER IN LIFE.

17 Q WHAT ABOUT CONSISTENCY HERE? DO YOU SEE ANY
18 ISSUES WITH CONSISTENCY HERE?

19 A NO, THIS IS ONE OF THE MOST CONSISTENT CHAPTERS
20 OF RESEARCH THAT YOU CAN IMAGINE.

21 Q WHY DO YOU SAY THAT?

22 A BECAUSE THERE'S SO MANY STUDIES ALL, YOU KNOW,
23 DIFFERENT DESIGN TYPES, DIFFERENT TIME PERIODS,
24 DIFFERENT COUNTRIES, DIFFERENT TYPES OF LEAD EXPOSURE
25 FROM A SMELTER COMMUNITY IN AUSTRALIA TO KOREA TO NORTH
26 AMERICA TO EUROPE.

27 YOU COULDN'T WISH FOR MORE CONSISTENCY IN THE
28 RESULTS.

1 Q NOW, DOCTOR, I WANT TO ASK YOU ABOUT A CONCEPT
2 IN EPIDEMIOLOGY.

3 NOW, YOU UNDERSTAND THAT ADHD IS A DISORDER, A
4 DISEASE OR DISORDER THAT IS VERY HIGHLY ALSO ASSOCIATED
5 WITH ASD; RIGHT?

6 A IN FACT, THERE'S A SUB TYPE OF ASD THAT HAS
7 ADHD FEATURES, YES. IT'S WELL KNOWN.

8 Q AND WHEN YOU, FROM AN EPIDEMIOLOGICAL
9 STANDPOINT, WHEN YOU START NARROWING AND SPECIFYING AND
10 CHARACTERIZING THE DISEASE OUTCOME, AUTISM SPECTRUM
11 DISORDER IS A PRETTY WIDE SPECTRUM, BUT WHEN YOU START
12 NARROWING ON A SPECIFIC TYPE OF SUBTYPE, WHAT TYPICALLY
13 HAPPENS IF THERE IS IN FACT A RISK THERE? WHAT DO YOU
14 SEE IN THE DATA?

15 A WELL, IT'S EVEN MORE CONSISTENT BECAUSE IT
16 TELLS YOU THAT THE SAME BRAIN STRUCTURES THAT, YOU KNOW,
17 AFFECT AUTISM AND POSSIBLY THE ADHD SUB TYPE OF AUTISM
18 ALSO AFFECTS THE DISEASE ALONE ADHD BECAUSE IT'S THE
19 SAME BRAIN STRUCTURES, RIGHT. SO YOU WOULD EXPECT LEAD
20 TO AFFECT THESE BRAIN STRUCTURES WHETHER THE CHILD ALSO
21 HAS AUTISTIC FEATURES OR ONLY HAS ADHD.

22 Q WELL, WHEN DR. HILL TALKED ABOUT DIFFERENT
23 PERSONS, DIFFERENT PLACES, DIFFERENT CIRCUMSTANCES AND
24 DIFFERENT TIMES, YOU ALSO HAVE IT HERE IN RELATED
25 DISEASES, DON'T YOU?

26 A ABSOLUTELY. SO IF I KNOW THAT CERTAIN BRAIN
27 STRUCTURES CONTRIBUTE TO DIFFERENT TYPES OF DISEASES,
28 THEN I WOULD EXPECT TO FIND THE EXPOSURE OR TO SEE THAT

1 THE EXPOSURE ACTUALLY AFFECTS THESE DIFFERENT TYPES OF
2 DISEASES IN SAME WAY.

3 THE EASIEST EXAMPLE IS CANCER AND SMOKING. WE
4 ALL KNOW THAT CANCER CAUSES -- THAT CANCER OF THE LUNG
5 IS CAUSED BY SMOKING, BUT WE ALSO KNOW THAT IT'S CAUSING
6 CERVICAL CANCER AND BLADDER CANCER, AND SO -- AND, YOU
7 KNOW, MOUTH AND THROAT CANCER AND IT'S THE SAME KIND OF
8 PROCESS OF CARCINOGENICITY THAT IS CAUSED BY THE AGENTS
9 AND SMOKING THAT I SEE IN DIFFERENT PARTS OF THE BODY
10 CAUSING THESE DIFFERENT TYPES OF CANCERS, IT'S THE SAME
11 IN THE BRAIN.

12 IF LEAD AFFECTS CERTAIN TYPES OF STRUCTURES IN
13 THE BRAIN, MAYBE AT DIFFERENT DEVELOPMENTAL PERIODS OR
14 AT A DIFFERENT LEVEL OR ACCORDING TO DIFFERENT GENETIC
15 SUSCEPTIBILITIES OF THESE INDIVIDUALS, I MAY SEE ONE
16 PHENOTYPE OVER THE OTHER, BUT I WOULD EXPECT TO SEE IT
17 ACROSS DIFFERENT PHENOTYPES THAT ARE ALL AFFECTED BY
18 THIS BRAIN STRUCTURE'S WORKINGS.

19 Q WELL, THANK YOU VERY MUCH, DOCTOR. I HAVE A
20 FEW THINGS LEFT THAT I WANT TO COVER. IT SHOULDN'T TAKE
21 MORE THAN FIVE TO TEN MINUTES, BUT I'VE BEEN GOING
22 THROUGH MY NOTES, YOUR HONOR, AND SPECIFYING IT AND WILL
23 STREAMLINE IT, SO I THINK THIS WOULD BE A GOOD TIME TO
24 BREAK FOR THE DAY.

