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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

BEFORE THE HONORABLE PHYLLIS J. HAMILTON, JUDGE

PLANNED PARENTHOOD FEDERATION OF AMERICA, INC. AND PLANNED PARENTHOOD GOLDEN GATE, PLAINTIFFS, VS. JOHN ASHCROFT, ATTORNEY GENERAL OF THE UNITED STATES, IN HIS OFFICIAL CAPACITY, DEFENDANT.	NO. C 03-4872 PJH THURSDAY, APRIL 15, 2004 SAN FRANCISCO, CALIFORNIA

REPORTER'S TRANSCRIPT OF PROCEEDINGS

APPEARANCES:

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(APPEARANCES CONTINUED ON NEXT PAGE)

REPORTED BY: DIANE E. SKILLMAN, CSR 4909
OFFICIAL COURT REPORTER

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10 FOR DEFENDANT: U.S. DEPARTMENT OF JUSTICE
20 MASSACHUSETTS AVENUE, N.W. ROOM 7128
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BY: MARK THOMAS QUINLIVAN
12 W. SCOTT SIMPSON,
KAIJA MARIE CLARK,
13 PREEYA NORONHA,
ASSISTANT U.S. ATTORNEYS
14
15
16
17
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25

1 THURSDAY, APRIL 15, 2004 8:30 A.M.

2

3 P R O C E E D I N G S

4 THE COURT: ALL RIGHT. GOOD MORNING.

5 AND GOOD MORNING, MS. NORONHA.

6 MS. NORONHA: YOUR HONOR.

7 THE COURT: ARE YOU READY WITH YOUR NEXT WITNESS?

8 MS. NORONHA: YES, WE ARE. YOUR HONOR, AT THIS TIME

9 THE DEFENDANT CALLS DR. ANAND TO THE STAND.

10 THE CLERK: PLEASE RAISE YOUR RIGHT HAND.

11 DR. KANWALJEET S. ANAND

12 CALLED AS A WITNESS FOR THE DEFENDANT, HAVING BEEN DULY SWORN,

13 TESTIFIED AS FOLLOWS:

14 THE WITNESS: I DO.

15 THE CLERK: PLEASE TAKE THE STAND.

16 THE WITNESS: GOOD MORNING, YOUR HONOR.

17 THE COURT: GOOD MORNING.

18 THE CLERK: STATE YOUR NAME FOR THE COURT.

19 THE WITNESS: MY NAME IS KANWALJEET S. ANAND.

20 THE CLERK: CAN YOU SPELL YOUR FIRST NAME?

21 THE WITNESS: FIRST NAME IS SPELLED

22 K-A-N-W-A-L-J-E-E-T.

23 THE CLERK: AND YOUR LAST NAME?

24 THE WITNESS: LAST NAME SPELLED A-N-A-N-D.

25 THE CLERK: THANK YOU.

1 THE WITNESS: THANK YOU.
2 DIRECT EXAMINATION
3 BY MS. NORONHA:
4 Q. GOOD MORNING, DR. ANAND.
5 A. GOOD MORNING.
6 Q. DR. ANAND, WHAT IS YOUR OCCUPATION?
7 A. I'M A PEDIATRIC SPECIALIST SPECIALIZED AS A PEDIATRICIAN
8 TAKING CARE OF CRITICALLY ILL INFANTS AND CHILDREN.
9 Q. DOCTOR, WHY ARE YOU TESTIFYING HERE TODAY?
10 A. I WAS REQUESTED TO DO SO BY THE U.S. DEPARTMENT OF JUSTICE
11 BASED ON MY BACKGROUND AND RESEARCH.
12 Q. IS THERE A RESEARCH IN ANY PARTICULAR AREA?
13 A. RESEARCH IN THE AREA OF DEVELOPMENT OF THE PAIN SYSTEM AND
14 STRESS RESPONSES DURING FETAL AND NEONATAL LIFE.
15 Q. DR. ANAND, I HAVE HANDED YOU WHAT HAS BEEN MARKED AS
16 EXHIBIT A-1. WHAT IS THIS DOCUMENT?
17 A. THIS IS A PRINTOUT OF MY CURRICULUM VITAE.
18 Q. IS THIS AN CURRENT AND UPDATED COPY OF YOUR C.V.?
19 A. ACTUALLY, THIS A COPY THAT WAS PRINTED OUT IN JANUARY OF
20 THIS YEAR. AND THERE HAVE BEEN A COUPLE OF CHANGES SINCE THEN.
21 Q. WHAT CHANGES HAVE OCCURRED SINCE JANUARY?
22 A. SOME OF THE PAPERS THAT WERE IN PRESS HAVE BEEN PUBLISHED,
23 AND ALSO I HAVE RECEIVED AN AWARD FROM THE BROAD COLLEGE OF
24 PEDIATRICS AND CHILD HEALTH IN THE UK.
25 MS. NORONHA: YOUR HONOR, AT THIS TIME I OFFER

1 EXHIBIT A-1 INTO EVIDENCE.
2 THE COURT: ANY OBJECTION?
3 MS. GARTNER: NO, YOUR HONOR.
4 THE COURT: IT WILL BE ADMITTED.
5 THE CLERK: A-1 INTO EVIDENCE.
6 (DEFENDANT'S EXHIBIT A-1
7 WAS RECEIVED IN EVIDENCE.)
8 BY MS. NORONHA:
9 Q. DOCTOR, WHERE DID YOU GO TO MEDICAL SCHOOL?
10 A. I WENT TO MEDICAL SCHOOL IN MAHATMA GANDHI MEMORIAL MEDICAL
11 IN INDORE, SPELLED AS I-N-D-O-R-E.
12 Q. WHAT DEGREE DID YOU RECEIVE FROM THAT COLLEGE?
13 A. I RECEIVED A DEGREE SHORTENED AS MBBS, WHICH STANDS FOR
14 BACHELOR OF MEDICINE, BACHELOR OF SURGERY. AND IT'S EQUIVALENT
15 TO THE MD DEGREE IN THE U.S.
16 Q. DID YOU DO AN INTERNSHIP AFTER MEDICAL SCHOOL?
17 A. YES. I DID A ROTATING INTERNSHIP AT YESHWANTRAO HOSPITAL.
18 I WILL SPELL THAT: Y-E-S-H-W-A-N-T-R-A-O HOSPITAL, AND AT
19 HINDU RAO HOSPITAL. H-I-N-D-U. NEXT WORD: R-A-O, HOSPITAL.
20 AND THAT IS IN DELHI.
21 Q. DID YOU ALSO DO A RESIDENCY PROGRAM IN INDIA?
22 A. YES. FOLLOWING THIS ROTATING INTERNSHIP THROUGH DIFFERENT
23 DEPARTMENTS, I CAME BACK TO THE UNIVERSITY OF INDORE, AND I WAS
24 REGISTERED AND WORKING IN A THREE-YEAR RESIDENCY PROGRAM FOR
25 POSTGRADUATE TRAINING IN PEDIATRICS.

1 Q. DID YOU COMPLETE THAT PROGRAM, DOCTOR?
2 A. NO, I DIDN'T. I COMPLETED ONE YEAR OF THAT THREE-YEAR
3 PROGRAM. AND THEN, DURING THAT YEAR I HAD APPLIED FOR THE
4 RHODES SCHOLARSHIP, AND I RECEIVED THAT, AND WENT TO OXFORD,
5 UNIVERSITY OF OXFORD FOR A PERIOD OF ONE YEAR.
6 Q. HOW LONG WERE YOU AT OXFORD?
7 A. I WAS AT UNIVERSITY OF OXFORD FROM OCTOBER 1982 TO NOVEMBER
8 OF 1985, SO ABOUT THREE YEARS.
9 Q. WHAT DEGREE DID YOU RECEIVE FROM OXFORD?
10 A. I RECEIVED WHAT IS CALLED A "D.PHIL," OR DOCTOR OF
11 PHILOSOPHY DEGREE FROM THE FACULTY OF CLINICAL MEDICINE.
12 Q. DOCTOR, DID YOU PERFORM ANY RESEARCH AS PART OF YOUR
13 STUDIES AT OXFORD?
14 A. YES, CERTAINLY. THE D.PHIL. DEGREE AT OXFORD IS PRIMARILY
15 A RESEARCH-BASED DEGREE, AND I PERFORMED RESEARCH ON THE
16 HORMONAL AND METABOLIC RESPONSES OF NEWBORN INFANTS UNDERGOING
17 SURGERY AND ANESTHESIA.
18 Q. WHAT WAS THE RESULT OF THE RESEARCH THAT YOU PERFORMED?
19 A. WE HAD POSTULATED THAT NEWBORN BABIES MAY NOT BE ABLE TO
20 MOUNT A SIGNIFICANT RESPONSE, HORMONAL STRESS RESPONSE TO A
21 SURGICAL OPERATION. AND OUR INITIAL STUDIES SHOWED THAT IT WAS
22 THE OPPOSITE, THAT BABIES HAD A MASSIVE HORMONAL STRESS
23 RESPONSE, THREE TO FIVE TIMES THAT OF ADULT PATIENTS UNDERGOING
24 SIMILAR TYPES OF SURGERY.
25 WE THEN DESIGNED SOME STUDIES TO LOOK AT THE EFFECT

1 OF ANESTHESIA ON THIS HORMONAL STRESS RESPONSE. THE REASON
2 BEING AT THAT TIME THE STANDARD PRACTICE WAS TO PERFORM
3 OPERATIONS ON BABIES WITHOUT GIVING THEM ANY PAIN RELIEF OR
4 ANESTHESIA.
5 AND WE FELT PART OF THE REASON THAT THEY HAVE A
6 MASSIVE HORMONAL STRESS RESPONSE IS THAT THEY WERE ESSENTIALLY
7 AWAKE DURING OPERATIVE PROCEDURES. AND SO WHEN WE DID THESE
8 RANDOMIZED CONTROLLED TRIALS LOOKING AT THE EFFECTS OF
9 ANESTHESIA IN NEWBORN INFANTS, WE FOUND THAT THEIR STRESS
10 RESPONSES WERE MARKEDLY REDUCED AND THEIR COMPLICATIONS AFTER
11 THE SURGERY WERE ALSO DIMINISHED.
12 Q. DOCTOR, DID YOU DO ANY ADDITIONAL TRAINING AFTER YOU
13 ACQUIRED YOUR D.PHIL. FROM THE UNIVERSITY OF OXFORD?
14 A. YES. AFTER THAT I MOVED TO HARVARD MEDICAL SCHOOL AND
15 BOSTON CHILDREN'S HOSPITAL WHERE I DID A POSTDOCTORAL
16 FELLOWSHIP IN THE DEPARTMENT OF ANESTHESIA.
17 Q. WHAT SORT OF WORK DID YOU DO IN YOUR POSTDOCTORAL
18 FELLOWSHIP?
19 A. I CONTINUED THIS LINE OF INVESTIGATION. I WAS VERY
20 INTRIGUED BY THE FACT THAT GIVING POTENT ANESTHESIA CAN REDUCE
21 COMPLICATIONS FOLLOWING SURGERY. SO I WANTED TO STUDY BABIES
22 THAT ARE CRITICALLY ILL AFTER AN OPERATIVE PROCEDURE. AND
23 BOSTON CHILDREN'S WAS THE ONE PLACE IN THE WORLD THAT HAD THE
24 LARGEST NUMBER OF BABIES UNDERGOING OPEN HEART SURGERY.
25 SO WE DESIGNED SOME NOVEL ANESTHETIC TECHNIQUES.

1 AND WHEN WE DID A RANDOMIZED CONTROLLED TRIAL FOUND THAT BABIES
2 WHO HAD RECEIVED THE DEEP ANESTHETIC DURING OPEN HEART SURGERY
3 HAD NOT ONLY SIGNIFICANTLY LESS COMPLICATIONS, BUT THEIR
4 SURVIVAL AFTER THE OPERATION HAD IMPROVED.
5 Q. SO WERE YOU A MEMBER OF THE DEPARTMENT OF ANESTHESIA AT
6 CHILDREN'S HOSPITAL?
7 A. YES, I WAS. I WAS AT THE RANK OF AN INSTRUCTOR AT THE
8 ANESTHESIA DEPARTMENT.
9 Q. DID YOU DO ANY TEACHING WHILE YOU THERE?
10 A. PART OF MY DUTIES, IN ADDITION TO THE RESEARCH, INVOLVED
11 GIVING LECTURES OR DOING JOURNAL CLUB OR OTHER THINGS FOR
12 ANESTHESIA RESIDENTS AND FELLOWS WHO WERE IN THE DEPARTMENT OF
13 ANESTHESIA AT THAT TIME.
14 I ALSO DID A BIOSTATISTICS COURSE FOR HELPING
15 DEVELOP THEIR RESEARCH SKILLS IN THE ANESTHESIA FIELD.
16 Q. DOCTOR, WHERE DID YOU GO AFTER YOU COMPLETED YOUR
17 POSTDOCTORATE RESEARCH FELLOWSHIP AT CHILDREN'S HOSPITAL?
18 A. I APPLIED FOR RESIDENCY PROGRAMS TO TRAIN IN PEDIATRICS,
19 AND I WAS MATCHED AT BOSTON CHILDREN'S HOSPITAL. SO I DID A
20 THREE-YEAR RESIDENCY TRAINING IN PEDIATRICS AFTER THIS
21 FELLOWSHIP.
22 Q. WERE YOU ALSO AT MASSACHUSETTS GENERAL HOSPITAL?
23 A. YES. AT THE COMPLETION OF MY RESIDENCY TRAINING IN
24 PEDIATRICS I WENT TO SUBSPECIALIZE IN THE AREA OF NEONATAL AND
25 PEDIATRIC INTENSIVE CARE, AND SO I MOVED TO MASS. GENERAL

1 HOSPITAL, STILL WITHIN THE HARVARD MEDICAL SCHOOL SYSTEM, TO DO
2 A CLINICAL TRAINING FELLOWSHIP IN THE PEDIATRIC AND NEONATAL
3 ICU'S AT MASS. GENERAL.
4 Q. WHAT DID YOU DO AFTER YOU COMPLETED YOUR WORK AT
5 MASSACHUSETTS GENERAL HOSPITAL?
6 A. I SPENT MANY YEARS IN POSTGRADUATE TRAINING. AND IT WAS
7 TIME TO FIND A JOB. I WAS APPOINTED AS ASSISTANT PROFESSOR OF
8 PEDIATRICS ANESTHESIOLOGY AND PSYCHIATRY AT EMORY UNIVERSITY IN
9 ATLANTA.
10 Q. DID YOU DO ANY RESEARCH WHILE YOU WERE AT EMORY?
11 A. YES, I DID. I CONTINUED THIS LINE OF RESEARCH, BECAUSE I
12 HAD CONVINCED MYSELF, AT LEAST, THAT PREMATURE AND FULL-TERM
13 NEWBORN INFANTS ARE SENSITIVE TO PAIN.
14 I DESIGNED SOME ANALOG MODELS TO LOOK AT THE
15 LONG-TERM EFFECTS OF PAIN DURING EARLY LIFE, AS WELL AS DESIGN
16 SOME NOVEL WAYS OF GIVING PAIN RELIEF TO PREMATURE AND
17 FULL-TERM INFANTS.
18 Q. DID YOU ALSO CARE FOR PATIENTS WHILE YOU WERE AT EMORY?
19 A. YES. WHILE AT EMORY I WAS ALSO A PEDIATRIC INTENSIVIST,
20 WHICH MEANS I WAS TAKING CARE OF CRITICALLY ILL CHILDREN IN THE
21 PEDIATRIC ICU AT TWO DIFFERENT HOSPITALS. ONE WAS EGLESTON
22 CHILDREN'S HOSPITAL, WHICH IS E-G-L-E-S-T-O-N, AND THE OTHER
23 WAS HUGHES SPAULDING CHILDREN'S HOSPITAL, BOTH IN ATLANTA.
24 Q. DOCTOR, WHEN DID YOU LEAVE EMORY?
25 A. I LEFT EMORY IN SEPTEMBER OF 1997 AND MOVED TO UNIVERSITY

1 OF ARKANSAS FOR MEDICAL SCIENCES.
2 Q. IS THAT WHERE YOU ARE PRESENTLY?
3 A. THAT IS WHERE I AM AT PRESENT.
4 Q. WHAT IS YOUR PRESENT POSITION AT THE UNIVERSITY OF
5 ARKANSAS?
6 A. I'M CURRENTLY A PROFESSOR OF PEDIATRICS, ANESTHESIOLOGY,
7 PHARMACOLOGY, AND NEUROBIOLOGY AT UNIVERSITY OF ARKANSAS FOR
8 MEDICAL SCIENCES. I ALSO WORK AT ARKANSAS CHILDREN'S HOSPITAL
9 AS A PEDIATRIC INTENSIVIST, AND ON THE SEDATION SERVICE AT
10 CHILDREN'S HOSPITAL.
11 Q. SO WHAT SORT OF WORK DO YOU DO AS A PRACTICING PEDIATRIC
12 CARE INTENSIVIST AT THE CHILDREN'S HOSPITAL?
13 A. MY CLINICAL WORK INCLUDES TAKING CARE OF INFANTS AND
14 CHILDREN WHO ARE SEVERELY ILL FROM MULTIPLE DIFFERENT ILLNESSES
15 AND ARE ADMITTED TO THE PEDIATRIC ICU AT ARKANSAS CHILDREN'S
16 HOSPITAL.
17 I ALSO WORK ON A SEDATION SERVICE WHICH PROVIDES
18 DEEP SEDATION AND LIGHT ANESTHESIA TO CHILDREN ALL OVER THE
19 HOSPITAL WHENEVER THEY ARE UNDERGOING ANY KIND OF PROCEDURE.
20 Q. SO DO YOU ADMINISTER ANESTHESIA TO YOUR PATIENTS?
21 A. YES. PART OF MY TRAINING AS AN INTENSIVIST INCLUDES THE
22 USE OF SEDATIVE ANESTHETIC AND ANALGESIC DRUGS.
23 AND ON THE SEDATION SERVICE, IN PARTICULAR, I ACT AS
24 AN ANESTHESIOLOGIST DOING A PREANESTHETIC EVALUATION, PROVIDING
25 THE ANESTHESIA, AND THEN DOING A POSTANESTHETIC EVALUATION THE

1 CHILDREN'S HOSPITAL.
2 Q. DOCTOR, ARE YOU A BOARD CERTIFIED ANESTHESIOLOGIST?
3 A. NO, I AM NOT.
4 Q. WELL, WHAT IS THE DIFFERENCE BETWEEN WHAT A BOARD CERTIFIED
5 ANESTHESIOLOGIST DOES AND WHAT YOU DO?
6 A. THERE IS SOME DEGREE OF OVERLAP IN THE TRAINING OF CRITICAL
7 CARE SPECIALISTS AND ANESTHESIOLOGISTS. THE ANESTHESIOLOGIST
8 PROVIDES ANESTHESIA IN THE OPERATING ROOM, AND USES A MULTITUDE
9 OF DIFFERENT TECHNIQUES, SOME OF WHICH ARE APPLICABLE OUTSIDE
10 THE OPERATING ROOM, AS WELL.
11 THE INTENSIVIST IS PRIMARILY CONCERNED WITH
12 PROVIDING SEDATION AND ANALGESIA FOR INVASIVE PROCEDURES,
13 EITHER IN THE ICU OR AS WE DO AS PART OF THE SEDATION SERVICE.
14 SO THERE IS A LITTLE BIT OF OVERLAP BETWEEN THE TWO
15 FIELDS.
16 Q. YOU ALSO MENTIONED THAT YOU HAVE AN ADJUNCT APPOINTMENT IN
17 THE DEPARTMENT OF ANESTHESIA AT THE UNIVERSITY. WHAT DO YOU DO
18 IN THAT CAPACITY?
19 A. I HELP WITH THE TRAINING OF RESIDENTS AND FELLOWS IN THE
20 DEPARTMENT OF ANESTHESIA. BUT THIS IS, AGAIN, BECAUSE THIS IS
21 WITHIN THE SAME MEDICAL SCHOOL, WHEN I AM TEACHING PEDIATRIC
22 RESIDENTS AND FELLOWS, THERE WILL BE IN THE SAME LECTURES OR
23 JOURNAL CLUBS THERE WILL BE THE ANESTHESIA RESIDENTS AND
24 FELLOWS INCLUDED IN THAT.
25 MANY OF THE ANESTHESIA FELLOWS WILL ROTATE THROUGH

1 THE PEDIATRIC ICU. AND IN THAT CAPACITY I HELP TRAIN THEM IN
2 THE CARE OF CRITICALLY ILL CHILDREN.
3 Q. DOCTOR, WHAT IS THE PAIN NEUROBIOLOGY LABORATORY AT
4 ARKANSAS CHILDREN'S HOSPITAL?
5 A. THIS IS A LABORATORY THAT I AM THE DIRECTOR OF THE PAIN
6 NEUROBIOLOGY LAB AT THE RESEARCH INSTITUTE. AND THE FOCUS OF
7 THIS LAB IS PERFORMING RESEARCH ON THE SHORT-TERM AND LONG-TERM
8 EFFECTS OF PAIN, PARTICULARLY IN ANIMAL MODELS OF FETAL AND
9 NEONATAL PAIN.
10 Q. WHAT SORT OF RESEARCH ARE YOU PRESENTLY CONDUCTING IN THOSE
11 AREAS?
12 A. THERE ARE SEVERAL CLINICAL AND EXPERIMENTAL STUDIES
13 UNDERWAY RIGHT NOW. CLINICAL STUDIES INCLUDE A MULTINATIONAL
14 RANDOMIZED CLINICAL TRIAL, FOR WHICH I AM THE STUDY CHAIRMAN,
15 WHERE WE ARE COORDINATING THE EFFORTS OF 16 DIFFERENT CENTERS
16 AND LOOKING AT THE EFFECTS OF MORPHINE GIVEN AS PAIN RELIEF IN
17 PREMATURE INFANTS WHO ARE VENTILATED.
18 THERE ARE A COUPLE OF OTHER MINOR CLINICAL STUDIES,
19 AS WELL.
20 ON THE EXPERIMENTAL SIDE, WE ARE PERFORMING RESEARCH
21 ON THE IMPACT REPETITIVE PAIN MAY HAVE ON THE DEVELOPMENT OF
22 THE BRAIN, LOOKING AT CELL DEATH WITHIN THE BRAIN AND LOOKING
23 AT SOME ANESTHETIC AND ANALGESIC DRUGS THAT CAN ELIMINATE SOME
24 OF THE LONG-TERM DETRIMENTAL EFFECTS OF PAIN.
25 THIS IS PERFORMED PRIMARILY IN A RAT MODEL OF

1 NEONATAL PAIN.
2 Q. DOCTOR, ARE YOU PRESENTLY CONDUCTING ANY CLINICAL STUDIES
3 ON PAIN IN THE HUMAN FETUS?
4 A. NO, I AM NOT.
5 Q. HAVE YOU EVER PARTICIPATED IN SUCH STUDIES IN THE PAST?
6 A. WHILE I WAS AT OXFORD I WAS INVOLVED SOMEWHAT PERIPHERALLY
7 IN TWO STUDIES THAT WERE ONGOING AT THAT TIME. I AM A
8 CO-AUTHOR ON ONE OF THE PUBLICATIONS THAT RESULTED FROM ONE OF
9 THOSE TWO STUDIES, BUT I DID INTERACT WITH THOSE RESEARCHERS,
10 REVIEW THE PROTOCOL AND HELP IN THE INTERPRETATION OF THEIR
11 RESULTS.
12 SINCE THEN, I HAVE NOT HAD ANY -- I HAVE NOT
13 PERFORMED MY OWN RESEARCH ON FETAL -- IN THE FETAL SETTING.
14 Q. DOCTOR, ARE YOU BOARD CERTIFIED IN ANY MEDICAL SPECIALTY?
15 A. I AM A DIPLOMATE OF THE AMERICAN BOARD OF PEDIATRICS AND
16 THE SUBBOARD OF PEDIATRIC CRITICAL CARE MEDICINE.
17 Q. WHERE ARE YOU LICENSED TO PRACTICE MEDICINE?
18 A. IN THE STATE OF ARKANSAS.
19 Q. APPROXIMATELY HOW MANY ARTICLES HAVE YOU PUBLISHED?
20 A. AS LISTED IN THIS C.V., THERE IS ABOUT 200 ARTICLES THAT
21 HAVE BEEN PUBLISHED.
22 Q. HAVE THESE ARTICLES ADDRESSED THE TOPIC OF FETAL PAIN?
23 A. TO SOME EXTENT THEY HAVE. A FEW ARTICLES HAVE FOCUSED ON
24 THE EARLY DEVELOPMENT OF THE PAIN SYSTEM AND HAVE ADDRESSED THE
25 QUESTION OF CONSCIOUSNESS AS IT DEVELOPS DURING FETAL AND

1 NEONATAL LIFE, AND HAVE INCLUDED SUBSECTIONS ON FETAL PAIN AND
2 FETAL CONSCIOUSNESS.
3 Q. DOCTOR, DO YOU PERFORM ANY PEER REVIEW OF SCIENTIFIC
4 PAPERS?
5 A. YES. CERTAINLY I DO. I AM ON THE EDITORIAL BOARD OF A
6 JOURNAL CALLED CRITICAL CARE MEDICINE. AND UP UNTIL DECEMBER
7 OF LAST YEAR, I WAS ALSO ON THE EDITORIAL BOARD OF A JOURNAL
8 CALLED BIOLOGY OF THE NEONATE.
9 IN ADDITION TO THESE EDITORIAL APPOINTMENTS, I
10 PERFORM PEER REVIEW OF PAPERS SUBMITTED TO MULTIPLE DIFFERENT
11 JOURNALS: ANESTHESIOLOGY, ANALGESIA, AMERICAN JOURNAL OF
12 OBSTETRICS AND GYNECOLOGY, THE NEUROSCIENCE JOURNALS AND A
13 LARGE NUMBER OF PEDIATRIC JOURNALS, AS WELL.
14 Q. DOCTOR, WHAT IS THE MATERNAL FETAL RESEARCH NETWORK OF THE
15 NIH?
16 A. THIS IS A RESEARCH NETWORK THAT IS FUNDED THROUGH THE
17 NATIONAL INSTITUTE FOR MENTAL HEALTH AND IS A MULTIDISCIPLINARY
18 GROUP OF RESEARCHERS THAT ARE FOCUSED ON STUDIES OF FETAL
19 PHYSIOLOGY, NEONATAL PHYSIOLOGY, AND THE IMPACT OF MATERNAL
20 STRESS OR PERINATAL ADVERSE EXPERIENCES ON LONG-TERM OUTCOMES.
21 Q. AND YOU ARE A MEMBER OF THIS NETWORK?
22 A. YES, I WAS INVITED TO BE A MEMBER OF THIS NETWORK.
23 Q. DOCTOR, HAVE YOU EVER TESTIFIED AS AN EXPERT WITNESS
24 BEFORE?
25 A. DURING THE COURSE OF MY CLINICAL WORK I HAVE TESTIFIED AS A

1 FACT WITNESS IN A NUMBER OF CASES, BUT IN THE PROCESS OF
2 REVIEWING MY CREDENTIALS I WAS CLASSIFIED AS AN EXPERT IN THE
3 AREA OF PEDIATRICS AND PEDIATRIC CRITICAL CARE IN SOME OF
4 THOSE.
5 THERE IS ONE OTHER CASE IN THE LAST FOUR YEARS WHERE
6 I WAS INVITED AS AN EXPERT ON THE PHARMACOLOGY OF ANESTHESIA
7 AND ANALGESIC DRUGS.
8 Q. HAVE YOU EVER TESTIFIED IN A CASE INVOLVING ABORTION
9 PROCEDURES, ASIDE FROM THE THREE CASES IN WHICH YOU HAVE
10 TESTIFIED REGARDING THE PARTIAL-BIRTH ABORTION BAN ACT OF 2003?
11 A. NO, I HAVE NOT.
12 MS. NORONHA: YOUR HONOR, AT THIS TIME WE OFFER
13 DR. ANAND AS AN EXPERT IN THE AREAS OF FETAL BIOLOGY -- FETAL
14 NEUROBIOLOGY -- EXCUSE ME -- FETAL PAIN AND THE PHARMACOLOGY OF
15 ANESTHETIC DRUGS.
16 MS. PARKER: YOUR HONOR, IF I MIGHT, I WOULD LIKE TO
17 DO SOME VOIR DIRE.
18 THE COURT: ALL RIGHT.
19 VOIR DIRE EXAMINATION
20 BY MS. PARKER:
21 Q. GOOD MORNING, DR. ANAND. NICE TO SEE YOU AGAIN.
22 A. GOOD MORNING, MS. PARKER.
23 Q. AS I UNDERSTAND IT, YOU ARE A PEDIATRIC INTENSIVIST; IS
24 THAT RIGHT?
25 A. THAT IS CORRECT.

1 Q. YOU ARE NOT AN OBSTETRICIAN?
2 A. NO, I AM NOT.
3 Q. AND YOU ARE NOT A GYNECOLOGIST?
4 A. NO, I AM NOT.
5 Q. IN FACT, OTHER THAN AS A MEDICAL STUDENT, YOU HAVE NO
6 TRAINING IN EITHER OBSTETRICS OR GYNECOLOGY?
7 A. THAT IS CORRECT. MY TRAINING WAS DURING MY MEDICAL SCHOOL
8 DAYS, AS WELL AS DURING THE ROTATING INTERNSHIP THAT I HAD
9 COMPLETED IN INDIA.
10 Q. BUT SINCE THEN YOU HAVE NO TRAINING IN OBSTETRICS OR
11 GYNECOLOGY?
12 A. ABSOLUTELY RIGHT.
13 Q. AND YOU HAVE NEVER PERFORMED AN ABORTION PROCEDURE?
14 A. NO, I HAVE NOT.
15 Q. YOU HAVE NEVER WRITTEN ANY ARTICLES ABOUT ABORTION
16 PROCEDURES?
17 A. THAT IS CORRECT.
18 Q. AND YOU'VE NEVER CONDUCTED OR PARTICIPATED IN ANY STUDIES
19 ON ANY METHOD OF ABORTION, HAVE YOU?
20 A. THAT IS CORRECT.
21 I HAVE NOT PARTICIPATED IN THOSE KINDS OF STUDIES.
22 Q. AND BEFORE YOU SPOKE WITH COUNSEL FOR THE GOVERNMENT IN
23 THIS CASE, YOU THOUGHT THE PARTIAL-BIRTH ABORTION BAN ACT OF
24 2003 COVERED THE VAST MAJORITY OF PROCEDURES FOR ABORTIONS;
25 ISN'T THAT RIGHT?

1 A. YES, THAT WAS MY SOMEWHAT IGNORANT IMPRESSION.
2 Q. BUT COUNSEL FOR THE GOVERNMENT TOLD YOU THAT THE PROCEDURE
3 THAT THE ACT BANNED WAS THE DILATION AND EXTRACTION, OR D&X
4 PROCEDURE; IS THAT RIGHT?
5 A. YES, THEY DID. AND AFTER THAT INITIAL TELEPHONE CONTACT, I
6 RECEIVED A COPY OF THE ACT, AND I READ THROUGH THAT, AND THEN
7 INFORMED MYSELF AS TO WHAT IT IS ALL ABOUT.
8 Q. BUT BEFORE THAT CONVERSATION AND RECEIVING A COPY OF THE
9 ACT, YOU DIDN'T HAVE MUCH OF AN UNDERSTANDING OF THE INTACT D&E
10 PROCEDURE; ISN'T THAT RIGHT?
11 A. THAT IS RIGHT, IF THE INTACT D&E PROCEDURE IS WHAT YOU CALL
12 THE D&X PROCEDURE.
13 Q. IN FACT, I THINK YOU TOLD ME AT YOUR DEPOSITION YOU WENT ON
14 GOOGLE TO LOOK FOR INFORMATION ABOUT IT?
15 A. YOU'RE ABSOLUTELY RIGHT.
16 Q. AND YOUR UNDERSTANDING EVEN NOW IS ONLY RUDIMENTARY?
17 A. I AGREE WITH THAT.
18 Q. SO YOU'VE NEVER PERFORMED AN INTACT D&E PROCEDURE?
19 A. NO, I HAVE NOT.
20 Q. NEVER OBSERVED ONE HAPPENING?
21 A. NO, I HAVE NOT.
22 Q. AND YOU DON'T CONSIDER YOURSELF AN EXPERT ON THAT
23 PROCEDURE?
24 A. YOU'RE ABSOLUTELY RIGHT. I DON'T CONSIDER OR CLAIM TO BE
25 AN EXPERT IN THAT PROCEDURE.

1 Q. I ALSO THINK ON DIRECT YOU INDICATED THAT YOU'RE NOT AN
2 ANESTHESIOLOGIST?
3 A. I AM NOT A BOARD CERTIFIED ANESTHESIOLOGIST.
4 Q. YOU HAVE NEVER HAD A BOARD CERTIFICATION IN THAT SPECIALTY
5 AREA; IS THAT RIGHT?
6 A. THAT IS CORRECT.
7 Q. YOU ARE NOT A MEMBER OF ANY PROFESSIONAL ORGANIZATION
8 RELATING TO ANESTHESIOLOGY?
9 A. NO, I AM NOT.
10 Q. YOU ARE NOT TRAINED OR CERTIFIED TO DELIVER ANESTHESIA TO
11 PATIENTS?
12 A. I DO DELIVER ANESTHESIA TO PATIENTS UNDER MY CERTIFICATION
13 AS A PEDIATRIC CRITICAL CARE SPECIALIST.
14 BUT THOSE ARE OVERLAPS BETWEEN THE FUNCTIONS OF A
15 PEDIATRIC INTENSIVIST AND AN ANESTHESIOLOGIST.
16 Q. BUT YOU DON'T DO THAT IN THE CONTEXT AS AN
17 ANESTHESIOLOGIST?
18 A. I DO THAT AS A PRACTICING CLINICIAN AT ARKANSAS CHILDREN'S
19 HOSPITAL.
20 MS. PARKER: YOUR HONOR, MAY I APPROACH THE WITNESS?
21 THE COURT: YES.
22 BY MS. PARKER:
23 Q. DR. ANAND, IF YOU COULD TAKE A LOOK AT YOUR DEPOSITION
24 WHICH OCCURRED FEBRUARY 17TH AT PAGE 214. AND I WOULD LIKE TO
25 DIRECT YOUR ATTENTION TO LINES THREE THROUGH 10. AND THERE YOU

1 ARE ASKED IN RESPONSE TO A QUESTION BY YOUR COUNSEL THAT SAID:
2 "DR. ANAND, EARLIER MS. WIGMORE ASKED YOU
3 WHETHER YOU WERE AN EXPERT IN ANESTHESIOLOGY, AND
4 YOU SAID THAT YOU WERE NOT AN EXPERT IN
5 ANESTHESIOLOGY. WHAT DID YOU MEAN BY THAT?"
6 AND YOU RESPONDED:
7 "SIMPLY MEANS THAT MY EXPERTISE IS IN
8 THE PHARMACOLOGY OF ANESTHESIA AND ANALGESIC DRUGS,
9 BUT I DON'T PRACTICE AS ANESTHESIOLOGIST, AND I'M
10 NOT TRAINED OR CERTIFIED TO DELIVER ANESTHESIA TO
11 ANY PATIENTS."
12 DO YOU SEE THAT?
13 A. YES, I CERTAINLY -- COULD I DIRECT YOUR ATTENTION TO
14 PAGE 44 OF THE SAME DEPOSITION?
15 THE COURT: THIS IS A BIT UNUSUAL.
16 MS. PARKER: YES. I THINK I AM THE ONE WHO GETS TO
17 ASK THE QUESTIONS, DR. ANAND.
18 THE WITNESS: YOUR HONOR, THE DEPOSITION OCCURRED --
19 THE COURT: WELL, FIRST OF ALL, THIS IS A VOIR DIRE
20 PROCEDURE. SHE IS TESTING THE EXTENT AND SCOPE OF YOUR
21 QUALIFICATIONS. COUNSEL FOR THE GOVERNMENT WILL HAVE AN
22 OPPORTUNITY TO DRAW OUR ATTENTION TO ANY OTHER PAGES OF THE
23 DEPOSITION THAT ARE PERTINENT.
24 THE WITNESS: CERTAINLY, WHATEVER YOU DESIRE.
25 BY MS. PARKER:

1 Q. SO YOU CURRENTLY DON'T ACT IN THE AREA OF OBSTETRIC
2 ANESTHETICS; IS THAT RIGHT?
3 A. THAT IS CORRECT.
4 Q. AND YOU HAVE NOT CONDUCTED ANY STUDIES MEASURING THE
5 EFFECTS OF ANESTHESIA ON FETUSES; ISN'T THAT RIGHT?
6 A. THAT'S RIGHT.
7 Q. YOU DON'T CONSIDER YOURSELF TO BE AN EXPERT IN
8 ANESTHESIOLOGY; ISN'T THAT RIGHT?
9 A. THAT IS RIGHT.
10 Q. YOU INDICATED THAT YOU SPEND SOME PART OF YOUR TIME WORKING
11 WITH THE DEPARTMENT OF ANESTHESIOLOGY AT THE UNIVERSITY OF
12 ARKANSAS, I BELIEVE?
13 A. YES, I HAVE AN ADJUNCT APPOINTMENT IN THE DEPARTMENT OF
14 ANESTHESIOLOGY, BUT MY PRIMARY APPOINTMENT IS IN DEPARTMENT OF
15 PEDIATRICS.
16 Q. IN FACT, YOU SPEND 99 PERCENT OF YOUR TIME IN THE
17 DEPARTMENT OF PEDIATRICS; ISN'T THAT RIGHT?
18 A. I THINK IT IS 99 PERCENT OF MY EFFORT, RATHER THAN MY TIME.
19 AND THAT PART OF THAT EFFORT ALSO SUBSERVES THE FUNCTIONS OF
20 THE DEPARTMENT OF ANESTHESIOLOGY OR PHARMACOLOGY OR
21 NEUROBIOLOGY.
22 AS AN EXAMPLE, SUPPOSE I APPLY FOR AN NIH GRANT AND
23 I RECEIVE AN NIH GRANT, THE GRANT TOTAL WILL BE INCLUDED IN THE
24 RESEARCH FUNDING FOR DEPARTMENT OF ANESTHESIOLOGY, AS WELL AS
25 MY PRIMARY DEPARTMENT, WHICH IS DEPARTMENT OF PEDIATRICS.

1 Q. BUT AT YOUR DEPOSITION YOU TOLD US THAT YOU SPEND LESS THAN
2 1 PERCENT OF YOUR TIME IN THE DEPARTMENTS OTHER THAN THE
3 DEPARTMENT OF PEDIATRICS; ISN'T THAT RIGHT?
4 A. LESS THAN 1 PERCENT OF MY EFFORT, NOT TIME.
5 Q. OKAY.
6 A. AND --
7 Q. AND ALL OF YOUR SALARY COMES ENTIRELY FROM THE DEPARTMENT
8 OF PEDIATRICS; ISN'T THAT RIGHT?
9 A. ABSOLUTELY RIGHT.
10 Q. SO, DR. ANAND, YOU ALSO CLAIM TO BE AN EXPERT IN FETAL
11 PAIN; IS THAT RIGHT?
12 A. YES, I DO.
13 Q. BUT YOU ARE NOT CURRENTLY CONDUCTING ANY RESEARCH ON PAIN
14 IN THE HUMAN FETUS; ISN'T THAT TRUE?
15 A. THAT IS TRUE. I AM NOT CURRENTLY CONDUCTING ANY RESEARCH
16 IN THE AREA OF FETAL PAIN, ALTHOUGH DURING MY ENTIRE RESEARCH
17 CAREER I HAVE CLOSELY FOLLOWED THE LITERATURE PERTAINING TO
18 FETAL PAIN OVER THE LAST 20 PLUS YEARS.
19 AND I HAVE FREQUENTLY SERVED AS A REVIEWER FOR
20 STUDIES THAT HAVE LOOKED AT FETAL RESPONSES TO PAIN.
21 Q. BUT YOU YOURSELF ARE NOT CURRENTLY CONDUCTING ANY RESEARCH
22 ON FETAL PAIN?
23 A. YOU'RE RIGHT.
24 Q. AND ALL THE RESEARCH YOU ARE CURRENTLY CONDUCTING IS ON
25 ANIMAL MODELS OR PRE-TERM INFANTS OR NEONATES; IS THAT RIGHT?

