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ONCOLOGY.

Q. WHEN AND FROM WHAT SCHOOL DID YOU RECEIVE YOUR MEDICAL DOCTOR DEGREE?

A. JEFFERSON -- THOMAS JEFFERSON UNIVERSITY MEDICAL COLLEGE 1967.

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Q. IS THAT IN PHILADELPHIA, PENNSYLVANIA?

A. YES.

Q. UPON COMPLETION OF YOUR MEDICAL SCHOOL TRAINING, DID YOU SERVE AN INTERNSHIP?

A. YES, I DID.

Q. WHERE DID YOU SERVE YOUR INTERNSHIP?

A. PHILADELPHIA GENERAL HOSPITAL.

Q. AND HOW LONG DID YOU SERVE THAT?

A. ONE YEAR.

Q. AND COULD YOU DESCRIBE BRIEFLY THE DUTIES THAT YOU HAD DURING YOUR INTERNSHIP?

A. I'D BE RESPONSIBLE FOR THE CARE OF MEDICAL IN PATIENTS AND OUT PATIENTS.

Q. IN GENERAL MEDICINE?

A. YES.

Q. UPON COMPLETION OF YOUR INTERNSHIP, DID YOU SERVE A RESIDENCY?

A. YES, I DID.

Q. WHAT IS A RESIDENCY? WHAT DOES THAT

MEAN?

A. WHEN ONE GRADUATES FROM MEDICAL SCHOOL, ONE BECOMES -- IS REQUIRED TO SERVE ONE YEAR AS A PHYSICIAN IN A HOSPITAL SETTING AND THEN ONE GETS A LICENSE TO PRACTICE MEDICINE. DURING INTERNSHIP, UNDER IMMEDIATE SUPERVISION. A RESIDENT IS A FURTHER TRAINING IN WHATEVER FIELD IS DESIRED.

Q. SO IT'S FURTHER TRAINING IN A SPECIALIZED FIELD?

A. YES.

Q. WHERE DID YOU SERVE YOUR RESIDENCY?

A. THOMAS JEFFERSON UNIVERSITY HOSPITAL.

Q. AND HOW LONG WAS THAT RESIDENCY?

A. IT WAS TWO YEARS.

Q. AND WHAT FIELD OR AREA OF MEDICINE DID YOU SPECIALIZE IN IN YOUR RESIDENCY AT JEFFERSON?

A. INTERNAL MEDICINE, WHICH IS THE NONE SURGICAL TREATMENT OF ADULTS.

Q. IT IS INTERNAL ORGANS OF THE BODY?

A. YES.

Q. AFTER THE COMPLETION OF YOUR RESIDENCY, DID YOU SERVE ANY ADDITIONAL RESIDENCY OR FELLOWSHIPS TO FURTHER

SPECIALIZED --

A. I WAS A MEDICAL ONCOLOGIC FELLOW, WHICH IS A SUBSPECIALTY OF MEDICINE.

Q. WHERE DID YOU SERVE THIS FELLOWSHIP?

A. I SERVED ONE YEAR AT JEFFERSON UNIVERSITY HOSPITAL AND ONE YEAR AT AMERICAN ONCOLOGIC HOSPITAL, BOTH IN PHILADELPHIA.

Q. NOW, UPON COMPLETION OF YOUR FELLOWSHIP, DID YOU BEGIN TO WORK IN THE PRIVATE PRACTICE OF MEDICINE?

A. YES, I DID.

Q. IS THERE ANY PARTICULAR AREA OF MEDICINE THAT -- IN WHICH YOU RESTRICT YOUR PRACTICE OR SPECIALIZE IN?

A. MEDICAL ONCOLOGY.

Q. CAN YOU DESCRIBE FOR US WHAT ONCOLOGY IS AND WHAT AN ONCOLOGIST DOES?

A. IT COMES IN A GREEK WORD MEANING CANCER, GROWTHS, AND IT HAS TO DO WITH THE DIAGNOSIS, TREATMENT, PREVENTION OF CANCER.

Q. DOES ONCOLOGY -- DO YOU AS AN ONCOLOGIST ALSO CONCERN YOURSELVES WITH THE CAUSES OF CANCER AND THE GROWTHS OF CANCEROUS TUMORS?

A. YES.

Q. IS ONCOLOGY AN AREA OF MEDICINE THAT IS RECOGNIZED AS AN AREA SPECIALIZATION BY ANY BOARD OR ORGANIZATION?

A. YES.

Q. HAVE YOU BEEN CERTIFIED BY --

A. YES.

Q. BY SUCH BOARD OR ORGANIZATION?

WHAT IS THAT BOARD THAT CERTIFIES SPECIALIST IN ONCOLOGY?