25 THE COURT: BUT LET'S TALK ABOUT TOMORROW
26 BECAUSE I HAVE US ON IN THE AFTERNOON ONLY.

27 MR. WISNER: THAT'S CORRECT.

28 THE COURT: OKAY. YOU SAID TOMORROW MORNING

1 WHEN YOU WERE TALKING EARLIER.

2 MR. WISNER: OH, I'M SORRY.

3 THE COURT: OKAY. I JUST WANT TO MAKE SURE
4 THAT WE'RE ALL --

5 MR. WISNER: WE'RE ALL BLENDING TOGETHER, YES,
6 AT 1:30 TOMORROW, YES.

7 THE COURT: SO I HAVE IT AT 1:30.

8 IS THERE ANY OTHER HOUSEKEEPING OR OTHER
9 BUSINESS WE NEED TO TAKE UP TODAY?

10 MR. IMBROSCIO: JUST ONE FOR ME, YOUR HONOR.
11 THIS IS MR. PETROSINELLI.

12 MR. WISNER: SHOULD WE EXCUSE THE WITNESS OR
13 DOES IT MATTER?

14 MR. IMBROSCIO: IT DOESN'T MATTER TO ME.

15 MR. WISNER: OKAY.

16 MR. IMBROSCIO: WHATEVER YOU WANT.

17 MR. WISNER: ALL RIGHT.

18 MR. IMBROSCIO: TWO QUESTIONS, YOUR HONOR.

19 ONE IS NORMALLY IF WE WERE THERE IN PERSON WE
20 WOULD HAVE HANDED YOU, BOTH SIDES, WOULD HAVE HANDED YOU
21 SLIDE DECS OF OUR OPENINGS. WOULD YOU LIKE TO US SEND
22 YOU THE OPENING SLIDES?

23 THE COURT: SURE.

24 MR. IMBROSCIO: AND THE SECOND QUESTION IS THE
25 DEMONSTRATIVES THAT WERE USED JUST NOW WITH DR. RITZ,
26 AGAIN, IF WE WERE IN COURT TOGETHER, I WOULD HAVE BEEN
27 HANDED A COPY OF THOSE. I DON'T HAVE A COPY OF THOSE
28 AND I WONDER WHETHER PLAINTIFF'S COUNSEL COULD SEND

1 THOSE TO ME AFTER WE BREAK FOR THE DAY.

2 MR. WISNER: YES.

3 THE COURT: YEAH, I THINK EVERYTHING THE COURT
4 HAS SEEN NEEDS TO GO INTO THE COURT FILE AND NOT JUST
5 CASE ANYWHERE OR AN INFORMAL SUBMISSION, WE NEED TO BE
6 TRANSPARENT IN ALL WAYS.

7 MR. IMBROSCIO: THANK YOU, YOUR HONOR.

8 MR. WISNER: SO, YOUR HONOR, I THINK THE PLAN
9 IS --

10 THE COURT: YES.

11 MR. WISNER: AND YOU CAN TELL US HOW YOU PREFER
12 THIS.

13 SO OUR PROPOSAL WAS WE'RE GOING TO GO THROUGH
14 THIS HEARING WITH ALL THE EXHIBITS, WE'RE GOING TO KEEP
15 STUDIOUS NOTES AND AGREEMENTS ON WHAT WAS USED AND WHAT
16 WASN'T, AND THEN WE'RE GOING TO AT THE END OF IT PUT IT
17 ALL TOGETHER BECAUSE THERE'S HUNDREDS OF EXHIBITS, WE'RE
18 NOT GOING TO USE THEM ALL, WHAT'S ACTUALLY USED AND THEN
19 SUBMIT IT TO THE COURT AND FILE IT UNDER THE RECORD. I
20 THINK THAT'S THE PLAN. IF YOU WANTED TO SEE THEM
21 SOONER, WE COULD HAVE THEM DELIVERED TO YOU IN THE
22 MORNING AT THE END OF EACH DAY IF YOU PREFER. IT'S UP
23 TO YOU.

24 THE COURT: I DON'T THINK NECESSARY. FROM YOUR
25 EARLIER SUBMISSIONS, I SEE THAT I HAVE MANY OF THE
26 STUDIES.

27 MR. WISNER: RIGHT.

28 THE COURT: AND I COULD FIND IT IF I WERE

1 LOOKING FOR IT AND I DID SKIM THROUGH SOME OF THEM
2 YESTERDAY. THAT SOUNDS FINE TO ME.

3 MR. WISNER: ON THE OTHER ISSUE OF SHARING
4 DEMONSTRATIVES, I THINK PROVIDED WE ALL AGREE TO SHARE,
5 I THINK WE'RE IN GOOD SHAPE, MR. PETROSINELLI. I'LL
6 SHARE MY POWERPOINT AND SEND THEM OVER TO YOU, THAT
7 WOULD BE GREAT.

8 MR. IMBROSCIO: YES, THANK YOU.

9 THE COURT: OKAY.

10 MR. WISNER: SURE.

11 THE COURT: WELL, I APPRECIATE THE WORK THAT
12 WENT INTO THIS AND THE HIGH LEVEL OF ADVOCACY. AND I'LL
13 LOOK FORWARD TO TOMORROW TO SEE YOU AT 1:30.

14 MR. WISNER: THANK YOU, YOUR HONOR. THANK YOU
15 FOR YOUR TIME.

16 THE WITNESS: THANK YOU.

17 MR. IMBROSCIO: THANK YOU, YOUR HONOR.

18 THE COURT: THANKS, EVERYBODY.

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{TIME NOTED: 4:33 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 3RD DAY OF FEBRUARY, 2022.

JEANESE JOHNSON, CSR NO. 11635, CLR
CERTIFIED STENOGRAPHIC REALTIME REPORTER
OFFICIAL REPORTER PRO TEMPORE

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