1 A. THAT IS RIGHT.
2 Q. AND, IN FACT, ALL OF THE RESEARCH YOU HAVE CONDUCTED IN THE
3 PAST HAS FOCUSED ON NEWBORN INFANTS; ISN'T THAT RIGHT?
4 A. EXCEPT AS NOTED ABOVE IN RELATION TO THE STUDIES I HAVE
5 PARTICIPATED IN UNIVERSITY OF OXFORD, ALL OF MY RESEARCH HAS
6 BEEN IN ANIMAL MODELS OF NEONATAL PAIN AND PRE-TERM INFANTS.
7 Q. BUT THERE IS A HUGE DIFFERENCE BETWEEN PRE-TERM INFANTS AND
8 FETUSES; ISN'T THAT RIGHT, IN TERMS OF THEIR EXPERIENTIAL
9 CONTACTS, THE PHYSIOLOGICAL DIFFERENCES AND DIFFERENCES IN
10 TERMS OF THEIR ENVIRONMENT?
11 A. YOU'RE ABSOLUTELY RIGHT.
12 Q. AND THE DOCTORAL THESIS YOU JUST MENTIONED ALSO INVOLVED
13 PREMATURE INFANTS; ISN'T THAT CORRECT, NOT FETUSES?
14 A. YES, PREMATURE INFANTS AND FULL-TERM INFANTS.
15 Q. IT DID NOT FOCUS ON FETAL PAIN OR FETAL ANESTHESIA?
16 A. IT DID NOT FOCUS ON FETAL PAIN OR FETAL ANESTHESIA.
17 Q. IN FACT, THE ONLY WORK ON FETAL PAIN THAT YOU HAVE DONE IS
18 A STUDY YOU PARTICIPATED IN PERIPHERALLY WHILE YOU WERE AT
19 OXFORD?
20 A. YES. LIKE I MENTIONED BEFORE, THERE WERE TWO STUDIES THAT
21 I PARTICIPATED IN.
22 Q. THAT WAS OVER 20 YEARS AGO; ISN'T THAT RIGHT?
23 A. YES.
24 Q. AND ONE OF THOSE STUDIES WAS BY A JOACHIM PARTSCH; IS THAT
25 RIGHT?

1 A. THAT'S RIGHT.
2 Q. YOUR ROLE IN THAT STUDY WAS SIMPLY TO REVIEW THE STUDY
3 PROTOCOL AT DEPARTMENTAL MEETINGS AND HELPING INTERPRETING THE
4 RESULTS; ISN'T THAT RIGHT?
5 A. THAT IS CORRECT.
6 Q. YOU WEREN'T AN AUTHOR ON THAT PUBLICATION?
7 A. I WAS NOT A CO-AUTHOR ON THAT PUBLICATION.
8 Q. AND THE SECOND STUDY YOU PARTICIPATED IN ALSO OCCURRED IN
9 THE 1980'S; ISN'T THAT RIGHT?
10 A. THAT'S RIGHT.
11 Q. AND THAT IS THE STUDY YOU INDICATE YOU WERE A CO-AUTHOR ON?
12 A. YES, I WAS THE SECOND AUTHOR ON THAT PUBLICATION.
13 Q. BUT THAT STUDY DID NOT CONCLUDE THAT A FETUS FEELS PAIN,
14 DID IT?
15 A. NO, IT WASN'T DESIGNED TO LOOK AT THE QUESTION OF FETAL
16 PAIN.
17 Q. SO IT WASN'T EVEN DESIGNED TO INVESTIGATE THE QUESTION OF
18 FETAL PAIN?
19 A. THAT'S RIGHT. AT THAT TIME FETAL OR NEONATAL PAIN HAD
20 SIMPLY NOT BEEN ADDRESSED IN ANY MEDICAL RESEARCH THAT I'M
21 AWARE OF.
22 Q. SO THE TWO STUDIES YOU PARTICIPATED IN IN THE 1980'S DIDN'T
23 REALLY LOOK AT THE WHOLE ISSUE OF FETAL PAIN. AND SINCE THE
24 1908'S, YOU HAVE NOT PARTICIPATED IN ANY STUDIES ON FETAL PAIN;
25 ISN'T THAT RIGHT?

1 A. I HAVE NOT PERFORMED ANY STUDIES ON FETAL PAIN SINCE THE
2 1980'S, YOU'RE RIGHT.
3 Q. ARE YOU AWARE OF ANY STUDIES OF FETAL PAIN DURING THE
4 INTACT D&E PROCEDURE?
5 A. I AM NOT AWARE OF ANY SUCH STUDIES.
6 Q. ARE YOU AWARE OF ANY ARTICLES ON FETAL PAIN DURING THE
7 INTACT D&E PROCEDURE?
8 A. THAT TOPIC TO THE BEST OF MY KNOWLEDGE HAS NOT BEEN
9 RESEARCHED OR PUBLISHED AS YET.
10 Q. SO IN MAKING THE OPINIONS YOU INTEND TO GIVE TODAY YOU ARE
11 NOT RELYING ON ANY STUDIES OR ARTICLES ON THE PAIN A FETUS
12 MIGHT EXPERIENCE DURING AN INTACT D&E PROCEDURE; ISN'T THAT
13 RIGHT?
14 A. THAT IS RIGHT. SUCH INFORMATION IS NOT AVAILABLE IN THE
15 MEDICAL LITERATURE.
16 MS. PARKER: YOUR HONOR, WE WOULD OBJECT TO THE
17 QUALIFICATIONS OF DR. ANAND IN -- AS AN ANESTHESIOLOGIST AND AS
18 TO FETAL PAIN UNDER FEDERAL RULE OF EVIDENCE 702, BECAUSE
19 DR. ANAND DOES NOT HAVE THE KNOWLEDGE, SKILL, EXPERIENCE,
20 TRAINING OR EDUCATION TO TESTIFY IN THESE TWO AREAS.
21 AS TO ANESTHESIA, BY HIS OWN ADMISSION, DR. ANAND IS
22 NOT AN EXPERT. HE DOES NOT PRACTICE IN THIS AREA. HE IS NOT
23 TRAINED IN THIS AREA, AND HE HAS NOT DONE RESEARCH ON THE AREA
24 OF FETAL ANESTHESIA.
25 THE COURT: I HAVE A QUESTION IN THAT REGARD. THE

1 DOCTOR HAS INDICATED THAT HE BELIEVES HIMSELF TO BE AN EXPERT
2 IN THE PHARMACOLOGY OF ANESTHETIC DRUGS AND NOT ANESTHESIA, PER
3 SE, BECAUSE HE IS NOT A CERTIFIED ANESTHESIOLOGIST.
4 WHAT IS THE DIFFERENCE BETWEEN THOSE TWO?
5 THE WITNESS: YOUR HONOR, ALL OF MY RESEARCH HAS
6 BEEN FOCUSED ON THE EFFECTS OF ANESTHETIC AND ANALGESIC DRUGS
7 DURING EARLY LIFE IN THE DEVELOPING BRAIN AND IN THE STRESS
8 RESPONSES.
9 I HAVE AUTHORED MANY ARTICLES ON THAT SUBJECT. IN
10 FACT, FOR THE LAST TWO BOARD CONGRESSES OF PEDIATRIC AND
11 NEONATAL INTENSIVE CARE, I WAS THE CHAIRMAN OF THE PHARMACOLOGY
12 TRACK WITHIN THOSE BOARD CONGRESSES.
13 MY AREA OF RESEARCH IS WELL-RECOGNIZED AS SEMINAL IN
14 THE AREA OF ANESTHETIC ANALGESIC DRUGS DURING EARLY LIFE.
15 MS. PARKER: WE DO NOT OBJECT TO HIS TESTIFYING
16 ABOUT THE PHARMACOLOGY OF ANESTHETICS. BUT TO THE EXTENT HE
17 WANTS TO PROVIDE TESTIMONY ABOUT THE IMPACT OR EFFECT AS A
18 RESULT OF AN ANESTHETIC PROCEDURE, WE WOULD OBJECT TO THAT.
19 THE COURT: COUNSEL INDICATED HE WAS BEING OFFERED
20 AS AN EXPERT IN THE PHARMACOLOGY OF ANESTHETIC DRUGS, FETAL
21 PAIN AND FETAL NEUROBIOLOGY. AND YOUR OBJECTION IS TO
22 TESTIMONY AS AN ANESTHESIOLOGIST, WHICH DOESN'T APPEAR TO ME
23 THAT IS WHAT HE HAS BEEN CALLED TO GIVE; IS THAT CORRECT?
24 MS. NORONHA: THAT IS CORRECT, YOUR HONOR.
25 THE COURT: ALL RIGHT.

1 MS. KRASNOFF: AS LONG AS THAT IS CLEAR WHEN HE
2 STARTS PROVIDING HIS OPINIONS, BECAUSE WE BELIEVE HIS OPINIONS
3 GO OVER TO THE GENERAL AREA OF ANESTHESIOLOGY.
4 THE COURT: I AM SURE YOU WILL POINT THAT OUT TO ME.
5 MS. PARKER: AS TO FETAL PAIN, DR. ANAND ADMITS HE
6 HAS DONE NO RESEARCH AND WRITTEN NO ARTICLES ON FETAL PAIN. HE
7 HAS TESTIFIED ABOUT HIS EXPERTISE IN PAIN AND STRESS RESPONSES,
8 BUT NOT FETAL PAIN, IN PARTICULAR.
9 WHILE WE HAVE NO OBJECTIONS TO HIS TESTIFYING ABOUT
10 HIS RESEARCH AND THE JUDGMENTS HE MAKES BASED ON HIS RESEARCH,
11 WE OBJECT TO THE CHARACTERIZATION OF THAT AS FETAL PAIN.
12 THE COURT: OKAY. ALL RIGHT. RESPONSE?
13 MS. NORONHA: YOUR HONOR, MAY I --
14 THE COURT: DO YOU WISH TO RESPOND OR ASK ANY VOIR
15 DIRE ON THAT?
16 MS. NORONHA: MAY I ASK FURTHER QUESTIONS BEFORE
17 RESPONDING?
18 DIRECT EXAMINATION, CONTINUED
19 BY MS. NORONHA:
20 Q. DR. ANAND, FIRST OF ALL, YOU HAD WANTED TO EXPLAIN SOME
21 TESTIMONY IN YOUR DEPOSITION ON PAGE 44. WOULD YOU LIKE TO DO
22 THAT NOW?
23 A. YES, COUNSEL. THE REASON WHY I SAID THAT IS BECAUSE MY
24 DEPOSITION WAS ABNORMAL INSOMUCH IT WAS OBTAINED BY TWO
25 DIFFERENT COUNSELS, AMY WIGMORE AND BETH PARKER. AND SO THERE

1 WAS A CONSIDERABLE DEGREE OF REPETITION OF QUESTIONS. ON
2 PAGE 44, I WOULD REFER TO LINES SIX THROUGH 23 WHERE I HAVE
3 DESCRIBED THAT THERE IS A CONSIDERABLE DEGREE OF OVERLAP IN
4 WHAT I DO FOR DEPARTMENT OF PEDIATRICS AND THE MISSIONS AND
5 GOALS OF THESE OTHER DEPARTMENTS.
6 SO IF I HAVE PUBLISHED PAPERS THAT ARE FOCUSED ON
7 NEONATAL PHARMACOLOGY OR I HAVE OBTAINED GRANTS FOR STUDIES
8 THAT ARE DESIGNED FOR NEONATAL PHARMACOLOGY OR NEUROBIOLOGY,
9 THE INFORMATION IN HERE, THEN THOSE ACTIVITIES --
10 THE COURT: SLOW DOWN, PLEASE.
11 THE WITNESS: SORRY. I APOLOGIZE. THEN THOSE
12 ACTIVITIES ARE LISTED AS PART OF THOSE THE OTHER DEPARTMENTS,
13 AS WELL. SO ALL OF MY SALARY SUPPORT COMES FROM DEPARTMENT OF
14 PEDIATRICS, AND THAT'S WHERE MY PRIMARY ALLEGIANCE AND EFFORT
15 IS DIRECTED.
16 AS FOR THESE OTHER ADJUNCT DEPARTMENTS, YES, I WILL
17 ON OCCASION PROVIDE SERVICES, AS AND WHEN REQUESTED BY THOSE
18 DEPARTMENT HEADS. IT'S NOT, YOU KNOW -- THERE IS NO WAY OF
19 SORT OF CLASSIFYING PERSON EFFORT TO THIS DEPARTMENT OR THAT
20 DEPARTMENT, BECAUSE WHAT I DO FOR DEPARTMENT OF PEDIATRICS ALSO
21 HELPS THE TEACHING IN THE DEPARTMENTS OF ANESTHESIOLOGY AND
22 PHARMACOLOGY AND NEUROBIOLOGY.
23 BY MS. NORONHA:
24 Q. DOCTOR, YOU STATED YOU HAVEN'T CONDUCTED ANY STUDIES
25 YOURSELF ON FETAL PAIN RECENTLY. HOW ARE YOU THEN ABLE TO

1 OPINE ON THE SUBJECT OF FETAL PAIN IF YOU YOURSELF HAVE NOT
2 CONDUCTED SOME OF THOSE STUDIES?
3 A. I HAVE MAINTAINED A SCHOLARLY INTEREST IN THE AREA OF FETAL
4 PAIN AND THE DEVELOPMENT OF THE PAIN SYSTEM DURING EARLY LIFE.
5 THE FIRST TIME THAT FETAL PAIN EVER CAME INTO CONSIDERATION IN
6 THE MEDICAL LITERATURE WAS AN ARTICLE THAT WAS PUBLISHED IN
7 NOVEMBER OF 1987 IN THE NEW ENGLAND JOURNAL OF MEDICINE, WHICH
8 WAS TITLED "PAIN AND ITS EFFECTS IN THE HUMAN NEONATE AND
9 FETUS."
10 SINCE THEN, MULTIPLE OTHER ARTICLES HAVE FOCUSED ON
11 THIS AREA. AND ALTHOUGH I HAVEN'T DESIGNED ANY ORIGINAL
12 RESEARCH PROTOCOLS, I HAVE SERVED AS A REVIEWER FOR THE
13 PUBLICATIONS AND PROTOCOLS THAT OTHER PEOPLE HAVE SUBMITTED,
14 EITHER FOR PUBLICATION TO JOURNAL OR FOR GRANT FUNDING AT THE
15 NIH LEVEL, AND, THEREFORE, CONTINUING MY INTEREST IN FETAL
16 PAIN.
17 I HAVE ALSO SERVED AS A MEMBER OF THE EDITORIAL
18 BOARD OF BIOLOGY OF THE NEONATE, WHICH IS A JOURNAL THAT IS
19 FOCUSED ON FETAL AND NEONATAL PHYSIOLOGY. AND AS A MEMBER OF
20 THE EDITORIAL BOARD, I FREQUENTLY REVIEWED PAPERS ON FETAL PAIN
21 AND FETAL STRESS RESPONSES.
22 Q. DOCTOR, YOU HAVE CONDUCTED STUDIES YOURSELF ON THE SUBJECT
23 OF PAIN IN PRE-TERM NEONATES, RIGHT?
24 A. THAT IS CORRECT. EVEN MY CURRENT RESEARCH IS FOCUSED ON
25 PREMATURE NEONATES ALL THE WAY FROM 23 WEEKS OF GESTATION

1 ONWARDS. AND I FREQUENTLY PARTICIPATE IN THOSE RESEARCH
2 STUDIES IN THE COLLECTION AND INTERPRETATION OF DATA RELATED TO
3 PAIN IN PRE-TERM BABIES. INSOMUCH THAT THE PHYSIOLOGY OF THE
4 FETUS AND THE PREMATURE NEONATE MAY BE DIFFERENT, BUT THE
5 PATTERNS OF PHYSIOLOGICAL RESPONSES TO PAIN ARE VERY SIMILAR IN
6 THE PRE-TERM NEONATE AS THEY ARE IN THE FETUS.
7 THERE IS A CONSIDERABLE DEGREE OF OVERLAP THAT I
8 WOULD LIKE TO POSTULATE.
9 MS. NORONHA: THANK YOU, DOCTOR.
10 YOUR HONOR, THE ONLY THING I WOULD LIKE TO ADD IS
11 THAT DR. ANAND HAS BEEN QUALIFIED AS AN EXPERT IN THESE THREE
12 AREAS BEFORE JUDGE CASEY IN NEW YORK. AND ALTHOUGH JUDGE KOPF
13 IN NEBRASKA DOES NOT PARTICULARLY QUALIFY EXPERTS, HE DID HEAR
14 DR. ANAND'S TESTIMONY.
15 THE COURT: THANK YOU.
16 ALL RIGHT. ANYTHING ELSE?
17 MS. PARKER: YES, YOUR HONOR. I BELIEVE THAT
18 COUNSEL ALSO WANTED TO CERTIFY HIM AS AN EXPERT IN FETAL
19 NEUROBIOLOGY, BUT I DO NOT BELIEVE HE TESTIFIED DURING HIS
20 DIRECT ON ANY EXPERTISE IN THE AREA OF FETAL NEUROBIOLOGY. AND
21 IN FACT, HE'S TESTIFIED HIS EXPERTISE IS IN CARE OF CHILDREN,
22 CRITICALLY ILL CHILDREN AND PRE-TERM NEONATES, WHICH ARE QUITE
23 DIFFERENT THAN FETUSES.
24 THE COURT: THAT IS CORRECT. YOU HAVEN'T ELICITED
25 ANY INFORMATION THAT WOULD LEAD ME TO QUALIFY HIM IN THAT AREA

1 DO YOU WISH AN OPPORTUNITY TO DO SO?
2 MS. NORONHA: YES. THANK YOU, YOUR HONOR.
3 BY MS. NORONHA:
4 Q. DR. ANAND, I BELIEVE YOU STATED YOU WERE FAMILIAR WITH THE
5 DEVELOPMENT OF THE PAIN SYSTEM IN EARLY LIFE. CAN YOU EXPLAIN
6 HOW THAT IS APPLICABLE TO THE FETUS?
7 A. CERTAINLY. THE PAIN SYSTEM STARTS DEVELOPING VERY EARLY IN
8 GESTATION FROM ABOUT SIX OR SEVEN WEEKS OF GESTATION.
9 MS. PARKER: YOUR HONOR, I AM SORRY TO OBJECT AT
10 THIS TIME, BUT IT APPEARS HE IS NOW GOING TO START PROVIDING
11 HIS OPINION, AND HE HAS NOT YET BEEN QUALIFIED. SO WE THINK IT
12 IS INAPPROPRIATE FOR HIM --
13 THE COURT: I THINK THAT IS WHAT SHE IS TRYING TO
14 GET AT, CORRECT? WE NEED TO DETERMINE FIRST IF HE IS
15 QUALIFIED. HE HAS NOT TOLD US ANYTHING ABOUT HIS BACKGROUND IN
16 FETAL NEUROBIOLOGY.
17 MS. NORONHA: THAT IS CORRECT, YOUR HONOR.
18 BY MS. NORONHA:
19 Q. GO AHEAD, DOCTOR.
20 A. THEREFORE, I HAVE LOOKED AT THE DEVELOPMENT OF THE PAIN
21 SYSTEM AND HAVE SYNTHESIZED THE DATA PERTAINING TO FETAL
22 DEVELOPMENT OF THE PAIN SYSTEM. THIS ALSO HAS A MAJOR CONTEXT
23 IN TERMS OF DEVELOPING --
24 THE COURT: IF I CAN STOP YOU FOR A MOMENT. MAYBE
25 YOU START AT THE BEGINNING. WHAT IS NEUROBIOLOGY AS IT APPLIES

1 TO FETUSES?
2 THE WITNESS: CERTAINLY, YOUR HONOR. NEUROBIOLOGY
3 IS THE DISCIPLINE FOR THE STUDY OF THE CENTRAL AND PERIPHERAL
4 NERVOUS SYSTEM. THE CENTRAL NERVOUS SYSTEM COMPRISING OF THE
5 BRAIN, THE BRAIN STEM AND THE SPINAL CORD. THERE IS THE
6 PERIPHERAL NERVOUS SYSTEM, INCLUDES THE NERVE FIBERS AND THE
7 RECEPTORS LOCATED IN THE SKIN, MUCUS MEMBRANES AND OTHER
8 ORGANS.
9 AND THAT'S THE DISCIPLINE OF NEUROBIOLOGY.
10 THE COURT: HOW ARE STUDIES CONDUCTED ON FETUSES?
11 THE WITNESS: THERE ARE DIFFERENT WAYS OF LOOKING AT
12 THE NEUROBIOLOGY OF THE FETUS. PRIMARILY THROUGH ANIMAL
13 EXPERIMENTS OR THROUGH FETUSES THAT WERE THE RESULT OF
14 ABORTIONS. AND A LOT OF THE EARLY RESEARCH WAS DONE ON FETUSES
15 THAT WERE OBTAINED DURING ABORTIONS.
16 SO, THOSE ARE SOME OF THE STUDIES THAT I HAVE
17 REVIEWED. THERE ARE ALSO CURRENT STUDIES ONGOING THAT LOOK AT
18 PHYSIOLOGICAL RESPONSES IN THE FETUS WHEN IT IS SUBJECTED TO A
19 PAINFUL STIMULUS OR PAINFUL EXPERIENCE.
20 AND I HAVE SERVED AS REVIEWER FOR THOSE STUDIES. I
21 HAVE BEEN INVITED TO WRITE EDITORIALS ON THE SUBJECT OF FETAL
22 NEUROBIOLOGY. I HAVE PUBLISHED SEVERAL ARTICLES THAT DEAL WITH
23 THE DEVELOPMENT OF THE BRAIN AND THE IMPACT OF PAIN ON THIS
24 DEVELOPMENT.
25 THE COURT: ALL RIGHT. SO YOU HAVE NOT CONDUCTED

1 ANY OF THE STUDIES YOURSELF?
2 THE WITNESS: YOU'RE RIGHT. I HAVE NOT CONDUCTED
3 THOSE STUDIES MYSELF.
4 THE COURT: ALL RIGHT. ANYTHING ELSE?
5 MS. NORONHA: I HAVE NOTHING FURTHER, YOUR HONOR.
6 THE COURT: ALL RIGHT. ANYTHING ELSE FROM YOU,
7 MS. PARKER?
8 MS. PARKER: NO, YOUR HONOR.
9 THE COURT: ALL RIGHT. ON THE THREE AREAS IN WHICH
10 HE HAS BEEN OFFERED, I FIND THAT THE PLAINTIFFS' ARGUMENTS
11 PRETTY MUCH GO TO THE WEIGHT TO BE ASSESSED AND TO BE ASSIGNED
12 TO HIS TESTIMONY IN THIS REGARD, MORE SO THAN THE
13 QUALIFICATIONS. I WILL PERMIT HIM TO TESTIFY AS AN EXPERT IN
14 ALL THREE AREAS.
15 MS. NORONHA: THANK YOU, YOUR HONOR.
16 BY MS. NORONHA:
17 Q. DR. ANAND, I WOULD LIKE TO TURN NOW TO THE DEFINITION OF
18 PAIN. WOULD YOU PLEASE GIVE US A DEFINITION OF PAIN?
19 A. PAIN IS DEFINED AS AN UNPLEASANT SENSORY AND EMOTIONAL
20 EXPERIENCE ASSOCIATED WITH ACTUAL OR POTENTIAL TISSUE DAMAGE OR
21 DESCRIBED IN TERMS OF SUCH DAMAGE.
22 Q. DOCTOR, WHAT IS THE SOURCE OF THAT DEFINITION?
23 A. THIS IS THE OFFICIAL DEFINITION THAT WAS PROPOSED BY THE
24 INTERNATIONAL ASSOCIATION FOR THE STUDY OF PAIN. THEY HAVE A
25 COMMITTEE ON TAXONOMY THAT DECIDES THE DEFINITION OF VARIOUS

1 PAIN-RELATED TERMS, AND THIS WAS THE DEFINITION PROPOSED BY
2 THAT COMMITTEE.
3 Q. WHAT IS THE INTERNATIONAL ASSOCIATION FOR THE STUDY OF
4 PAIN?
5 A. THIS IS A LARGE ORGANIZATION, MORE THAN 7,000 MEMBERS, OF
6 CLINICIANS, OF RESEARCHERS, PHYSIOLOGISTS, OBSTETRICIANS,
7 ANESTHESIOLOGISTS. ALL OF THESE PEOPLE WHO ARE FOCUSED ON THE
8 STUDY OF PAIN BELONG, OR MOST OF THEM BELONG TO THE IASP, WHICH
9 IS THE INTERNATIONAL ASSOCIATION FOR THE STUDY OF PAIN.
10 Q. DO YOU CONSIDER THE IASP TO BE AN AUTHORITATIVE BODY?
11 A. I CERTAINLY DO.
12 Q. YOU ARE A MEMBER OF THE IASP?
13 A. YES, I AM A MEMBER OF THE IASP.
14 Q. HOW DOES ONE BECOME A MEMBER OF THIS ORGANIZATION?
15 A. WHEN I APPLIED TO THE IASP FOR MEMBERSHIP, I WAS REQUIRED
16 TO SUBMIT AN APPLICATION FORM. I HAD TO GET NOMINATED BY TWO
17 MEMBERS THAT WERE IN GOOD STANDING AT THE IASP. AND THEN, THIS
18 APPLICATION WAS REVIEWED BY THE COMMITTEE ON MEMBERSHIP. AND
19 THIS COMMITTEE ON MEMBERSHIP MAKES THEIR OWN INQUIRIES.
20 AND THEN, AFTER A FEW MONTHS, YOU EITHER GET
21 ACCEPTED OR REJECTED AS A MEMBER OF THE IASP.
22 MS. NORONHA: MAY I APPROACH THE WITNESS, YOUR
23 HONOR?
24 THE COURT: YES.
25 BY MS. NORONHA:

1 Q. DR. ANAND, I HAVE HANDED YOU WHAT HAS BEEN MARKED AS
2 LEARNED TREATISE A-31. WOULD YOU PLEASE TURN TO PAGE 2 OF THAT
3 DOCUMENT?
4 A. YES, I HAVE IT.
5 Q. APPROXIMATELY HALFWAY DOWN IT SAYS "PAIN TERMS" AND LISTS
6 THE DEFINITION OF "PAIN." IS THIS THE DEFINITION TO WHICH YOU
7 WERE REFERRING?
8 A. YES, THIS IS EXACTLY THE SAME DEFINITION.
9 Q. DOCTOR, WOULD YOU PLEASE EXPLAIN WHAT A SENSORY EXPERIENCE
10 IS?
11 A. A SENSORY EXPERIENCE IS ONE THAT IS ASSOCIATED WITH
12 SENSATION. SO, BASICALLY IT REFERS TO THE SENSORY ASPECT OF
13 PAIN THAT IS CONDUCTED THROUGH RECEPTORS AND THEIR FIBERS, AND
14 IS THEN PROCESSED WITHIN THE RAIN.
15 Q. WHAT IS AN EMOTIONAL EXPERIENCE OF PAIN?
16 A. AN EMOTIONAL EXPERIENCE OF PAIN IS ONE THAT CHARACTERIZES
17 THE PAIN AS BEING UNPLEASANT OR NOXIOUS IN NATURE. AND THIS IS
18 ASSOCIATED WITH AN EMOTIONAL RESPONSE TO THAT NOXIOUS, SUCH AS
19 THE EXPRESSIONS OF PAIN OR CRYING DUE TO PAIN OR OTHER
20 REACTIONS TO THE EMOTIONAL ASPECT OF PAIN.
21 Q. DOCTOR, THERE IS A NOTE UNDER THE DEFINITION WHICH STATES
22 THAT:
23 "THE INABILITY TO COMMUNICATE VERBALLY DOES NOT
24 NEGATE THE POSSIBILITY THAT AN INDIVIDUAL IS
25 EXPERIENCING PAIN AND IS IN NEED OF APPROPRIATE PAIN

1 RELIEVING TREATMENT."
2 WHAT DOES THAT NOTE MEAN?
3 A. YOU SEE, THE DEFINITION OF PAIN IS HEAVILY DEPENDENT ON
4 VERBAL SELF-EXPRESSION. SO THE LIVING BEINGS THAT ARE UNABLE
5 TO COMMUNICATE VERBALLY ARE AT A DISADVANTAGE. AND THIS NOTE
6 WAS ADDED IN MAY OF 2001, AFTER FIVE YEARS OF REPRESENTATIONS
7 THAT WERE MADE TO THE IASP.
8 I WAS SPEARHEADING THAT EFFORT IN ORDER TO APPLY THE
9 DEFINITION OF PAIN TO BABIES WHO MAY NOT COMMUNICATE VERBALLY
10 OR TO ANIMALS OR TO ADULT PATIENTS WITH DEMENTIA OR OTHER
11 PATIENTS WITH HANDICAP WHO WERE PARTICULARLY DISADVANTAGED IN
12 TERMS OF RECEIVING APPROPRIATE MEDICATIONS FOR PAIN RELIEF.
13 Q. SO, DOCTOR, IS THERE A DIFFERENCE BETWEEN THE PERCEPTION OF
14 PAIN AND THE REACTION TO PAIN?
15 A. YES. IN SOME -- TO SOME EXTENT. THE PERCEPTION OF PAIN IS
16 ALL OF THE INPUT INTO THE PAIN SYSTEM, WHICH THEN REGISTERED
17 THAT PAINFUL EXPERIENCE HAS OCCURRED. AND WHAT FOLLOWS
18 THEREAFTER, HOW THE LIVING ORGANISM RESPONDS TO LIMIT THE
19 INTENSITY OR DURATION OF THAT PAIN IS BASICALLY -- OR
20 COMMUNICATED THE EXPERIENCE IS PART OF THE REACTION TO PAIN.
21 Q. SO IF THERE IS NO REACTION TO PAIN, DOES THAT MEAN THAT THE
22 PERCEPTION OF PAIN HAS NOT OCCURRED?
23 A. CERTAINLY NOT. THERE ARE STOIC PEOPLE WHO MAY BE ABLE TO
24 COMPLETELY HIDE THE FACT THAT THEY ARE IN PAIN. THERE ARE
25 SITUATIONS WHERE SUPPOSE A PATIENT IS GIVEN A MUSCLE RELAXANT

1 TO PARALYZE THEM, THERE WILL BE THE PERCEPTION OF PAIN, BUT
2 THERE WILL BE NO REACTION TO PAIN, NO BEHAVIORAL REACTION TO
3 PAIN, AS SUCH.
4 THERE ARE OTHER SITUATIONS, ALTERED STATES OF
5 CONSCIOUSNESS WHERE THERE CAN BE PERCEPTION OF PAIN, BUT NO
6 OVERT REACTION TO PAIN.
7 Q. DOCTOR, THERE IS ANOTHER NOTE UNDER THE DEFINITION OF PAIN
8 THAT STATES THAT:
9 "PAIN IS ALWAYS SUBJECTIVE."
10 WHAT DOES THAT MEAN?
11 A. IT MEANS THAT PAIN HAS SPECIAL MEANING AND SIGNIFICANCE FOR
12 THE LIVING BEING THAT IS EXPERIENCING THE PAIN. IT PERTAINS TO
13 THE SUBJECT THAT IS UNDERGOING THAT EXPERIENCE, THE SUBJECT OF
14 THAT EXPERIENCE.
15 I WOULD LIKE TO ADD, IF I MAY, THAT EVERY
16 EXPERIENCE, NOT ONLY PAIN, IS, IN ESSENCE, A SUBJECTIVE
17 EXPERIENCE. EVEN PEOPLE WHO UNDERGO THE SAME EXPERIENCE HAVE A
18 VERY INDIVIDUAL EXPERIENCE THAT IS SPECIAL TO THAT INDIVIDUAL.
19 SO PAIN, AS WELL AS ALL OTHER EXPERIENCES, ARE
20 ENTIRELY SUBJECTIVE.
21 Q. DOCTOR, NOW, I WOULD LIKE TO TURN TO FETAL PAIN. DO YOU
22 HAVE AN OPINION AS TO WHETHER THE FETUS FEELS PAIN?
23 A. BASED ON MULTIPLE LINES OF EVIDENCE I BELIEVE THAT FETUSES
24 BEYOND 20 WEEKS OF GESTATION HAVE THE ABILITY TO FEEL PAIN.
25 Q. COULD YOU GENERALLY TELL US WHAT YOU MEAN BY "MULTIPLE

1 LINES OF EVIDENCE"?
2 A. YES. THESE LINES OF EVIDENCE ARE BASED ON THE ANATOMICAL
3 DEVELOPMENT OF THE PAIN SYSTEM DURING FETAL LIFE, THE
4 FUNCTIONAL CORRELATES OF A SYSTEM THAT IS FUNCTIONING, AND
5 OTHER RESPONSES FROM THE BRAIN, AS WELL AS THE PHYSIOLOGICAL
6 RESPONSES THAT MAY OCCUR FOLLOWING A PAINFUL STIMULUS. AND,
7 FINALLY, THE BEHAVIOR THAT RESULTS FROM A PAINFUL EXPERIENCE.
8 ALL THOSE ARE DIFFERENT LINES OF EVIDENCE. THESE
9 ARE ARBITRARY DIVISIONS SIMPLY TO CLASSIFY THE RESEARCH THAT IS
10 AVAILABLE IN THE LITERATURE.
11 Q. DOCTOR, IS YOUR OPINION TO A REASONABLE DEGREE OF MEDICAL
12 CERTAINTY?
13 A. YES, IT IS.
14 Q. DOCTOR, AT THIS TIME I WOULD LIKE TO TURN TO THE ANATOMICAL
15 MARKERS FOR PAIN THAT YOU MENTIONED. BUT BEFORE WE DISCUSS THE
16 APPEARANCE OF THESE IN THE FETUS, I WANT TO ASK YOU GENERALLY
17 ABOUT THE ANATOMICAL STRUCTURES THAT ARE REQUIRED IN HUMAN
18 BEINGS TO EXPERIENCE PAIN.
19 MS. NORONHA: MAY I APPROACH THE WITNESS, YOUR
20 HONOR?
21 THE COURT: YES.
22 MS. PARKER: DO YOU HAVE A COPY FOR ME?
23 MS. NORONHA: I DO.
24 BY MS. NORONHA:
25 Q. DOCTOR, I HAVE HANDED YOU TWO DEMONSTRATIVE EXHIBITS.