A. IT'S A SUBSPECIALTY OF INTERNAL MEDICINES, SO THE CERTIFIER IS THE AMERICAN BOARDS OF INTERNAL MEDICINE.

Q. AND WHAT HAVE YOU BEEN CERTIFIED AS?

A. FIRST I WAS CERTIFIED IN INTERNAL MEDICINE IN 1972 AND I WAS THEN CERTIFIED IN MEDICAL ONCOLOGY IN 1977.

Q. WERE THERE ANY REQUIREMENTS TO OBTAIN THIS CERTIFICATIONS THAT YOU RECEIVED FROM THAT BOARD?

A. ONE HAS TO BE RECOMMENDED BY THE HEAD OF THE TRAINING PROGRAM AND ONE HAS TO PASS AN EXAMINATION.

Q. DOCTOR, WITH WHAT HOSPITALS ARE YOU PRESENTLY ASSOCIATED?

A. CURRENTLY I'M WITH FOUR HOSPITALS:

THOMAS JEFFERSON UNIVERSITY HOSPITAL, METHODIST HOSPITAL, NAZARETH HOSPITAL, ALL IN PHILADELPHIA AND OUR LADY OF LOURDES HOSPITAL IN CAMDEN, NEW JERSEY.

Q. WHAT IS YOUR POSITION AT THE JEFFERSON HOSPITAL?

A. I'M AN ATTENDING PHYSICIAN IN THE HOSPITAL AND I'M ASSISTANTS PROFESSOR OF MEDICINE IN THE MEDICAL SCHOOL.

Q. SO, YOU TEACH, IN ADDITION TO YOUR MEDICAL PRACTICE, YOU TEACH AT THE MEDICAL SCHOOL?

A. YES.

Q. AT JEFFERSON?

A. YES.

Q. WHAT IS YOUR -- WHAT DO YOU TEACH OVER AT THE MEDICAL SCHOOL, WHAT AREAS OF MEDICINE?

A. INTERNAL MEDICINE AND MEDICAL ONCOLOGY.

Q. WHO DO YOU TEACH?

A. MEDICAL STUDENTS, RESIDENTS.

Q. MEDICAL STUDENTS AND RESIDENTS?

A. RIGHT.

Q. DOCTOR, HAVE YOU WRITTEN ANY

ARTICLES THAT HAVE BEEN PUBLISHED IN ANY MEDICAL OR SCIENTIFIC JOURNALS?

A. YES, I HAVE.

Q. APPROXIMATELY HOW MANY ARTICLES HAVE YOU WRITTEN OR PUBLISHED?

A. SEVENTEEN ARTICLES AND TWO CHAPTERS IN BOOKS.

Q. AND GENERALLY, WHAT OF THESE ARTICLES AND CHAPTERS IN THE BOOKS DEALT WITH?

A. MAJOR EMPHASIS HAS BEEN ON IMMUNOTHERAPY OF MALIGNANCY.

Q. THAT'S THE TREATMENTS OF CANCER?

A. TREATMENT OF CANCER.

Q. IN ADDITION TO THE DUTIES THAT YOU'VE JUST DESCRIBED TO US, DO YOU ALSO ENGAGE IN AT ANY TIME AS A CONSULTANT FOR ANY OUTSIDE AGENCIES?

A. WELL, NOT -- NOT USUAL USUALLY. I'M A PARTICIPANT IN A CANCER RESEARCH GROUP, BUT IT'S NOT A CONSULTANT, I DON'T THINK.

Q. NOW, DOCTOR, IS IT TRUE THAT I'VE ADVISED THAT OUR OFFICE WILL BE PAYING YOU FOR THE TIME YOU'RE USING TO TESTIFY IN THIS MATTER?

A. YES.

Q. DOCTOR, WHEN DID YOU FIRST COME TO TREAT MR. JOHN GRASSO? I'M SORRY, DOCTOR. BEFORE WE GET INTO THAT, YOUR HONOR, I'D LIKE TO MOVE INTO EVIDENCE AS PLAINTIFF'S EXHIBIT TEN THE RECORDS OF FOUR HOSPITALIZATIONS OF MR. GRASSO AT THE JEFFERSON HOSPITAL, THE FIRST HOSPITALIZATION PERIOD BEING JUNE 15, 1976 THROUGH JUNE 30, 1976; THE SECOND HOSPITALIZATION BEING JULY 28, 1976 THROUGH AUGUST 21, 1976; THE THIRD HOSPITALIZATION BEING DECEMBER 23, 1976 TO DECEMBER 24, 1976; AND THE FINAL HOSPITALIZATION BEING DECEMBER 29 -- DECEMBER 29, 1976 TO JANUARY 8, 1977.

THE COURT: THEY'RE ALL MARKED AS ONE EXHIBIT.

MR. VASSALOTTI: THEY'RE ALTOGETHER AND TABULATED AND I BELIEVE MR. RENNEISEN HAS NO OBJECTION TO THIS.

THE COURT: ARE THEY PREMARKED.

MR. VASSALOTTI: THEY'RE PREMARKED.

MR. RENNEISEN: YOUR HONOR, I HAVE AGREED ALL ALONG THAT I WOULD NOT REQUIRE THE CUSTODIAN TO BE CALLED TO

AUTHENTICATE THEM. I THINK THAT THE DOCTOR CAN REFER TO THEM AND, THEY WOULD BE ADMISSIBLE OTHERWISE. I'M NOT AGREEING ON THE ADMISSIBILITY TO THE ENTIRE RECORD.

THE COURT: LET'S HAVE THEM MARKED FOR IDENTIFICATION AND THE DOCTOR MAY REFER TO THEM.

MR. VASSALOTTI: IT'S BEEN PREMARKED YOUR HONOR AS PLAINTIFF'S EXHIBIT TEN.

(AT WHICH TIME THE AFOREMENTIONED EXHIBITS WERE MARKED FOR IDENTIFICATION.)

BY MR. VASSALOTTI:

Q. NOW, DOCTOR, DID THERE COME A TIME HAD YOU TREATED A MR. JOHN GRASSO?

A. YES.

Q. DO YOU RECALL WHEN YOU FIRST TREATED HIM?

A. REFERRING TO THE RECORD, IT WAS AUGUST 6, 1976.

Q. AND WHERE WAS THAT?

A. THOMAS JEFFERSON UNIVERSITY HOSPITAL.

Q. AND DID YOU EXAMINE HIM AT THAT TIME?

A. YES.

Q. AND WHAT WERE HIS PHYSICAL

COMPLAINTS WHEN YOU FIRST SAW HIM AT THAT TIME?

A. HE HAD COUGHED UP BLOOD, PAIN IN HIS ABDOMEN, FEVER.

Q. DID YOU INQUIRE AS TO WHETHER HE HAD BEEN AT THE JEFFERSON HOSPITAL BEFORE THE TIME THAT YOU -- THE HOSPITALIZATION WHEN YOU FIRST TREATED HIM?

A. I WAS AWARE, YES.

Q. DID YOU REVIEW THE RECORDS OF THAT PREVIOUS HOSPITALIZATION WHEN YOU WERE CALLED IN TO SEE MR. GRASSO?

A. I DID.

Q. NOW, DOCTOR, YOU'VE JUST BEEN HANDED THE MEDICAL RECORDS FOR THE HOSPITALIZATIONS. THOSE RECORDS INDICATE THAT MR. GRASSO WAS FIRST HOSPITALIZED AT JEFFERSON IN JUNE OF 1976.

FROM YOUR REVIEW OF THOSE RECORDS, CAN YOU TELL US WHAT MR. GRASSO'S PHYSICAL COMPLAINTS WERE WHEN HE WAS TREATED DURING THAT FIRST HOSPITALIZATION?

A. HE COUGHED UP BLOOD.

Q. AND WHAT TESTS OR TREATMENT WAS UNDERTAKEN DURING THAT FIRST HOSPITALIZATION

OF MR. GRASSO TO DETERMINE WHAT MIGHT BE CAUSING HIS PROBLEM?