1 MS. NORONHA: AND, YOUR HONOR, I BELIEVE THEY ARE
2 BEHIND TAB 50 IN YOUR BINDER.
3 BY MS. NORONHA:
4 Q. IF YOU TAKE A LOOK AT THE ONE LABELED "ANATOMICAL
5 STRUCTURES FOR PAIN," DOCTOR, IS THIS A TRUE AND ACCURATE
6 SCHEMATIC OF THE ANATOMICAL STRUCTURES REQUIRED FOR A HUMAN
7 BEING TO EXPERIENCE PAIN?
8 A. YES. VERY SIMPLIFIED VERSION, I MIGHT ADD.
9 Q. WOULD THIS DEMONSTRATIVE ASSIST YOU IN YOUR TESTIMONY
10 TODAY?
11 A. TO SOME EXTENT, YES.
12 MS. NORONHA: I WOULD LIKE TO PLACE THE
13 DEMONSTRATIVE ON THE DOCUMENT CAMERA.
14 THE COURT: ALL RIGHT.
15 MS. NORONHA: MAY I APPROACH, YOUR HONOR?
16 THE COURT: YES.
17 BY MS. NORONHA:
18 Q. DOCTOR, AS WE GO THROUGH THIS I HAVE HANDED YOU A REMOTE
19 CONTROL. IT HAS A RED LASER LIGHT THAT YOU CAN POINT. I
20 BELIEVE YOU HAVE TO HOLD THE GREEN BUTTON DOWN TO USE IT.
21 A. OKAY.
22 Q. SO, DOCTOR, USING THIS DEMONSTRATIVE EXHIBIT, WOULD YOU
23 PLEASE BRIEFLY DESCRIBE FOR THE COURT THE ANATOMICAL STRUCTURES
24 THAT ARE REQUIRED FOR A HUMAN BEING TO EXPERIENCE PAIN?
25 A. CERTAINLY. THE POINT OF ENTRY INTO THE STIMULATION OF THE

1 PAIN SYSTEM ARE RECEPTORS THAT MAY BE LOCATED IN THE SKIN OR
2 MUCUS MEMBRANES OR THE VARIOUS BODY ORGANS OR BIG MUSCLE, ET
3 CETERA.
4 THESE ARE RECEPTORS THAT ARE CONNECTED WITH SENSORY
5 NERVES. AND ONCE THE RECEPTOR GETS ACTIVATED, A NERVE IMPULSE
6 IS CONDUCTED ALONG THE SENSORY NERVE TO THE LEVEL THE SPINAL
7 CORD.
8 IN THE SPINAL CORD IS A COLLECTION OF NERVE CELLS
9 TOWARDS THE BACK OF THE SPINAL CORD, WHICH IS CALLED THE DORSAL
10 HORN. AND THIS IS WHERE THE INITIAL PROCESSING OF PAIN OCCURS.
11 THERE IS A COMPLEX CIRCUITRY OVER THERE WHICH
12 RESULTS IN THE ACTUAL PAIN IMPULSE EITHER BEING ACCENTUATED OR
13 MODULATED OR CAN EVEN BE BLOCKED AT THE LEVEL OF THE DORSAL
14 HORN, RESULTING FROM INHIBITION THAT IS LOCAL, AS WELL AS
15 INHIBITION THAT MAY COME FROM HIGHER CENTERS.
16 THIS COMPLEX CIRCUITRY CONVERGES ON TO NERVE CELLS
17 THAT ARE CALLED "PROJECTION NEURONS." AND THESE PROJECTION
18 NEURONS SEND NERVE FIBERS UP TO HIGHER LEVELS OF THE BRAIN
19 WHERE THEY MAKE SIDE CONNECTIONS WITH THE CELLS LOCATED IN THE
20 BRAIN STEM. AND THEY FINALLY TERMINATE IN AN AREA OF THE BRAIN
21 CALLED THE "THALAMUS."
22 THE THALAMUS IS WHERE THE INITIAL RECEPTION OF PAIN
23 OCCURS. AND THE THALAMUS IS RICHLY CONNECTED WITH SUBCORTICAL
24 STRUCTURES, SUCH AS THE AMYGDALA, WHICH IS RESPONSIBLE FOR
25 EMOTIONAL PROCESSING, THE HIPPOCAMPUS, WHICH IS RESPONSIBLE FOR

1 THE LONG-TERM MEMORY THAT MAY RESULT FROM PAINFUL EXPERIENCES,
2 OR HIPPOTHALAMUS FROM WHERE THE STRESS RESPONSE IS COORDINATED
3 AND GENERATED.
4 SO THESE ARE WHAT WE CALL SUBCORTICAL STRUCTURES
5 THAT ARE LOCATED BELOW THE CORTEX.
6 THE THALAMUS ALSO TRANSMITS THE PAINFUL INFORMATION
7 TO WHAT IS CALLED A "SOMATOSENSORY CORTEX," ON THIS FIGURE
8 LABELED AS JUST THE "CORTEX," AS WELL AS THE SECONDARY
9 SOMATOSENSORY CORTEX LOCATED IN A PART OF THE CORTEX OF THE
10 BRAIN WHICH IS CALLED THE "INSULA."
11 THESE ARE THE TWO AREAS IN THE CORTEX THAT ARE
12 INVOLVED IN THE HIGHER PROCESSING OF PAIN AND IN THE STRATEGIES
13 TO LIMIT THE INTENSITY OR DURATION OF PAIN.
14 THERE ARE OTHER AREAS OF THE CORTEX THAT ARE ALSO
15 CONNECTED WITH THE THALAMUS THAT RECEIVE INPUT ABOUT
16 INFORMATION. FOR EXAMPLE, THE ANTERIOR CINGULATE -- SPELL THAT
17 C-I-N-G-U-L-A-T-E -- CORTEX OR OTHER AREAS.
18 Q. THANK YOU, DOCTOR. ARE ALL OF THESE STRUCTURES PRESENT AND
19 FUNCTIONAL IN THE FETUS BY 20 WEEKS' GESTATION?
20 A. YES, THEY ARE.
21 Q. OKAY. DOCTOR, I WOULD LIKE TO GO THROUGH SOME OF THESE
22 INDIVIDUALLY AND NOTE EXACTLY WHEN THEY DO APPEAR AND HOW THEIR
23 FUNCTION OCCURS IN THE FETUS.
24 IF YOU WOULD LOOK AT THE SECOND DEMONSTRATIVE
25 LABELED "DEVELOPMENT OF THE FETAL PAIN SYSTEM," IS THIS A TRUE

1 AND ACCURATE DIAGRAM OF THE APPEARANCE OF THE ANATOMICAL
2 STRUCTURES REQUIRED FOR THE FETUS TO EXPERIENCE PAIN?
3 A. TO A LARGE EXTENT. IT IS A VERY SIMPLIFIED VERSION.
4 Q. WILL THIS DEMONSTRATIVE ASSIST YOU IN YOUR TESTIMONY TODAY?
5 A. YES, IT WILL.
6 MS. NORONHA: YOUR HONOR, I WOULD LIKE TO PLACE THIS
7 ONE ON THE SCREEN, AS WELL.
8 THE COURT: ALL RIGHT.
9 BY MS. NORONHA:
10 Q. DOCTOR, YOU STARTED WITH THE SKIN RECEPTORS. ARE THEY
11 PRESENT AND FUNCTIONING IN THE FETUS BY 20 WEEKS' GESTATION?
12 A. YES. RECEPTORS, SENSORY RECEPTORS IN THE SKIN APPEAR
13 AROUND THE AREA OF THE MOUTH AT ABOUT SEVEN WEEKS OF GESTATION,
14 AND BY 14 WEEKS THEY HAVE SPREAD TO ALL PARTS OF THE BODY
15 EXCEPT THE TOP PART AND THE BACK PART OF THE HEAD.
16 BY 20 WEEKS, SENSORY RECEPTORS ARE LOCATED IN ALL
17 PARTS OF THE SKIN AND MUCUS MEMBRANE THAT CAN BE ACCESSED.
18 Q. NEXT YOU MENTIONED THE SENSORY NERVES. ARE THEY PRESENT
19 AND FUNCTIONING BY 20 WEEKS' GESTATION?
20 A. THE SENSORY NERVES ACTUALLY GROW OUT FROM THE AREA OF THE
21 SPINAL CORD. SO THESE ARE NERVE OUTGROWTHS AND NERVE FIBERS
22 THAT ARE GROWING INTO THE DEVELOPING LIMBS, INTO THE DEVELOPING
23 BODY OF THE FETUS. AND THESE NERVES, WHEN THEY REACH THEIR
24 TARGET ORGAN, WHICH MAY BE THE SKIN, OR THE MUCUS MEMBRANE, ET
25 CETERA, THAT IS WHEN THE NERVE ENDINGS DIFFERENTIATE TO FORM

1 THE RECEPTORS.
2 SO, THE FACT THAT RECEPTORS HAVE APPEARED IN THE
3 SKIN IS THE PROOF OF THE FACT THAT NERVE FIBERS HAVE REACHED
4 THEIR TARGET ORGANS AND THOSE RECEPTORS ARE ESSENTIALLY
5 OUTGROWTHS OF THE SENSORY NERVES LEADING TO THE SPINAL CORD.
6 Q. WHAT ABOUT THE DORSAL HORN OF THE SPINAL CORD, DOCTOR? IS
7 THAT PRESENT AND FUNCTIONING BY 20 WEEKS' GESTATION?
8 A. CERTAINLY. THE DORSAL HORN STARTS DEVELOPING AT THE END OF
9 THE FIRST-TRIMESTER, AND BY 20 WEEKS OF GESTATION THE
10 DIFFERENTIATION OF NERVE CELLS HAS OCCURRED. THERE IS THE
11 EXPRESSION OF VARIOUS NEUROTRANSMITTERS. AND A MAJOR PART OF
12 THE COMPLEX CIRCUITRY THAT WILL HELP IN TRANSDUCTION OF THE
13 PAIN FROM THE PERIPHERY FROM THE PERIPHERAL NERVOUS SYSTEM THAT
14 HAS DEVELOPED BY 20 WEEKS OF GESTATION.
15 Q. WHAT ABOUT THE BRAIN STEM, DOCTOR? WHEN DOES THAT APPEAR
16 AND IS FUNCTIONAL IN THE FETUS?
17 A. THE BRAIN STEM STARTS DEVELOPING AT ABOUT SIX TO EIGHT
18 WEEKS OF GESTATION.
19 AND, AGAIN, BY 20 WEEKS OF GESTATION, HAS
20 DIFFERENTIATED INTO THE DIFFERENT NUCLEI WHICH WILL BE
21 CONNECTED WITH THE PAIN SYSTEM AND HELP IN REGULATION OF BODILY
22 FUNCTIONS, SUCH AS HEART RATE CHANGES OR BLOOD PRESSURE CHANGES
23 OR CHANGES IN RESPIRATORY PATTERN THAT ARE ASSOCIATED WITH
24 PAINFUL STIMULI.
25 Q. IS THAT ALSO TRUE FOR THE THALAMUS?

1 A. THE THALAMUS ACTUALLY IS ONE OF THE EARLIEST AREAS TO START
2 DEVELOPING. IT STARTS WITH A COLLECTION OF BRAIN CELLS JUST
3 OUTSIDE THE THIRD VENTRICLE OF THE BRAIN AND PROCEEDS VERY
4 RAPIDLY. BY 14 TO 16 WEEKS THE THALAMUS HAS SEPARATED INTO THE
5 DIFFERENT NUCLEI WITHIN THE THALAMUS.
6 AND BY 18 WEEKS THALAMIC NERVE CELLS -- EXCUSE ME --
7 HAVE STARTED EXPRESSING THE NEUROTRANSMITTERS AND OTHER
8 CHEMICALS THAT ARE REQUIRED FOR THEIR FUNCTION.
9 BY 20 WEEKS OF GESTATION, THE THALAMUS IS CONNECTED
10 WITH THE PROJECTION NEURONS THAT HAVE SENT NERVE FIBERS UP THE
11 SPINAL CORD TO MAKE CONNECTIONS WITH THE THALAMIC PROCESSING.
12 Q. DOCTOR, YOU MENTIONED SEVERAL SUBCORTICAL STRUCTURES,
13 INCLUDING THE AMYGDALA, HIPPOCAMPUS AND HYPOTHALAMUS. ARE THEY
14 ALL PRESENT AND FUNCTIONAL BY 20 WEEKS' GESTATION?
15 A. TO SOME EXTENT THEY ARE. THESE STRUCTURES DEVELOP IN
16 PARALLEL. YOU SEE, THE BRAIN IS DEVELOPING AS A WHOLE. AND
17 FOR OUR SAKE OF UNDERSTANDING WITH ARBITRARILY DIVIDED INTO
18 THESE DIFFERENT SYSTEMS.
19 AND SO THE LYMPHIC SYSTEM, WHICH INCLUDES THE
20 AMYGDALA, STARTS DEVELOPING FAIRLY EARLY. THERE ARE INPUTS
21 INTO THE AMYGDALA FROM THE THALAMUS BY 20 WEEKS OF GESTATION.
22 THE THALAMUS HAS A VERY RICH INTERCONNECTION WITH
23 THE HIPPOCAMPUS, WHICH IS THE LEARNING AND MEMORY, LONG-TERM
24 MEMORY CENTER, AS WELL AS WITH THE HIPPOTHALAMUS, WHICH IS
25 LOCATED DIRECTLY BELOW THE THALAMUS. AND THOSE AREAS ARE ALSO

1 FUNCTIONING BY 20 WEEKS OF GESTATION.
2 Q. YOU MENTIONED THE LYMPHIC SYSTEM. WHAT IS THAT?
3 A. IT'S A SUBDIVISION OF STRUCTURES WITHIN THE BRAIN THAT ARE
4 MOSTLY INVOLVED WITH THE PROCESSING OF FEAR, SADNESS, SENSUAL
5 PLEASURE. THESE ARE THE EMOTIONAL RESPONSES OF THE LYMPHIC
6 SYSTEM.
7 Q. AND, FINALLY, DOCTOR, YOU MENTIONED THE CORTEX AND THE
8 INSULA. ARE THEY PRESENT AND FUNCTIONING BY 20 WEEKS'
9 GESTATION?
10 A. YES. THE CORTEX STARTS DEVELOPING AT ABOUT EIGHT WEEKS OF
11 GESTATION. AND, INITIALLY, MOST OF THE BRAIN CELLS THAT ARE
12 GOING TO BE LOCATED IN THE CORTEX ARE SIMPLY MIGRATING TO THE
13 OUTER PART OF THE OUTER MANTLE OF THE BRAIN.
14 AND 20 WEEKS OF GESTATION, THE NEURONAL MIGRATION IS
15 ALMOST COMPLETED. THESE NEURONS HAVE FOUND THEIR PRECISE
16 POSITION IN DIFFERENT LAYERS OF THE CORTEX AND HAVE SPROUTED
17 VARIOUS CONNECTING FIBERS, WHICH ARE CALLED DENDRITES AND
18 AXONS, CONNECTING -- DENDRITES IS D-E-N-D-R-I-T-E-S -- OR
19 AXONS, CONNECTING WITH OTHER CELLS WITHIN THE CORTEX, AS WELL
20 AS CONNECTING WITH SOME OF THE SUBCORTICAL CENTERS.
21 FOR EXAMPLE, THE CORTEX SENDS FIBERS DOWN TO THE
22 THALAMUS AND MAKES CONNECTIONS WITH THALAMIC CELLS BY ABOUT 16
23 TO 18 WEEKS OF GESTATION.
24 HOWEVER, FIBERS FROM THE THALAMIC CELLS START
25 GROWING UP TO THE CORTEX, AND THEY REACH AN AREA JUST BELOW THE

1 LEVEL OF THE CORTEX BY ABOUT 18 WEEKS. AND THEY THEN JUST WAIT
2 THERE FOR ABOUT A WEEK OR SO.
3 AND AFTER THE CELLS AND THE CORTEX HAVE ARRANGED
4 THEMSELVES THESE FIBERS SUDDENLY SPROUT OUT AND MAKE
5 CONNECTIONS BY THE END OF THE 19TH WEEK AND EARLY 20 WEEKS.
6 THERE ARE BRIDGE CONNECTIONS BETWEEN THE THALAMUS AND THE
7 CORTEX.
8 Q. SO, ALL OF THE SUBCORTICAL AND CORTICAL STRUCTURES ARE
9 LINKED TOGETHER BY 20 WEEKS' GESTATION?
10 A. YES, AT LEAST AS FAR AS THE ANATOMICAL DEVELOPMENT OF THE
11 NERVOUS SYSTEM IS CONCERNED. THESE STRUCTURES ARE DEVELOPED,
12 AND THEY ARE LINKED UP THROUGH FIBERS.
13 Q. DOCTOR, NOW I WOULD LIKE TO TURN TO SOME OF THE FUNCTIONAL
14 INDICATORS FOR PAIN THAT YOU MENTIONED.
15 FIRST OF ALL, WHAT DOES "FUNCTIONAL INDICATOR" MEAN?
16 A. FUNCTIONAL INDICATOR MEANS SIMPLY THAT THESE ARE NOT SIMPLY
17 STRUCTURES, THEY ALSO PERFORM SOME FUNCTION, THAT THEY ARE
18 ACTUALLY FUNCTIONING AND RESPONDING TO THE ENVIRONMENT, TO THE
19 STIMULI FROM THE ENVIRONMENT.
20 Q. WHAT ARE THIS SOME OF THE FUNCTIONAL INDICATORS PRESENT IN
21 THE FETUS?
22 A. IF WE LOOK SIMPLY AT THE FUNCTION OF COMPONENTS WITHIN THE
23 PAIN SYSTEM, GOING FROM THE PERIPHERY RIGHT UP TO THE CENTRAL
24 AREAS THE RECEPTORS, WHEN THEY FIRST APPEAR, THEY HAVE VERY
25 MATURE PROPERTIES. THEIR MEMBRANE POTENTIAL, THEIR THRESHOLD

1 FOR STIMULATION, THEIR FIRING PATTERNS, ARE VERY SIMILAR TO
2 THAT OF RECEPTORS IN ADULT SKIN.
3 THE NERVE FIBERS THEMSELVES ARE CAPABLE OF
4 INDUCTION. SOME NERVE FIBERS MAY NOT BE MYELINATED WHEREAS
5 SOME NERVE FIBERS ARE UNMYELINATED. MYELIN IS SIMPLY A SHEATH
6 THAT COVERS THE NERVE FIBERS AND SPEEDS UP THE CONDUCTION SPEED
7 WITHIN THAT NERVE FIBER.
8 AS FAR AS PAIN PROCESSING IS CONCERNED, 80 PERCENT
9 OF PAINFUL INFORMATION IS TRANSMITTED THROUGH UNMYELINATED
10 NERVE FIBERS, EVEN IN THE ADULT. SO MYELINATION IS NOT A
11 NECESSARY REQUIREMENT FOR FUNCTIONING IN THE FETAL NERVES.
12 THE SPINAL CORD IS FUNCTIONING INSOMUCH AS IT HAS
13 ALL THE CHEMICAL TRANSMITTERS THAT ARE BEING RELEASED IN
14 RESPONSE TO EXCITATORY STIMULI, SUCH AS PAIN.
15 AND FROM ABOUT 24, 25 WEEKS OF GESTATION, ONE CAN
16 EVEN LOOK AT WHAT ARE CALLED "SOMATOSENSORY EVOKED POTENTIALS."
17 THESE ARE ELECTRICAL CHANGES THAT OCCUR IN THE BRAIN AS A
18 RESULT OF SENSORY STIMULATION.
19 AND ONE CAN SEPARATE OUT THE CORTICAL COMPONENT OF
20 THESE EVOKED POTENTIALS. THESE ARE STUDIES THAT WERE DONE IN
21 PRE-TERM BABIES. AND YOU CAN SEE THAT THERE IS PROCESSING OF
22 SENSORY INFORMATION, BOTH AT THE LEVEL OF THE CORTEX, AS WELL
23 AS BELOW THE CORTEX IN THE THALAMIC AND OTHER AREAS.
24 Q. WHAT ABOUT EEG SIGNALS, DOCTOR?
25 A. THAT IS ANOTHER CORRELATE OF FUNCTION WITHIN THE CEREBRAL

1 CORTEX. BASICALLY, "EEG" MEANS ELECTRICAL BRAINWAVE ACTIVITY
2 FROM THE NERVE CELLS IN THE BRAIN. AND THE EEG STARTS -- IN
3 THE FETUS CAN BE RECORDED FROM ABOUT 19 TO 20 WEEKS OF
4 GESTATION.
5 IT BECOMES SYNCHRONOUS, MEANING SYNCHRONIZED BETWEEN
6 THE TWO SIDES OF THE BRAIN, BY ABOUT 26 WEEKS OF GESTATION.
7 EVEN DURING FETAL LIFE THE PATTERN OF THE EEG CAN BE
8 CORRELATED WITH THE BEHAVIOR OF THE FETUS SHOWING STATES OF
9 WAKEFULNESS VERSUS SLEEP AT IN UTERO THESE STUDIES HAVE BEEN
10 DONE.
11 THERE ARE OTHER LINES OF EVIDENCE THAT SHOW THAT
12 OTHER SYSTEMS WITHIN THE BRAIN ARE ALSO FUNCTIONING AT THAT
13 TIME.
14 Q. DOCTOR, AS A FUNCTIONAL MATTER, CAN THE FETUS RESPOND TO
15 CERTAIN ENVIRONMENTAL STIMULI, SUCH AS LIGHT OR TOUCH, FOR
16 INSTANCE?
17 A. YES. A LOT OF STUDIES HAVE NOT LOOKED AT LIGHT OR TOUCH,
18 BUT HAVE LOOKED AT SOUND. AND FROM 20 WEEKS OF GESTATION,
19 THERE ARE WELL-RECOGNIZED PATTERNS OF FETAL BEHAVIOR IN
20 RESPONSE TO LOUD SOUNDS. PEOPLE HAVE IN THE -- 40, 50 YEARS
21 AGO PEOPLE HAVE USED A CAR HORN OR OTHER LOUD NOISES IN ORDER
22 TO STUDY THE FETAL RESPONSE.
23 BUT THERE IS DATA TO SUGGEST THAT THE FETUS RESPONDS
24 TO THESE SOUNDS RIGHT FROM 22 WEEKS OF GESTATION ONWARDS. IN
25 FACT, FETAL -- FEMALE FETUSES RESPOND TWO WEEKS BEFORE MALE

1 FETUSES CAN RESPOND TO THE -- WHAT IS CALLED ACOUSTIC
2 STIMULATION.
3 THE FETUS ALSO RESPONDS TO LIGHT THAT IS FOCUSED ON
4 THE MOTHER'S ABDOMEN.
5 STUDIES OF INTRAUTERINE PROCEDURES HAVE SHOWN THAT
6 THE FETUS RESPONDS TO TOUCH. AND THERE IS AN EVOLVING
7 BEHAVIORAL RESPONSE. FOR EXAMPLE, IF -- THESE STUDIES HAVE
8 SHOWN IF THE FETUS' FACE IS TOUCHED IN EARLY GESTATION, THE
9 RESPONSE OF THE FETUS IS TO TURN AWAY FROM THAT TACTILE
10 STIMULUS.
11 WHEREAS, IN LATER GESTATION WHEN THE FACE IS
12 TOUCHED, THE FETUS TURNS TOWARDS THAT TACTILE STIMULUS, WHICH
13 IS SIMPLY SHOWING A MATURATION OF THE ROOTING REFLEX THAT WILL
14 HELP THE BABY BREAST FEED AFTER BIRTH.
15 SO THOSE ARE SOME OF THE STUDIES LOOKING AT SOUND,
16 LIGHT AND TOUCH. THERE ARE OTHER STUDIES THAT HAVE LOOKED AT
17 TASTE AND SMELL IN FETUSES. FOR EXAMPLE, IF YOU PUT A SWEET
18 SUBSTANCE, SAY SACCHARINE INTO THE AMNIOTIC FLUID, ULTRASOUND
19 STUDIES SHOWED THAT THE FETUS STARTS SWALLOWING THE AMNIOTIC
20 FLUID MUCH FASTER THAN BEFORE THIS SWEET SUBSTANCE WAS
21 INTRODUCED.
22 AND IF YOU INTRODUCE A BITTER TASTING OIL INTO THE
23 AMNIOTIC FLUID, THE SWALLOWING STOPS. SO FROM EARLY ON, THE
24 FETUS SEEMS TO HAVE A SWEET TOOTH.
25 NO WONDER WHY ALL CHILDREN LOVE CANDY.

1 AND OTHER STUDIES HAVE LOOKED AT THE SENSE OF SMELL,
2 FOR EXAMPLE. THERE WAS AN EXPERIMENT DONE WHERE PREGNANT WOMEN
3 WERE ASKED TO TAKE A CAPSULE, WHICH WAS TASTELESS AND ODORLESS,
4 BUT CONTAINED CRUSHED CUMIN -- CUMIN IS A HERB -- WITHIN THE
5 CAPSULE.
6 AND AFTER THE BABIES WERE BORN, THEY WERE EXPOSED TO
7 THE SCENT OF CUMIN VERSUS THE SCENT OF CITRON, WHICH A LEMONY
8 SCENT VERSUS ANOTHER UNCHARACTERIZED SCENT, AND THEY HAD A
9 CALMING AND ORIENTING RESPONSE TO THE SMELL OF CUMIN, SO THAT
10 IT SHOWS THAT THERE ARE DIFFERENT LINES OF EVIDENCE TO SHOW
11 THAT THE BRAIN IS ACTUALLY FUNCTIONING. IT'S DOING SOMETHING.
12 AND ALL THESE SENSORY SYSTEMS ARE DEVELOPING DURING FETAL LIFE.
13 Q. DOCTOR, NOW LET'S TURN TO THE PHYSIOLOGICAL INDICATORS FOR
14 PAIN THAT YOU MENTIONED. WHAT DOES "PHYSIOLOGICAL" MEAN?
15 A. "PHYSIOLOGICAL" PERTAINS TO CHANGES IN THE PHYSIOLOGY THAT
16 MAY OCCUR AS A RESULT OF THE RESPONSE TO PAIN. AND THESE AREAS
17 HAVE MAINLY BEEN LOOKED AT IN TERMS OF HORMONAL AND CIRCULATORY
18 RESPONSES TO PAIN.
19 Q. ARE THEIR STUDIES THAT HAVE SHOWN THESE HORMONAL AND
20 CIRCULATORY RESPONSES TO PAIN?
21 A. YES. THERE IS A CONSISTENT AND WELL-DEVELOPED LINE OF
22 INVESTIGATION FOLLOWED FOR THE LAST 10 OR 15 YEARS THAT HAS
23 SHOWN CONSISTENT RESPONSES WITH THE RELEASE OF HORMONES AND
24 CHANGES IN CIRCULATION IN RESPONSE TO PAINFUL STIMULATION.
25 Q. AND HOW EARLY HAVE THESE RESPONSES BEEN EXHIBITED IN THE

1 FETUS?
2 A. THE EARLIEST RESPONSE THAT HAS BEEN REPORTED IN THE
3 LITERATURE IS FROM ABOUT A FETUS OF 16 WEEKS OF GESTATION. BUT
4 MOST OF THESE RESPONSES ARE ROBUST AND REPRODUCIBLE AFTER 20
5 WEEKS OF GESTATION.
6 Q. DOCTOR, WOULD YOU DESCRIBE BRIEFLY FOR US THE STUDY
7 PERFORMED ON STRESS HORMONES?
8 A. CERTAINLY. ONE OF THE LEADING RESEARCHERS IN THIS FIELD IS
9 SOMEONE BY THE NAME OF DR. NICHOLAS FISK FROM IMPERIAL COLLEGE,
10 LONDON.
11 AND HE HAS PUBLISHED SEVERAL STUDIES WHERE FETUSES
12 WHO REQUIRED A BLOOD TRANSFUSION IN UTERO WERE GIVEN THE BLOOD
13 TRANSFUSION USING TWO DIFFERENT APPROACHES. ONE APPROACH IS TO
14 GIVE THE BLOOD TRANSFUSION AT THE INSERTION OF THE UMBILICAL
15 CORD WHERE YOU CAN ADVANCE THE NEEDLE INTO THE UMBILICAL VEIN
16 AND GIVE A FETAL BLOOD TRANSFUSION TO THE FETUS.
17 IN SOME SITUATIONS IF THE FETUS IS POSITIONED IN A
18 WAY THAT THE FETUS SEEMS TO BE COVERING THE PLACENTA, THEN
19 ACCESS TO THAT AREA IS LIMITED OR IS IMPOSSIBLE. AND SO AN
20 ALTERNATIVE METHOD IS TO INTRODUCE THE NEEDLE THROUGH THE
21 ABDOMINAL WALL, THROUGH THE FETAL BODY INTO THE ABDOMINAL WALL,
22 ACROSS THE PERITONEAL CAVITY INTO THE CAPSULE OF THE LIVER.
23 AND THEN PLACE THE NEEDLE IN A VEIN THAT LIES WITHIN THE LIVER.
24 IT'S CALLED THE INTRAHEPATIC, AND TO TRANSFUSE THROUGH THAT
25 VEIN.

1 WHEN THE RESPONSES OF FETUSES ARE COMPARED BETWEEN
2 THESE TWO DIFFERENT APPROACHES, ONE IS A PAINFUL APPROACH, THE
3 INTRAHEPATIC VEIN, AND THE OTHER IS A NONPAINFUL APPROACH,
4 THROUGH THE UMBILICAL CORD, BECAUSE THE UMBILICAL CORD DOESN'T
5 HAVE ANY SENSORY NERVES.
6 WHAT THEY FOUND WERE ROBUST HORMONAL RESPONSES THAT
7 OCCURRED AS A RESULT OF TRANSFUSION THROUGH THE INTRAHEPATIC
8 VEIN. THESE HORMONAL RESPONSES WERE CHARACTERIZED BY MEASURING
9 LEVELS OF BETA ENDORPHIN AND FOUND FIVE TO SIXFOLD INCREASES IN
10 THIS HORMONE, CHARACTERIZED BY THE RELEASE OF CATECHOLAMINES,
11 HORMONES SUCH AS ADRENALIN AND NORADRENALINE, AND UP TO TWO OR
12 THREEFOLD INCREASES OCCURRED. AND THE RELEASE OF CORTISOL,
13 WHICH IS ANOTHER STRESS HORMONE RELEASED. AND THIS WAS
14 RELEASED IN RESPONSE TO THE PAINFUL APPROACH USING THE
15 INTRAHEPATIC VEIN.
16 WHAT WAS ALSO REMARKABLE WAS THAT THE MAGNITUDE OF
17 THIS HORMONAL RESPONSE WAS DIRECTLY CORRELATED WITH THE
18 DURATION OF PAINFUL STIMULATION. SO NOT ONLY IS THE FETUS ABLE
19 TO RESPOND TO PAIN, BUT CAN RESPOND TO DIFFERENT DURATIONS OF
20 THE PAINFUL STIMULUS.
21 Q. DOCTOR, YOU MENTIONED THERE WAS ALSO A STUDY PERFORMED A
22 CIRCULATORY STRESS RESPONSES. WOULD YOU BRIEFLY DESCRIBE THAT
23 STUDY, PLEASE?
24 A. CERTAINLY. SEVERAL STUDIES HAVE LOOKED AT CIRCULATORY
25 RESPONSES IN THE FETUS AND PRIMARILY HAVE SEEN CHANGES IN BLOOD

1 FLOW TO THE BRAIN THAT RESULT DURING A PAINFUL STIMULUS. FOR
2 EXAMPLE, THERE IS A DECREASE IN WHAT IS CALLED THE PULSATILITY
3 INDEX OF THE MIDDLE CEREBRAL ARTERY. THIS IS AN ARTERY THAT
4 SUPPLIES THE SENSORY AREA OF THE BRAIN, AND WHICH IMPLIES THAT
5 FOLLOWING PAINFUL STIMULATION AN INCREASE IN BLOOD FLOW OCCURS
6 TO THAT PART OF THE BRAIN.
7 AND THIS RESPONSE WAS NOTED WITHIN 70 SECONDS OF THE
8 NEEDLE PIERCING THROUGH THE FETAL ABDOMINAL WALL.
9 Q. DOCTOR, WAS THERE ANY ANESTHESIA USED IN EITHER OF THESE
10 STUDIES?
11 A. INITIAL STUDIES WERE DONE WITHOUT ANY ANESTHETIC BEING
12 ADMINISTERED TO THE FETUS. THESE STUDIES WERE PERFORMED UNDER
13 ULTRASOUND GUIDANCE. AND ONE OF THE LATER STUDIES PUBLISHED, I
14 BELIEVE IN OCTOBER 2001, DECIDED TO TEST THE HYPOTHESIS THAT:
15 IS THIS A SPECIFIC PAIN RESPONSE?
16 SO WHAT THEY DID WAS THEY -- FOR FETUSES THAT WERE
17 HAVING REPEATED TRANSFUSIONS THEY RANDOMIZED THEM TO EITHER
18 RECEIVE FENTANYL, WHICH A PAIN RELIEVING DRUG -- SPELLED
19 F-E-N-T-A-N-Y-L -- A PAIN RELIEVING DRUG WAS GIVEN AT THE
20 BEGINNING OF THE TRANSFUSION, AND THEN THE TRANSFUSION WAS
21 GIVEN, AND THEN THE HORMONAL RESPONSE WAS MEASURED. AS OPPOSED
22 TO THE SAME FETUS RECEIVING THE BLOOD TRANSFUSION WITHOUT THE
23 FENTANYL.
24 AND WHAT THEY FOUND WAS GIVING THE ANESTHETIC DRUG
25 BLOCKED THE HORMONAL AND THE CIRCULATORY RESPONSE TO THE

1 PAINFUL STIMULATION DURING BLOOD TRANSFUSION.
2 Q. DOCTOR, ARE THERE ANY OTHER FACTORS BESIDES PAIN THAT CAN
3 CAUSE THESE STRESS RESPONSES?
4 A. THAT IS A GOOD QUESTION. THE STRESS RESPONSE IS PRIMARILY
5 NONSPECIFIC, SO THAT OTHER THINGS, FOR EXAMPLE, IF THE MOTHER
6 GETS A FEVER AND THE FETUS HAS A FEVER, THAT WILL ALSO LEAD TO
7 A STRESS RESPONSE.
8 BUT THE FACT THAT THESE RESPONSES ARE SEQUENTIALLY
9 AND TEMPORALLY RELATED TO PAINFUL STIMULATION, REALLY
10 SUBSTANTIATES THE FACT THAT THESE ARE IN RESPONSE TO A PAINFUL
11 STIMULUS.
12 ALSO THESE RESEARCHERS HAVE BEEN VERY CAREFUL ABOUT
13 STUDYING THE CONTROL SITUATION AS WELL. FOR EXAMPLE, THEY WILL
14 MEASURE THE HORMONAL LEVELS AT BASELINE, AND THEN THEY WILL
15 MEASURE THE HORMONAL LEVEL AFTER THE PAINFUL STIMULUS HAS
16 OCCURRED.
17 AND IN SOME FETUSES THEY WILL USE THE PAINFUL METHOD
18 THROUGH THE INTRAHEPATIC VEIN VERSUS A NONPAINFUL METHOD,
19 THROUGH THE UMBILICAL CORD.
20 SO GOOD CONTROLS HELP US JUDGE THAT THESE ARE
21 RESPONSES SPECIFIC TO THE PAINFUL STIMULATION.
22 Q. BUT, DOCTOR, WOULD YOU SAY THAT THESE PHYSIOLOGICAL
23 RESPONSES ARE DIRECT EVIDENCE OF PAIN IN THE FETUS?
24 A. IT DEPENDS ON WHAT YOU WANT TO CLASSIFY AS "DIRECT."
25 ESSENTIALLY, THE FETUS CANNOT TALK. AND IF THE FETUS CAN'T

1 TALK TO US, THEN WE NEED TO FIND OTHER SURROGATE MARKERS FOR
2 THE RESPONSE OF THE FETUS. AND WE'RE SIMPLY LIMITED TO THE
3 CHANGES IN PHYSIOLOGY OR CHANGES IN BEHAVIOR THAT WOULD RESULT
4 FOLLOWING PAINFUL STIMULATION.
5 Q. WOULD YOU CHARACTERIZE THESE RESPONSES AS AN INFERENCE?
6 A. YES, TO A GREAT EXTENT. THE PATTERN OF THESE RESPONSES IS
7 VERY SIMILAR TO THE PATTERN OF PHYSIOLOGICAL RESPONSES THAT ARE
8 GENERATED IN OLDER CHILDREN OR ADULTS.
9 AND OLDER CHILDREN AND ADULTS ARE ABLE TO TELL US
10 THAT THEY HAVE PERCEIVED PAIN. SO WE LOOK AT THE PATTERN OF
11 RESPONSES, EVEN THOUGH THERE ARE HUGE PHYSIOLOGICAL DIFFERENCES
12 BETWEEN A CHILD AND A FETUS, HOWEVER, THE PATTERN OF THE
13 RESPONSE APPEARS TO BE VERY SIMILAR. AND THE CHILD DOES REPORT
14 THAT THIS IS PAINFUL.
15 SO, WE CAN INFER FROM THESE STUDIES THAT THESE MAY
16 BE REACTION TO THE PAIN THAT THE FETUS WAS EXPERIENCING.
17 MS. NORONHA: YOUR HONOR, I UNDERSTAND THAT YOU
18 BREAK AT 10:00 O'CLOCK. WOULD YOU LIKE TO DO IT NOW?
19 THE COURT: IS THIS A GOOD PLACE FOR YOU?
20 MS. NORONHA: YES.
21 THE COURT: ALL RIGHT. WE WILL BREAK FOR 15
22 MINUTES.
23 THE WITNESS: THANK YOU, YOUR HONOR.
24 (RECESS TAKEN AT 10:00 A.M.)
25 (PROCEEDINGS RESUMED AT 10:18 A.M.)

1 THE COURT: ALL RIGHT. PLEASE CONTINUE.
2 BY MS. NORONHA:
3 Q. DR. ANAND, BEFORE THE BREAK WE WERE TALKING A LITTLE BIT
4 ABOUT INFERENCE. I WOULD LIKE TO STEP BACK AND ASK YOU: WHAT
5 IS A SCIENTIFIC INFERENCE?
6 A. SCIENTIFIC INFERENCE IS SIMPLY THE ABILITY TO CONVERT DATA
7 INTO INFORMATION. WITHIN AN EXPERIMENTAL PARADIGM WE WILL TRY
8 TO LOOK AT PATTERNS OF DATA AND INFER ABOUT WHAT THEY MAY MEAN
9 OR WHAT THEY MAY REPRESENT.
10 SCIENTIFIC INFERENCE IS COMMONLY USED AS PART OF
11 THAT SCIENTIFIC METHOD.
12 Q. IS YOUR OPINION IN THIS CASE BASED ON SCIENTIFIC INFERENCE?
13 A. YES, TO A GREAT EXTENT IT IS.
14 Q. IN WHAT WAYS?
15 A. WELL, I LOOK AT THE DEVELOPMENT OF THE PAIN SYSTEM AND ITS
16 THE EVIDENCE FOR ITS FUNCTIONING. AND I INFER THAT THE PAIN
17 SYSTEM IS CAPABLE OF REGISTERING AND RESPONDING TO PAINFUL
18 STIMULI.
19 I LOOK AT THE PATTERNS OF RESPONSES THAT PREMATURE
20 BABIES MAY HAVE AND INFER THAT THESE ARE RESPONSES SPECIFICALLY
21 TO A PAINFUL STIMULUS. SO THOSE ARE EXAMPLES IN WHICH
22 "INFERENCE" HAS BEEN USED. AND WE CAN GO ON AND ON, BUT
23 BASICALLY THAT'S -- INFERENCE IS VERY COMMON IN THE
24 INTERPRETATION OF SCIENTIFIC DATA.
25 Q. DOCTOR, IS A SCIENTIFIC INFERENCE THE SAME THING AS AN

1 EXTRAPOLATION?
2 A. NO, IT ISN'T. INFERENCE IS APPLIED WITHIN A PARTICULAR
3 EXPERIMENTAL SETTING OR WITHIN A CLINICAL PARADIGM, AS SUCH,
4 WHEREAS EXTRAPOLATION, YOU TAKE THE FINDINGS FROM ONE
5 EXPERIMENTAL PARADIGM AND APPLY THOSE TO ANOTHER EXPERIMENTAL
6 PARADIGM, WHILE YOU TAKE FINDINGS FROM ONE SET OF PATIENTS AND
7 APPLY THOSE TO ANOTHER SET OF PATIENTS.
8 THAT'S THE EXAMPLES OF EXTRAPOLATION.
9 Q. IS EXTRAPOLATION A WIDELY-ACCEPTED TOOL IN THE SCIENTIFIC
10 COMMUNITY FOR DRAWING CONCLUSIONS FROM DATA?
11 A. YES. IT IS FREQUENTLY USED TO GENERATE HYPOTHESES THAT CAN
12 THEN BE TESTED BY -- IN TERMS OF PRESENTING NEW EXPERIMENTS.
13 Q. IS YOUR OPINION IN THIS CASE BASED ON EXTRAPOLATION?
14 A. TO SOME EXTENT, YES, THERE IS EXTRAPOLATION, BECAUSE I CAN
15 LOOK AT THE RESPONSES OF PREMATURE INFANTS WITH THAT, AND AT
16 THE SAME NEUROBIOLOGICAL MATURITY I CAN EXTRAPOLATE SOME OF
17 THOSE RESPONSES TO BEING SIMILAR TO WHAT THE FETUS EXHIBITS.
18 OR I CAN EXTRAPOLATE FROM THE DEVELOPMENT OF THE
19 PAIN SYSTEM IN ANIMAL SPECIES AND SEE IF THOSE CORRESPONDING
20 STRUCTURES ARE DEVELOPING AT THE SAME NEUROBIOLOGICAL MATURITY
21 IN THE HUMAN PAIN SYSTEM. OR I CAN EXTRAPOLATE FROM OLDER
22 CHILDREN AND ADULTS TO THE RESPONSE OF PREMATURE INFANTS OR
23 FETUSES.
24 Q. DOCTOR, YOU YOURSELF HAVE PERFORMED STUDIES ON PAIN
25 RESPONSES IN PREMATURE INFANTS. WHAT GESTATIONAL AGES HAVE YOU

1 LOOKED AT?
2 A. THE STUDIES HAVE BEEN DESIGNED TO LOOK AT PREMATURE INFANTS
3 THAT ARE ADMITTED TO ASU AND ARE CONSIDERED VIABLE AND ARE ON A
4 VENTILATOR, BASICALLY, BECAUSE THEY ARE UNABLE TO BREATHE. AND
5 THE YOUNGEST OF THESE PREMATURE INFANTS WAS ABOUT 22-AND-A-HALF
6 WEEKS. BUT FROM 23 WEEKS ONWARDS, ALMOST ALL PREMATURE INFANTS
7 ARE VIABLE.
8 Q. AND, DOCTOR, AREN'T THERE DIFFERENCES BETWEEN PREMATURE
9 NEONATES AND FETUSES THAT WOULD AFFECT YOUR ABILITY TO
10 EXTRAPOLATE FROM ONE TO THE OTHER?
11 A. THERE ARE CERTAINLY DIFFERENCES, PHYSIOLOGICAL DIFFERENCES,
12 BETWEEN A FETUS AND PREMATURE NEONATE, EVEN AT THE SAME
13 GESTATION.
14 THE FETUS DOES NOT REQUIRE THE ABILITY TO GET OXYGEN
15 AND NUTRITION AND SO ON. ALL THESE ARE SUPPLIED TO THE FETUS
16 THROUGH THE UMBILICAL CORD FROM THE MATERNAL SIDE. WHEREAS, A
17 PREMATURE INFANT HAS TO RESORT TO ITS OWN PHYSIOLOGY IN ORDER
18 TO MAINTAIN OXYGENATION THROUGH THE LUNGS AND THE HEART OR HAS
19 TO DEAL WITH ALTERNATE PERIODS OF FEEDING AND FASTING, WHICH IS
20 NOT THE CASE DURING THE FETAL LIFE. THERE IS A CONTINUOUS
21 SUPPLY OF NUTRITION THROUGH THE PLACENTA.
22 SO THERE ARE MAJOR PHYSIOLOGICAL DIFFERENCES BETWEEN
23 FETUSES AND PREMATURE INFANTS.
24 Q. HOW CAN YOU EXTRAPOLATE ABOUT PAIN FROM NEONATES TO
25 FETUSES?