A. WELL, HE HAD A CHEST -- CHEST X-RAY; HE HAD BRONCHOSCOPY, WHERE ONE LOOKS INTO THE LUNG, THE BRONCHI TO SEE WHETHER THEY WOULD FIND A TUMOR. THEY DIDN'T. AND HE WAS DISCHARGED WITH A DIAGNOSIS OF HEMOPHTHISIS, WHICH IS A COMPLAINT, BRONCHIECTASIS AND POSSIBLE --

Q. EXCUSE ME, WHAT IS HAD I MONTHS /TEU CYST?

A. CAUGHING UP BLOOD.

Q. AND WHAT WERE THE OTHER --

A. AND POSSIBLE ASBESTOSIS.

Q. WAS THERE ANY DIAGNOSE MADE OF WHAT MR. GRASSO'S CONDITION WAS AT THAT TIME?

A. NO. THERE WERE LABORATORY TESTS THAT WERE ABNORMAL. BUT A CLEAR CONCLUSIVE DIAGNOSIS WAS NOT REACHED.

Q. WERE ANY TESTS OF THE LIVER DONE DURING THAT FIRST HOSPITALIZATION?

A. HE HAD ON PHYSICAL EXAMINATION, HIS LIVER WAS OF NORMAL SIZE. LIVER ENZYMES WERE PERFORMED AND ONE OF THEM WAS ABNORMAL.

Q. WHILE YOU THERE THERE WAS NO

DIAGNOSIS AT ANY -- OF ANY SPECIFIC CONDITION AFTER THAT FIRST HOSPITALIZATION?

A. NO.

Q. WHEN WAS HE DISCHARGED FROM JEFFERSON THAT FIRST TIME?

A. JUNE 30, 1976.

Q. AND THEREAFTER, WAS HE REHOSPITALIZED AT THE JEFFERSON HOSPITAL?

A. YES.

Q. WHEN WAS THAT?

A. JULY 28, 1976.

Q. THAT WAS THE HOSPITALIZATION WHEN YOU FIRST CAME TO TREAT MR. GRASSO; IS THAT CORRECT?

A. YES.

Q. WHAT WAS HIS CONDITION UPON ADMISSION TO JEFFERSON HOSPITAL THE SECOND TIME?

A. THIS TIME, HE HAD RIGHT UPPER QUADRANT PAIN, THAT'S IN THE ABDOMEN, COUGHED UP BLOOD, FEVER.

Q. WERE ANY TESTS CONDUCTED ON MR. GRASSO DURING THE SECOND HOSPITALIZATION IN AN ATTEMPTS TO DETERMINE --

A. YES.

Q. -- WHAT CAUSED HIS PROBLEMS?
A. YES.
Q. CAN YOU GIVE ME A DESCRIPTION OF SOME OF THE TESTS THAT WERE ADMINISTERED TO HIM?
A. WELL, A PHYSICAL EXAMINATION REMEMBER SEALED HE HAD A LARGE LIVER, A MASS.
Q. YOU MENTIONED IN THE FIRST HOSPITALIZATION THE PHYSICAL EXAMINATION DID NOT REVEAL A ENLARGED LIVER?
A. YES.
Q. AND THE SECOND HOSPITALIZATION DID REVEAL AN ENLARGED LIVER?
A. YES.
Q. WHAT OTHER FINDINGS OR TESTS WERE DONE?
A. A LIVER SCAN WAS ABNORMAL. IT WAS CONSISTENT WITH METASTATIC DISEASE, OR CANCER. BRONCHOSCOPY WAS REPEATED WHICH SHOWED HE HAD DIFFUSE PULMONARY BLEEDING. CHEST X-RAY NOW SHOWED TUMOR NODULES.
Q. IN THE LUNG?
A. IN THE LUNGS.
Q. THEY WEREN'T PRESENT BEFORE IN THE X-RAY?

A. NO, THEY WERE NOT.
Q. THOSE TUMOR MODULES DID NOT SHOW IN THE X-RAYS IN THE FIRST HOSPITALIZATION?
A. THAT'S CORRECT. THE LIVER BIOPSY WAS PERFORMED.
Q. WHAT IS A BIOPSY?
A. WELL, BIOPSY IS TAKING A SAMPLE OF SOMETHING. IT'S USUALLY SURGICAL.
Q. WAS A SURGICAL BIOPSY DONE WITH MR. GRASSO OR WAS IT DONE BY ANOTHER MEANS?
A. IT WAS DONE BY A NEEDLE.
Q. HOW IS THAT ACCOMPLISHED?
A. ONE PUTS IN A LOCAL ANESTHETIC AND PUTS A NEEDLE, WHICH HAS A HOLLOW CORE, AND ONE STICKS IT IN AND TAKES -- SUCKS OUT A PIECE OF LIVER FOR MICROSCOPIC EXAMINATION.
Q. AND AS A RESULT OF THE NEEDLE BIOPSY THAT WAS DONE ON MR. GRASSO, WAS A DIAGNOSIS OF HIS ILLNESS MADE?
A. YES.
Q. WHAT WAS THAT DIAGNOSIS?
A. ANGIOSARCOMA.
Q. WAS THE ANGIOSARCOMA LOCATED IN ANY PARTICULAR PLACE?
A. IT WAS IN HIS LIVER.