1 A. YOU SEE, THE MATURITY OF THE DEVELOPING NERVES AND SPINAL
2 CORD AND BRAIN IS THE SAME. THE MECHANISMS AT ALL LEVELS OF
3 THE PAIN SYSTEM ARE THE SAME. THE PATTERNS OF RESPONSES THAT
4 FETUSES SHOW IN RESPONSE TO PAINFUL STIMULATION ARE VERY
5 SIMILAR TO THE PATTERNS OF RESPONSES THAT PREMATURE BABIES SHOW
6 TO PAINFUL STIMULATION.
7 SO YOU CAN EXTRAPOLATE FROM ONE SITUATION TO THE
8 OTHER, DESPITE DIFFERENCES IN OTHER ASPECTS OF THEIR
9 PHYSIOLOGY.
10 Q. DOCTOR, CAN YOU EXTRAPOLATE YOUR OPINION ON FETAL PAIN TO
11 FETUSES WITH ANOMALIES?
12 A. THAT'S A GOOD QUESTION. YES AND NO. IT DEPENDS ON WHERE
13 THOSE ANOMALIES ARE LOCATED. IF A FETUS HAS CONGENITAL
14 ANOMALIES OF THE BRAIN OR SPINAL CORD OR SENSORY NERVES, THEN
15 WE WOULD NOT BE ABLE TO EXTRAPOLATE TO THOSE FETUSES.
16 THE RESEARCH WOULD HAVE TO BE DONE ON FETUSES THAT
17 HAVE THOSE ANOMALIES IN ORDER TO LOOK AT THEIR RESPONSES.
18 OR ONE WOULD HAVE TO TAKE EACH FETUS WITH A BRAIN OR
19 SPINAL CORD ANOMALY AS A CASE-BY-CASE BASIS. SO IT WOULD BE
20 DIFFICULT TO EXTRAPOLATE.
21 HOWEVER, GIVEN THAT SCIENTIFIC SKEPTICISM, THERE IS
22 ONE STUDY THAT HAS LOOKED AT RESPONSES TO PAIN IN PREMATURE
23 BABIES THAT HAVE BLEEDING WITHIN THEIR HEAD OR WITHIN THEIR
24 BRAIN, INTRAVENTRICULAR HEMORRHAGE IT IS CALLED. OR THEY HAVE
25 A ROTTING AWAY OF THE WHITE MATTER. AND THESE PREMATURE BABIES

1 WHO WERE KNOWN TO HAVE BRAIN LESIONS HAD A PAIN RESPONSE THAT
2 WAS VERY SIMILAR TO PREMATURE BABIES WHO DIDN'T HAVE THESE
3 BRAIN LESIONS, BUT WERE OF THE SAME GESTATIONAL AGE, AS SUCH.
4 Q. SO, DOCTOR, CAN YOU CONCLUDE WITH A DEGREE OF MEDICAL
5 CERTAINTY THAT A FETUS WITH A NEUROLOGICAL ANOMALY DOES NOT
6 FEEL PAIN WHEN SUBJECT TO A PAINFUL STIMULUS?
7 A. NO, I CANNOT.
8 Q. DR. ANAND, DO YOU HAVE AN OPINION AS TO WHETHER THE FETUS
9 CAN FEEL PAIN MORE INTENSELY AT CERTAIN PERIODS OF GESTATION?
10 A. YES. THE ACCUMULATING DATA FOR THE LAST 10 YEARS OR SO
11 SUGGESTS THAT THE PAIN SYSTEM WHEN IT DEVELOPS THERE, THE
12 EXCITATORY MECHANISMS DEVELOP EARLY AND DEVELOP TO A GREAT
13 EXTENT BEFORE ANY OF THE INHIBITORY MECHANISMS DEVELOP.
14 SO YOU CAN LOOK AT DIFFERENT TYPES OF EVIDENCE. FOR
15 EXAMPLE, THE DENSITY OF THE RECEPTORS IN THE SKIN IS MUCH
16 HIGHER BETWEEN 20 AND 30 WEEKS OF GESTATION AS COMPARED TO
17 LATER GESTATION OR INFANCY OR CHILDHOOD.
18 OR THE RESPONSES OF INDIVIDUAL NERVE CELLS IN THE
19 DORSAL HORN ARE MUCH GREATER IN THAT EARLY PERIOD OF GESTATION
20 AS COMPARED TO LATER IN GESTATION. AND SO ONE CAN ALSO LOOK AT
21 THRESHOLDS TO PAIN. AND THE PAIN THRESHOLD IN PREMATURE BABIES
22 AT 24, 25 WEEKS OF GESTATION IS ABOUT A THIRD THAT OF BABIES
23 WHO WERE AT FULL-TERM. AND EVEN FULL-TERM BABIES HAVE A LOWER
24 THRESHOLD THAN INFANTS WHO ARE ONE OR TWO YEARS OF AGE. OR
25 TWO-YEAR-OLD CHILDREN HAVE A LOWER THRESHOLD THAN FIVE OR

1 SIX-YEAR-OLD CHILDREN, AND SO ON, UP UNTIL ADOLESCENCE. YOU
2 HAVE A PROGRESSIVE INCREASE IN THE PAIN THRESHOLD.
3 THIS IS SEEN FOR PAIN RELATED TO TISSUE INJURY.
4 THERE ARE ANIMAL STUDIES SHOWING THAT INFLAMMATORY PAIN, THERE
5 IS AN ELEVENFOLD DIFFERENCE BETWEEN THE NEWBORN RAT AT THREE
6 DAYS OF AGE, WHICH IS EQUIVALENT NEUROLOGICAL MATURITY TO ABOUT
7 A 24 WEEK GESTATION PRE-TERM INFANT AND THE ADULT. THERE IS
8 ELEVENFOLD CHANGES IN THE THRESHOLD TO INFLAMMATORY PAIN.
9 SO, BASED ON ALL OF THESE LINES OF EVIDENCE, IN
10 ADDITION TO OTHER LINES, SUCH AS THE ACCENTUATED METABOLIC
11 RESPONSES OF FETUSES AND PREMATURE INFANTS AS COMPARED TO OLDER
12 INFANTS, OR THEIR CARDIOVASCULAR RESPONSES, I CONCLUDE THAT
13 SENSITIVITY TO PAIN IS GREATEST IN THAT EARLIEST PART OF
14 GESTATION, FROM ABOUT 20, 22 WEEKS OF GESTATION TO ABOUT 30
15 WEEKS OF GESTATION.
16 Q. DOCTOR, YOU HAD MENTIONED SOMETHING ABOUT INHIBITORY
17 MECHANISMS. WHAT ARE THOSE AND WHEN DO THEY APPEAR IN THE
18 FETUS?
19 A. INHIBITORY MECHANISMS ARE THE MECHANISMS BY WHICH THE
20 INCOMING PAINFUL STIMULUS CAN BE MODULATED, DAMPENED OR EVEN
21 BLOCKED COMPLETELY. AND THESE ARE VERY IMPORTANT MECHANISMS.
22 FOR EXAMPLE, IF I AM SHOT, I HAVE A GUNSHOT IN MY
23 LEG, BUT I AM TRYING TO ESCAPE TO SAVE MY LIFE, THEN WHAT THE
24 BRAIN WILL AUTOMATICALLY DO IS BLOCK THAT INCOMING PAINFUL
25 STIMULUS RIGHT AT THE LEVEL OF THE SPINAL CORD SO IT NEVER EVEN

1 GETS UP TO THE BRAIN STEM OR ANY OF THE HIGHER CENTERS. SO
2 THAT WHEN THE PERIOD OF DANGER HAS PASSED, THAT'S WHEN THE
3 PAIN -- THE BLOCK IS REMOVED AND THE PAIN IS PERCEIVED.
4 SO, THESE ARE INHIBITORY MECHANISMS THAT ALLOW US TO
5 MODULATE INCOMING PAINFUL INFORMATION. AND THESE ARE BASED
6 MAINLY TWO TYPES OF INHIBITORY MECHANISMS. ONE ARE THE LOCAL
7 OR SPINAL INHIBITORY MECHANISMS FROM LOCAL INHIBITORY CELLS AT
8 THE LEVEL OF THE DORSAL HORN.
9 THE OTHER ARE INHIBITORY MECHANISMS ARE THAT COMING
10 FROM HIGHER CENTERS, AND THEY ARE CONDUCTED THROUGH THE
11 DESCENDING INHIBITORY FIBERS FROM THE BRAIN STEM FROM THE
12 THALAMUS, ET CETERA.
13 SO, THESE MECHANISMS START TO DEVELOP AT ABOUT 32 TO
14 34 WEEKS OF GESTATION. AND THAT'S PART OF THE REASON WHY
15 SENSITIVITY IS MUCH HIGHER BEFORE THESE MECHANISMS HAVE
16 DEVELOPED.
17 Q. DOCTOR, DO YOU HAVE AN OPINION AS TO WHETHER THE FETUS IS
18 CONSCIOUS OF PAIN?
19 A. THIS IS A VERY CONTROVERSIAL TOPIC. FROM THE MULTIPLE
20 LINES OF EVIDENCE, I BELIEVE THAT CONSCIOUSNESS APPEARS IN THE
21 FETUS AT ABOUT 20 TO 22 WEEKS OF GESTATION.
22 Q. AND HOW DO YOU KNOW THAT?
23 A. YOU SEE, CONSCIOUSNESS HAS TO BE INFERRED. IT CANNOT BE
24 MEASURED. EVEN IN THE HUMAN ADULT, CONSCIOUSNESS IS THOUGHT TO
25 BE CORRELATED WITH SHIFTING PATTERNS OF ELECTRICAL ACTIVITY

1 WITHIN THE CORTEX.
2 WELL, IF WE LOOK AT THE FETUS, THEN THOSE PATTERNS
3 OF ELECTRICAL ACTIVITY START AT ABOUT 19 OR 20 WEEKS OF
4 GESTATION.
5 FROM ALL THE RESPONSES TO SOUND, TO LIGHT, TO PAIN,
6 TO TOUCH, TASTE, ET CETERA, THOSE THAT HAVE BEEN REVIEWED.
7 THESE RESPONSES SEEM TO START IN THAT PERIOD OF MID-GESTATION,
8 SO FROM ABOUT 20 TO 22 WEEKS.
9 THE REASON WHY I SAY "20 TO 22 WEEKS" IS BECAUSE
10 CONSCIOUSNESS IS NOT AN ALL-OR-NONE PHENOMENA. CONSCIOUSNESS
11 IS MORE LIKE A DIMMER SWITCH. SO THERE ARE INCREASING DEGREES
12 OF CONSCIOUSNESS THAT WILL ADHERE DURING MID-GESTATION.
13 Q. ARE THERE ANY OTHER ANATOMICAL STRUCTURES BESIDES THE
14 CORTEX THAT WOULD LEAD YOU TO BELIEVE THAT CONSCIOUSNESS IS
15 PRESENT IN THE FETUS BY 20 WEEKS' GESTATION?
16 A. THE PREVALENT NOTION IN THE SCIENTIFIC COMMUNITY IS THAT
17 CONSCIOUSNESS IS PRIMARILY RESIDENT FROM CORTICAL ACTIVITY,
18 ALTHOUGH THE ACTIVATION OF CORTICAL ACTIVITY DEPENDS ON OTHER
19 SYSTEMS IN THE BRAIN STEM AND SORT OF SUBCORTICAL STRUCTURES.
20 MOST OF THAT IS AVAILABLE FROM CORTICAL ACTIVITY.
21 AS WE HAVE REVIEWED, THE CORTEX DOES START TO DEVELOP AND
22 BECOMES FUNCTIONAL FROM ABOUT 20 WEEKS OF GESTATION. SO I
23 BELIEVE AT THAT TIME THE SYSTEM IS PRIMED FOR THE EXPRESSION OF
24 CONSCIOUSNESS.
25 Q. DOES LEARNING OR MEMORY HAVE ANY EFFECT ON THIS CONCLUSION?

1 A. CERTAINLY. LEARNING CANNOT OCCUR IN THE ABSENCE OF
2 CONSCIOUSNESS. AND THERE ARE MULTIPLE STUDIES THAT HAVE LOOKED
3 AT LEARNING DURING FETAL LIFE.
4 THESE STUDIES HAVE LOOKED AT, FOR EXAMPLE,
5 HABITUATION WHERE A LOUD SOUND IS PLAYED EITHER THROUGH
6 EARPHONES LOCATED ON THE MOTHER'S ABDOMEN OR A SHORT DISTANCE,
7 LIKE A CAR HORN SHORT DISTANCE AWAY FROM THE MOTHER.
8 AND THE FETUS SHOWS THE ABILITY TO HABITUATE TO
9 THESE SOUNDS, MEANING THE FETUS LEARNS ABOUT THE FAMILIARITY OF
10 THE SOUND AND IS ABLE TO TURN DOWN ITS REACTION TO A LOUD
11 SOUND.
12 AND THIS ABILITY APPEARS VERY, VERY EARLY IN
13 GESTATION. IT HAS BEEN DOCUMENTED EVEN FROM 22 WEEKS ONWARDS,
14 AND CERTAINLY BECOMES MUCH MORE ROBUST IN THE THIRD-TRIMESTER
15 OR AFTER 27 WEEKS OF GESTATION.
16 IF I MAY JUST ADD, THERE ARE OTHER STUDIES THAT HAVE
17 LOOKED AT MEMORY AND LEARNING IN THE THIRD-TRIMESTER WHERE THE
18 MOTHER WAS ASKED TO READ A PARTICULAR STORY, AND THE BABIES
19 WERE EXPOSED TO THE READING OF THAT STORY JUST AFTER THEY WERE
20 BORN.
21 AND THEY SHOWED RECOGNITION FOR THE STORY. WHEREAS,
22 ANOTHER STORY BY THE SAME AUTHOR BEING READ DID NOT HAVE THE
23 SAME ORIENTING OR CALMING RESPONSE ON THE FETUS. ON THE
24 NEWBORN INFANT. I AM SORRY.
25 AND EVEN IF THE SAME STORY WAS READ WITH

1 DIFFERENT -- IN A DIFFERENT TONE OR AT A DIFFERENT SPEED, THE
2 FETUS -- THAN WHAT THE FETUS HAD BEEN EXPOSED TO -- THE NEWBORN
3 INFANT WAS ABLE TO SHOW A REACTION TO THE CHANGE IN TONE OR
4 SPEED.
5 SO THERE ARE WELL-DOCUMENTED EXPERIMENTAL PARADIGMS,
6 VERY GOOD EMPIRICAL RESEARCH TO SHOW THAT MEMORY AND LEARNING
7 DOES OCCUR IN UTERO.
8 Q. NOW, DOCTOR, IN SPITE OF THIS EVIDENCE, YOU FIRST DESCRIBED
9 CONSCIOUSNESS AS A CONTROVERSIAL TOPIC. WHAT DID YOU MEAN BY
10 THAT?
11 A. BY DEFINITION, CONSCIOUSNESS IS BEYOND THOUGHT.
12 CONSCIOUSNESS IS THE SUBSTRATUM TO ALL TAUGHT SPEECH,
13 EXPERIENCE, ET CETERA. IT IS LIKE --
14 THE COURT: I AM SORRY. ARE YOU SAYING "THOUGHT"?
15 THE WITNESS: THOUGHT, YES.
16 SO, BY ITS VERY NATURE, CONSCIOUSNESS CANNOT BE
17 MEASURED. IT CAN BE EXPERIENCED. FOR EXAMPLE, YOU CANNOT
18 MEASURE SILENCE, BUT YOU CAN EXPERIENCE IT.
19 SIMILARLY, CONSCIOUSNESS, EVEN IN THE ADULT HUMAN,
20 CANNOT BE MEASURED. IT CAN BE INFERRED FROM BEHAVIOR, FROM
21 REACTIONS, FROM DIFFERENT SOURCES OF INFORMATION.
22 IF -- YOUR HONOR, IF I WOULD BE PERMITTED TO USE AN
23 ANALOGY, WE GO TO THE MOVIE THEATER, AND WE SEE THE MOVIE. IT
24 HAS A STORY LINE, MANY CHARACTERS, LOTS OF EVENTS AND
25 INTERACTIONS OCCUR, INTERRELATIONSHIPS OCCUR, ET CETERA.

1 BUT THE MOVIE IS THERE SIMPLY BECAUSE THE SCREEN IS
2 THERE. IF THERE WAS NO SCREEN, THEN THERE WOULD BE NO MOVIE.
3 SIMILARLY, THIS THREE-DIMENSIONAL EXPRESSION OF
4 NATURE IS BASED ON THE SCREEN OF CONSCIOUSNESS. AND THAT IS
5 WHY THIS IS VERY CONTROVERSIAL.
6 DIFFERENT PEOPLE HAVE COME UP WITH THEIR OWN
7 ESTIMATES, DIFFERENT ESTIMATES OF WHEN CONSCIOUSNESS IS
8 EXPRESSED DURING FETAL LIFE.
9 MS. NORONHA: MAY I APPROACH THE WITNESS, YOUR
10 HONOR?
11 THE COURT: YES.
12 BY MS. NORONHA:
13 Q. DOCTOR, I HAVE HANDLED HAD YOU LEARNED TREATISE NINE, WHICH
14 IS A PLAINTIFFS' EXHIBIT. DO YOU RECOGNIZE THIS DOCUMENT?
15 A. YES, I DO.
16 Q. WHAT IS IT?
17 A. THIS IS A REPORT OF THE WORKING PARTY APPOINTED BY THE
18 ROYAL COLLEGE OF OBSTETRICS AND GYNECOLOGY IN NOVEMBER OF 1996.
19 Q. AND, DOCTOR, HAVE YOU CONSIDERED THIS REPORT IN ARRIVING AT
20 YOUR CONCLUSIONS ABOUT CONSCIOUSNESS AND FETAL PAIN?
21 A. I HAVE CERTAINLY REVIEWED THIS REPORT. THIS, TO SOME
22 EXTENT, VICTIMIZES THE CONTROVERSY ABOUT EXPRESSION OF
23 CONSCIOUSNESS IN THE FETUS.
24 Q. CAN YOU EXPLAIN HOW THIS REPORT HAS AFFECTED YOUR
25 CONCLUSIONS?

1 A. CERTAINLY. IF I MAY OFFER SOME HISTORY TO THIS REPORT.
2 THERE WAS A BRITISH PARLIAMENTARY COMMISSION IN 1996 THAT
3 CONCLUDED THAT A FETUS IS SENTIENT FROM ABOUT SIX WEEKS OF
4 GESTATION.
5 Q. WHAT WAS THE WORD?
6 A. SENTIENT, OR S-E-N-T-I-E-N-T. OR A FETUS IS CONSCIOUS,
7 BASICALLY, FROM SIX WEEKS OF GESTATION.
8 AND THERE WAS AN UPROAR REGARDING THIS COMMISSION'S
9 REPORT. AND THE ROYAL COLLEGE OF OBSTETRICS AND GYNECOLOGY
10 REACTED TO THAT AND PUT THIS WORKING PARTY TOGETHER IN NOVEMBER
11 OF '96.
12 AND THIS WORKING PARTY OFFERED THIS REPORT ALMOST A
13 YEAR LATER, IN OCTOBER OF '97, IN ORDER TO SUMMARIZE THE
14 EVIDENCE FROM THEIR POINT OF VIEW ABOUT THE APPEARANCE OF FETAL
15 CONSCIOUSNESS.
16 Q. AND HOW DO THE CONCLUSIONS IN THE REPORT AFFECT YOUR
17 OPINION?
18 A. THIS WORKING PARTY CONCLUDED THAT FETAL CONSCIOUSNESS DOES
19 NOT APPEAR BEFORE 26 WEEKS OF GESTATION. ALTHOUGH, I THINK
20 THESE ARE EXTREME POSITIONS, NEITHER THE SIX WEEKS IS CORRECT
21 NOR THE 26 WEEKS IS CORRECT. I THINK THE TRUTH LIES SOMEWHERE
22 IN-BETWEEN.
23 IF I MIGHT ADD, THIS WORKING PARTY WAS EXTREMELY
24 UNBALANCED IN TERMS OF THE MEMBERS WHO WERE APPOINTED TO THIS
25 WORKING PARTY.

1 FROM WHAT I RECALL, THESE MEMBERS WERE SELECTED
2 BECAUSE OF THEIR OWN PERSONAL AND SCIENTIFIC POSITION REGARDING
3 FETAL CONSCIOUSNESS.
4 AND MANY RESEARCHERS IN ENGLAND AT THAT TIME, PEOPLE
5 SUCH AS DR. DAVID HARVEY, OR DR. NICHOLAS FISK, OR OTHERS,
6 DR. VIVETTE GLOVER, THEY WERE NOT INCLUDED ON THIS PANEL. AND
7 THAT WAS SIMPLY BECAUSE THESE WERE PEOPLE WHO HAD DONE RESEARCH
8 IN THE FETUS AND HELD A DIFFERENT OPINION FROM THOSE WHO WERE
9 APPOINTED TO THE WORKING PARTY.
10 SO IN SOME RESPECTS, THIS IS A SOMEWHAT UNBALANCED
11 COMPOSITION OF THIS GROUP.
12 THE OTHER THING I WOULD LIKE TO POINT OUT AFTER
13 READING THIS REPORT I FELT THAT THERE WAS A VERY LIMITED
14 PERSPECTIVE TAKEN IN TERMS OF THE DEVELOPMENT OF THE FETAL
15 BRAIN AND PHYSIOLOGICAL RESPONSES AND THINGS LIKE THAT. THEY
16 REVIEWED MULTIPLE DIFFERENT AREAS.
17 AND I AM NOT GOING TO GO INTO ALL OF THOSE, BUT IF I
18 COULD DIRECT YOUR ATTENTION TO ONE OF THESE SECTIONS, SECTION
19 4.1 ON PAGE 14.
20 YES, IT IS SECTION 4.1, ALTHOUGH IT DOESN'T SEEM TO
21 BE ON PAGE 14. IT IS ON PAGE 18, FOR SOME REASON.
22 AND THEY SAY IN THIS OPENING STATEMENT ABOUT THE
23 DEVELOPMENT OF THE PAIN SYSTEM AND SENSORY CONNECTIONS, ET
24 CETERA.
25 AND THEY SAY:

1 "THESE DATA HAVE BEEN THOROUGHLY REVIEWED
2 ELSEWHERE," REFERRING TO REFERENCES NUMBER 9 TO 13.
3 "IF YOU LOOK AT REFERENCES 9 THROUGH 13, THEY ARE
4 ALL THE WORK PRODUCT OF ONE SINGLE AUTHOR, WHICH
5 WAS DR. MARIA FITZGERALD, WHO WAS A MEMBER OF THIS
6 WORKING PARTY.
7 "IN SIMPLY ALL OTHER AREAS, THE RICH LITERATURE
8 ON DEVELOPMENT OF THE FETAL BRAIN WAS IGNORED.
9 DR. MARIA FITZGERALD HAS HERSELF NOT PERFORMED ANY
10 RESEARCH ON DEVELOPMENT OF THE THALAMUS OR THE
11 CORTEX. ALL OF HER RESEARCH HAS BEEN FOCUSED ON THE
12 SPINAL CORD OR PERIPHERAL RECEPTORS."
13 AND YET, THE REVIEW ARTICLES THAT ARE REFERENCED IN
14 THIS REPORT ARE COMPLETELY ONE-SIDED. DESPITE THAT, ON
15 BALANCE, THE REPORT SEEMS TO BE CONFUSED IN DIFFERENT PARTS.
16 THEY PROPOSE THAT CONSCIOUSNESS OR CONSCIOUS PERCEPTION OF PAIN
17 IS NOT POSSIBLE BEFORE 26 WEEKS OF GESTATION.
18 YET, THEY RECOMMEND THAT IF THERE IS A TERMINATION
19 OF PREGNANCY -- THIS IS SECTION 3.5.2 -- THEY SAY:
20 "WHEN A PREGNANCY IS TERMINATED BECAUSE OF
21 FETAL ABNORMALITY AFTER 21 WEEKS, THE PROCEDURE,
22 EITHER SURGICAL OR MEDICAL, IS USUALLY PRECEDED BY
23 INJECTION OF POTASSIUM CHLORIDE INTO THE UMBILICAL
24 CORD OR FETAL HEART IN ORDER TO STOP THE FETAL
25 HEARTBEAT."

1 SO IF THERE IS NO CONSCIOUS AWARENESS OF PAIN, WHY
2 WOULD THERE BE THE NEED TO ENSURE FETICIDE BEFORE TERMINATION
3 OF PREGNANCY OCCURS?
4 THERE ARE OTHER SECTIONS THAT SIMILARLY HAVE
5 INCONSISTENCIES THROUGHOUT THE REPORT. AND, THEREFORE, I USE
6 THIS REPORT TO SOME EXTENT IN FORMING MY OPINION, BUT I ALSO
7 LOOKED AT THE PRIMARY SOURCES OF THE INFORMATION REGARDING
8 FETAL DEVELOPMENT OF CONSCIOUSNESS.
9 Q. DOCTOR, NOW I WOULD LIKE TO TURN TO THE PARTIAL-BIRTH
10 ABORTION PROCEDURE.
11 NOW, YOU'VE ALREADY TESTIFIED THAT YOU ARE NOT AN
12 EXPERT IN THE PROCEDURE. ARE YOU FAMILIAR WITH IT?
13 A. YES, I HAVE READ THE ACT, AND I HAVE LOOKED AT SOME
14 WEBSITES. AND I HAVE READ SOME MEDICAL REPORTS RELATING TO
15 THIS PROCEDURE.
16 Q. SO, ON THOSE GROUNDS, WHAT IS YOUR OPINION, YOUR
17 UNDERSTANDING OF HOW THE PARTIAL-BIRTH ABORTION PROCEDURE IS
18 CONDUCTED?
19 A. MY UNDERSTANDING IS VERY RUDIMENTARY. AND IN MY REPORT I
20 HAD DETAILED THAT THE PROCEDURE WOULD CONSIST OF DILATION OF
21 THE CERVIX, OF THE SURGEON REACHING WITHIN THE AMNIOTIC CAVITY
22 TO GRASP THE LOWER EXTREMITY OF THE FETUS, MANIPULATION AND
23 ROTATION OF THE FETUS, AND DELIVERY OF THE FETAL BODY BY A
24 BREECH OR A FOOTLING PRESENTATION UNTIL THE POINT THAT THE
25 FETAL NECK IS EXPOSED.

1 I BELIEVE AT THAT TIME A SURGICAL INCISION IS PLACED
2 AND A TROCAR IS INSERTED TO PUNCTURE THROUGH THE OCCIPITAL BONE
3 AND THE MEMBRANES COVERING THE BRAIN, AND THEN SUCTION IS
4 APPLIED TO SIMPLY REMOVE THE INTRACRANIAL CONTENTS. AND THEN
5 THE FETAL HEAD IS DELIVERED THROUGH THE CERVIX.
6 THAT'S MY SOMEWHAT RUDIMENTARY UNDERSTANDING OF THIS
7 PROCEDURE.
8 Q. DOCTOR, DO YOU HAVE AN OPINION AS TO WHETHER THIS PROCEDURE
9 WOULD CAUSE PAIN TO THE FETUS AT OR BEYOND 20 WEEKS' GESTATION?
10 A. YES. IF PERFORMED ON FETUSES BEYOND 20 WEEKS OF GESTATION,
11 THIS PROCEDURE HAS A VERY HIGH PROBABILITY OF CAUSING PROLONGED
12 AND EXCRUCIATING PAIN TO THE FETUS.
13 Q. WHAT DO YOU MEAN BY "PROLONGED AND EXCRUCIATING PAIN"?
14 A. I BELIEVE THAT THE GRASPING OF THE LOWER EXTREMITY OF THE
15 FETUS, THE MANIPULATION OF THE FETUS AND ITS -- THE DELIVERY OF
16 THE FETAL BODY THROUGH AN INCOMPLETELY DILATED CERVIX WOULD BE
17 TRAUMATIC AND PAINFUL TO THE FETUS.
18 THAT THE SURGICAL INCISION PLACED WOULD CAUSE ACUTE
19 PAIN, BECAUSE OF THE TISSUE INJURY INVOLVED. THAT THE PUNCTURE
20 THROUGH THE OCCIPITAL BONE, THROUGH THE MEMBRANES OF THE BRAIN,
21 BOTH OF WHICH ARE VERY RICHLY INNERVATED WITH SENSORY FIBERS
22 WOULD CAUSE EXCRUCIATING PAIN.
23 UP TO THE POINT THAT THE FETAL BRAIN IS SUCTIONED
24 OUT AND FETAL DEMISE OCCURS, THERE WOULD BE PAIN EXPERIENCED BY
25 THE FETUS.

1 Q. DOCTOR, DO YOU HAVE AN OPINION AS TO WHETHER EXTRACTING THE
2 FETUS FROM THE UTERINE CAVITY WITH EITHER AN INSTRUMENT,
3 FORCEPS, OR MANUALLY WITH THE HAND WOULD CAUSE PAIN TO THE
4 FETUS?
5 A. GIVEN THE SENSITIVITY TO PAIN DURING THAT EARLY PART OF
6 GESTATION, THERE IS GREATER PROBABILITY THAN NOT THAT ALL OF
7 THESE MANIPULATIONS, USING THE FORCEPS OR USING THE HAND, WOULD
8 BE PAINFUL TO THE FETUS.
9 Q. DOCTOR, DO YOU HAVE AN OPINION AS TO WHETHER INSTEAD OF A
10 PUNCTURE AND SUCTION, A CRUSHING OF THE FETAL SKULL WOULD CAUSE
11 PAIN TO THE FETUS?
12 A. IT CERTAINLY WOULD.
13 Q. DO YOU HAVE AN OPINION AS TO WHETHER CUTTING THE FETAL NECK
14 WITH SCISSORS SO AS TO DECAPITATE THE HEAD FROM THE BODY WOULD
15 CAUSE PAIN TO THE FETUS?
16 A. YES. THAT WOULD CAUSE PAIN, BECAUSE THE NERVES SUPPLYING
17 THE SKIN AND STRUCTURES OF THE NECK WOULD STILL BE ATTACHED
18 THROUGH THE UPPER PART OF THE SPINAL CORD. UNTIL FETAL DEMISE
19 OCCURS, IT WOULD CAUSE PAIN TO THE FETUS.
20 Q. DOCTOR, DO YOU HAVE AN OPINION AS TO WHETHER IN AN ABORTION
21 PROCEDURE IN WHICH THE FETUS IS DISMEMBERED AS IT IS BEING
22 BROUGHT OUT OF THE UTERUS, WOULD THAT CAUSE PAIN TO THE FETUS?
23 A. BECAUSE OF THE GREATER SOMATIC INJURY INVOLVED IN
24 DISMEMBERMENT, YES, IT WOULD CAUSE PAIN TO THE FETUS.
25 Q. DO YOU HAVE AN OPINION AS TO WHETHER CUTTING THE UMBILICAL

1 CORD WHILE THE FETUS IS IN UTERO WOULD CAUSE PAIN TO THE FETUS?
2 A. VERY UNLIKELY. LIKE I MENTIONED BEFORE, THE UMBILICAL CORD
3 IS NOT SUPPLIED WITH SENSORY NERVES, SO CUTTING THE FETAL
4 UMBILICAL CORD WOULD NOT BE ASSOCIATED WITH PAIN TO THE FETUS.
5 Q. DO YOU HAVE AN OPINION AS TO WHETHER AN INJECTION OF
6 DIGOXIN OR POTASSIUM CHLORIDE INTO THE FETAL BODY WOULD CAUSE
7 PAIN TO THE FETUS?
8 A. THE FETUS WOULD EXPERIENCE ACUTE PAIN FROM THE NEEDLE
9 PUNCTURE FROM THE POINT WHERE THE NEEDLE WAS INSERTED INTO THE
10 FETAL BODY TO THE POINT WHEN CARDIAC ARREST OCCURS AS A RESULT
11 OF THE INJECTION OF DIGOXIN OR POTASSIUM CHLORIDE.
12 IT DEPENDS ON WHERE THESE DRUGS ARE INJECTED. AND
13 IF THEY ARE INJECTED, SAY, INTO THE FETAL HEART, THEN CARDIAC
14 ARREST WOULD OCCUR ALMOST IMMEDIATELY, AND THERE WOULD BE FETAL
15 DEMISE VERY SOON AFTER THE NEEDLE PUNCTURE HAS OCCURRED.
16 Q. DOCTOR, DO YOU HAVE AN OPINION AS TO WHETHER AN INDUCTION
17 BY ADMINISTRATION OF PROSTAGLANDINS WOULD CAUSE PAIN TO THE
18 FETUS?
19 A. IF THERE IS NO TISSUE INJURY INVOLVED, THEN INDUCTION OF
20 LABOR BY PROSTAGLANDINS WOULD BE UNLIKELY TO CAUSE PAIN TO THE
21 FETUS.
22 I SAY THAT WITH SOME DEGREE OF SKEPTICISM BECAUSE
23 PROSTAGLANDINS ARE CHEMICALS THAT ARE RELEASED IN THE SKIN OR
24 TISSUES AT THE TIME INJURY OCCURS OR INFLAMMATION OCCURS, AND
25 THEY ARE PART OF THE MEDIATORS OF PAIN.

1 BUT PLACING PROSTAGLANDINS INTO THE AMNIOTIC FLUID
2 WOULD BE UNLIKELY TO HAVE ANY CONTACT WITH THE NERVE ENDINGS IN
3 THE SKIN, IN THE INTACT SKIN, AND, THEREFORE, WOULD BE UNLIKELY
4 TO CAUSE PAIN TO THE FETUS.
5 ON THE OTHER HAND, PROSTAGLANDINS LEAD TO THE ONSET
6 OF LABOR, AND THEY WILL CAUSE THE SEPARATION OF THE PLACENTA.
7 SO MY EXPECTATION WOULD BE THAT WHEN THE PLACENTA IS SEPARATED,
8 FETAL DEMISE OCCURS, AND THE EXTRACTION OF THE FETUS WOULD NOT
9 BE PAINFUL FOLLOWING THAT APPROACH.
10 Q. DOCTOR, DO YOU PERSONALLY SUPPORT A WOMAN'S RIGHT TO AN
11 ABORTION?
12 A. YES, I DO. I FEEL EVERY WOMAN HAS THE INALIENABLE RIGHT TO
13 PROTECT HER HEALTH AND MENTAL WELL-BEING BY GETTING AN
14 ABORTION, WITH THE CAVEAT THAT IT SHOULD NOT CAUSE PAIN TO THE
15 FETUS.
16 Q. DOCTOR, NOW, I WOULD LIKE TO TURN TO THE PHARMACOLOGY OF
17 ANESTHETIC DRUGS ADMINISTERED TO THE MOTHERS. GENERALLY, COULD
18 YOU DESCRIBE HOW ANESTHESIA ADMINISTERED TO THE MOTHER WOULD
19 REACH THE FETUS?
20 A. IT DEPENDS ON WHAT ANESTHETIC IS GIVEN AND HOW IT IS
21 DELIVERED AND HOW MUCH IS GIVEN. SO THERE IS A NUMBER OF
22 FACTORS THAT IT DEPENDS ON.
23 JUST IN GENERAL, THE ANESTHETIC DELIVERED TO THE
24 MOTHER WOULD HAVE TO AVOID METABOLISM IN THE LIVER AND
25 EXCRETION BY THE KIDNEYS, WOULD HAVE TO CIRCULATE THROUGHOUT

1 THE MOTHER'S BLOODSTREAM, AND THEN WOULD HAVE TO CROSS THE
2 PLACENTAL BARRIER.
3 YOU SEE, THE MOTHER'S CIRCULATION DOES NOT MIX WITH
4 THE BABY'S CIRCULATION. THERE IS A PLACENTAL MEMBRANE THAT
5 SEPARATES THESE TWO CIRCULATIONS. SO ANY ANESTHETIC DRUG THAT
6 IS GIVEN WOULD HAVE TO CROSS THAT PLACENTAL BARRIER AND THEN
7 CIRCULATE WITHIN THE FETUS TO A CERTAIN THERAPEUTIC
8 CONCENTRATION, AND THEN WOULD HAVE TO CROSS THE BLOOD-BRAIN
9 BARRIER INSIDE THE FETUS IN ORDER TO PRODUCE AN ANESTHETIC
10 EFFECT ON THE FETUS.
11 Q. SO, DOCTOR, DO YOU HAVE AN OPINION AS TO WHETHER ANESTHESIA
12 ADMINISTERED TO THE MOTHER WOULD COMPLETELY PREVENT THE FETUS
13 FROM EXPERIENCING PAIN?
14 A. THIS AREA IS RELATIVELY UNDERINVESTIGATED. WE KNOW ABOUT
15 THE EFFECTS OF ANESTHESIA GIVEN TO THE MOTHERS FROM STUDIES
16 THAT WERE EITHER DONE IN THE THIRD-TRIMESTER OR DONE IN THE
17 FIRST-TRIMESTER FOR MEDICAL TERMINATION OF PREGNANCY. AND SO
18 WE CAN EXTRAPOLATE FROM THOSE STUDIES.
19 MY OPINION IS THAT THE MOTHER WOULD BE EXPOSED TO
20 TOXIC DOSES OF ANESTHETIC DRUGS IN ORDER TO ENSURE THAT THE
21 FETUS IS ANESTHETIZED.
22 Q. IS YOUR OPINION THE SAME FOR ALL TYPES OF ANESTHETIC DRUGS?
23 A. LIKE I SAID BEFORE, IT DEPENDS ON WHICH TYPE OF ANESTHESIA
24 YOU ARE TALKING ABOUT. ONE APPROACH TO ANESTHESIA IS TO GIVE A
25 PERINEURAL NERVE BLOCK, WHICH IS A BLOCK OF THE NERVES THAT ARE

1 SUPPLYING THE UTERUS. AND CERTAINLY LOCAL ANESTHETIC DRUGS
2 INJECTED IN THE VICINITY OF THE NERVES WOULD BE UNLIKELY TO
3 HAVE ANY EFFECT ON THE FETUS.
4 ANOTHER APPROACH IS TO USE EPIDURAL ANESTHESIA,
5 INJECTING LOCAL ANESTHETIC DRUGS TO THE NERVES THAT ARE COMING
6 OUT OF THE SPINAL CORD. AND, AGAIN, THE CONCENTRATION OF THOSE
7 ANESTHETIC DRUGS AT THE POINT WHERE THEY ARE INJECTED IS MUCH
8 GREATER THAN WHAT IS ABSORBED INTO THE MOTHER'S BLOODSTREAM.
9 AND THEN, THAT CONCENTRATION EFFECTS WHAT GETS
10 ACROSS THE PLACENTAL MEMBRANE, AND SO IT WOULD BE UNLIKELY TO
11 HAVE ANY EFFECT ON THE FETUS.
12 ON THE OTHER HAND, IF THE MOTHER RECEIVES
13 INTRAVENOUS ANESTHETIC DRUGS, DRUGS SUCH AS MORPHINE OR
14 MIDAZOLAM -- M-I-D-A-Z-O-L-A-M -- OR FENTANYL OR PROPOFOL --
15 P-R-O-P-O-F-O-L -- THESE DRUGS WOULD BE TRANSFERRED TO SOME
16 EXTENT ACROSS THE PLACENTAL MEMBRANE, BUT THEY WOULD NOT
17 ACHIEVE THERAPEUTIC CONCENTRATIONS IN THE FETAL CIRCULATION
18 ENOUGH TO ENSURE THAT THERE IS ESCAPE OF FETAL ANESTHESIA.
19 Q. DOCTOR, HOW CAN THIS BE TRUE IF THE FETUS IS SO MUCH
20 SMALLER THAN THE MOTHER IS?
21 A. YOU SEE, WHEN A FETUS -- WHEN THE MOTHER IS RECEIVING
22 ANESTHETIC DRUGS INJECTED INTRAVENOUSLY, THOSE DRUGS HAVE TO
23 CIRCULATE THROUGHOUT THE MOTHER'S BLOOD VOLUME.
24 AS WE KNOW, DURING PREGNANCY THE MOTHER'S BLOOD
25 VOLUME IS HIGHER THAN IN THE NONPREGNANT STATE. ALSO, BLOOD

1 FLOW TO THE LIVER IS ACCENTUATED DURING PREGNANCY.
2 SO SUPPOSE -- IF I MAY HAVE YOUR PERMISSION, I WILL
3 DO SOME VERY QUICK CALCULATIONS. SUPPOSE A MOTHER RECEIVES A
4 DRUG OF PROPOFOL, WHICH IS CERTAINLY THE MOST LIPID-SOLUBLE OF
5 ALL THESE DRUGS THAT I MENTIONED, AND MOST EASILY ABLE TO CROSS
6 THE PLACENTAL BARRIER.
7 A THERAPEUTIC DOSE TO PRODUCE ANESTHESIA IN THE
8 MOTHER WOULD BE, SAY, ABOUT 150 TO 200 MILLIGRAMS OF PROPOFOL.
9 THIS WOULD BE DILUTED IN ABOUT 5 LITERS OF THE MOTHER'S BLOOD
10 VOLUME AND WOULD BE METABOLIZED BY THE LIVER, SO THAT WHEN
11 THESE STUDIES WERE DONE WHAT THEY FOUND WAS A THERAPEUTIC DOSE
12 PRODUCED CONCENTRATIONS OF ABOUT 1 MICROGRAM PER CC IN THE
13 MOTHER'S BLOOD.
14 WHAT THEY ALSO FOUND WAS THAT 65 PERCENT OF THIS
15 CONCENTRATION WAS REACHED IN THE BABY'S BLOOD, IN THE FETAL
16 CIRCULATION, SO THAT THERE IS A LOWER CONCENTRATION IN THE
17 FETAL CIRCULATION.
18 NOW, THESE STUDIES WERE DONE IN THE THIRD-TRIMESTER
19 AT A POINT WHERE THE PLACENTAL MEMBRANE IS AT ITS THINNEST, AND
20 THEREFORE, IS MUCH MORE EFFICIENT TO ALLOW THE TRANSFER OF
21 THESE DRUGS.
22 SO LET'S GIVE THE BENEFIT OF THE DOUBT AND SAY THAT
23 THERE IS A SIMILAR DEGREE OF PLACENTAL EFFICIENCY, EVEN IN THE
24 SECOND-TRIMESTER. THE FETUS WOULD THEN HAVE A VERY LOW
25 CONCENTRATION, SAY LESS THAN 1 MICROGRAM PER CC, IN THE FETAL

1 CIRCULATION, WHICH WOULD NOT BE ENOUGH TO PRODUCE AN ANESTHETIC
2 STATE, LIKE CROSSING THE BLOOD-BRAIN BARRIER IN THE FETUS.
3 IN CONTRAST, WHEN WE GIVE PROPOFOL ANESTHESIA
4 DIRECTLY TO PREMATURE INFANTS, WE SEE THAT WE NEED ABOUT
5 BETWEEN FIVE TO 50 TIMES THAT CONCENTRATION IN ORDER TO PRODUCE
6 A STATE OF ANESTHESIA.
7 AND SO TO EXTRAPOLATE BACK TO THE MATERNAL
8 ANESTHESIA STUDIES, WE WOULD NEED TO INCREASE THE DOSE OF
9 ANESTHETIC BY A FACTOR OF FIVE TO 50 TIMES, WHICH WOULD
10 CERTAINLY RESULT IN TOXICITY AND WOULD ENDANGER THE LIFE OF THE
11 MOTHER.
12 Q. SO, DOCTOR, ARE YOU AWARE OF ANY ANESTHETIC DRUG THAT WHEN
13 SAFELY ADMINISTERED TO THE MOTHER WOULD PROVIDE COMPLETE PAIN
14 RELIEF TO THE FETUS?
15 A. NO, I AM NOT. THE INHALATIONAL ANESTHETICS, ANESTHETIC
16 GASES, SUCH AS HALOTHANE OR ISOFLURANE OR SEVOFLURANE, WOULD BE
17 MUCH MORE LIKELY TO CROSS THE PLACENTAL BARRIER, AND MAY
18 ACHIEVE SOME DEGREE OF CONCENTRATION WITHIN THE FETUS.
19 BUT WHAT THESE STUDIES HAVE SHOWN IS THAT A FETUS
20 SERVES AS A DEEP COMPARTMENT WITHIN THE MATERNAL CIRCULATION,
21 AS SUCH. SO THAT THE CALIBRATION OF THE SAME CONCENTRATION OF
22 DRUG IN THE MOTHER'S BLOOD STREAM AS OPPOSED TO THE FETUS'
23 BLOOD STREAM, REQUIRES A PROLONGED DURATION OF GAS ANESTHESIA,
24 USING FAIRLY HIGH CONCENTRATIONS.
25 AGAIN, THAT WOULD EXPOSE THE MOTHER TO POSSIBLE

1 TOXICITY FROM THOSE ANESTHETICS.
2 SO, IF A STATE OF FETAL ANESTHESIA HAD TO BE
3 PRODUCED, NECESSARILY BE PRODUCED, THEN I WOULD SAY THE GAS
4 ANESTHETICS WOULD PERHAPS BE THE BEST CLASS OF DRUGS TO USE IN
5 ORDER TO PRODUCE FETAL ANESTHESIA.
6 BUT THERE IS A RISK OF SIDE EFFECTS TO THE MOTHER.
7 Q. THANK YOU.
8 MS. NORONHA: YOUR HONOR, I HAVE NO FURTHER
9 QUESTIONS AT THIS TIME.
10 THE COURT: ALL RIGHT. THANK YOU.
11 CROSS?
12 CROSS-EXAMINATION
13 BY MS. PARKER:
14 Q. ON DIRECT, DR. ANAND, YOU TESTIFIED THAT YOU BELIEVE A
15 FETUS EXPERIENCES PAIN AT 20 WEEKS' GESTATION; IS THAT CORRECT?
16 A. THAT IS CORRECT.
17 Q. AND YOU ARE MEASURING 20 WEEKS AS 20 WEEKS AFTER
18 CONCEPTION; IS THAT CORRECT?
19 A. THAT'S CORRECT.
20 Q. THAT WOULD BE APPROXIMATELY TWO WEEKS LATER THAN 20 WEEKS
21 LMP?
22 A. THAT IS CORRECT. PREGNANCY BEGINS AT CONCEPTION, I
23 BELIEVE.
24 Q. SO IT IS EITHER 20 WEEKS AFTER CONCEPTION OR 22 WEEKS LMP?
25 A. THAT IS CORRECT.