Q. WHAT IS ANGIOSARCOMA OF THE LIVER, CAN YOU TELL US?

A. IT'S A SMALL -- ANGIO MEANS BLOOD VESSEL. SARCOMA MEANS MALIGNANCY DERIVED FROM MESOTHELIUM; CARCINOMA AND SARCOMA ARE THE TWO MALIGNANTS TUMORS IN HUMANS. COMA COMES FROM SURFACE OF ORGANS, LIKE THE SKIN. SARCOMAS ARE SOLID ORGANISMS LIKE BONE, MUSCLE, BLOOD VESSELS. ANGIOSARCOMA IS DERIVED FROM BLOOD VESSELS.

Q. AND HIS CANCER APPARENTLY DEVELOPED IN THE LIVER?

A. YES.

Q. WHEN YOU WERE CALLED IN TO SEE MR. GRASSO, DID YOU PROVIDE ANY COURSE OF TREATMENT FOR HIS CANCER?

A. YES, I DID.

Q. BEFORE WE GET TO THAT, IS ANGIOSARCOMA OF THE LIVER A TYPE OF CANCER WHICH CAN BE CURED UNDER KNOWN MEDICAL METHODS?

A. ALMOST ALWAYS WHEN THEY OCCUR IN THE LIVER, THERE INOPERABLE. ONE CAN'T REMOVE THE ENTIRE LIVER. IN OTHER SITES, WHICH ARE RARE, THEY CAN BE SURGICALLY REMOVED AND ARE

CURABLE. HIS SITUATION WAS NOT A CURABLE SITUATION.

Q. DID YOU TELL MR. GRASSO ABOUT THE SEVERITY OF HIS DISEASE?

A. YES.

Q. DID YOU TELL HIM THAT HIS CONDITION WAS TERMINAL?

A. I TOLD HIM IT WAS POTENTIALLY FATAL.

Q. AND DO YOU RECALL WHEN YOU TOLD HIM THAT?

A. I BELIEVE I TOLD HIM DURING THIS HOSPITALIZATION WHERE I FIRST SAW HIM.

Q. WHAT WAS -- WHAT WAS MR. GRASSO'S CONDITION, PHYSICAL CONDITION, AS HE PROGRESSED THROUGH THAT SECOND HOSPITALIZATION AT THE END OF AUGUST OF 1976?

A. WELL, HE HAD -- HIS MAJOR SYMPTOMS WERE PAIN IN HIS LIVER, COUGHING UP BLOOD, FEAR.

Q. YOU SAY FEAR?

A. OF DYING; AND ANGER THAT HE WAS DYING.

Q. DID HE EXPRESS THOSE FEELINGS TO YOU?

A. YES.

Q. NOW, YOU MENTIONED THAT YOU STARTED

A COURSE OF TREATMENT FOR MR. GRASSO'S ANGIOSARCOMA OF THE LIVER.

CAN YOU DESCRIBE WHAT TYPE OF TREATMENT YOU ADMINISTERED TO HIM?

A. YES. BASIC --

Q. WHAT -- I'M SORRY, GO AHEAD.

A. BASICALLY, WHEN HE WAS DIAGNOSIED, WE HAD LIMITED ABILITY TO USE OF ACTIVE CHEMOTHERAPEUTIC AGENTS. AND HE WAS INVOLVED IN A STUDY THAT COMPARED GIVING ADRIAMYCIN OR -- WHICH IS A CHEMOTHERAPEUTIC AGENT VERSUS CYTOXAN, VINCRISTIN AND ACTINOMYCIN D.

Q. ARE THESE DRUGS ALL KNOWN AS CHEMOTHERAPEUTIC DRUGS?

A. YES.

Q. WHAT IS CHEMOTHERAPY, HOW DOES IT WORK AGAINST CANCER?

A. WELL, SOME CASES, WE DON'T KNOW WHY. SOME SPECIFIC DRUGS DO. BUT IN GENERAL, IT'S DESIGNED TO KILL GROWING CELLS AND HOPEFULLY GET A PREFERENTIAL EFFECT OVER THE CELLS THAT ARE MALIGNANT THAT ARE GROWING VERSUS THE NORMAL CELLS THAT ARE GROWING IN THE BODY THAT ARE NORMALLY REQUIRED FOR SURVIVAL.