1 Q. NOW, I BELIEVE YOUR TESTIMONY WAS THAT THERE WERE
2 CONVERGING LINES OF EVIDENCE THAT SUGGESTS THAT CONSCIOUSNESS
3 IN THE FETUS OCCURS AT ABOUT 20 TO 22 WEEKS; IS THAT RIGHT?
4 A. THAT IS CORRECT.
5 Q. BUT YOU DO NOT HOLD THE VIEW TO A REASONABLE DEGREE OF
6 CERTAINTY THAT FETUSES BEFORE 20 WEEKS EXPERIENCE PAIN?
7 A. THAT IS CORRECT.
8 Q. IN FACT, YOU ARE NOT AT ALL CERTAIN THAT A FETUS CAN
9 EXPERIENCE PAIN BETWEEN 16 AND 20 WEEKS?
10 A. THAT IS CORRECT.
11 Q. AT YOUR DEPOSITION YOU SAID THERE IS ONLY A 50 PERCENT
12 PROBABILITY THAT A FETUS CAN FEEL PAIN BETWEEN 16 AND 20 WEEKS?
13 A. EXACTLY. THE LIKELIHOOD OF FEELING PAIN OR NOT FEELING
14 PAIN IS ABOUT THE SAME. THERE IS -- SO, AT THIS POINT I AM NOT
15 ABLE TO SAY EITHER WAY DOES THE FETUS FEEL PAIN OR DOES NOT
16 FEEL PAIN BETWEEN 16 AND 20 WEEKS, LIKE YOU SAID.
17 Q. IT IS NO DIFFERENT THAN WE FLIPPED A COIN, 50 PERCENT
18 HEADS/50 PERCENT TAILS?
19 A. YOU'RE RIGHT. ABSOLUTELY.
20 Q. AND, INDEED, YOUR OPINION WITH RESPECT TO THE FETUS BETWEEN
21 16 AND 20 WEEKS IS BASED ON A NEW VIEW OF PAIN?
22 A. THAT IS CORRECT.
23 Q. A VERY NOVEL, NEW VIEW?
24 A. ABSOLUTELY RIGHT.
25 Q. IN FACT, NO ONE HAS DONE A STUDY OF THAT NEW VIEW AS IT

1 RELATES TO FETUSES?
2 A. THAT IS CORRECT.
3 Q. AND NO ONE HAS EVER DONE A STUDY OF THE NEW VIEW OF PAIN AS
4 IT RELATES TO PRE-TERM NEONATES?
5 A. YOU'RE ABSOLUTELY RIGHT. THIS IS A VERY NOVEL VIEW OF PAIN
6 THAT WAS PUBLISHED AS RECENTLY AS JUNE OF 2003. AND CURRENTLY,
7 THERE ARE NO STUDIES THAT HAVE BEEN PUBLISHED BASED ON THIS NEW
8 VIEW OF PAIN.
9 Q. AND IS THERE NO FIRM SCIENTIFIC EVIDENCE THAT PAIN CAN BE
10 EXPERIENCED BY A FETUS AS EARLY AS 16 WEEKS?
11 A. NO, THERE IS NOT.
12 Q. OR, INDEED, BEFORE 20 WEEKS?
13 A. NO, THERE IS NOT. I AGREE THAT THERE IS SOME DATA SHOWING
14 PHYSIOLOGICAL RESPONSES, MEANING RELEASE OF HORMONES OR CHANGES
15 IN CIRCULATION BEFORE 20 WEEKS, BUT I AM VERY SKEPTICAL ABOUT
16 THE REPRODUCIBILITY OF THAT DATA AND FEEL THAT IT CANNOT -- IT
17 CANNOT BE RELIED UPON AS WELL OR AS MUCH AS WE CAN RELY ON DATA
18 AFTER 20 WEEKS OF GESTATION.
19 Q. AND THAT IS WHY THE MAJORITY OF SCIENTISTS AGREE THAT
20 THERE'S NO -- THAT PAIN CANNOT BE EXPERIENCED BEFORE 20 WEEKS?
21 A. I AGREE WITH THAT, YES.
22 Q. AND SO IT WOULD NOT BE A MEDICAL FACT THAT A FETUS WOULD
23 EXPERIENCE PAIN BEFORE 20 WEEKS?
24 A. THAT IS CORRECT.
25 Q. NOW, DR. ANAND, ON DIRECT YOU OFFERED AN OPINION THAT A

1 FETUS WOULD BE SUBJECTED TO PAIN FROM THE ABORTION PROCEDURES
2 BANNED BY THE PARTIAL-BIRTH ABORTION BAN ACT OF 2003; IS THAT
3 RIGHT?
4 A. THAT IS CORRECT, IF THE FETUS IS BEYOND 20 WEEKS OF
5 GESTATION.
6 Q. OKAY. SO YOUR OPINION DOES NOT GO BEYOND THE 20 WEEK
7 PERIOD?
8 A. THAT IS CORRECT.
9 Q. SO IF THERE ARE PROCEDURES THAT ARE BANNED BY THE ACT
10 BEFORE -- THAT OCCUR BEFORE 20 WEEKS, YOUR OPINION DOES NOT
11 APPLY TO THOSE PROCEDURES?
12 A. ABSOLUTELY RIGHT.
13 THE COURT: LET ME MAKE SURE I UNDERSTAND. WHEN YOU
14 USE 20 WEEKS, WE ARE TALKING ABOUT 22 WEEKS LMP?
15 MS. PARKER: THAT'S CORRECT. THAT'S WHAT HE --
16 BY MS. PARKER:
17 Q. THAT IS WHAT YOU TESTIFIED. YOU ARE TALKING ABOUT 22 WEEKS
18 LMP?
19 A. I TESTIFIED THAT IT'S 20 WEEKS OF GESTATION OR 20 WEEKS
20 POSTCONCEPTION --
21 THE COURT: ALL RIGHT. BUT YOU HAVE --
22 THE WITNESS: -- SO IT IS --
23 THE COURT: THROUGHOUT THIS ENTIRE TRIAL WE HAVE
24 BEEN USING LMP. I WANT TO MAKE SURE THAT I UNDERSTAND YOUR
25 TESTIMONY TO BE AFTER CONCEPTION. LMP WOULD BE AN OLDER --

1 THE WITNESS: THAT'S CORRECT, YOUR HONOR. YES.
2 BY MS. PARKER:
3 Q. AND BY THAT YOUR OPINION STARTS AT 22 WEEKS LMP; IS THAT
4 RIGHT?
5 A. YES. IF YOU POSTULATE, WHICH I HAVEN'T TESTIFIED TO, IF
6 YOU POSTULATE, THERE IS TWO WEEKS BETWEEN LMP AND CONCEPTION.
7 AND THAT CAN BE VARIABLE TO SOME EXTENT, BUT LMP IS
8 THE ACCEPTED WAY IN OBSTETRIC CLINICAL PRACTICE OF MEASURING
9 THE LENGTH OF PREGNANCY, WHEREAS IN SCIENTIFIC STUDIES
10 INVOLVING FETUSES OR IN THE MEASUREMENT OF NEONATAL MATURITY OF
11 PREMATURE NEONATES, USUALLY POSTCONCEPTION IS THE USUAL WAY
12 THIS IS MEASURED.
13 Q. NOW, I WOULD LIKE TO FOCUS ON YOUR OPINION THAT FETAL PAIN
14 CAN BE EXPERIENCED AT 20 WEEKS LMP. IT IS TRUE, IS IT NOT,
15 THAT THERE ARE NO STUDIES OF FETAL PAIN DURING AN ABORTION
16 PROCEDURE?
17 A. YOU'RE RIGHT. THERE ARE NO STUDIES THAT I KNOW OF THAT
18 HAVE LOOKED AT THE QUESTION OF FETAL PAIN DURING AN ABORTION
19 PROCEDURE.
20 Q. AND YOU'RE AWARE OF NO ARTICLES THAT ARE FOCUSED ON THAT
21 ISSUE, EITHER; ISN'T THAT RIGHT?
22 A. THAT IS RIGHT.
23 Q. AND, IN FACT, NONE OF THE STUDIES YOU ARE RELYING ON
24 DIRECTLY ESTABLISH FETAL PAIN AT 22 WEEKS LMP?
25 A. THAT'S RIGHT.

1 Q. YOUR OPINIONS ARE BASED INSTEAD -- I THINK YOU SAID THIS ON
2 DIRECT -- ON EXTRAPOLATIONS FROM STUDIES ON PREMATURE BABIES?
3 A. YES.
4 Q. AND EXTRAPOLATIONS FROM ANIMAL MODELS?
5 A. YES, AS WELL AS THE RESPONSES OF FETUSES UNDERGOING PAINFUL
6 PROCEDURES IN UTERO.
7 Q. AND YOUR OPINION IS ALSO BASED ON INFERENCES?
8 A. THAT'S CORRECT.
9 Q. IN FACT, YOUR ENTIRE OPINION IS BASED ON INFERENCES?
10 A. THAT IS CORRECT. ALL SCIENTIFIC CONCLUSIONS ARE, FOR THE
11 MOST PART, BASED ON INFERENCES.
12 Q. SO AS A RESULT, IT IS NOT YOUR OPINION THAT A FETUS AT 22
13 WEEKS LMP WILL DEFINITELY EXPERIENCE PAIN?
14 A. IT DEPENDS ON HOW YOU DEFINE "DEFINITELY." IT DEPENDS ON
15 WHAT LEVEL OF CERTAINTY THAT YOU CONSIDER AS LABELING
16 DEFINITELY EVIDENCE.
17 Q. WELL, IN FACT, AT YOUR DEPOSITION I THINK YOU USED
18 80 PERCENT WAS THE NUMBER THAT YOU THREW OUT?
19 A. YES. IN MY DEPOSITION I HAD SAID THAT THERE IS AN
20 80 PERCENT OR GREATER PROBABILITY THAT A FETUS WILL EXPERIENCE
21 PAIN DURING THE D&X PROCEDURE AFTER 20 WEEKS OF GESTATION.
22 AND THAT IS SIMPLY TO RETAIN SOME LEVEL OF
23 SCIENTIFIC SKEPTICISM. I AM PREPARED TO DISCARD MY HYPOTHESIS
24 IF EVIDENCE SHOWS TO THE CONTRARY THAT A FETUS DOES NOT FEEL
25 PAIN AFTER 20 WEEKS OF GESTATION.

1 Q. BUT THAT EVIDENCE DOES NOT -- HAS NOT YES BEEN TESTED.
2 THERE HAS BEEN NO DEFINITIVE STUDIES ON THAT AS OF NOW; ISN'T
3 THAT RIGHT?
4 A. YOU SEE, THAT'S WHAT I MEANT EARLIER. IT DEPENDS ON HOW
5 YOU WOULD -- WHAT YOU WOULD TAKE AS DEFINITIVE EVIDENCE. PAIN
6 OR EXPERIENCE, FOR THAT MATTER, ANY EXPERIENCE CANNOT BE
7 MEASURED DIRECTLY EXCEPT WHEN IT IS REPORTED BY THE INDIVIDUAL
8 UNDERGOING THE EXPERIENCE.
9 AND SO IF YOU TELL ME WHAT YOU CONSIDER AS
10 DEFINITIVE EVIDENCE, THEN I'LL BRING OUT THAT EVIDENCE IF IT IS
11 AVAILABLE IN THE LITERATURE, OR I WILL DESIGN A STUDY TO SHOW
12 YOU HOW THAT DEFINITIVE EVIDENCE COULD BE OBTAINED.
13 Q. BUT STUDIES LOOKING AT THAT DIRECTLY TODAY DO NOT EXIST;
14 ISN'T THAT RIGHT?
15 A. CERTAINLY DEFINITIVE EVIDENCE BY DIRECT MEASUREMENT OF
16 FETAL EXPERIENCE IS NOT POSSIBLE.
17 Q. RIGHT. IT IS YOUR OPINION, IS IT NOT, THAT IT IS NOT
18 POSSIBLE TO DIRECTLY MEASURE WHETHER A FETUS EXPERIENCES PAIN?
19 A. THAT IS RIGHT.
20 Q. NO --
21 A. AND THAT IS WHY -- THAT IS WHY WE DEPEND ON SURROGATE
22 MARKERS OF PAIN AND THE MULTIPLE LINES OF EVIDENCE, THE
23 ANATOMICAL AND PHYSIOLOGICAL AND FUNCTIONAL AND BEHAVIORAL
24 ASPECTS OF PAIN.
25 Q. AND NO TECHNOLOGY CURRENTLY EXISTS EVEN TO DETERMINE

1 WHETHER A FETUS EXPERIENCES PAIN?
2 A. WELL, I WOULD LIKE TO QUALIFY WHAT I SAID AT MY DEPOSITION.
3 THE TECHNOLOGY DOES EXIST. AS OF VERY RECENTLY I HAVE HEARD OF
4 PET SCANS: POSITION EMISSION TOMOGRAPHY SCANS. THIS IS A TYPE
5 OF IMAGING OF THE BRAIN, BEING DONE AT YALE UNIVERSITY AND
6 BEING SET UP AT WAYNE STATE UNIVERSITY. SO THE TECHNOLOGY DOES
7 EXIST, BUT THOSE STUDIES HAVE NOT BEEN DONE USING EXPERIMENTAL
8 PARADIGM FOR PAIN, EITHER IN THE FETUS OR THE PRE-TERM D&E.
9 Q. BUT, STILL, AS OF TODAY, NONE OF THE STUDIES HAVE BEEN DONE
10 OR EVEN DESIGNED.
11 NOW, ON DIRECT YOU INDICATED THAT YOU AGREED WITH
12 THE IASP'S DEFINITION OF PAIN AS AN UNPLEASANT SENSORY AND
13 EMOTIONAL EXPERIENCE ASSOCIATED WITH ACTUAL OR POTENTIAL TISSUE
14 DAMAGE OR DESCRIBED IN TERMS OF SUCH DAMAGE, RIGHT?
15 A. THAT IS CORRECT.
16 Q. IN OTHER WORDS, PAIN IS A COMBINATION OF THE EMOTIONAL
17 EXPERIENCE AND THE SENSORY STIMULATION?
18 A. THAT IS CORRECT.
19 Q. AND BY EMOTIONAL EXPERIENCE OF PAIN, YOU MEAN
20 CHARACTERIZING THE EXPERIENCE AS UNPLEASANT; IS THAT RIGHT?
21 A. THAT IS CORRECT.
22 Q. AND THE EMOTIONAL EXPERIENCE OF PAIN IS VERY SPECIFIC FOR
23 EACH INDIVIDUAL; ISN'T THAT RIGHT?
24 A. YES, IT IS A SUBJECTIVE EXPERIENCE OF PAIN.
25 Q. SO THE WAY I FEEL IT WOULD BE DIFFERENT THAN THE WAY YOU

1 WOULD FEEL A SIMILAR ACCIDENT?
2 A. ABSOLUTELY RIGHT, YES.
3 Q. AND IT IS TRUE, IS IT NOT, THAT IT'S TECHNOLOGICALLY
4 IMPOSSIBLE AT THIS TIME TO MEASURE EMOTIONS OF THE FETUS?
5 A. YOU'RE RIGHT. IT IS IMPOSSIBLE TO MEASURE EMOTIONS IN THE
6 FETUS, ALTHOUGH WE ARE ABLE TO STUDY THE EMOTIONAL RESPONSES OF
7 THE FETUS IN THE TERMS OF FACIAL EXPRESSIONS, EYE BLINKING, OR
8 EVEN THE CRYING ACTIVITY FROM MOVEMENTS OF THE DIAPHRAGM, USING
9 ULTRASOUND BEHAVIOR STUDIES.
10 Q. DR. ANAND, IF YOU COULD TURN TO PAGE 128 OF YOUR
11 DEPOSITION.
12 A. YES, I HAVE IT.
13 Q. AND IT IS TRUE, IS IT NOT, I ASKED YOU AT YOUR DEPOSITION:
14 "BUT YOU'RE SAYING YOU CANNOT EVALUATE THE
15 EMOTIONAL EXPERIENCE OF PAIN BY A FETUS?"
16 AND YOU RESPONDED:
17 "AT THIS TIME, I THINK IT IS TECHNOLOGICALLY
18 DIFFICULT TO EVALUATE THE EMOTIONAL EXPERIENCE OF
19 THE FETUS. THERE ARE EMOTIONAL EXPERIENCES THE
20 FETUS MANIFESTS THAT HAVE BEEN EVALUATED THROUGH
21 STUDIES IN LATER PREGNANCY, SO WE DO KNOW THAT
22 EMOTION DOES EXIST DURING FETAL LIFE."
23 AND IT IS ALSO YOUR OPINION WE ARE JUST NOT SMART
24 ENOUGH TO EVALUATE THE EMOTIONAL EXPERIENCE?
25 A. YES. THAT IS WHAT IS STATED IN THE CONTINUATION OF THAT

1 STATEMENT.
2 Q. RIGHT. NOW, YOU ALSO AGREE, I BELIEVE YOU STATED ON DIRECT,
3 WITH THE IASP STATEMENT THAT PAIN IS ALWAYS SUBJECTIVE.
4 A. YES, IT IS.
5 Q. BY "SUBJECTIVE," YOU MEAN, IT IS MEANING AND INTERPRETATION
6 BY THE INDIVIDUAL WHO IS EXPERIENCING IT?
7 A. THAT IS CORRECT.
8 Q. AND SUBJECTIVITY CANNOT BE STUDIED IN FETUSES; ISN'T THAT
9 CORRECT?
10 A. THAT IS CORRECT, OR AT ANY OTHER AGE.
11 Q. IT CANNOT BE STUDIED BECAUSE WE CANNOT COMMUNICATE WITH
12 FETUSES?
13 A. THAT IS CORRECT.
14 Q. IN FACT, THERE IS NO ABILITY OF THE FETUS TO EXPRESS OR
15 COMMUNICATE ITS EXPERIENCE OF PAIN?
16 A. YES. AND THAT IS WHY THE DEFINITION OF PAIN WAS CHANGED IN
17 MAY OF 2001, IN ORDER TO SIMPLY NOT RELY EXCLUSIVELY ON VERBAL
18 EXPRESSION AS THE EVIDENCE FOR THE SUBJECTIVE EXPERIENCE OF
19 PAIN.
20 THIS WAS THE SITUATION. AND I WROTE AN EDITORIAL
21 THAT WAS PUBLISHED IN THE JOURNAL CALLED PAIN. IT APPEARED IN
22 OCTOBER OF 1996.
23 AND THAT'S WHERE WE MADE THE FIRST ARGUMENT THAT
24 THIS CURRENT DEFINITION OF PAIN IS -- HAS OUTLIVED ITS
25 USEFULNESS. THAT IT DOES NOT APPLY TO LIVING BEINGS WITHOUT

1 LINGUISTIC ABILITY.
2 AND AT THAT TIME THERE WAS GOOD EVIDENCE TO SHOW,
3 FOR EXAMPLE, IN OLD PEOPLE'S HOMES. THOSE WHO HAD LINGUISTIC
4 ABILITY HAD MUCH GREATER TREATMENT OF THEIR PAINFUL CONDITIONS.
5 AS COMPARED TO THOSE PEOPLE WHO WERE UNABLE TO EXPRESS
6 THEMSELVES BY VERBAL SELF-EXPRESSION.
7 SO THAT IS WHY THE DEFINITION OF PAIN WAS CHANGED TO
8 INCLUDE OTHER SOURCES OF EVIDENCE OTHER THAN VERBAL
9 SELF-REPORTING.
10 Q. BUT THE IASP'S DEFINITION STILL INCLUDES THE STATEMENT THAT
11 "PAIN IS ALWAYS SUBJECTIVE"; DOES IT NOT?
12 A. YES, IT IS PRECEDED BY THE STATEMENT THAT:
13 "THE INABILITY TO COMMUNICATE VERBALLY DOES
14 NOT NEGATE THE POSSIBILITY THAT AN INDIVIDUAL IS
15 EXPERIENCING PAIN AND IS IN NEED OF APPROPRIATE
16 PAIN-RELIEVING TREATMENT."
17 Q. AND YOU ALSO AGREE, THOUGH, DO YOU NOT, THAT A SUBJECTIVE
18 EXPERIENCE REQUIRES AN INDIVIDUAL WHO IS -- AN INDIVIDUAL WHO
19 IS EXPERIENCING IT TO INTERPRET IT; IS THAT RIGHT?
20 A. TO SOME EXTENT, IT IS.
21 Q. WE CAN'T REALLY STUDY THAT IN FETUSES BECAUSE THEY CAN'T
22 COMMUNICATE WITH US; ISN'T THAT RIGHT?
23 A. YES. YOU SEE, PAIN DOES NOT REQUIRE INTERPRETATION, AS
24 SUCH. THE EXPERIENCE OF PAIN OCCURS EVEN WITH THE VERY FIRST
25 PAINFUL STIMULUS THAT A LIVING ORGANISM IS EXPOSED TO. THE

1 MEANING OF WHAT THAT PAIN REPRESENTS DEVELOPS. THAT IS
2 SOMETHING THAT WE LEARN AS WE GROW OLDER AND WE HAVE MORE
3 PAINFUL EXPERIENCES.
4 SO, FOR PAIN TO OCCUR DOES NOT REQUIRE PRIOR
5 EXPERIENCE OR INTERPRETATION. IT REQUIRES THE ABILITY TO
6 PERCEIVE.
7 AND SO PERCEPTION OF PAIN, THE OTHER THING THAT
8 COMES ALONG. SUPPOSE I AM GETTING AN INJECTION. I KNOW THE
9 INJECTION IS GOING TO LAST FOR A FEW MINUTES, SO I CAN
10 ANTICIPATE THE END OF THAT PAINFUL STIMULUS.
11 BUT FOR A NEWBORN INFANT WHO IS UNABLE TO INTERPRET
12 THAT, THERE IS NO END TO THAT PAINFUL STIMULUS. IT CANNOT
13 ANTICIPATE EITHER THE OCCURRENCE OF THE PAIN OR AN ENDING TO
14 THEIR PAINFUL STIMULUS. SO IT IS IN THAT SENSE SOMEWHAT MORE
15 TERRIFYING. IT MIGHT BE SOMEWHAT MORE TERRIFYING FOR BABIES TO
16 UNDERGO PAINFUL EXPERIENCES.
17 SO I AGREE WITH YOU, BUT -- TO SOME EXTENT, BUT NOT
18 COMPLETELY.
19 Q. DR. ANAND, IF YOU CAN TAKE A LOOK AT PAGE 133 OF YOUR
20 DEPOSITION, LINES THREE THROUGH 13. I ASKED YOU UNDER OATH AT
21 THAT TIME:
22 "DO YOU AGREE THAT THE EVALUATION OF PAIN IN
23 THE HUMAN FETUS IS DIFFICULT BECAUSE PAIN IS
24 GENERALLY DEFINED AS A SUBJECTIVE PHENOMENON?"
25 YOU RESPONDED:

1 "YES, IT IS."
2 AND THEN I ASKED:
3 "AND WHAT IS MEANT BY THE TERM 'IT'S A
4 SUBJECTIVE PHENOMENON OR SUBJECTIVE EXPERIENCE'?"
5 AND YOU RESPONDED:
6 "A SUBJECTIVE PHENOMENON IS -- HAS MEANING AND
7 INTERPRETATION BY THE INDIVIDUAL WHO IS EXPERIENCING
8 THAT SUBJECTIVE PHENOMENON. SO OUR INABILITY TO
9 COMMUNICATE WITH THE FETUS PREVENTS US FROM STUDYING
10 PAIN AND ITS SUBJECTIVITY IN INDIVIDUAL FETUSES."
11 SO, AND WITH THE EMOTIONAL EXPERIENCE THE TECHNOLOGY
12 DOES NOT YET EXIST TO ENABLE US TO DETERMINE WHETHER THE FETUS
13 ACTUALLY EXPERIENCES PAIN; ISN'T THAT RIGHT?
14 A. YES. I AGREE WITH WHAT WAS STATED IN THE DEPOSITION. AND
15 WHAT I AM SAYING NOW IS NOT INCONSISTENT WITH THAT. I JUST
16 FEEL -- I AGREE WITH YOUR EARLIER STATEMENT, BUT NOT
17 COMPLETELY.
18 Q. OKAY. YOU WOULD ALSO AGREE THAT IT IS NECESSARY FOR A
19 FETUS TO HAVE SOME LEVEL OF CONSCIOUSNESS IN ORDER TO
20 EXPERIENCE PAIN; ISN'T THAT RIGHT?
21 A. THAT IS CORRECT.
22 Q. AND THAT IS BECAUSE YOU CANNOT EXPERIENCE PAIN WITHOUT
23 CONSCIOUSNESS?
24 A. THAT IS CORRECT.
25 Q. AND CONSCIOUSNESS IS NOT SOMETHING THAT EVEN CAN BE

1 MEASURED IN ADULTS; ISN'T THAT RIGHT?
2 A. THAT IS CORRECT.
3 Q. AND THERE ARE NO STUDIES EXAMINING CONSCIOUSNESS OF THE
4 FETUS; IS THAT RIGHT?
5 A. THAT IS RIGHT.
6 Q. THOSE STUDIES SIMPLY CAN'T BE DONE?
7 A. YOU'RE ABSOLUTELY RIGHT.
8 Q. AND YOU WOULD AGREE, WOULD YOU NOT, THAT THERE IS NO
9 CONSENSUS IN THE MEDICAL COMMUNITY THAT CONSCIOUSNESS BEGINS
10 EVEN AT 20 WEEKS FOR FETUSES?
11 A. IT DEPENDS ON HOW YOU WOULD DEFINE -- IN THE GENERAL
12 MEDICAL COMMUNITY, NO, THERE IS NO CONSENSUS. BUT SAY, FOR
13 EXAMPLE, PEOPLE IN OUR MATERNAL FETAL NETWORK WHO ARE VERY
14 FOCUSED ON THE DEVELOPMENT DURING FETAL LIFE THERE WOULD BE
15 CONSENSUS THAT CONSCIOUSNESS IS EXPRESSED VERY SOON AFTER 20
16 WEEKS OF GESTATION.
17 Q. WELL, DIDN'T YOU RELY IN PUTTING TOGETHER YOUR EXPERT
18 REPORT ON SOME ARTICLES THAT EXPRESS THE VIEW THERE WAS NO
19 CONSENSUS THAT CONSCIOUSNESS BEGINS AT 20 WEEKS?
20 A. YES. CERTAINLY I HAD INCLUDED THOSE IN MY EXPERT REPORT IN
21 -- FOR DUE DILIGENCE, TO SHOW THAT THERE ARE CONTRARY OPINIONS
22 TO THE ONE THAT I AM STATING.
23 Q. WELL, LET'S TAKE LOOK AT SOME OF THOSE. LET'S LOOK AT
24 GOVERNMENT LEARNED TREATISE LT A-37.
25 MS. PARKER: MAY I APPROACH THE WITNESS, YOUR HONOR?

1 THE COURT: YES.
2 BY MS. PARKER:
3 Q. DR. ANAND, I HAVE SHOWN YOU WHAT HAS BEEN MARKED AS LEARNED
4 TREATISE A-37. THAT IS AN ARTICLE BY MODI (PHONETIC) AND
5 GLOVER CALLED "FETAL PAIN AND STRESS" THAT WAS PUBLISHED IN
6 2000; IS THAT RIGHT?
7 A. YES, THAT IS RIGHT.
8 Q. IF YOU COULD TURN TO PAGE 218 --
9 A. I HAVE IT.
10 Q. -- OF THAT ARTICLE. I THINK IT IS THE PARAGRAPH IN THE
11 FULL RIGHT-HAND COLUMN. AND IT STATES, DOES IT NOT:
12 "WE DO NOT KNOW WHEN, IF AT ALL, CONSCIOUSNESS
13 BEGINS DURING FETAL LIFE."
14 DO YOU SEE THAT?
15 A. YES, I DO.
16 Q. AND YOU ALSO SAID SIMILAR WORDS IN AN ARTICLE YOU PUBLISHED
17 IN 1999; ISN'T THAT RIGHT?
18 A. WHICH ARTICLE ARE YOU REFERRING TO?
19 Q. IF YOU CAN TAKE A LOOK AT LEARNED -- MARKED AS LEARNED
20 TREATISE 3, A-3. I AM SORRY. IT IS THE GOVERNMENT'S LEARNED
21 TREATISE.
22 MS. PARKER: YOUR HONOR, MAY I APPROACH THE WITNESS?
23 THE COURT: YES.
24 BY MS. PARKER:
25 Q. THAT IS AN ARTICLE THAT YOU PUBLISHED IN THE PAIN FORUM IN

1 1999: "CONSCIOUSNESS, BEHAVIOR, AND CLINICAL IMPACT OF THE
2 DEFINITION OF PAIN"?
3 A. YES. THAT IS CORRECT.
4 Q. IF YOU COULD LOOK AT PAGE 67, THE RIGHT-HAND COLUMN, THE
5 LAST SENTENCE IN THE SECOND PARAGRAPH, UNDER THE HEADING:
6 "CONSCIOUSNESS IN THE FETUS."
7 DO YOU SEE THAT?
8 A. YES.
9 Q. AND THERE IT SAYS:
10 "IT MAY BE IMPOSSIBLE TO OBTAIN UNEQUIVOCAL
11 EVIDENCE FOR FETAL CONSCIOUSNESS"?
12 A. THAT IS CORRECT.
13 Q. AND YOU'RE ALSO FAMILIAR -- I BELIEVE YOU DISCUSSED THIS ON
14 YOUR DIRECT -- WITH A ROYAL COLLEGE OF OBSTETRICS AND
15 GYNECOLOGY IN THE UNITED KINGDOM?
16 A. YES.
17 Q. THAT ORGANIZATION HAD ESTABLISHED A WORKING GROUP TO REVIEW
18 ALL OF THE MATERIAL AVAILABLE AT THAT TIME REGARDING FETAL
19 CONSCIOUSNESS; ISN'T THAT RIGHT?
20 A. THAT IS CORRECT.
21 Q. AND THAT GROUP CONCLUDED THAT FETAL CONSCIOUSNESS DID NOT
22 OCCUR BEFORE 26 WEEKS; ISN'T THAT RIGHT?
23 A. THAT IS CORRECT.
24 Q. SO, THE ENTIRE NOTION OF FETAL CONSCIOUSNESS IS FAIRLY
25 CONTROVERSIAL; ISN'T THAT RIGHT?

1 A. YOU ARE ABSOLUTELY RIGHT.
2 Q. THAT IS BECAUSE THERE IS NO DEFINITIVE EVIDENCE OF IT AND
3 WHEN IT BEGINS?
4 A. YES, THAT'S CORRECT.
5 Q. IN YOUR DEPOSITION YOU AGREED WITH ME IT IS ALL SORT OF
6 SUPPOSITION OR SPECULATION; ISN'T THAT RIGHT?
7 A. WHERE ARE YOU REFERRING TO IN MY DEPOSITION?
8 Q. IF YOU CAN LOOK AT PAGE 163, LINE 16 AND 17. ACTUALLY, IF
9 YOU LOOK STARTING AT LINE 1, I ASKED:
10 "IS IT ALSO CONTROVERSIAL AMONGST THE GROUP OF
11 PEOPLE WHO BELIEVE THAT THERE IS FETAL CONSCIOUSNESS
12 AS TO WHEN THAT CONSCIOUSNESS BEGINS?"
13 AND YOU ANSWERED:
14 "TRUE."
15 AND LATER ON I SAID:
16 "THERE IS NO DEFINITIVE EVIDENCE OF IT."
17 YOU ANSWERED:
18 "EXACTLY."
19 I SAID:
20 "SO IT IS ALL SORT OF SUPPOSITION OR
21 SPECULATION?"
22 AND YOU RESPONDED:
23 "EXACTLY."
24 A. YES, THAT IS PART OF MY ANSWER.
25 Q. AND IT'S ALSO POSSIBLE, IS IT NOT, THAT CONSCIOUSNESS DOES

1 NOT DEVELOP UNTIL THE MOMENT OF BIRTH?
2 A. IT'S PROBABLE, BUT HIGHLY UNLIKELY, GIVEN ALL THE EVIDENCE
3 THAT WE HAVE OF FETAL BEHAVIOR, FETAL LEARNING AND MEMORY.
4 VERY UNLIKELY THAT CONSCIOUSNESS DEVELOPS AT THE MOMENT OF
5 BIRTH.
6 Q. IT IS NOT YOUR OPINION THAT THE PROCESS OF BIRTH AND THE
7 DEMANDS OF INDEPENDENT EXISTENCE OUTSIDE THE UTERUS COULD SERVE
8 AS A TRIGGER FOR THE EXPRESSION OF CONSCIOUSNESS?
9 A. THAT IS A STATEMENT FROM MY 1999 ARTICLE, ALTHOUGH IT IS
10 CUSTOMARY IN SCIENTIFIC WRITING TO FIRST STATE THE KNOWN
11 HYPOTHESIS, OR STATE THE VIEWPOINT OPPOSITE TO WHAT YOU WOULD
12 LIKE TO PROVE, AND THEN TO DISPROVE THAT OPPOSITE VIEWPOINT
13 BASED ON THE EVIDENCE THAT IS AVAILABLE.
14 SO THAT IS THE SOURCE OF THOSE STATEMENTS IN MY
15 WRITING, AS WELL AS IN THE WRITINGS OF OTHER AUTHORS THAT WE
16 HAVE REFERENCED. TAKEN OUT OF CONTEXT IT WOULD SAY THAT THE
17 OPINION BEING EXPRESSED IS OPPOSITE TO WHAT THE AUTHORS
18 INTENDED TO SAY.
19 BUT THAT IS HOW SCIENTIFIC WRITING IS DONE.
20 Q. BUT YOU SAID, DID YOU NOT, IN THE ARTICLE YOU WROTE IN 1999
21 CALLED "CONSCIOUSNESS, BEHAVIOR, AND CLINICAL IMPACT OF THE
22 DEFINITION OF PAIN." I THINK IT IS BEFORE YOU AS THE
23 GOVERNMENT'S LEARNED TREATISE A-3.
24 ON PAGE 67 IN THE FIRST COLUMN:
25 "EVIDENCE FROM FETAL DEVELOPMENT AND BEHAVIOR

1 IN UTERO MUST BE DIFFERENTIATED FROM THAT OF
2 PREMATURE INFANTS BECAUSE OF THE POSSIBILITY THAT
3 THE PROCESS OF BIRTH AND DEMANDS OF INDEPENDENT
4 EXISTENCE EX UTERO MAY SERVE AS A TRIGGER FOR THE
5 EXPRESSION OF CONSCIOUSNESS."
6 THOSE ARE THE DIRECT WORDS FROM THAT ARTICLE; ARE
7 THEY NOT?
8 A. THAT IS CORRECT, ALTHOUGH AFTER CONCLUDING THESE LINES OF
9 ARGUMENT ON THE VERY NEXT PAGE WE SUGGEST AT THE BOTTOM OF THE
10 LEFT-HAND SIDE COLUMN:
11 "ALL THE LINES OF EVIDENCE REVIEWED ABOVE
12 SUGGEST THE PRESENCE OF CONSCIOUSNESS FROM ABOUT 20
13 TO 22 WEEKS OF FETAL LIFE. ACCUMULATING DATA MAY
14 CONFIRM OR REFUTE THESE TENTATIVE PROJECTIONS,
15 ALTHOUGH CURRENT PRACTICE SHOULD INCORPORATE THESE
16 EFFECTIVE PAIN MANAGEMENT" --
17 Q. WELL, WE ARE GOING TO TALK ABOUT THOSE LINES IN JUST A
18 MINUTE.
19 BUT YOUR OPINION ON FETAL CONSCIOUSNESS IS BASED, IN
20 PART, ON STUDIES OF PRE-TERM NEONATES?
21 A. IN PART, YES.
22 Q. PRE-TERM NEONATES ARE INFANTS THAT ARE BORN PREMATURELY?
23 A. THAT IS RIGHT.
24 Q. AND I THINK YOU'VE AGREED WITH ME BEFORE, THERE ARE
25 PHYSIOLOGICAL DIFFERENCES BETWEEN A PRE-TERM NEONATE AND A

1 FETUS?
2 A. WELL, THERE ARE MAJOR PHYSIOLOGICAL DIFFERENCES BETWEEN
3 PRE-TERM NEONATES AND FETUSES. THE PATTERNS OF PHYSIOLOGICAL
4 RESPONSE TO PAINFUL STIMULATION ARE QUITE SIMILAR.
5 Q. BUT THERE ARE PHYSIOLOGICAL DIFFERENCES BETWEEN PRE-TERM
6 NEONATES AND FETUSES?
7 A. I AGREE WITH YOU.
8 Q. AND THERE ARE ALSO RADICAL DIFFERENCES IN TERMS OF THEIR
9 ENVIRONMENTAL EXPERIENCES; ISN'T THAT RIGHT?
10 A. THAT IS CORRECT.
11 Q. AND THE STUDIES YOU CITED DURING YOUR DIRECT TESTIMONY
12 ABOUT THE ABILITY OF FETUSES TO ACQUIRE VERBAL MEMORIES, ALL OF
13 THOSE WERE PERFORMED IN THE THIRD-TRIMESTER; ISN'T THAT RIGHT?
14 A. THEY WERE MOSTLY FROM THE THIRD-TRIMESTER. THERE WERE SOME
15 STUDIES FROM THE SECOND-TRIMESTER, AS WELL.
16 Q. BUT NONE OF THOSE STUDIES INCLUDED FETUSES AT 20 WEEKS;
17 ISN'T THAT RIGHT?
18 A. THAT IS RIGHT.
19 Q. AND TO THE EXTENT THAT YOU EXPRESS AN OPINION THAT THERE IS
20 CONSCIOUSNESS IN A FETUS THAT WOULD BE A RUDIMENTARY FORM OF
21 CONSCIOUSNESS?
22 A. THAT IS CORRECT. CONSCIOUSNESS, THE PREVALENT NOTION IN
23 THE MEDICAL COMMUNITY IS THAT CONSCIOUSNESS IS NOT AN
24 ALL-OR-NONE PHENOMENON. IT IS NOT LIKE AN ON/OFF SWITCH: ON
25 ONE MINUTE AND OFF THE NEXT, OR VICE VERSA. IT IS MORE LIKE A

1 DIMMER SWITCH.
2 IT IS MORE LIKE THE EXPRESSION OF CONSCIOUSNESS IS
3 GRADUAL. IF I COULD USE A COMMON EXPERIENCE THAT WE ALL HAVE,
4 WHEN WE AWAKEN FROM A DEEP, DREAMLESS STATE OF SLEEP, THERE ARE
5 INTERMEDIATE LEVELS OF CONSCIOUSNESS: DEEP DROWSINESS, AND
6 THEN DROWSINESS, AND THEN LIGHT DROWSINESS, AND THEN
7 AWAKEFULNESS, AND SO ON.
8 IT IS THOUGHT THAT CONSCIOUSNESS APPEARS IN THE
9 FETUS IN A VERY SIMILAR MANNER THAT THERE ARE -- AFTER THE
10 DEVELOPMENT OF THE CORTEX IS COMPLETED, THERE ARE INCREASING
11 LEVELS OF CONSCIOUSNESS VERY GRADUALLY. IT IS LIKE THE NIGHT
12 MEETS THE DAY. VERY GRADUALLY THERE IS THE DAWN OF
13 CONSCIOUSNESS DURING FETAL LIFE.
14 Q. BUT IT IS YOUR OPINION, IS IT NOT, THAT TO THE EXTENT A
15 FETUS HAS CONSCIOUSNESS AT 20 WEEKS IT IS RUDIMENTARY?
16 A. TRUE. THAT IS CORRECT.
17 Q. NOW, DR. ANAND, YOU ALSO AGREE THERE IS A DIFFERENCE IN THE
18 MEDICAL -- OPINION IN THE MEDICAL COMMUNITY ABOUT THE ABILITY
19 OF A FETUS TO EXPERIENCE PAIN?
20 A. YES, THERE ARE DIFFERENCES OF OPINION WITHIN THE MEDICAL
21 COMMUNITY.
22 Q. EVEN FOR THOSE WHO FEEL OR BELIEVE THAT A FETUS COULD
23 EXPERIENCE PAIN, THERE IS DISAGREEMENT AS TO WHEN THAT THEY
24 WOULD FIRST BEGIN TO EXPERIENCE PAIN?
25 A. THAT IS CORRECT.

1 Q. AND THERE ARE SIGNIFICANT PEOPLE IN THE MEDICAL COMMUNITY
2 WHO DISAGREE WITH YOUR OPINION IN THIS REGARD; ISN'T THAT
3 RIGHT?
4 A. IT DEPENDS ON WHO YOU ARE TALKING TO, AND I AM SURE THERE
5 WOULD BE PEOPLE WHO WOULD DIFFER FROM MY OPINION, AND THERE
6 WOULD BE SOME PEOPLE WHO WOULD AGREE WITH MY OPINION.
7 Q. AND THERE ARE A NUMBER OF ARTICLES THAT ARE INCONSISTENT
8 WITH THE OPINIONS YOU ARE OFFERING TODAY; ISN'T THAT RIGHT?
9 A. THE OPINION I AM OFFERING TODAY IS BASED ON THE CURRENT
10 STATE OF THE EVIDENCE.
11 YES, THERE ARE DIFFERENCES OF OPINION THAT MAY HAVE
12 BEEN PUBLISHED, SAY, FOR EXAMPLE, THE WORKING PARTY FROM THE
13 COLLEGE OF OBSTETRICS AND GYNECOLOGY REVIEWED EVIDENCE
14 AVAILABLE IN NOVEMBER OF 1996.
15 WE MOVED MUCH FURTHER ALONG IN THE LINES OF EVIDENCE
16 THAT ARE AVAILABLE, SO I BASED MY OPINION ON WHATEVER IS THE
17 CURRENT EVIDENCE AVAILABLE TO ME. AND THOSE DIFFERENCES OF
18 OPINION MAY HAVE REFLECTED THE STATE OF THE SCIENCE AVAILABLE
19 AT THE TIME WHEN THOSE OPINIONS WERE MADE.
20 Q. LET'S START FIRST WITH THE REPORT OF THE ROYAL COLLEGE OF
21 OBSTETRICS AND GYNECOLOGISTS, WHICH YOU INDICATED WAS PUBLISHED
22 IN 1997 IN LONDON, SO ABOUT SEVEN YEARS AGO?
23 A. THAT'S CORRECT.
24 Q. AND THAT REPORT WAS PREPARED IN RESPONSE TO QUESTIONS
25 RAISED RELATING TO FETAL PAIN?

1 A. IT WAS RAISED IN RESPONSE TO QUESTIONS RELATING TO FETAL
2 CONSCIOUSNESS. IT WAS THE BRITISH PARLIAMENT'S GROUP THAT
3 IDENTIFIED FETUS ASCENCION. FETAL PAIN WAS A DOWNSTREAM
4 CONCERN AT THE TIME THIS WORKING PARTY WORK BEGAN.
5 Q. WELL, IF YOU CAN LOOK AT THE FORWARD OF THE REPORT
6 PUBLISHED BY THE ROYAL COLLEGE OF OBSTETRICIANS AND
7 GYNAECOLOGISTS, LT-9, IT STATES, DOES IT NOT THAT:
8 "THE COLLEGE SET UP A WORKING PARTY IN
9 RESPONSE TO QUESTIONS RAISED IN PARLIAMENT RELATING
10 TO FETAL PAIN AND AWARENESS, AND SUBSEQUENT ARTICLES
11 IN THE MEDIA."
12 DO YOU SEE THAT?
13 A. YES, I DO.
14 Q. OKAY. ONE OF THE PARTICIPANTS IN THAT GROUP WAS PROFESSOR
15 MARIA FITZGERALD; IS THAT RIGHT?
16 A. YES.
17 Q. AND YOU CONSIDER HER TO BE ONE OF THE MAJOR RESEARCHERS IN
18 THE FETAL PAIN ARENA; ISN'T THAT RIGHT?
19 A. NEONATAL AND FETAL PAIN AREA, YES.
20 Q. IN FACT, SHE IS ONE OF THE FEW RESEARCHERS IN THE FETAL
21 PAIN ARENA; ISN'T THAT RIGHT?
22 A. YES, WITH THE PROVISO THAT MORE THAN 90 PERCENT OF HER
23 RESEARCH IS BASED ON ANIMAL STUDIES. SHE'S DONE VERY LITTLE
24 RESEARCH WITH THE HUMAN FETUS OR ACTUALLY NO STUDIES WITH THE
25 HUMAN FETUS THAT I AM AWARE OF. SOME OF HER STUDIES HAVE

1 INCLUDED PRE-TERM INFANTS OR FULL-TERM INFANTS.
2 Q. BUT, REGARDLESS, YOU CONSIDER HER TO BE ONE OF THE MAJOR
3 SEARCHERS IN THIS FIELD?
4 A. ABSOLUTELY.
5 Q. AND THEY LOOKED AT THE SAME SORT OF ANATOMICAL DEVELOPMENT
6 THAT YOU LOOKED AT OR TESTIFIED ABOUT; ISN'T THAT RIGHT?
7 A. THAT IS RIGHT.
8 Q. AND THEY CONCLUDED THAT:
9 "THIS MINIMUM STAGE OF DEVELOPMENT, WITH
10 STRUCTURAL INTEGRATION OF PERIPHERAL NERVES, SPINAL
11 CORD, BRAIN STEM, THALAMUS AND, FINALLY, THE
12 CEREBRAL CORTEX, HAS NOT BEGUN BEFORE 20 WEEKS' --
13 26 WEEKS' GESTATION"; ISN'T THAT RIGHT?
14 A. WHERE ARE YOU READING?
15 Q. I AM LOOKING AT THE SUMMARY AND RECOMMENDATIONS 1.1, THE
16 SECOND BULLET ON FAX PAGE 7.
17 A. THAT'S RIGHT.
18 Q. AND SO THEY PUT THE ANATOMICAL STAGE OF DEVELOPMENT AT 26
19 WEEKS' GESTATION; ISN'T THAT RIGHT?
20 A. THAT IS CORRECT.
21 Q. NOW, I THINK YOU INDICATED THAT THERE, THAT IS AN OLDER
22 PIECE OF RESEARCH; IS THAT RIGHT?
23 A. YES.
24 Q. BUT THERE WERE SEVERAL ARTICLES FROM 2000 THAT YOU RELIED
25 UPON IN YOUR EXPERT REPORT; ISN'T THAT CORRECT?

1 A. THAT IS CORRECT.
2 Q. ONE WAS AN ARTICLE BY SMITH, WHICH CAN BE FOUND AS
3 GOVERNMENT LEARNED TREATISE A-46.
4 MS. PARKER: YOUR HONOR, MAY I APPROACH THE WITNESS?
5 THE COURT: YES.
6 BY MS. PARKER:
7 Q. AND LEARNED TREATISE A-46 IS AN ARTICLE CALLED "PAIN AND
8 STRESS IN THE HUMAN FETUS" THAT APPEARED IN 2000 IN THE
9 EUROPEAN JOURNAL OF OBSTETRICS AND GYNECOLOGY; IS THAT RIGHT?
10 A. THAT IS RIGHT.
11 Q. AND IF YOU LOOK AT THE BOTTOM RIGHT-HAND COLUMN ON PAGE 1,
12 DO YOU SEE THAT?
13 A. YES.
14 Q. THOSE AUTHORS CONCLUDE:
15 "IN SUMMARY, PRIOR TO 22 WEEKS THE FETUS DOES
16 NOT HAVE THE NEUROANATOMICAL PATHWAYS IN PLACE TO
17 FEEL PAIN. BETWEEN 22 AND 26 WEEKS, THALAMOCORTICAL
18 CONNECTIONS ARE FORMING. AND AFTER 26 WEEKS THE
19 FETUS HAS THE NECESSARY CONNECTIONS TO FEEL PAIN."
20 DO YOU SEE THAT?
21 A. YES, I DO.
22 Q. SO THOSE AUTHORS ALSO CONCLUDE THAT THE ANATOMICAL
23 STRUCTURES ARE NOT IN PLACE UNTIL 26 WEEKS?
24 A. ALTHOUGH THEY DO ADMIT THAT THESE CONNECTIONS ARE FORMING
25 BETWEEN 22 AND 26 WEEKS OF GESTATION.

1 Q. THAT'S CORRECT, BUT THEY EXPLICITLY STATE THAT IT IS NOT
2 UNTIL AFTER 26 WEEKS THAT THE FETUS HAS THE NECESSARY
3 CONNECTIONS TO FEEL PAIN; IS THAT RIGHT?
4 CAN WE ALSO TAKE A LOOK AT ANOTHER ARTICLE YOU CITE
5 IN YOUR EXPERT REPORT? IT IS GOVERNMENT LEARNED TREATISE A-50.
6 MS. PARKER: I AM SORRY. SOMETIMES WE HAVE A FEW
7 TOO MANY EXHIBITS.
8 YOUR HONOR, MAY I APPROACH THE WITNESS?
9 THE COURT: YES.
10 THE WITNESS: THANK YOU.
11 BY MS. PARKER:
12 Q. DR. ANAND, I SHOW YOU WHAT IS GOVERNMENT LEARNED TREATISE
13 LT A-50, WHICH IS AN ARTICLE BY VANHATALO, V-A-N-H-A-T-A-L-O,
14 CALLED "FETAL PAIN?" WHICH APPEARED IN 2000 IN BRAIN AND
15 DEVELOPMENT?
16 A. THAT'S RIGHT.
17 Q. AND IF I COULD DIRECT YOUR ATTENTION TO -- AND THIS WAS
18 ANOTHER ARTICLE YOU CITED IN YOUR REPORT?
19 A. ABSOLUTELY.
20 Q. AND IF I CAN HAVE YOU TURN YOUR ATTENTION TO PAGE 146, THE
21 SECOND COLUMN, STARTING THE LAST LINE.
22 A. YES.
23 Q. AND THAT ARTICLE STATES:
24 "THE THALAMOCORTICAL CONNECTIONS IN HUMANS
25 BEGIN TO GROW INTO THE CORTEX AT 24 TO 26 WEEKS OF

1 GESTATION, MEANING THAT PAIN IMPULSES MAY REACH THE
2 CEREBRAL CORTEX FOR THE FIRST TIME DURING WEEK 26.
3 HOWEVER, IT IS NOT BEFORE WEEK 29 THAT EVOKED
4 POTENTIALS CAN BE MEASURED FROM THE CORTEX,
5 SUGGESTING THAT A FUNCTIONALLY MEANINGFUL PATHWAY
6 FROM THE PERIPHERY TO THE CEREBRAL CORTEX STARTS TO
7 OPERATE FROM THAT TIME ONWARDS."
8 DO YOU SEE THAT?
9 A. YES, I DO.
10 Q. SO THOSE AUTHORS ALSO CONCLUDE THAT PAIN -- THAT THE
11 ANATOMICAL STRUCTURES WOULD NOT BE IN PLACE AT A MINIMUM UNTIL
12 WEEK 26, AND PERHAPS COULD NOT EVEN BE MEASURED UNTIL WEEK 29;
13 ISN'T THAT RIGHT?
14 A. THAT IS CORRECT. IT SUMMARIZES THE EVIDENCE THAT WAS
15 AVAILABLE IN THE YEAR 2000.
16 IF YOU LOOK AT THE REFERENCES OF THIS ARTICLE, THESE
17 AUTHORS HAVE NOT REFERENCED EVEN A SINGLE ARTICLE THAT THEY HAD
18 PUBLISHED, EITHER ON THIS SUBJECT OR RELATED SUBJECTS, IN
19 TRYING TO SUMMARIZE THIS EVIDENCE.
20 WHEREAS, FIVE OF MY PREVIOUS ARTICLES HAVE BEEN
21 REFERENCED. WHAT I WOULD LIKE TO SUBMIT IS THAT THIS IS A
22 RATHER NAIVE ATTEMPT ON THE PART OF THESE RESEARCHERS TO
23 SUMMARIZE THE EVIDENCE THAT WAS AVAILABLE AT THAT TIME. AND IT
24 IS NOT COMPREHENSIVE IN TERMS OF EVEN WHAT WAS AVAILABLE IN THE
25 YEAR 2000.

1 Q. BUT, DR. ANAND, IT IS CORRECT, IS NOT IT NOT, THAT YOU
2 CITED A WHOLE NUMBER OF ARTICLES WITH YOUR EXPERT REPORT, MANY
3 OF WHICH CONCLUDE THAT THE ANATOMICAL STRUCTURES ARE NOT IN
4 PLACE UNTIL 26 WEEKS?
5 A. YES, MS. PARKER, I MENTIONED THAT --
6 Q. AND THAT --
7 A. -- I FELT THAT DUE DILIGENCE WAS REQUIRED IN ORDER TO SHOW
8 BOTH SIDES OF THE CONTROVERSY.
9 Q. AND SO THAT WOULD INDICATE THAT THERE IS A FAIR BIT OF
10 CONTROVERSY WITHIN THE MEDICAL COMMUNITY AS TO WHEN FETAL PAIN
11 COULD BEGIN TO EXIST?
12 A. I AGREE WITH YOU.
13 Q. NOW, BECAUSE THERE IS NO DEFINITIVE EVIDENCE OF PAIN, YOU
14 USE SURROGATE MARKERS. I THINK THAT IS YOUR TERM?
15 A. YES.
16 Q. AND THOSE SURROGATE MARKERS INDICATE PAIN IS BASED ON
17 STUDIES ON CHILDREN AND ADULTS, IN PART.
18 A. IN PART, IN CHILDREN AND ADULTS, AND ALSO FROM PREMATURE
19 INFANTS. AND THERE ARE SOME DIRECT STUDIES FROM THE FETUS, AS
20 WELL.
21 Q. I BELIEVE WE TALKED ABOUT THE DIFFERENCES BETWEEN PRE-TERM
22 INFANTS AND FETUSES. BUT YOU WOULD ALSO AGREE, WOULD YOU NOT,
23 THAT THERE ARE HUGE PHYSIOLOGICAL DIFFERENCES BETWEEN FETUSES
24 AND ADULTS?
25 A. CERTAINLY THERE ARE DIFFERENCES IN THEIR PHYSIOLOGY, BUT

1 THE PATTERNS OF RESPONSE TO PAIN ARE CONSIDERED
2 CROSS-DEVELOPMENT.
3 Q. BUT THE PHYSIOLOGICAL DIFFERENCES WOULD IMPACT THE ABILITY
4 TO EXTRAPOLATE FROM STUDIES ON ADULTS TO FETUSES; ISN'T THAT
5 RIGHT?
6 A. CERTAINLY.
7 Q. AND THERE ARE ALSO PHYSIOLOGICAL DIFFERENCES BETWEEN
8 FETUSES AND CHILDREN?
9 A. YES, THERE ARE.
10 Q. AND THOSE PHYSIOLOGICAL DIFFERENCES WOULD ALSO IMPACT ON
11 YOUR ABILITY TO EXTRAPOLATE FROM STUDIES ON CHILDREN TO
12 FETUSES; ISN'T THAT RIGHT?
13 A. TO SOME EXTENT, YES, ALTHOUGH NOT COMPLETELY.
14 Q. AND ONE OF YOUR SURROGATE MARKERS IS THAT THE ANATOMICAL
15 STRUCTURES REQUIRED FOR PAIN ARE IN PLACE AT 22 WEEKS LMP?
16 A. THAT IS CORRECT.
17 Q. AND YOU BASE THAT ON AN ANALYSIS OF NORMAL, HEALTHY
18 FETUSES?
19 A. THAT IS CORRECT.
20 Q. BUT THOSE SAME CONCLUSIONS -- AND I BELIEVE YOU'VE STATED
21 THIS ON YOUR DIRECT TESTIMONY -- DO NOT HOLD TRUE FOR FETUSES
22 WITH VARIOUS FETAL ANOMALIES?
23 A. IF THOSE ANOMALIES INVOLVE THE BRAIN, SPINAL CORD OR
24 SENSORY NERVES, YES, THEY WOULD NOT HOLD TRUE FOR FETUSES WITH
25 ANOMALIES.

1 Q. YOU DO NOT EXTEND YOUR OPINION WITH FETUSES WITH CERTAIN
2 CHROMOSOMAL ABNORMALITIES?
3 A. YES, IF THOSE CHROMOSOMAL ABNORMALITIES INCLUDE ANOMALIES
4 OF THE SPINAL NERVOUS SYSTEM OR THE PERIPHERAL NERVOUS SYSTEM,
5 YES.
6 Q. YOUR OPINION DOES NOT APPLY TO THEM?
7 A. THAT IS TRUE.
8 Q. YOUR OPINION DOES NOT APPLY TO FETUSES THAT HAVE
9 ABNORMALITIES IN BRAIN STRUCTURE?
10 A. THAT IS CORRECT.
11 Q. SO, FOR EXAMPLE, YOU DO NOT EXTEND YOUR CONCLUSIONS TO A
12 FETUS WITH HYDROCEPHALY?
13 A. THAT IS CORRECT.
14 Q. OR TRISOMY 18?
15 A. THAT IS CORRECT.
16 Q. OR TRISOMY 13?
17 A. THAT'S CORRECT. THESE ARE ALL LETHAL ABNORMALITIES OF A
18 CHROMOSOMAL NATURE.
19 Q. YOUR OPINION DOES NOT APPLY TO THEM?
20 A. TRUE.
21 Q. ANOTHER ONE OF THE SURROGATE MARKERS YOU DISCUSSED WAS FOR
22 HORMONAL STRESS RESPONSE; IS THAT RIGHT?
23 A. THAT'S RIGHT.
24 Q. BUT JUST BECAUSE A FETUS EXPERIENCES A STRESS RESPONSE,
25 THAT DOES NOT NECESSARILY MEAN THAT IT IS EXPERIENCING PAIN;

1 ISN'T THAT RIGHT?
2 A. THAT IS CORRECT. UNLESS, THE HORMONAL STRESS RESPONSE
3 FOLLOWS FROM PAINFUL STIMULATION AND IS RELATED TEMPORALLY AND
4 SEQUENTIALLY WITH THAT PAINFUL STIMULATION.
5 Q. THERE IS NOT A DIRECT EQUATION BETWEEN STRESS RESPONSE AND
6 A PAIN EXPERIENCE?
7 A. THAT IS CORRECT.
8 Q. IN FACT --
9 THE COURT: EXCUSE ME. I AM SORRY. I THINK WE ARE
10 COMING UP ON THAT TIME.
11 MS. PARKER: OKAY. GREAT.
12 THE COURT: BREAK FOR 15 MINUTES.
13 (RECESS TAKEN AT 11:45 A.M.)
14 (PROCEEDINGS RESUMED AT 12:02 P.M.)
15 THE COURT: ALL RIGHT. PLEASE CONTINUE.
16 BY MS. PARKER:
17 Q. DR. ANAND, BEFORE THE BREAK WE WERE TALKING ABOUT STRESS
18 HORMONE RESPONSES; ISN'T THAT RIGHT?
19 A. THAT IS RIGHT.
20 Q. AND THE FACT THAT YOU CAN'T EQUATE ALWAYS A STRESS RESPONSE
21 WITH A PAIN EXPERIENCE?
22 A. THAT IS CORRECT.
23 Q. SO THERE CAN BE A STRESS HORMONE RESPONSE WHERE PAIN IS NOT
24 EXPERIENCED?
25 A. THAT IS CORRECT.

1 Q. LIKE AN EXAMPLE WOULD BE BLOOD LOSS IN SOME CASES?
2 A. YEAH, OR LACK OF OXYGEN OR --
3 Q. EXERCISE?
4 A. EXERCISE. ABSOLUTELY.
5 Q. OR, I KNOW FOR MANY OF US WHEN WE STAND UP IN COURT OR GO
6 UP TO THE WITNESS STAND, OUR HEART POUNDS AND WE FEEL AN
7 ADRENALIN SURGE, THAT WOULD BE A STRESS RESPONSE?
8 A. THAT'S RIGHT.
9 Q. BUT WE DON'T EXPERIENCE PAIN WHEN THAT OCCURS?
10 A. THAT IS CORRECT.
11 THE COURT: AT LEAST NOT EVERY TIME.
12 (LAUGHTER.)
13 MS. PARKER: HOPEFULLY, YOUR HONOR.
14 BY MS. PARKER:
15 Q. AND, SIMILARLY, JUST BECAUSE A FETUS EXPERIENCES A STRESS
16 RESPONSE, THAT DOESN'T NECESSARILY MEAN THAT IT IS EXPERIENCING
17 PAIN; ISN'T THAT RIGHT?
18 A. THAT IS CORRECT. YES.
19 Q. FOR EXAMPLE, WHEN THE UMBILICAL CORD IS CUT, A FETUS WOULD
20 NOT EXPRESS RESPONSE TO THAT, WOULDN'T IT?
21 A. IT DEPENDS ON IF THE FETUS IS ALIVE FOR LONG ENOUGH AFTER
22 AN UMBILICAL CORD IS CUT. THE BLOOD LOSS THAT MAY OCCUR AFTER
23 CUTTING THE UMBILICAL CORD MAY BE SO RAPID THAT THE FETAL
24 DEMISE MAY OCCUR BEFORE THERE IS THE CHANCE FOR THOSE HORMONES
25 TO INCREASE. IT TAKES SEVERAL MINUTES FOR HORMONES TO RISE IN

1 A STRESS RESPONSE.
2 Q. BUT THERE MAY BE EXAMPLES WHEN THE UMBILICAL CORD IS CUT
3 AND THE FETUS EXHIBITS SOME SORT OF STRESS RESPONSE?
4 A. YOU SEE, THE STRESS RESPONSE OCCURS AS A RESULT OF THE
5 PHYSICAL STRESS CAUSED BY A LOSS OF BLOOD AND LACK OF OXYGEN
6 SUPPLY.
7 AND IF DURING THAT BLOOD LOSS SOMEHOW THE BLOOD LOSS
8 IS STOPPED AND THE FETUS SURVIVES THIS EQUAL LOSS OF BLOOD,
9 THEN THERE WILL BE A STRESS RESPONSE DEFINITELY.
10 BUT IF BLOOD LOSS CONTINUES AND THERE IS LACK OF
11 OXYGEN TO THE BRAIN AND THE FETUS DIES AS A RESULT OF THAT,
12 THEN THERE MAY NOT BE MUCH TIME AVAILABLE FOR THE FETUS TO
13 MOUNT A STRESS RESPONSE.
14 Q. BUT THERE ARE SOME TIMES WHEN THE FETUS MOUNTS A STRESS
15 RESPONSE WHEN THE UMBILICAL CORD IS CUT?
16 A. TO BLOOD LOSS, YEAH, LEADING TO A LOSS OF MORE THAN
17 30 PERCENT OF BLOOD VOLUME. IF A FETUS IS SURVIVING THAT, THEN
18 THERE WILL BE A STRESS RESPONSE TO COMPENSATE FOR THAT BLOOD
19 LOSS.
20 Q. BUT IT'S YOUR OPINION, IS IT NOT, THAT CUTTING THE
21 UMBILICAL CORD WOULD NOT BE PAINFUL OR AT MOST WOULD RESULT IN
22 VERY MILD PAIN TO THE FETUS?
23 A. TOTALLY AGREE WITH YOU.
24 Q. THAT IS AN EXAMPLE OF WHEN A FETUS CAN MOUNT A STRESS
25 RESPONSE THAT DOES NOT INDICATE THAT THE FETUS IS EXPERIENCING

1 PAIN?
2 A. THAT IS RIGHT.
3 Q. AND ISN'T IT TRUE THAT SOME OF THE ARTICLES YOU CONSIDERED
4 IN FORMING YOUR OPINION IN THIS CASE MADE CLEAR THE MEASURE OF
5 STRESS RESPONSE HAS LIMITATIONS IN DETERMINING THE EXISTENCE OF
6 FETAL PAIN?
7 A. CERTAINLY. THOSE ARE THE LIMITATIONS THAT YOU'VE POINTED
8 OUT ALREADY.
9 Q. I THINK I POINTED OUT SOME LIMITATIONS WITH THE ANATOMICAL
10 STRUCTURES, BUT AS I UNDERSTAND IT, THE HORMONAL STRESS
11 RESPONSE IS ANOTHER SURROGATE MARKER THAT YOU ARE RELYING ON?
12 A. THAT IS CORRECT.
13 EACH OF THESE PIECES OF EVIDENCE IN AND OF
14 THEMSELVES ARE NOT DEFINITIVE, BUT WHEN YOU PUT ALL THE PIECES
15 OF EVIDENCE TOGETHER, THEY DO FORM A SUBSTANTIAL BODY OF
16 EVIDENCE WHICH SUGGESTS FETAL PAIN.
17 Q. RIGHT NOW WE ARE TALKING ABOUT THE HORMONE STRESS
18 RESPONSES, AND I WOULD LIKE TO LOOK AT SOME OF THE ARTICLES YOU
19 RELIED ON WITH YOUR EXPERT REPORT.
20 IF I COULD FIRST DIRECT YOUR ATTENTION TO THE
21 GOVERNMENT'S LEARNED TREATISE A-46, WHICH I BELIEVE YOU HAVE
22 ALREADY.
23 IT'S THE ARTICLE BY SMITH TITLED "PAIN AND STRESS IN
24 THE HUMAN FETUS" THAT APPEARED IN THE EUROPEAN JOURNAL OF
25 OBSTETRICS AND GYNECOLOGY IN 2000.

1 A. YES, I HAVE IT.
2 Q. AND IF YOU COULD LOOK AT THE SECOND PAGE, 162, THE LEFT
3 COLUMN -- I GUESS IT IS THE THIRD PARAGRAPH. AND THE TWO
4 SENTENCES IN THE MIDDLE STATE:
5 "THIS IS LIMITATIONS: STRESS RESPONSES DO NOT
6 NECESSARILY IMPLY PAIN, FOR EXAMPLE, DURING
7 EXERCISE, AND STRESS RESPONSES DO NOT INVOLVE
8 THE CORTEX."
9 DO YOU SEE THAT?
10 A. YES, I DO.
11 Q. COULD I ALSO DIRECT YOUR ATTENTION TO THE GOVERNMENT'S
12 LEARNED TREATISE A-37, WHICH IS THE ARTICLE BY MODI AND GLOVER
13 TITLED "FETAL PAIN AND STRESS".
14 A. YES, I HAVE IT.
15 Q. THAT ALSO APPEARED IN THE YEAR 2000 IN A JOURNAL ENTITLED
16 "PAIN AND NEONATES".
17 A. THIS WAS ACTUALLY A BOOK THAT I HAD EDITED. SO I HAD
18 INVITED THESE AUTHORS TO COMPLETE THIS CHAPTER.
19 Q. THAT'S RIGHT. AND THIS IS A CHAPTER IN THAT BOOK, ISN'T
20 THAT RIGHT, EXPRESSLY ON FETAL PAIN?
21 A. YES.
22 Q. IF YOU COULD LOOK AT PAGE 221 ON THE LEFT-HAND COLUMN, THE
23 FIRST SENTENCE OF THAT -- THE BOTTOM PARAGRAPH. AND THAT
24 STATES:
25 "THE MEASUREMENT OF STRESS RESPONSES IS OF

1 VALUE FOR DETERMINING THE EXISTENCE OF FETAL
2 PAIN IF ONE IS AWARE OF ITS LIMITATIONS."
3 A. THAT IS CORRECT.
4 Q. AND AT THE TOP OF THE NEXT COLUMN IT STATES:
5 "ALTHOUGH STRESS HORMONES ARE USUALLY INCREASED
6 WHEN AN INDIVIDUAL IS EXPERIENCING PAIN, THERE
7 ARE MANY OTHER SITUATIONS WHICH ARE NOT
8 PAINFUL, SUCH AS EXERCISE, WHICH WILL ALSO
9 INCREASE HORMONAL LEVELS."
10 A. THAT IS CORRECT.
11 Q. DO YOU SEE THAT?
12 SO MANY OF THESE ARTICLES EXPLICITLY SAY THAT A
13 HORMONAL RESPONSE CANNOT AUTOMATICALLY BE EQUATED WITH A
14 PERCEPTION OF PAIN?
15 A. TRUE.
16 Q. YOU ALSO RELIED ON A STUDY BY -- I AM GOING TO RUIN THIS
17 HOPELESSLY, GIANNAKOULOPOULOS --
18 A. GIANAKOULOPOULOS?
19 Q. -- WHICH IS GOVERNMENT'S LEARNED TREATISE 18. I WON'T EVEN
20 BEGIN TO PRONOUNCE HIS FIRST NAME.
21 AND THAT'S AN ARTICLE CALLED "FETAL PLASMA CORTISOL
22 AND BETA-ENDORPHIN RESPONSE TO INTRAUTERINE NEEDLING" THAT
23 APPEARED IN THE LANCET.
24 IF YOU CAN LOOK AT PAGE 80.
25 A. I DON'T HAVE THAT.

1 MS. PARKER: SORRY.
2 YOUR HONOR, MAY I APPROACH THE WITNESS?
3 THE COURT: YOU MAY.
4 THE WITNESS: THANK YOU.
5 DID YOU SAY PAGE 80?
6 BY MS. PARKER:
7 Q. YES. IF YOU COULD TURN TO PAGE 80. RIGHT COLUMN, SECOND
8 TO LAST PARAGRAPH. AND THE AUTHORS OF THAT ARTICLE THERE STATE
9 THAT:
10 "SINCE THE MECHANISMS INVOLVED IN PAIN
11 PERCEPTION ARE NOT FULLY UNDERSTOOD, IT IS NOT
12 POSSIBLE TO CONCLUDE THAT THE FETUS EXPERIENCES
13 PAIN; A HORMONAL RESPONSE CANNOT BE EQUATED
14 WITH THE PERCEPTION OF PAIN."
15 DO YOU SEE THAT?
16 A. YES, I DO.
17 Q. AND YOU ALSO RELIED, IN FORMING YOUR OPINIONS, ON AN
18 ARTICLE BY VANHATALO?
19 A. VANHATALO, YES.
20 Q. AND ONNO VAN NIEUWENHUIZEN; IS THAT RIGHT?
21 A. YES.
22 Q. GOVERNMENT'S LEARNED TREATISE 50.
23 I BELIEVE YOU ALREADY HAVE THAT. THAT'S AN ARTICLE
24 ENTITLED "FETAL PAIN?" THAT APPEARED IN BRAIN AND DEVELOPMENT
25 2000?

1 A. YES, I HAVE IT.
2 Q. AND IF YOU LOOK AT PAGE 145 IN THE LAST PARAGRAPH?
3 A. YES.
4 Q. THAT ARTICLE CONCLUDES, DOES IT NOT, THAT:
5 "INDIRECT METHODS OF ASSESSING PAIN LIKE MOTOR
6 MOVEMENT PATTERNS, PULSE RATE AND BLOOD
7 PRESSURE ARE STILL BEING DEVELOPED AND NONE IS
8 YET SUITABLE FOR ASSESSING PAIN IN FETUSES."
9 ISN'T THAT RIGHT?
10 A. THAT IS CORRECT ON PAGE 146, THE FIRST PARAGRAPH.
11 Q. AND, FINALLY, YOU RELIED ON AN ARTICLE BY FISK, WHICH IS
12 LEARNED TREATISE A-16.
13 MS. PARKER: MAY I APPROACH THE WITNESS, YOUR HONOR?
14 THE COURT: YES.
15 BY MS. PARKER:
16 Q. THAT'S AN ARTICLE TITLED EFFECT OF DIRECT FETAL OPIOID
17 ANALGESIA ON FETAL HORMONAL AND HEMODYNAMIC STRESS RESPONSE TO
18 INTRAUTERINE NEEDLING" THAT APPEARED 2001 IN A JOURNAL CALLED
19 ANESTHESIOLOGY?
20 A. YES, I HAVE IT.
21 Q. I BELIEVE YOU STATED ON DIRECT THAT DR. FISK WAS ONE OF THE
22 LEADING RESEARCHERS IN THE AREA OF FETAL RESPONSE TO HORMONAL
23 STRESS; ISN'T THAT RIGHT?
24 A. CERTAINLY.
25 Q. THERE, THE AUTHORS IN THE ARTICLE CONCLUDE IT IS NOT KNOWN

1 WHETHER THE HUMAN FETUS EXPERIENCES PAIN; ISN'T THAT RIGHT?
2 A. WHERE ARE YOU READING?
3 Q. IF YOU CAN TURN TO PAGE 14 OF 17, IN THE THIRD PARAGRAPH,
4 AND THE FIRST SENTENCE STATES:
5 "ALTHOUGH THE HUMAN FETUS IN THE LAST HALF OF
6 GESTATION HAS THE NECESSARY NEUROCONNECTIONS
7 FOR NOCICEPTION, IT IS NOT KNOWN WHETHER THE
8 HUMAN FETUS EXPERIENCES PAIN."
9 DO YOU SEE THAT?
10 A. YES. THAT IS CORRECT.
11 Q. THEY ALSO CONCLUDED, DO THEY NOT, AND I AM LOOKING AT THE
12 FINAL SENTENCE OF THE THIRD PARAGRAPH ON PAGE 14:
13 "BECAUSE THE RELATION BETWEEN STRESS RESPONSES
14 AND PAIN IS NOT CLEAR, IT IS NOT POSSIBLE FROM
15 OUR DATA TO CONCLUDE THAT THE HUMAN FETUS
16 EXPERIENCES PAIN IN UTERO."
17 DO YOU SEE THAT?
18 A. YES, I DO.
19 Q. AND THE TERM "NOCICEPTION," I DON'T EVEN KNOW IF I AM
20 PRONOUNCING THAT CORRECTLY, THAT'S NOT THE SAME AS PAIN, IS IT?
21 A. NOCICEPTION SIMPLY IMPLIES ACTIVITY WITHIN THE RECEPTORS,
22 THE NERVE FIBERS AND THE AREAS IN THE BRAIN ASSOCIATED WITH THE
23 PRESENTATION OF A NOXIOUS STIMULUS.
24 THIS TERM WAS PRIMARILY COINED BECAUSE OF SOME
25 ANIMAL RESEARCH WHERE RESEARCHERS HAD DECAPITATED THE ANIMAL

1 AND THEN STIMULATED THE PAIN RECEPTORS OR SENSORY RECEPTORS.
2 AND IN THE ABSENCE OF THE BRAIN, THAT ACTIVITY WITHIN THE
3 NEUROCIRCUITRY CANNOT BE CLASSIFIED AS PAIN BECAUSE PAIN NEEDS
4 PROCESSING WITHIN THE BRAIN IN ORDER TO BE REGISTERED.
5 SO THAT'S BASICALLY WHAT NOCICEPTION IMPLIES.
6 Q. THE INTERNATIONAL ASSOCIATION FOR THE STUDY OF PAIN
7 DESCRIBED NOCICEPTION IN ITS DEFINITION OF PAIN; ISN'T THAT
8 RIGHT?
9 AND THAT'S -- I DON'T KNOW IF YOU HAVE THAT. I
10 THINK YOUR COUNSEL GAVE IT TO YOU?
11 A. YES.
12 Q. LEARNED TREATISE A-31, IASP PAIN TERMINOLOGY. I BELIEVE ON
13 PAGE 2 IN THE LAST PARAGRAPH, IT STATES:
14 "THIS DEFINITION AVOIDS TYING PAIN TO THE
15 STIMULUS. ACTIVITY INDUCED IN THE NOCICEPTOR
16 AND NOCICEPTIVE PATHWAYS BY NOXIOUS STIMULUS IS
17 NOT PAIN, WHICH IS ALWAYS A PSYCHOLOGICAL
18 STATE, EVEN THOUGH WE MAY WELL APPRECIATE THAT
19 PAIN MOST OFTEN HAS A PROXIMATE PHYSICAL
20 CAUSE."
21 A. THAT IS TRUE. I AGREE WITH THAT.
22 Q. YOU HAVE BEEN INVOLVED IN AN EFFORT TO CHANGE THE IASP
23 DEFINITION OF PAIN; ISN'T THAT RIGHT?
24 A. YES, CERTAINLY. IT'S LIKE FIGHTING CITY HALL.
25 Q. YOU THINK THAT NOCICEPTION SHOULD BE INCORPORATED INTO THE

1 DEFINITION OF PAIN; ISN'T THAT RIGHT?
2 A. NO, NOT NECESSARILY.
3 I FEEL THAT THE FORMS OF SELF-EXPRESSION THAT LIVING
4 ORGANISMS CAN MANIFEST SHOULD BE CONSIDERED IN THE DEFINITION
5 OF PAIN.
6 I HAD PROPOSED A VIEWPOINT THAT THIS CURRENT
7 DEFINITION OF PAIN WAS EXTREMELY USEFUL AND RESULTED IN MAJOR
8 ADVANCES WITHIN THE FIELD IN THE STUDY OF PAIN, HOWEVER, IT HAD
9 OUTLIVED ITS USEFULNESS AND THAT A MULTI-DISCIPLINARY TASK
10 FORCE SHOULD BE ESTABLISHED TO REWRITE THE DEFINITION OF PAIN,
11 INCLUDING FORMS OF SELF-EXPRESSION THAT ARE NOT NECESSARILY
12 VERBAL OR INDIVIDUALISTIC, AND THEREBY MAKING AVAILABLE THE
13 CONSEQUENCES OF PAIN EXPRESSION, WHICH MEANS SIMPLY THE USE OF
14 PAIN RELIEVING DRUGS, ET CETERA TO ORGANISMS THAT ARE
15 NONLINGUISTIC.
16 Q. BUT THE IASP HAS NOT YET AMENDED ITS DEFINITION IN THAT
17 REGARD, HAS IT?
18 A. DESPITE FIVE YEARS OF PRESENTATIONS AT MULTIPLE FORUMS,
19 THEY -- THE COMMITTEE ON TAXONOMY WAS NOT PREPARED TO TAKE SUCH
20 A RADICAL STEP. THEY SIMPLY COMPROMISED BY ADDING THAT LITTLE
21 NOTE UNDER THE TRADITIONAL DEFINITION OF PAIN.
22 Q. AND I THINK YOU ALSO PRODUCED AT YOUR DEPOSITION A REPORT
23 OF THE MRC EXPERT GROUP ON FETAL PAIN?
24 A. YES. THAT WAS GIVEN TO ME BY THE COUNSEL FOR THE
25 GOVERNMENT, ALTHOUGH IT HAD NO ROLE IN MY FORMULATING THE

1 EXPERT OPINION.
2 Q. BUT YOU STATED AT YOUR DEPOSITION THAT THE DOCUMENT
3 CONFIRMED THE OPINIONS YOU STATED IN YOUR EXPERT REPORT; ISN'T
4 THAT RIGHT?
5 A. THAT IS RIGHT.
6 Q. AND THAT REPORT WAS ISSUE IN AUGUST OF 2001, AND WAS AN
7 UPDATE SOMEWHAT FROM THE REPORT, THE 1997 REPORT BY THE ROYAL
8 COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS IN LONDON?
9 A. ALTHOUGH I MUST POINT OUT THAT THESE WERE TWO ENTIRELY
10 DIFFERENT BODIES, AND THE COMPOSITION OF THE PANEL THAT THE MRC
11 HAD PUT TOGETHER WAS VERY DIFFERENT FROM THE ONE THAT THE ROYAL
12 COLLEGE OF OBSTETRICS AND GYNAECOLOGY HAD PUT TOGETHER.
13 SO, THESE WERE REPORTS THAT HAD A FEW MEMBERS IN
14 COMMON, BUT THE CONCLUSIONS WERE QUITE DIFFERENT.
15 Q. OKAY.
16 MS. PARKER: YOUR HONOR, MIGHT I APPROACH THE
17 WITNESS?
18 HERE IS A COPY FOR YOUR HONOR.
19 THE COURT: DOES OPPOSING COUNSEL HAVE A COPY?
20 MS. PARKER: THEY PRODUCED IT TO US.
21 MS. NORONHA: I DO HAVE A COPY, YES.
22 BY MS. PARKER:
23 Q. AND THE MRC REPORT ALSO MAKES CLEAR IT WOULD BE A MISTAKE
24 TO EQUATE FETAL REFLECTIONS WITH A PAIN EXPERIENCE; ISN'T THAT
25 RIGHT?

1 A. WHERE ARE YOU READING?
2 Q. IF YOU COULD LOOK AT SECTION 4.1, THE THIRD AND FOURTH
3 SENTENCES STATE:
4 "MUCH PUBLIC CONCERN HAS ARISEN BECAUSE OF THE
5 POSSIBILITY THAT A FETUS MAY FEEL PAIN; SUCH A
6 POSSIBILITY IS FOUNDED ON THE EXISTENCE OF
7 REFLEX MOVEMENTS AND NEURAL ACTIVITY PRODUCED
8 BY SENSORY STIMULATION. DESPITE THE USEFULNESS
9 OF SUCH REFLEXES IN UNDERSTANDING SPINAL CORD
10 AND BRAIN STEM PAIN PROCESSING, IT WOULD BE A
11 MISTAKE TO EQUATE THEM WITH TRUE PAIN
12 EXPERIENCE WHICH MUST INVOLVE THE CORTEX AND
13 DEVELOP POSTNATALLY ALONG WITH MEMORY, ANXIETY,
14 AND OTHER COGNITIVE BRAIN FUNCTIONS."
15 DO YOU SEE THAT?
16 A. YES, I DO. THAT IS PART OF THIS REPORT.
17 Q. AND THE MRC REPORT ALSO CONCLUDES THAT FETAL PAIN IS STILL
18 POORLY UNDERSTOOD; ISN'T THAT RIGHT?
19 A. THAT IS RIGHT.
20 Q. AND IF I COULD DIRECT YOUR ATTENTION TO PAGE 11, OR
21 SECTION 9, CONCLUSIONS. AND THERE IT STATES:
22 "THE BASIC MOLECULAR AND CELLULAR MECHANISMS OF
23 FETAL AND NEONATAL PAIN ARE STILL POORLY
24 UNDERSTOOD AS ARE THE EFFECTS OF ANESTHETICS OR
25 ANALGESICS." CORRECT?

1 A. THAT IS CORRECT.
2 Q. YES?
3 A. YES. THIS REPORT WAS PUBLISHED IN AUGUST OF 2001 AND
4 APPEARED BEFORE THE PAPER BY NICHOLAS FISK AND PUBLISHED
5 ACTUALLY A FEW MONTHS LATER.
6 Q. SO, LET'S TALK BRIEFLY ABOUT THE EFFECT OF MATERNAL
7 ANESTHESIA ON THE FETUS, BECAUSE I BELIEVE ONE OF THE OPINIONS
8 YOU GAVE CONCERNED THE EFFECT OF MATERNAL ANESTHESIA ON THE
9 FETUS; IS THAT RIGHT?
10 A. THAT IS CORRECT.
11 Q. AND I BELIEVE YOU STATED EARLIER THAT YOU PERSONALLY HAVE
12 NOT CONDUCTED ANY STUDIES MEASURING THE EFFECTS OF ANESTHESIA
13 ON FETUSES?
14 A. YES. MY OPINION IS THAT IT WOULD BE UNETHICAL TO PERFORM
15 SUCH STUDIES BECAUSE OF THE TOXICITY THAT THE MOTHER WOULD BE
16 EXPOSED TO. SO, NO IRB COMMITTEE WOULD APPROVE SUCH RESEARCH
17 PROTOCOLS.
18 Q. YOU HAVE NOT PERSONALLY DONE ANY OBSTETRIC ADMINISTRATION
19 OF ANESTHETICS EITHER; ISN'T THAT RIGHT?
20 A. I HAVE NOT. THAT'S RIGHT.
21 Q. AND IT'S CORRECT, ISN'T IT, THAT THE EFFECT OF MATERNAL
22 ANESTHESIA ON THE SECOND-TRIMESTER FETUSES IS A RELATIVELY
23 UNDERINVESTIGATED AREA?
24 A. THAT IS CORRECT.
25 Q. IN FACT, IT IS COMPLETELY UNEXPLORED; ISN'T THAT RIGHT?

1 A. TO A GREAT EXTENT, YES, IT IS.
2 Q. THERE'S SIMPLY NO INFORMATION OF THE DELIVERY AND EFFICACY
3 OF ANESTHESIA TO FETUSES DURING THE SECOND-TRIMESTER THAT'S
4 CURRENTLY AVAILABLE?
5 A. I WOULDN'T SAY THAT THERE IS NO INFORMATION. THERE ARE
6 STUDIES THAT HAVE LOOKED AT THE MEDICAL TERMINATION OF
7 PREGNANCY USING PROSTAGLANDINS THAT HAVE MEASURED BLOOD LEVELS
8 OF ANESTHETICS IN THE MOTHER AND THE FETUS, AND THERE ARE SOME
9 OF THOSE STUDIES WERE PERFORMED IN THE SECOND-TRIMESTER.
10 BUT THE AMOUNT OF DATA THAT IS AVAILABLE IS
11 EXTREMELY SPARSE, EXTREMELY LIMITED AS COMPARED TO WHAT IS
12 AVAILABLE IN THE THIRD TRIMESTER OR THE FIRST TRIMESTER.
13 Q. DR. ANAND, COULD YOU TURN TO PAGE 179 OF YOUR DEPOSITION?
14 A. I HAVE IT.
15 Q. AT LINES 13 TO 17, ISN'T IT TRUE THAT I ASKED YOU:
16 "SO, TO DATE, THERE HAS BEEN VIRTUALLY NO
17 RESEARCH ADDRESSING THE SORT OF DELIVERY AND
18 EFFICACY OF ANESTHESIA TO FETUSES DURING THE
19 SECOND TRIMESTER?"
20 AND YOU RESPONDED:
21 "YES, THERE IS UNFORTUNATELY NO INFORMATION ON
22 THAT."
23 A. THAT IS CORRECT. ALTHOUGH, SINCE THEN, I AM A LITTLE
24 BETTER INFORMED ABOUT THE INFORMATION ON -- IN THIS AREA. ALSO
25 ELSEWHERE I HAD STATED THAT THIS IS RELATIVELY

1 UNDERINVESTIGATED.
2 AND I AGREE, THERE IS VERY LIMITED INFORMATION ON
3 THAT.
4 Q. BUT THERE HAVE BEEN NO CONCLUSIVE STUDIES LOOKING AT THE
5 AMOUNT OF MATERNAL ANESTHESIA THAT WOULD BE NEEDED TO CURB PAIN
6 IN A FETUS; ISN'T THAT RIGHT?
7 A. THAT IS RIGHT.
8 Q. AND THERE HAVE BEEN NO STUDIES OF ANESTHETIC AGENTS
9 ADMINISTERED TO A MOTHER DURING AN INTACT D&E PROCEDURE AND THE
10 IMPACT THAT WOULD HAVE ON THE ABILITY OF A FETUS TO EXPERIENCE
11 PAIN?
12 A. TRUE. THAT RESEARCH HAS JUST NOT BEEN DONE.
13 Q. SO, THERE IS THIS HUGE GAP IN OUR KNOWLEDGE REGARDING THE
14 EFFECTS OF MATERNAL ANESTHESIA ON THE FETUS IN THE SECOND
15 TRIMESTER?
16 A. THAT IS CORRECT.
17 Q. AND, IN FACT, THE MRC EXPERT GROUP ON FETAL PAIN, THE
18 REPORT WE WERE JUST LOOKING AT, THAT CAME OUT IN AUGUST 2001,
19 IT RECOMMENDED THAT THERE BE FURTHER STUDIES ON THIS EFFECT;
20 ISN'T THAT RIGHT?
21 A. THAT IS CORRECT. YES.
22 Q. AND IT ALSO CONCLUDED THAT RESEARCH NEEDED TO BE DONE ON
23 THE PLACENTAL TRANSFER OF ANALGESIC DRUGS IN THE SECOND
24 TRIMESTER?
25 A. THAT IS CORRECT.

1 THEY DO, HOWEVER, STATE IN HERE THAT:
2 "STUDIES AGREE THAT ANALGESIC DRUGS" -- THIS IS
3 IN SECTION 6.1 -- "MAY REDUCE THE STRESS
4 RESPONSES TO NOXIOUS STIMULI IN HUMAN FETUSES
5 AND NEWBORNS. HOWEVER, IT IS APPARENT THAT THE
6 EFFICACY OF DIFFERENT ANALGESICS ABILITY TO
7 ATTENUATE RESPONSIVENESS VARIES."
8 Q. THEN THEY GO ON TO RECOMMEND THAT STUDIES NEED TO BE DONE
9 IN THIS WHOLE AREA; ISN'T THAT RIGHT?
10 A. THAT IS CORRECT.
11 Q. NOW, IN FORMING YOUR OPINIONS ABOUT THE EFFECTS OF
12 ANESTHESIA, YOU ASSUME THAT METHODS OF LOCAL ANESTHESIA WOULD
13 BE ROUTINELY APPLIED FOR INTACT D&E PROCEDURES?
14 A. YES. THAT IS WHAT I HAVE LEARNED FROM READING THE
15 LITERATURE, PARTICULARLY THE WORK PUBLISHED BY DAVID GRIMES AND
16 OTHERS IN THIS FIELD.
17 Q. BUT YOU HAVE NEVER YOURSELF PERFORMED AN INTACT D&E?
18 A. CERTAINLY NOT.
19 Q. OR OBSERVED ONE?
20 A. CERTAINLY NOT.
21 Q. SO YOU DON'T REALLY HAVE ANY BASIS FOR KNOWING WHAT METHODS
22 OF ANESTHESIA ARE ROUTINELY APPLIED IN INTACT D&E PROCEDURES?
23 A. THAT IS CORRECT. I DON'T CLAIM TO BE AN EXPERT IN THIS
24 AREA.
25 Q. HAVE YOU REVIEWED THE TESTIMONY OF ANY OF THE EXPERTS IN

1 THIS CASE?
2 A. NO, I HAVE NOT.
3 Q. SO YOU ARE NOT EVEN FAMILIAR WITH WHAT METHODS OF
4 ANESTHESIA THEY USE EITHER?
5 A. NO, I AM NOT FAMILIAR WITH THAT.
6 Q. AND WOULD IT SURPRISE YOU TO LEARN THAT THERE ARE DOCTORS
7 WHO USE GENERAL ANESTHESIA FOR INTACT D&E PROCEDURES?
8 A. IT WOULDN'T SURPRISE ME. I THINK IF THEY ARE USING GENERAL
9 ANESTHESIA, IT DEPENDS ON WHAT DRUGS ARE BEING USED, IN WHAT
10 DOSAGE LEVELS, AND FOR HOW LONG PRIOR TO PERFORMING THE
11 MANIPULATIONS ON THE FETUS.
12 Q. SO BECAUSE THERE ARE CIRCUMSTANCES WHERE GENERAL
13 ANESTHETICS CAN CROSS THE PLACENTA BARRIER AND FETAL BLOOD
14 BRAIN BARRIER; ISN'T THAT RIGHT?
15 A. THAT IS TRUE. GENERAL ANESTHETICS MOST OF THE GENERAL
16 ANESTHETICS THAT ARE USED TEND TO REDUCE BLOOD FLOW TO THE
17 PLACENTA. SO -- AND WE KNOW THAT BLOOD FLOW TO THE MATERNAL
18 LIVER IS INCREASED WHERE A LOT OF THESE ANESTHETICS ARE
19 METABOLIZED.
20 SO, IN ORDER TO ENSURE THAT THE FETUS RECEIVES A
21 SUFFICIENT CONCENTRATION OF THE GENERAL ANESTHETIC TO BE
22 THERAPEUTIC, THESE STUDIES WOULD HAVE TO MEASURE THAT OR WOULD
23 HAVE TO DOCUMENT A FETAL ANESTHETIC STATE IN SOME MANNER. JUST
24 GIVING GENERAL ANESTHETIC TO THE MOTHER DOES NOT ENSURE THAT
25 THE FETUS IS ANESTHETIZED.

1 NUMEROUS GROUPS HAVE CONCLUDED THAT THE FETUS IS A
2 DEEP COMPARTMENT WITHIN THE METABOLIC COMPARTMENTS OF THE
3 MOTHER, AND IT TAKES A LONG TIME TO EQUILIBRATE TO THE LEVELS
4 OF ANESTHETIC THAT ARE BEING SEEN BY THE MOTHER'S BRAIN AS
5 COMPARED TO THE FETAL BRAIN.
6 Q. IT IS YOUR OPINION, IS IT NOT, THAT GENERAL ANESTHETICS CAN
7 PROVIDE SOME DEGREE OF PAIN RELIEF TO THE FETUS BECAUSE THEY
8 READILY CROSS THE PLACENTAL BARRIER AND THE FETAL BLOOD BRAIN
9 BARRIER?
10 A. YES. CERTAIN DRUGS AMONGST GENERAL ANESTHETICS DO CROSS --
11 IF THEY ARE GIVEN IN SUFFICIENT DOSAGE TO THE MOTHER AND FOR A
12 SUFFICIENT LENGTH OF TIME PRIOR TO MANIPULATING THE FETUS.
13 Q. AND THAT OPINION IS SUPPORTED BY THE RECOMMENDATIONS OF THE
14 ROYAL COLLEGE OF OBSTETRICS AND GYNAECOLOGY REPORT ON FETAL
15 PAIN? I BELIEVE THAT WAS LEARNED TREATISE 9 ON PAGE 8.
16 A. WHICH SECTION?
17 Q. IT IS ABOVE SECTION 1.2 "RECOMMENDATIONS." IT'S THE SECOND
18 BULLET POINT ABOVE THAT.
19 AND THAT REPORT STATES:
20 "AGENTS GIVEN TO THE MOTHER TO PROVIDE GENERAL
21 ANESTHESIA OR SEDATION WILL CROSS THE PLACENTA
22 AND AFFECT THE FETUS, BUT THIS OCCURS MORE
23 SLOWLY THAN IN THE MOTHER."
24 A. YES, BUT THAT IS ANOTHER EXAMPLE OF THE INCONSISTENCIES
25 WITHIN THIS REPORT.

1 BECAUSE IF YOU LOOK AT SECTION 4.3, WHICH IS TITLED
2 "THE EFFECTS OF ANALGESIC AND ANESTHETIC DRUGS ON THE FETUS,"
3 ON PAGE 24, THEY SAY:
4 "CONCERN ABOUT THE POSSIBLE NEED FOR FETAL
5 ANALGESIA DURING INTRAUTERINE PROCEDURES OR
6 LATE TERMINATIONS RAISES THE OPPOSITE PROBLEM.
7 IN THESE CIRCUMSTANCES, IF FETAL AWARENESS IS
8 CONSIDERED A POSSIBILITY, AND IF, IN THE CASE
9 OF LATE TERMINATION, FETICIDE IS NOT PRACTICED,
10 IT BECOMES IMPORTANT TO CONSIDER HOW BEST TO
11 ACHIEVE EFFECTIVE FETAL SEDATION OR ANALGESIA."
12 THEY ALSO SAY FURTHER DOWN THAT PAGE:
13 "DRUGS ACTING ON THE CENTRAL NERVOUS SYSTEM TO
14 PRODUCE UNCONSCIOUSNESS OR EVEN ANALGESIA MUST
15 ALL CROSS THE BLOOD-BRAIN BARRIER AND THEREFORE
16 MUST BE DELIVERED LIPID-SOLUABLE. INEVITABLY,
17 THEREFORE, THEY CROSS THE PLACENTA WITH AS MUCH
18 EASE AS THE BLOOD-BRAIN BARRIER. NEVERTHELESS,
19 THE FETUS IS WHAT IS TERMED A DEEP COMPARTMENT,
20 AND THOUGH MUCH SUCH DRUGS COME INTO
21 EQUILIBRIUM ACROSS THE PLACENTA IN A SINGLE
22 PLACENTAL CIRCULATION, FULL EQUILIBRATION WITH
23 THE ENTIRE FETAL COMPARTMENT IS DELAYED."
24 Q. BUT YOU DON'T DISAGREE WITH THE CONCLUSION THAT GENERAL
25 ANESTHESIA GIVEN TO A MOTHER CAN CROSS THE PLACENTAL BARRIER

1 AND AFFECT THE FETUS?
2 A. I DON'T DISAGREE WITH THE OVERVIEW OF THAT RECOMMENDATION,
3 ALTHOUGH WHEN THAT RECOMMENDATION IS APPLIED TO INDIVIDUAL
4 DRUGS, THERE IS SUFFICIENT CONCERN THAT THERE IS -- IT'S AN
5 INACCURATE CHARACTERIZATION OF WHAT OCCURS IN PRACTICE.
6 FOR EXAMPLE, ON PAGE 25, THE SECOND BULLET THAT THEY
7 SAY:
8 "SECONDLY, A DRUG SUCH AS THIOPENTONE, WHICH IS
9 A GENERAL ANESTHETIC, WHICH IS USED TO INDUCE
10 ANESTHESIA IS GIVEN BY INTRAVENOUS BOLUS WHICH
11 MAINTAINS A CONCENTRATION HIGH ENOUGH TO AFFECT
12 THE BRAIN, MATERNAL BRAIN ONLY FOR A SHORT
13 TIME. THEREAFTER, THE CONCENTRATIONS IN THE
14 BLOOD FALLS RAPIDLY AS THE DRUG IS DISPERSED TO
15 OTHER SITES IN THE MOTHER.
16 THE SAME BOLUS OF DRUG CROSSES THE PLACENTA AS
17 CROSSES THE BLOOD-BRAIN BARRIER, BUT ONCE
18 ACROSS THE PLACENTA, THE DRUG UNDERGOES FURTHER
19 DILUTION IN THE BABY'S LIVER AND BLOODSTREAM.
20 BY THE TIME IT REACHES THE BABY'S BRAIN, IT IS
21 TOO DILUTE TO HAVE A PROFOUND EFFECT."
22 SO, THEIR RECOMMENDATION MAY BE THAT GENERAL
23 ANESTHETICS HAS SOME EFFECT, ALTHOUGH THEY CANNOT GUARANTEE
24 THAT THE USE OF GENERAL ANESTHESIA WILL PRODUCE FETAL
25 ANESTHESIA.

1 Q. YOU HAVE EXPRESSED THE OPINION, HAVE YOU NOT, THAT GENERAL
2 ANESTHETICS CAN PROVIDE SOME DEGREE OF PAIN RELIEF TO THE
3 FETUS?
4 A. TRUE.
5 Q. YOU SAID THAT IN YOUR EXPERT REPORT, DIDN'T YOU?
6 A. ABSOLUTELY.
7 Q. AND ARE YOU FAMILIAR WITH THE RECOMMENDATIONS OF THE ROYAL
8 COLLEGE OF OBSTETRICS AND GYNAECOLOGISTS?
9 A. I AM AWARE OF --
10 Q. THAT THEY MADE SOME RECOMMENDATIONS?
11 A. TRUE.
12 Q. AND THEY DID NOT RECOMMEND, DID THEY, THAT ANESTHESIA BE
13 USED FOR ABORTIONS BEFORE 24 WEEKS LMP?
14 A. I BEG TO DIFFER RESPECTFULLY ON THAT.
15 Q. IF YOU COULD LOOK AT PAGE -- RECOMMENDATIONS 1.2, THEY SAY,
16 DO THEY NOT, THAT:
17 "WE RECOMMEND THAT PRACTITIONERS WHO UNDERTAKE
18 TERMINATION OF PREGNANCY AT 24 WEEKS OR LATER
19 SHOULD CONSIDER THE REQUIREMENTS FOR FETICIDE
20 OR FETAL ANALGESIA AND SEDATION."
21 A. YES.
22 Q. THEY DO NOT EXTEND THAT BEYOND 24 WEEKS; IS THAT RIGHT?
23 A. ALTHOUGH, IF YOU LOOK FURTHER INTO THE REPORT, THEY BRING
24 THAT BACK TO 21 WEEKS. AND THAT'S YET ANOTHER EXAMPLE OF THE
25 INCONSISTENCIES IN THIS REPORT.

1 Q. BUT THE RECOMMENDATIONS OF 1.2 SPECIFICALLY REFER TO AT OR
2 AFTER 24 WEEKS GESTATION?
3 A. YES. AND LATER ON THEY SAY THAT IN MEDICAL TERMINATION OF
4 PREGNANCY, IF IT IS PERFORMED AT 21 WEEKS OR LATER, THE NEED
5 FOR FETICIDE SHOULD BE CONSIDERED OR ENSURED.
6 Q. THE RECOMMENDATIONS THEMSELVES SPECIFICALLY REFER TO 24
7 WEEKS; ISN'T THAT CORRECT, ON PAGE 1.2?
8 MS. NORONHA: OBJECTION, YOUR HONOR, ASKED AND
9 ANSWERED.
10 THE COURT: SUSTAINED.
11 BY MS. PARKER:
12 Q. SO, THE OPINIONS YOU'VE GIVEN ABOUT FETAL PAIN FOCUS ON THE
13 INTACT D&E PROCEDURES THAT ARE BANNED BY THE ACT; IS THAT
14 RIGHT?
15 A. THAT IS RIGHT.
16 Q. AND YOU WOULD AGREE, WOULD YOU NOT, THAT TO THE EXTENT OF
17 THE FETUS HAS THE ABILITY TO EXPERIENCE PAIN DURING AN ABORTION
18 PROCEDURE, THAT INTACT D&E PROCEDURE WOULD NOT BE THE ONLY
19 ABORTION PROCEDURE THAT MIGHT CAUSE PAIN?
20 A. THAT IS CORRECT.
21 Q. YOU ARE FAMILIAR, ARE YOU NOT, WITH A METHOD OF ABORTION
22 CALLED INDUCTION?
23 A. TO SOME EXTENT. MY UNDERSTANDING IS RUDIMENTARY GIVEN THE
24 LACK OF EXPERTISE IN THAT AREA.
25 Q. BUT IT IS YOUR OPINION, IS IT NOT, THAT A FETUS MAY

1 EXPERIENCE PAIN DURING AN INDUCTION ABORTION PROCEDURE?
2 A. I MENTIONED EARLIER THAT IF THERE IS SEPARATION OF THE
3 PLACENTA AND FETAL DEMISE OCCURS PRIOR TO EXTRACTION OF THE
4 FETUS, THEN THERE WILL BE NO EXPERIENCE OF PAIN.
5 ON THE OTHER HAND, IF THE FETAL DEMISE DOES NOT
6 OCCUR, THERE WOULD BE THE EXTRACTION OF THE FETUS THROUGH AN
7 INCOMPLETELY DILATED CERVIX WOULD BE ASSOCIATED WITH PAIN TO
8 THE FETUS.
9 Q. AND IT'S ALSO YOUR OPINION, IS IT NOT, THAT A FETUS WOULD
10 EXPERIENCE ACUTE PAIN IN REACTION TO NEEDLING FOR THE PURPOSE
11 OF INJECTING EITHER DIGOXIN OR POTASSIUM CHLORIDE?
12 A. YES, THAT IS CORRECT.
13 Q. AND THAT THE INJECTION OF DIGOXIN OR POTASSIUM CHLORIDE
14 INTO THE FETAL BODY WILL CERTAINLY CAUSE PAIN TO THE FETUS?
15 A. YES. FROM THE POINT OF ENTRY OF THE NEEDLE INTO THE FETAL
16 BODY TO THE POINT WHEN FETAL DEMISE OCCURS AS A RESULT OF
17 CARDIAC ARREST, THERE WOULD BE A BRIEF PERIOD OF ACUTE PAIN.
18 Q. AND IT'S ALSO YOUR OPINION, IS IT NOT, THAT A FETUS
19 UNDERGOING DISMEMBERMENT DURING THE ABORTION PROCEDURE THAT IS
20 KNOWN AS THE DISARTICULATION D&E WOULD ALSO EXPERIENCE PAIN IF
21 IT WAS MORE THAN 20 WEEKS OUT GESTATION?
22 A. YES, THAT IS CORRECT.
23 Q. INDEED, SEVERE PAIN?
24 A. YES, DEPENDING ON THE DEGREE OF SOMATIC INJURY THAT IS
25 INVOLVED, THERE IS THE LIKELIHOOD OF SEVERE PAIN.

1 Q. IN FACT, IT'S YOUR OPINION THAT A FETUS UNDERGOING A
2 DISMEMBERMENT PROCEDURE WOULD EXPERIENCE GREATER PAIN THAN IF
3 THE FETUS WERE REMOVED INTACT DURING AN INTACT D&E PROCEDURE?
4 A. UP UNTIL THE POINT THAT FETAL DEMISE OCCURS, YES,
5 DISMEMBERMENT WILL BE ASSOCIATED WITH SEVERE PAIN AND MAY WELL
6 BE GREATER THAN WHAT OCCURS DURING THE INTACT D&E OR THE D&X
7 PROCEDURE.
8 MS. PARKER: I HAVE NO FURTHER QUESTIONS.
9 THE COURT: ALL RIGHT. ANY REDIRECT?
10 MS. NORONHA: YES, YOUR HONOR.
11 REDIRECT EXAMINATION
12 BY MS. NORONHA:
13 Q. DR. ANAND, MS. PARKER TOOK YOU THROUGH SEVERAL ARTICLES,
14 AND I WOULD LIKE TO DO THE SAME WITH A FEW OF THEM, BUT FIRST
15 LET'S LOOK AT YOUR DEPOSITION.
16 MS. PARKER ASKED YOU ABOUT THE EMOTIONAL EXPERIENCE
17 OF PAIN AND READ PART OF AN ANSWER TO YOU ON PAGE 128.
18 A. YES.
19 Q. YOU WERE ASKED ABOUT EVALUATING THE EMOTIONAL EXPERIENCE OF
20 PAIN IN THE FETUS, AND SHE READ LINE 7 TO 14. YOU THEN
21 CONTINUED IN YOUR ANSWER ON LINE 16.
22 WOULD YOU PLEASE READ FROM 16 TO 24?
23 A. THIS READS:
24 "AND -- SORRY. LET ME JUST FINISH.
25 AND KNOWING THE EXISTENCE OF EMOTIONS DURING

1 FETAL LIFE ALLOWS US TO INFER THAT, IF THE
2 CENTERS IN THE BRAIN THAT PROCESS EMOTIONS ARE
3 DEVELOPED AND FUNCTIONAL, THEN THERE WOULD BE
4 SOME PRIMORDIAL FORM OF EMOTION THAT THE FETUS
5 EXPERIENCES. YOU AND I MAY NOT -- MAY NOT BE
6 ABLE TO KNOW WHAT THAT IS, BUT GIVEN THE
7 FUNCTIONALITY OF THOSE STRUCTURES, THE
8 LIKELIHOOD IS THAT EMOTIONS EXIST OR COULD
9 EXIST."
10 Q. WHAT DO YOU MEAN WHEN YOU SAID THAT THERE WOULD BE SOME
11 PRIMORDIAL FORM OF EMOTION THAT THE FETUS EXPERIENCES?
12 A. YOU SEE, AS ADULT HUMANS, WE TRY TO INTERPRET THE FETAL
13 EXPERIENCES FROM OUR OWN VERY UNIQUE PERSPECTIVE. AND THE ONLY
14 WAY TO KNOW THAT IS ACCURATE IS TO SOMEHOW EXTRAPOLATE FROM
15 EMOTIONAL PROCESSING IN THE ADULT TO EMOTIONAL PROCESSING IN
16 THE FETAL BRAIN.
17 FOR EXAMPLE, IF SOME NEUROIMAGING STUDIES WERE TO BE
18 DONE AND THEY SHOWED PROCESSING OCCURRING IN AREAS OF THE
19 LYMPHIC SYSTEM, THOSE AREAS THAT ARE PROCESSING EMOTIONS IN THE
20 FETUS MAY DIFFER MARKEDLY FROM WHAT AREAS ARE ACTIVATED FOR THE
21 SAME TYPE OF PROCESSING IN THE ADULT HUMAN.
22 AND WE CAN ONLY SURMISE THAT IS THAT REFLECTIVE OF
23 THE EMOTIONS THAT AN ADULT EXPERIENCES OR A CHILD EXPERIENCES?
24 THERE IS -- UNTIL THE FETUS IS ABLE TO VERBALLY COMMUNICATE, IT
25 IS IMPOSSIBLE OR TECHNOLOGICALLY DIFFICULT TO STUDY.

1 SO I THINK WHAT WE ARE LIMITED TO ARE FORMS OF
2 EMOTIONAL EXPRESSION THAT ARE WITHIN THE BEHAVIORAL REPERTOIRE
3 OF THE FETUS. AND THOSE FORMS OF EMOTIONAL EXPRESSION ARE IN
4 THE FORM OF MOTOR MOVEMENTS, SUCH AS WITHDRAWAL. ALL FETUSES
5 WILL WITHDRAW FROM A NOXIOUS STIMULUS ROUTINELY DOCUMENTED ON
6 ULTRASOUND STUDIES WHERE AMNIOCENTESIS IS BEING DONE. IF THE
7 NEEDLE HAPPENS TO TOUCH A PART OF THE FETAL LIMBS, THAT LIMB IS
8 VERY QUICKLY WITHDRAWN. THAT CAN BE DOCUMENTED BY EXPRESSIONS,
9 FETAL EXPRESSIONS. PEOPLE HAVE NOTED EXPRESSIONS DISTINCTIVE
10 FOR THE PAIN EXPRESSION IN THE FETUS THAT IS EXPOSED TO NOXIOUS
11 STIMULATION, OR CAN BE NOTED FROM STUDIES OF THE BEHAVIOR OF
12 PRE-TERM BABIES AT THAT SAME NEUROBIOLOGICAL MATURITY.
13 SO, WE ARE LIMITED IN TERMS OF OUR ABILITY TO FIGURE
14 OUT WHAT THE FETUS IS EXPERIENCING. AND I THINK GIVEN THOSE
15 LIMITATIONS, THE BURDEN OF PROOF MUST REST ON THOSE WHO ARE
16 EXPOSING THE FETUS TO THESE NOXIOUS AND PAINFUL EXPERIENCES
17 THAT THERE IS NO EMOTIONAL RESPONSE TO THAT.
18 THE BURDEN OF PROOF, OR TO STATE IT DIFFERENTLY, I
19 THINK AS MEDICAL PROFESSIONALS, WE SHOULD GIVE THE BENEFIT OF
20 THE DOUBT TO THE FETUS IN TERMS OF BEING HUMANE TOWARDS THE
21 FETUS, THAT THESE EXPRESSIONS OF EMOTION ARE ACTUALLY OCCURRING
22 AS A RESULT OF THE FETAL EMOTIONAL RESPONSE.
23 Q. DOCTOR, MS. PARKER ALSO ASKED YOU ABOUT SUBJECTIVITY OF
24 PAIN IN THE FETUS AND DIRECTED YOU TO YOUR DEPOSITION ON
25 PAGE 133. FROM LINES 9 TO 13 YOU STATED THAT:

1 "A SUBJECTIVE PHENOMENA IS -- HAS MEANING AND
2 INTERPRETATION BY THE INDIVIDUAL WHO IS
3 EXPERIENCING THAT SUBJECTIVE PHENOMENON. SO
4 OUR INABILITY TO COMMUNICATE WITH THE FETUS
5 PREVENTS US FROM STUDYING PAIN AND ITS
6 SUBJECTIVITY IN INDIVIDUAL FETUSES."
7 NOW, DOES THAT STATEMENT MEAN THAT THE FETUS DOES
8 NOT HAVE A SUBJECTIVE EXPERIENCE OF PAIN?
9 A. NO, IT DOESN'T. IT SIMPLY MEANS THAT WE'RE NOT ABLE TO
10 EXAMINE THAT SUBJECTIVE EXPERIENCE.
11 YOU SEE, EXPERIENCE AND PERCEPTION APPEAR BEFORE
12 THEY CAN BE VERBALIZED OR EXPRESSED. EVEN IN THE ADULT HUMAN;
13 IF I AM IN PAIN, UNLESS I TELL YOU THAT I AM IN PAIN, THERE IS
14 NO WAY FOR YOU TO KNOW WHAT IS MY SUBJECTIVE EXPERIENCE.
15 SO, I THINK WE ARE CREATING CRITERIA THAT A FETUS IS
16 INCAPABLE OF MEETING IN ORDER TO EXAMINE A SUBJECTIVE
17 EXPERIENCE. AND, THEREFORE, I THINK, AGAIN, THE BENEFIT OF THE
18 DOUBT MUST BE GIVEN TO THE FETUS GIVEN THE DEVELOPMENT AND
19 FUNCTIONALITY OF ALL THESE SYSTEMS WITHIN THE DEVELOPING BRAIN.
20 Q. DOCTOR, NEXT MS. PARKER MOVED INTO THE SUBJECT OF
21 CONSCIOUSNESS WITH YOU AND SHOWED YOU LEARNED TREATISE A-37.
22 A. WHICH ONE IS THAT?
23 Q. MODI AND GLOVER ENTITLED "FETAL PAIN AND STRESS."
24 A. YES, I HAVE THAT.
25 Q. ON PAGE 218 IN THE SECOND COLUMN, SHE READ TO YOU:

1 "WE DO NOT KNOW WHEN, IF AT ALL, CONSCIOUSNESS
2 BEGINS DURING FETAL LIFE."
3 THEN THERE IS A DISCUSSION FURTHER ON IN THAT
4 PARAGRAPH. IF YOU WOULD READ THAT FOR US AND EXPLAIN THE
5 CONTEXT OF THAT SENTENCE THAT I JUST READ.
6 A. CERTAINLY.
7 THESE AUTHORS STATE:
8 "WE DO NOT KNOW WHEN, IF AT ALL, CONSCIOUSNESS
9 BEGINS DURING FETAL LIFE. EVEN IN THE ADULT,
10 THE PHYSICAL BASIS OF CONSCIOUSNESS IS FAR FROM
11 UNDERSTOOD. MOST EVIDENCE SUGGESTS THAT
12 CONSCIOUSNESS IS ASSOCIATED WITH ACTIVITY IN
13 THE CEREBRAL CORTEX. GREENFIELD HAS EMPHASIZED
14 THAT ONE SHOULD NOT THINK OF CONSCIOUSNESS AS
15 AN ALL-OR-NONE PHENOMENON BUT RATHER LIKE A
16 DIMMER SWITCH. THIS CONCEPT OF EVOLVING
17 CONSCIOUSNESS MIGHT WELL APPLY TO THE
18 DEVELOPING FETUS IN WHOM CONSCIOUS EXPERIENCE
19 IS BOTH UNLIKELY TO BE THE SAME OR TO HAVE THE
20 SAME PHYSICAL BASIS AS IN THE ADULT. FROGS,
21 FOR EXAMPLE, DO NOT HAVE A DEVELOPED CEREBRAL
22 CORTEX LACKING LAYERS IV TO VI. IF THEY ARE
23 CONSCIOUS AT ALL, THEIR EXPERIENCE MAY BE
24 ASSOCIATED WITH ACTIVITY IN A LESS COMPLEX
25 NEURONAL NETWORK, POSSIBLY MORE ANALOGOUS TO

1 THE FETAL SUBPLATE ZONE."
2 THIS GOES ON TO SAY:
3 "ACCEPTED CORRELATIONS BETWEEN STRUCTURE AND
4 FUNCTION MAY ALSO BE UNRELIABLE, PARTICULARLY
5 IN THE DEVELOPING FETUS."
6 FURTHER ON IN THIS ARTICLE, TOWARDS THE END OF THE
7 ARTICLE, THESE AUTHORS CONCLUDE THAT THERE ARE SOME PRACTICAL
8 CONSIDERATIONS THAT RESULT FROM THE REVIEW OF THE EVIDENCE THAT
9 WAS INCLUDED IN THIS CHAPTER.
10 ON PAGE 223, AT THE BOTTOM OF THE RIGHT-HAND SIDE
11 COLUMN, THEY SAY:
12 "THERAPEUTIC ABORTION IS A DIFFERENT AREA,
13 PARTICULARLY IF SURGICAL DISMEMBERMENT IS
14 INVOLVED. A PREVALENT VIEW IS THAT THE
15 QUESTION OF FETAL PAIN IS IRRELEVANT TO
16 ABORTION BECAUSE A CONSENSUS EXISTS AMONG FETAL
17 MEDICINE PRACTITIONERS THAT SURGICAL
18 TERMINATIONS ARE NOT PERFORMED AFTER 20 WEEKS
19 GESTATION WITHOUT ENSURING THAT THE FETUS FIRST
20 RECEIVES A LETHAL INJECTION. HOWEVER, THIS
21 APPROACH IS NOT UNIVERSAL."
22 AND THEY DISCUSS THIS VIEWPOINT THAT UNLESS FETICIDE
23 IS IN SHORT OR UNLESS FETAL ANESTHESIA IS ACHIEVED, INVASIVE
24 PROCEDURES THAT INVOLVE SOMATIC TISSUE INJURY OF THE FETUS WILL
25 CAUSE PAIN TO THE FETUS.

1 AGAIN, THIS WAS THE STATE OF THE ART AVAILABLE IN
2 THE YEAR 2000. THERE WERE SEVERAL SEMINAL STUDIES THAT HAD NOT
3 BEEN PUBLISHED AT THAT POINT.
4 Q. DOCTOR, NEXT IF YOU WOULD TURN TO LEARNED TREATISE A-3.
5 THIS IS ONE OF YOUR ARTICLES ENTITLED "CONSCIOUSNESS, BEHAVIOR,
6 AND CLINICAL IMPACT OF THE DEFINITION OF PAIN."
7 ON THE FOURTH PAGE OF THE ARTICLE, THE END OF
8 PAGE 67, WHERE IT SAYS "CONSCIOUSNESS OF THE FETUS"?
9 A. PAGE 67. YES.
10 Q. MS. PARKER READ TO YOU THE LAST SENTENCE OF THAT PARAGRAPH,
11 THE FIRST ONE UNDER "CONSCIOUSNESS IN THE FETUS":
12 "THEREFORE, IT MAY BE IMPOSSIBLE TO OBTAIN
13 UNEQUIVOCAL EVIDENCE FOR FETAL CONSCIOUSNESS."
14 WHAT DID YOU MEAN WHEN YOU WROTE THAT STATEMENT?
15 A. YOU SEE, LIKE I SAID BEFORE, THIS IS A STYLE OF SCIENTIFIC
16 WRITING.
17 WE WILL STATE THE NULL HYPOTHESIS BEFORE PLUGGING
18 AWAY AT IT AND TRYING TO REJECT THE NULL HYPOTHESIS SO THAT WE
19 CAN ACCEPT THE ALTERNATIVE HYPOTHESIS THAT IS INTEGRAL TO THE
20 SCIENTIFIC METHOD.
21 FOLLOWING THAT STATEMENT, IN THIS ARTICLE MY
22 CO-AUTHORS AND I REVIEWED THE DEVELOPMENT OF THE CEREBRAL
23 CORTEX, THE THALAMOCORTICAL CONNECTIONS AND WHEN THEY ARE
24 FORMED, AND AS WELL AS THE EVIDENCE FOR CORTICAL ACTIVITY.
25 THIS IS NOW ON PAGE 68. SUCH AS EEG'S RESPONSES TO TOUCH AND

1 SOUND, INCREASING COMPLEXITY OF THEIR SPONTANEOUS MOVEMENTS AND
2 THEN FINALLY AT THE BOTTOM OF THAT PARAGRAPH, WE SAY, THE FIFTH
3 LINE FROM THE BOTTOM, WE SAY:
4 "ALL THE LINES OF EVIDENCE REVIEWED ABOVE
5 SUGGEST THE PRESENCE OF CONSCIOUSNESS FROM
6 ABOUT 20 TO 22 WEEKS OF FETAL LIFE."
7 SO THAT WAS OUR CONCLUSION. THIS, AGAIN, WAS
8 PUBLISHED IN '99 AND WAS ACTUALLY SUBMITTED FOR PUBLICATION IN
9 DECEMBER OF '98. SO, THERE HAS BEEN ACCUMULATING DATA SINCE
10 THEN THAT HAS FURTHER CONFIRMED THESE CONCLUSIONS.
11 Q. DOCTOR, ARE YOU AWARE OF ANY EVIDENCE THAT CONSCIOUSNESS IN
12 THE FETUS DOES NOT EXIST?
13 A. AGAIN, YOU ARE STATING THE NULL HYPOTHESIS. AND IF WE
14 STATE THAT, OKAY, CONSCIOUSNESS DOES NOT EXIST IN THE FETUS AND
15 WE TRY AND EVALUATE THE EVIDENCE FOR AND AGAINST THAT
16 HYPOTHESIS, WE WILL FIND THAT THERE IS MUCH GREATER EVIDENCE
17 AGAINST THAT HYPOTHESIS GIVEN ALL THESE LINES OF EVIDENCE THAT
18 I HAVE REVIEWED; THAT THERE IS MUCH MORE EVIDENCE THAT SUGGESTS
19 FETAL CONSCIOUSNESS AS COMPARED TO THE EVIDENCE THAT SUGGESTS
20 THAT THE FETUS IS UNCONSCIOUS.
21 AND SO I THINK THE WEIGHT OF THE EVIDENCE IS TO A
22 GREAT EXTENT IN FAVOR OF THE DEVELOPMENT OF FETAL
23 CONSCIOUSNESS. AGAIN, WHICH IS DEVELOPING GRADUALLY DURING
24 THAT PERIOD OF 20 TO 22 WEEKS.
25 THERE IS ALSO STUDIES THAT I HAVE REVIEWED EARLIER

1 SUGGESTING THE CAPACITY FOR MEMORY AND LEARNING, AND THOSE
2 RESPONSES IN THE FORM OF HABITUATION WERE SEEN BETWEEN 22 TO 30
3 WEEKS OF GESTATION. SO, THAT IS CONSISTENT WITH THE
4 RECOMMENDATIONS OR THE OPINIONS THAT I HAVE OFFERED.
5 Q. DOCTOR, MOVING ON TO HORMONAL STRESS RESPONSES. YOU WERE
6 QUESTIONED ABOUT THE LIMITATIONS OF THESE STRESS RESPONSES IN
7 DETERMINING PAIN IN THE FETUS. IF YOU WOULD TURN TO ARTICLE
8 A-46.
9 A. TITLED?
10 Q. BY RICHARD SMITH, "PAIN AND STRESS IN THE HUMAN FETUS."
11 A. I HAVE IT, YES.
12 Q. NOW, MS. PARKER READ FOR YOU ON PAGE 162 UNDER THE SUBTITLE
13 "FETAL STRESS," THE SENTENCE IN THE MIDDLE OF THAT PARAGRAPH
14 ABOUT THE LIMITATIONS OF THE STRESS RESPONSES.
15 THE PARAGRAPH CONTINUES TO STATE:
16 "HOWEVER, THE CONVERSE IS THE NULL HYPOTHESIS,
17 I.E., IN THE ABSENCE OF A STRESS RESPONSE, THE
18 FETUS IS UNLIKELY TO EXPERIENCE PAIN. ALSO,
19 ONE COULD ARGUE THAT THE STRESS RESPONSE IS
20 MORE RELEVANT IN TERMS OF IMMEDIATE AND LONG
21 TERM SEQUELAE, WHETHER OR NOT ASSOCIATED WITH
22 PAIN IN THE FETUS."
23 WHAT DOES THAT MEAN AND HOW DOES THAT IMPACT YOUR
24 OPINION?
25 A. THESE ARE INDIVIDUAL AREAS OR INDIVIDUAL LINES OF EVIDENCE

1 THAT ARE BEING REVIEWED, AND THEY ARE EXAMINED IN ISOLATION.
2 BUT IF YOU PUT ALL THESE LINES OF EVIDENCE TOGETHER
3 I FEEL THAT THERE IS SUFFICIENT WEIGHT IN THAT EVIDENCE TO
4 SUGGEST THE OPINION THAT I HAVE STATED; NAMELY, WHEN YOU PUT
5 THAT THIS EVIDENCE WITHIN THE FRAMEWORK OF THE DEVELOPMENT OF
6 THE ANATOMICAL PAIN SYSTEM, THE EVIDENCE FOR FUNCTIONALITY OF
7 EACH OF ITS COMPONENTS, THE EVIDENCE FOR FUNCTIONALITY OF OTHER
8 SENSORY SYSTEMS, SOUND, TOUCH, TASTE, VISION, ET CETERA, AND
9 TOGETHER WITH THE BEHAVIORAL AND PHYSIOLOGICAL CORRELATES OF
10 PAINFUL STIMULATION, I THINK ALL OF THAT EVIDENCE POINTS
11 TOWARDS THE SAME THING, WHICH SUBSTANTIATES MY CONCLUSIONS.
12 Q. DOCTOR, IF YOU'D TURN TO A-37, WHICH IS THE MODI ARTICLE
13 THAT YOU WERE LOOKING AT EARLIER.
14 A. YES, I HAVE IT.
15 Q. PAGE 221 THE SECOND COLUMN, MS. PARKER READ YOU PART OF
16 THAT PARAGRAPH THAT BEGINS ON THE BOTTOM OF THE FIRST PAGE,
17 "THE MEASUREMENT OF STRESS RESPONSES IS OF VALUE," WOULD YOU
18 PLEASE READ THE REMAINDER THAT SHE DID NOT READ BEGINNING IN
19 THE SECOND COLUMN, "HOWEVER, IF THERE IS NO CHANGE IN STRESS
20 HORMONE LEVELS"?
21 A. THIS IS ON 221?
22 Q. YES.
23 A. (READING)
24 "THE MEASUREMENT OF STRESS RESPONSES IS OF
25 VALUE FOR DETERMINING THE EXISTENCE OF FETAL

1 PAIN IF ONE IS AWARE OF ITS LIMITATIONS.
2 PRODUCTION AND RELEASE OF STRESS HORMONES SUCH
3 AS CORTISOL CAN BE MEDIATED BY THE HYPOTHALAMUS
4 WITHOUT INVOLVEMENT OF THE CORTEX OR OTHER
5 HIGHER BRAIN REGIONS INVOLVED IN SENTIENCE.
6 ALSO, ALTHOUGH STRESS HORMONES ARE USUALLY
7 INCREASED WHEN AN INDIVIDUAL IS EXPERIENCING
8 PAIN, THERE ARE MANY OTHER SITUATIONS WHICH ARE
9 NOT PAINFUL, SUCH AS EXERCISE, WHICH WOULD ALSO
10 INCREASE HORMONAL LEVELS. HOWEVER, IF THERE IS
11 NO CHANGE IN STRESS HORMONE LEVELS, IT WOULD BE
12 VERY UNLIKELY THAT THE FETUS WAS EXPERIENCING
13 PAIN. STRESS RESPONSES MAY BE USED TO GIVE
14 SOME SORT OF INDEX OF AN IMPERFECT OF THE
15 DEGREE OF TISSUE INJURY CAUSED AND ALSO CAN BE
16 USED TO DETERMINE THE EFFECTIVENESS OF
17 ANALGESIA OR ANESTHESIA. FINALLY, CHRONIC
18 ELEVATIONS IN STRESS HORMONES ARE ASSOCIATED
19 WITH ADVERSE LONG-TERM CONSEQUENCES."
20 Q. THANK YOU, DOCTOR. YOU ACTUALLY READ THE ENTIRE PARAGRAPH
21 WHICH IS FINE.
22 THAT LAST SECTION THAT YOU READ, IS THAT CONSISTENT
23 WITH YOUR OPINION?
24 A. YES. IF THERE WAS NO PAIN PERCEPTION, THEN THERE WOULD BE
25 A GREATER LIKELIHOOD THAT THERE IS NO STRESS RESPONSE, THERE IS

1 NO HORMONAL RELEASE.
2 I THINK THE FACT THAT THERE ARE HORMONAL RESPONSES
3 IS FAR MORE INDICATIVE OF THESE RESPONSES OCCURRING
4 SPECIFICALLY FOLLOWING A PAINFUL STIMULUS RATHER THAN THE
5 OPPOSITE.
6 Q. ONE MORE ARTICLE ON THIS POINT, DOCTOR. IF YOU TURN TO
7 A-18, THE GIANNAKOULOPOULOS ARTICLE ENTITLED "FETAL PLASMA
8 CORTISOL AND BETA-ENDORPHIN RESPONSE TO INTRAUTERINE NEEDLING."
9 A. YES, I HAVE THAT.
10 Q. ON PAGE 80, THE SECOND COLUMN, SECOND TO THE LAST
11 PARAGRAPH, MS. PARKER READ THE FIRST SENTENCE OF THAT
12 PARAGRAPH.
13 "SINCE THE MECHANISMS INVOLVED IN PAIN
14 PERCEPTION ARE NOT FULLY UNDERSTOOD, IT IS NOT
15 POSSIBLE TO CONCLUDE THAT THE FETUS EXPERIENCES
16 PAIN; A HORMONAL RESPONSE CANNOT BE EQUATED
17 WITH THE PERCEPTION OF PAIN."
18 WOULD YOU PLEASE CONTINUE READING THE REMAINDER OF
19 THAT PARAGRAPH?
20 A. CERTAINLY.
21 "OUR STUDY SHOWS THAT, AS WITH NEONATES, THE
22 FETUS MOUNTS A SIMILAR HORMONAL RESPONSE TO
23 THAT WHICH WOULD BE MOUNTED BY OLDER CHILDREN
24 AND ADULTS TO STIMULI WHICH THEY WOULD FIND
25 PAINFUL. THIS IS OF RELEVANCE TO THE NOW

1 COMMONPLACE INTRAUTERINE NEEDLING PROCEDURES ON
2 THE FETUS SUCH AS CYST ASPIRATION, CHEST AND
3 BLADDER DRAINAGE, OR TISSUE BIOPSY. FURTHER
4 INVESTIGATION IS NEEDED INTO HOW THESE
5 RESPONSES MAY BE BLUNTED BY ANESTHESIA OR
6 ANALGESIA."
7 I ALSO BEG TO SUBMIT THAT THIS ARTICLE WAS ONE OF
8 THE FIRST ARTICLES SHOWING A FETAL STRESS RESPONSE. IT WAS
9 PUBLISHED 10 YEARS AGO IN JULY OF '94. AND BECAUSE THIS WAS A
10 RESEARCH ARTICLE, THE AUTHORS WERE CONSTRAINED TO BASE THEIR
11 CONCLUSIONS ONLY ON THE RESEARCH DATA THAT THEY HAD -- THE
12 ORIGINAL RESEARCH DATA THAT THEY HAD REPORTED IN THIS ARTICLE.
13 THEREFORE, AS OCCURS IN A NUMBER OF SCIENTIFIC
14 PAPERS, THEIR CONCLUSIONS CANNOT BE OUTSIDE OF THE DATA THAT
15 THEY ARE REPORTING, THE ORIGINAL DATA THAT THEY ARE REPORTING.
16 SO, THEREFORE, THESE AUTHORS WERE NOT ABLE TO EQUATE OR EVEN TO
17 RECOMMEND EXCEPT TO THE DEGREE THEY HAVE DONE THAT THESE
18 RESPONSES ARE REFLECTING PAIN PERCEPTION OF THE FETUS.
19 THIS IS ROUTINELY DONE IN ORIGINAL RESEARCH
20 ARTICLES, WHICH, IF YOU BASE YOUR CONCLUSIONS OUTSIDE THE DATA
21 THAT YOU SUPPLIED, THE EDITORS WILL REJECT YOUR ARTICLE.
22 HOWEVER, IN CHAPTERS OF TEXTBOOKS OR IN AN EDITORIAL, FOR
23 EXAMPLE, PEOPLE CAN TAKE ALL THE OTHER PIECES OF EVIDENCE THAT
24 ARE AVAILABLE AND GIVE A SCHOLARLY OVERVIEW OF WHAT ALL THIS
25 DATA MEANS.

1 Q. DOCTOR, IF YOU WOULD LOOK AT A-50.
2 A. WHICH ONE IS THAT?
3 Q. I'M SORRY, IT'S THE SAMPSA VANHATALO ARTICLE ENTITLED
4 "FETAL PAIN?"
5 A. YES.
6 Q. THIS WAS CITED BY MS. PARKER, I BELIEVE, AT LEAST ONCE.
7 WHAT IMPACT HAS THIS ARTICLE HAD ON YOUR OPINION IN
8 THIS CASE?
9 A. LIKE I MENTIONED BEFORE, THIS WAS A RATHER NAIVE ATTEMPT AT
10 SUMMARIZING THE EVIDENCE BY THESE AUTHORS WHO ARE NOT
11 THEMSELVES ACTIVE IN THIS RESEARCH AREA. THEREFORE, THEIR
12 RESPECTIVE, ALTHOUGH IMPORTANT, IS NOT COMPLETELY ACCURATE.
13 I HAD INCLUDED THIS ARTICLE IN MY EXPERT REPORT TO
14 SHOW DUE DILIGENCE IN OFFERING THE OPPOSITE OPINION TO THE ONE
15 THAT I WAS STATING. HOWEVER, IF YOU TURN TO PAGE 147 OF THIS
16 ARTICLE, AND LOOK IN THE SECOND PARAGRAPH OF THE LEFT-HAND SIDE
17 COLUMN, THEY SAY, ABOUT HALFWAY DOWN THAT PARAGRAPH:
18 "THALAMO-CORTICAL PROJECTIONS WAIT JUST BENEATH
19 THE CORTEX UNTIL THE ROUGH ORGANIZATION OF THE
20 CORTEX IS COMPLETED TO ALLOW THEIR INGROWTH.
21 ELECTROENCEPHALOGRAPHIC ACTIVITY, WHICH, TO
22 SOME EXTENT, REFLECTS THE INTEGRITY OF THE
23 CORTEX AND THALAMO-CORTICAL CIRCUITRIES,
24 APPEARS FOR THE FIRST TIME AT 20 WEEKS BUT
25 BECOMES SYNCHRONIC AT 26 WEEKS, AND REVEALS

1 SLEEP-WAKE CYCLES ONLY AT WEEK 30."
2 SO THEY, THEMSELVES, AGREE THAT THE THALAMO-CORTICAL
3 CONNECTIONS ARE FORMED AND FUNCTIONAL BY 20 WEEKS GESTATION.
4 FURTHER ON, ON THE SAME PAGE, THE RIGHT-HAND SIDE
5 COLUMN, IF YOU SEE THE FOURTH PARAGRAPH:
6 "UNLIKE OTHER MOTOR REFLEXES FACIAL EXPRESSIONS
7 MAY SPECIFICALLY REFLECT THE EMOTIONS OF PAIN."
8 SO, ALTHOUGH THEY DO ADMIT THAT THESE ARE SURROGATE
9 MARKERS, THEY DO COME UP WITH VERY SIMILAR CONCLUSIONS
10 REGARDING THESE INDIVIDUAL PIECES OF DATA THAT I HAVE REVIEWED.
11 Q. DOCTOR, THAT LEADS ME TO MY NEXT QUESTION.
12 MS. PARKER SHOWED YOU ARTICLES WHERE IT WAS STATED
13 THAT THE FINAL THALAMO-CORTICAL CONNECTIONS OCCURRED ONLY AT 26
14 WEEKS GESTATION, BUT YOU DISAGREE WITH THAT OPINION.
15 WHY IS THAT THE CASE?
16 A. THAT WAS THE CONCLUSION FROM THE ROYAL COLLEGE OF
17 OBSTETRICS AND GYNAECOLOGY REPORT AND WAS REFLECTED TO SOME
18 EXTENT, ALTHOUGH NOT VERBATIM IN THE MRC REPORT.
19 AGAIN, THOSE WERE AREAS OF EVIDENCE THAT WERE
20 REVIEWED MANY YEARS AGO AND THERE HAS BEEN ACCUMULATING DATA IN
21 THAT RESPECT WHICH HAS BEEN PUBLISHED IN THE LITERATURE.
22 THESE AUTHORS ALSO ARE SOMEWHAT ADAMANT THAT
23 PERCEPTION OF PAIN MUST OCCUR AT THE LEVEL OF THE CORTEX. ON
24 THE OTHER HAND, IN ADULT PATIENTS, REMOVAL OF THE CORTEX,
25 COMPLETE REMOVAL OF THE SENSORY CORTEX DOES NOT PREVENT THEM

1 FROM FEELING PAIN. ADULT PATIENTS WHO HAVE HAD THEIR CORTEX --
2 THE SENSORY MOTOR CORTEX REMOVED BECAUSE OF A BRAIN TUMOR OR
3 BECAUSE OF A STROKE, THEY STILL HAVE PERCEPTION OF PAIN AND
4 THEY WILL REPORT THAT.
5 IN NORMAL PATIENTS WITH A FUNCTIONING SENSORY
6 CORTEX, IF YOU PLACE ELECTRODES IN THE FUNCTIONING SENSORY
7 CORTEX AND STIMULATE THE SENSORY CORTEX ELECTRICALLY, THOSE
8 PATIENTS WILL NOT REPORT PAIN. SO, EITHER THE REMOVAL OF THE
9 SENSORY CORTEX OR THE STIMULATION OF THE SENSORY CORTEX, BOTH
10 OF THOSE OPPOSITE CONDITIONS ARE NOT REQUIRED COMPLETELY FOR
11 PROCESSING OF PAIN.
12 SO THE CURRENT VIEW IS THAT THE CORTEX IS INVOLVED
13 IN THE INTERPRETATION OF PAIN AND THE PLANNING REQUIRED TO
14 LIMIT THE DURATION OR INTENSITY OF PAIN. IT MAY NOT BE
15 INVOLVED IN THE ACTUAL PERCEPTION OF PAIN, WHICH MAY ACTUALLY
16 OCCUR AT THE LEVEL OF THE THALAMUS.
17 TO FOLLOW THOSE SAME LINES OF INVESTIGATION IN ADULT
18 PATIENTS, IF YOU INJECT A LOCAL ANESTHETIC INTO A VERY TINY
19 VERY SPECIFIC NUCLEUS OF THE THALAMUS, YOU CAN COMPLETELY BLOCK
20 THE INCOMING PAINFUL STIMULI SHOWING THAT PERCEPTION IS VERY
21 LIKELY OCCURRING AT THE LEVEL OF THE THALAMUS OR, YOU CAN PLACE
22 ELECTRODES AND STIMULATE USING EXTREMELY TINY CURRENTS THAT
23 PART OF THE THALAMUS AND THE ADULT PATIENTS WERE CONSCIOUS WILL
24 REPORT PAIN AS A RESULT OF THAT.
25 SO, ALL OF THIS SUGGESTS THAT THE THALAMO-CORTICAL

1 CONNECTIONS, ALTHOUGH ESSENTIAL, MAY NOT BE SUFFICIENT TO
2 EXPLAIN WHY THE FETUS DOES NOT OR DOES FEEL PAIN.
3 Q. DOCTOR, YOU WERE ALSO ASKED ABOUT YOUR OPINION ON
4 ANESTHESIA ADMINISTERED TO THE MOTHER AND ITS EFFECT ON THE
5 FETUS.
6 WITH THE DEPOSITION THAT YOU HAVE, IS THERE AN
7 ERRATA SHEET ATTACHED TO IT?
8 A. YES, THERE IS.
9 Q. COULD YOU TURN TO -- IS IT A COMPLETED ERRATA SHEET YOU
10 SUBMITTED?
11 A. YES, THERE IS.
12 Q. COULD YOU TURN TO PAGE 179 OF YOUR DEPOSITION?
13 A. YES.
14 Q. AND MS. PARKER READ TO YOU LINES 13 THROUGH 17 IN WHICH YOU
15 WERE ASKED:
16 "SO TO DATE, THERE'S BEEN VIRTUALLY NO RESEARCH
17 ADDRESSING THE SORT OF DELIVERY AND EFFICACY OF
18 ANESTHESIA TO FETUSES DURING THE SECOND
19 TRIMESTER?"
20 AND SHE READ YOUR ANSWER AS:
21 "YES, THERE'S UNFORTUNATELY NO INFORMATION ON THAT."
22 DID YOU CHANGE YOUR ANSWER, DR. ANAND, TO THAT
23 QUESTION?
24 A. YES, I DID.
25 IN THE ERRATA SHEET THAT WAS SUBMITTED PAGES

1 PAGE 179, LINE 16 THROUGH 17, THE ANSWER WAS RESTATED:
2 "THERE IS A LIMITED INFORMATION IN THE SECOND
3 TRIMESTER."
4 Q. WHY DID YOU MAKE THAT CHANGE TO YOUR ANSWER?
5 A. BECAUSE OF, LIKE I SAID DURING MY TESTIMONY, THIS AREA IS
6 RELATIVELY UNDERINVESTIGATED. AND I THINK I WAS TOO QUICK TO
7 AGREE WITH THE STATEMENT THAT HAD BEEN MADE IN THE QUESTIONING.
8 MS. PARKER HAD STATED, "THERE'S BEEN VIRTUALLY NO
9 RESEARCH ADDRESSING" AND I WAS EXAMINING HOW IMPORTANT IS THAT
10 OPERATIVE WORD "VIRTUALLY".
11 AND HAVING LEARNED BETTER, I FELT THAT THIS
12 STATEMENT NEEDED TO BE CHANGED.
13 Q. SO, DOCTOR, BASED ON THE STUDIES THAT YOU KNOW OF ABOUT
14 MATERNAL ANESTHESIA, HOW ARE YOU USING THOSE STUDIES TO COME TO
15 YOUR CONCLUSIONS ABOUT ITS EFFECT IN THE SECOND TRIMESTER?
16 A. IN THE ABSENCE OF DATA, AND FREQUENTLY AS CLINICIANS WE ARE
17 REQUIRED TO MAKE DECISIONS WHEN THERE IS NO DATA AVAILABLE.
18 SO, IN THE ABSENCE OF DATA, WE WOULD NEED TO
19 EXTRAPOLATE FROM STUDIES THAT HAVE BEEN DONE IN THE THIRD
20 TRIMESTER, AND THESE STUDIES WOULD SUGGEST MUCH GREATER
21 TRANSFER OF ANESTHETICS BECAUSE AT THAT POINT, THE PLACENTAL
22 MEMBRANE IS FAR MORE PERMEABLE TO THE TRANSFER OF A VARIETY OF
23 DRUGS, INCLUDING ANESTHETIC DRUGS, AND WE WOULD, IN
24 EXTRAPOLATING FROM THOSE STUDIES, WE WOULD BE OVERESTIMATING
25 THE AMOUNT OF ANESTHETIC DRUG THAT A FETUS IN THE SECOND

1 TRIMESTER ACTUALLY RECEIVES.
2 SO, EVEN FROM THAT OVERESTIMATION, IT IS UNLIKELY
3 THAT THERE WOULD BE THERAPEUTIC CONCENTRATIONS WITHIN THE FETUS
4 IN ORDER TO ENSURE A STATE OF FETAL ANESTHESIA BEFORE FETAL
5 DEMISE CONCERNS.
6 THE COURT: EXCUSE ME, COUNSEL.
7 YOU WILL HAVE TO WRAP IT UP SO OPPOSING COUNSEL WILL
8 HAVE AN OPPORTUNITY --
9 MS. NORONHA: I HAVE ONE QUESTION, YOUR HONOR.
10 BY MS. NORONHA:
11 Q. FINALLY, DOCTOR, DO YOU HAVE AN OPINION ON THE RELATIVE
12 SEVERITY OF PAIN OF AN INJECTION OF DIGOXIN OR POTASSIUM
13 CHLORIDE VERSUS THE PUNCTURE AND SUCTION OR THE CRUSHING OF THE
14 HEAD THAT YOU TESTIFIED TO ON DIRECT EXAMINATION?
15 A. YES.
16 I BELIEVE THAT THE INJECTION OF POTASSIUM CHLORIDE
17 OR DIGOXIN WILL HAVE LESS PAIN, IT WILL BE ACUTE PAIN FOR A
18 BRIEF DURATION AS COMPARED TO PAIN ASSOCIATED WITH THE HANDLING
19 AND THE STEPS OF THE D&X PROCEDURE.
20 MS. NORONHA: THANK YOU.
21 YOUR HONOR, I HAVE NO FURTHER QUESTIONS AT THIS
22 TIME.
23 RECROSS-EXAMINATION
24 BY MS. PARKER:
25 Q. JUST A FEW VERY BRIEF QUESTIONS.

1 FIRST, DR. ANAND, I WOULD LIKE TO ASK YOU ABOUT YOUR
2 ERRATA TO YOUR DEPOSITION.
3 YOU HAVE FOUR OR FIVE PAGES OF HANDWRITTEN NOTES
4 INDICATING AN ERRATA TO THAT DEPOSITION; ISN'T THAT CORRECT?
5 A. THAT IS CORRECT.
6 Q. THEN AT THE END THERE IS FOUR TYPEWRITTEN ERRATA. DO YOU
7 SEE THAT?
8 A. YES, THAT IS CORRECT.
9 Q. THAT INCLUDES THE ERRATA THAT MS. NORONHA THAT YOU JUST
10 INDICATED; IS THAT RIGHT?
11 A. THAT IS RIGHT.
12 Q. DID YOU TYPE THOSE UP?
13 A. YES, I DID.
14 Q. YOU DID. YOU DID IT AT A SEPARATE TIME THAN ALL THE
15 HANDWRITTEN CHANGES?
16 A. YES. THIS WAS DONE AT A TIME WHEN I DIDN'T HAVE ACCESS TO
17 THE -- BASICALLY THIS LAST PAGE WAS DONE WHEN I DIDN'T HAVE
18 ACCESS TO A FAX MACHINE. THESE OTHERS WERE DONE WHILE I WAS IN
19 MY OFFICE AND I WAS ABLE TO FAX THESE OVER TO MS. NORONHA.
20 Q. DID YOU HAVE DISCUSSIONS WITH COUNSEL BEFORE YOU MADE THOSE
21 ERRATA CHANGES?
22 A. BETWEEN THE TWO TYPES OF ERRATA CHANGES, THE HANDWRITTEN
23 AND THE TYPED VERSION, THERE WAS NO DISCUSSION WITH COUNSEL.
24 Q. OKAY.
25 NOW, ON REDIRECT YOU ANSWERED SOME QUESTIONS ABOUT

1 MOTOR MOVEMENTS AS IN RESPONSE TO OTHER EXPERIENCES OF PAIN; IS
2 THAT RIGHT?
3 A. THAT IS RIGHT.
4 Q. AND A MOTOR MOVEMENT IN A FETUS WOULD BE A STRESS RESPONSE,
5 WOULDN'T IT?
6 A. IT WOULD BE A REFLEX WITHDRAWAL FROM -- IT WOULD NOT BE
7 CORRECT TO CHARACTERIZE IT AS A STRESS RESPONSE.
8 Q. IT WOULD BE A REFLEX WITHDRAWAL. BUT NOT ALL REFLEX
9 WITHDRAWALS ARE EQUATED WITH PAIN EXPERIENCES; ISN'T THAT
10 RIGHT?
11 A. THAT IS CORRECT.
12 Q. AND THERE IS NO DEFINITIVE EVIDENCE THAT REFLEX RESPONSES
13 IN FETUSES ARE EQUATED WITH PAIN EXPERIENCES?
14 A. TO THE EXTENT THAT YOU COULD FIND DEFINITIVE EVIDENCE, YES,
15 THAT IS CORRECT.
16 Q. AND I BELIEVE ON REDIRECT YOU ALSO STATED THAT ONE CANNOT
17 KNOW WHETHER ANOTHER PERSON EXPERIENCES PAIN; IS THAT RIGHT?
18 A. THAT IS RIGHT.
19 Q. BUT AN ADULT OR A CHILD WHO WAS OF TALKING AGE CAN
20 COMMUNICATE WHEN THEY EXPERIENCE PAIN; ISN'T THAT CORRECT?
21 A. THAT IS CORRECT.
22 Q. THEY CAN TELL US ABOUT IT, THEY CAN CRY, THEY CAN CALL OUT
23 IN ANGUISH; ISN'T THAT CORRECT?
24 A. THAT IS CORRECT.
25 Q. AND THERE IS NO ABILITY OF A FETUS TO COMMUNICATE IN THIS

1 REGARD; ISN'T THAT RIGHT?

2 A. THERE IS SOME ABILITY OF THE FETUS TO COMMUNICATE INSOMUCH

3 ONE CAN SEE CRYING-TYPE MOVEMENTS THROUGH BIG CHANGES IN THE

4 LEVEL OF THE FETAL DIAPHRAGM OR EXPRESSIONS OF DISTRESS THAT

5 MAY BE REFLECTED ON THE FACE OF THE FETUS.

6 Q. BUT A FETUS CANNOT VERBALLY COMMUNICATE THAT THEY ARE

7 EXPERIENCING PAIN; ISN'T THAT RIGHT?

8 A. THAT IS CORRECT.

9 THE COURT: CAN YOU SEE THE FACE OF THE FETUS ON THE

10 SONOGRAM?

11 THE WITNESS: YES, YOUR HONOR.

12 THERE ARE THREE-DIMENSIONAL ULTRASOUND MACHINES THAT

13 ARE CAPABLE OF SEEING BOTH -- AND ACTUALLY THE MOST RECENT

14 MACHINES THAT ARE AVAILABLE CAN SEE IN THE FOURTH DIMENSION AS

15 WELL, MEANING DYNAMIC CHANGES THAT OCCUR IN THE FETAL -- IN THE

16 FETUS.

17 BY MS. PARKER:

18 Q. YOU ALSO DISCUSSED ON REDIRECT AN ARTICLE BY MODI AND

19 GLOVER. THAT WAS THE GOVERNMENT LEARNED TREATISE A-37.

20 A. YES. YES, I DID.

21 Q. AND IT IS TRUE, IS IT NOT, THAT THE AUTHORS CONCLUDE THAT:

22 "WE DO NOT KNOW WHEN, IF AT ALL, CONSCIOUSNESS

23 BEGINS DURING FETAL LIFE"?

24 A. THAT IS A STATEMENT OF THE NULL HYPOTHESIS.

25 Q. THAT IS THEIR CONCLUSION; ISN'T THAT CORRECT?

1 A. NO, THAT IS NOT CORRECT.
2 Q. BUT THEY STATE, DO THEY NOT, ON PAGE 218 THAT:
3 "WE DO NOT KNOW WHEN, IF AT ALL, CONSCIOUSNESS
4 BEGINS DURING FETAL LIFE."
5 ISN'T THAT RIGHT?
6 A. YES. AND I READ THE REST OF THE PARAGRAPH THAT FOLLOWS.
7 Q. OKAY.
8 YOU ALSO WERE ASKED ABOUT AN ARTICLE BY VANHATALO
9 ENTITLED "FETAL PAIN?" THAT'S LEARNED TREATISE A-50?
10 A. YES.
11 Q. AND YOU INDICATED THAT THAT ARTICLE CAME UP WITH SIMILAR
12 CONCLUSIONS AS YOU DO; ISN'T THAT RIGHT?
13 A. THEY INTERPRETED THE DATA THAT I HAD INTERPRETED IN A
14 SIMILAR WAY.
15 Q. BUT THEY STATE ON PAGE 146, DO THEY NOT, THAT:
16 "PAIN MAY REACH THE CEREBRAL CORTEX FOR THE
17 FIRST TIME DURING WEEK 26, AND IT IS NOT UNTIL
18 WEEK 29 THAT EVOKED POTENTIALS COULD BE
19 MEASURED FROM THE CORTEX."
20 ISN'T THAT CORRECT?
21 A. YES. AND THAT REFLECTS THEIR RELATIVE IGNORANCE OF THE
22 DATA THEY HAVE AVAILABLE AT THAT TIME.
23 Q. YOU ALSO INDICATE THERE IS ACCUMULATING DATA ON
24 CONSCIOUSNESS IN THE FETUS. I BELIEVE YOU SAID THAT SEVERAL
25 TIMES?

1 A. YES.
2 Q. BUT YOU AGREE, DO YOU NOT, THAT TO DATE THERE IS NO
3 DEFINITIVE EVIDENCE OF CONSCIOUSNESS IN A FETUS?
4 A. WITH THE PROVISO THAT DEFINITIVE EVIDENCE OF CONSCIOUSNESS
5 IN THE FETUS OR ANY OTHER LIVING ORGANISM IS NOT POSSIBLE TO
6 OBTAIN.
7 Q. BUT, IN FACT, AS YOU YOURSELF SAID AT YOUR DEPOSITION, IT'S
8 ALL SORT OF SUPPOSITION OR SPECULATION THIS CONSCIOUSNESS IN A
9 FETUS?
10 A. YOU COULD CALL IT THAT OR YOU COULD CALL IT SCIENTIFIC
11 INFERENCE.
12 MS. PARKER: I HAVE NO FURTHER QUESTIONS.
13 THE COURT: THANK YOU, DR. ANAND. YOU MAY STEP
14 DOWN.
15 THE WITNESS: THANK YOU, YOUR HONOR.
16 THE COURT: COUNSEL, WE ARE GOING TO ADJOURN UNTIL
17 TOMORROW MORNING.
18 I DO WANT, HOWEVER, TO RAISE WITH YOU THE ISSUE OF
19 THE EXHIBITS. BEFORE THE END OF THE TRIAL, ALL OF THE EXHIBITS
20 NEED TO BE COMPILED IN A SINGLE BINDER OR TWO BINDERS, HOWEVER
21 MANY YOU NEED, DEPENDING ON HOW MANY WERE ACTUALLY ADMITTED.
22 WE ONLY WANT THOSE ACTUALLY ADMITTED.
23 MS. MORIYAMA KEEPS A LIST OF THEM. CHECK WITH HER
24 TO MAKE SURE YOU HAVE THE ONES ON THE LIST THAT HAVE BEEN
25 ADMITTED AND SEE TO IT THEY ARE PLACED IN A SINGLE BINDER SO

1 WHEN WE CLOSE TOMORROW, WE WILL HAVE THAT.

2 OKAY. WE ARE ADJOURNED UNTIL 8:30.

3 (PROCEEDINGS ADJOURNED AT 1:20 P.M.)

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4 DEFENDANT'S WITNESS: PAGE

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6 ANAND, KANWALJEET S.

7 DIRECT EXAMINATION BY MS. NORONHA 1540

8 VOIR DIRE EXAMINATION BY MS. PARKER 1551

9 DIRECT EXAMINATION RESUMED BY MS. NORONHA 1562

10 CROSS-EXAMINATION BY MS. PARKER 1614

11 REDIRECT EXAMINATION BY MS. NORONHA 1668

12 RECROSS-EXAMINATION BY MS. PARKER 1686

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15 DEFENDANT'S EXHIBIT: PAGE

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17 A-1 1541

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