Q. SO, THE CHEMOTHERAPEUTIC AGENTS HAVE

ANY EFFECTS ON OTHER PARTS OF THE PATIENTS BODY IN ADDITION TO THE CANCEROUS TUMORS?

A. YES.

Q. WHAT TYPE OF EFFECTS DOES THE CHEMOTHERAPY HAVE ON THE REST OF THE PATIENTS BODY? WHAT ARE THE SIDE EFFECTS?

A. WELL, THE MOST SERIOUS MEDICAL SIDE EFFECTS ARE SIDE EFFECTS UPON GROWING CELLS THAT ARE NORMALLY REQUIRED. AND THE GROWING CELLS THAT ARE NORMALLY REQUIRED ARE THE BONE MARROW, WHICH MAKES RED CELLS AND WHITE CELLS AND PLATELETS.

Q. THAT'S BLOOD CELLS?

A. YES. AND THEN SORE THROAT, SORE MOUTH, G.I. TRACT, NAUSEA AND VOMITING, WHICH MR. -- JOHN HAD A FAIR AMOUNT OF THAT; HAIR LOSS.

Q. PATIENTS WILL LOSE ALL THEIR HAIR AS A RESULT OF THE CHEMOTHERAPY?

A. THE ADRIAMYCIN, YES, AND TO A LESSER EXTENT, THE CYTOXAN.

Q. DID MR. GRASSO LOSE ALL OF HIS HAIR?

A. YES, HE DID.

Q. HOW MANY TIMES AND HOW OFTEN WAS CHEMOTHERAPY GIVEN TO MR. GRASSO WHILE HE WAS

HOSPITALIZED DURING THAT SECOND TIME IN 1976?

A. I BELIEVE HE RECEIVED IT ONCE DURING THE HOSPITALIZATION. THE ADRIAMYCIN WAS GIVEN EVERY THREE WEEKS.

Q. AFTER HE WAS DISCHARGED FROM THE HOSPITAL THAT TIME, DID YOU CONTINUE TO SEE MR. GRASSO?

A. YES.

Q. AND TREAT HIM?

A. YES.

Q. HOW OFTEN WAS THE CHEMOTHERAPY ADMINISTERED AFTER HE GOT OUT OF THE HOSPITAL IN AUGUST OF 1976?

A. WELL, THE REMAINDER OF HIS LIFE HE CONTINUED ON CHEMOTHERAPY. THE AGENTS CHANGED.

Q. HOW OFTEN DID HE RECEIVE THE DOSAGE?

A. THE ADRIAMYCIN WAS EVERY THREE WEEKS AND LATER WHEN HE WORSEND, HE RECEIVED CYCLOPHOSLOMID, ADRIAMYCIN, VINCRISTIN. AND DURING HIS LAST HOSPITALIZATION, HE RECEIVED TWO OTHER AGENTS. THAT'S JUMPING AHEAD.

Q. DID YOU CONTINUE TO TREAT MR. GRASSO UP UNTIL THE TIME OF HIS DEATH?

A. I DID.

Q. DURING THE COURSE OF YOUR TREATMENT

OF MR. GRASSO, DID HE EVER COMPLAIN OF PAIN TO YOU RELATIVE TO HIS CONDITION?

A. YES.

Q. WHAT TYPE OF COMPLAINTS DID HE MAKE TO YOU?

A. HE HAD FAIRLY CONSISTENT LIVER PAIN. HE HAD --

Q. WHEN YOU SAY LIVER PAIN, WHAT DO YOU MEAN BY LIVER PAIN?

A. IT'S A -- THE LIVER IN THE -- BETWEEN THE CHEST AND THE ABDOMEN AND IT'S ON THE RIGHT SIDE. SO, IT CONSISTENT --

Q. PAIN ON THE RIGHT SIDE OF THE BELLY?

A. YES. SOMETIMES IT'S REFERRED AS THAT THE SHOULDER, TOO.

Q. HE COMPLAINED OF THAT PAIN. DID HE HAVE ANY OTHER COMPLAINTS OF PAIN?

A. THAT WAS HIS MAJOR PAIN COMPLAINT.

Q. DID YOU ADMINISTER OR PRESCRIBE ANY MEDICATIONS FOR MR. GRASSO FOR THE PURPOSE OF RELEAVING HIS PAIN?

A. YES.

Q. WHAT TYPES OF PAIN RELIEF MEDICATIONS DID YOU PROVIDE TO HIM?

A. WELL, HE WAS -- HE WAS ON A

NARCOTIC CODEINE UNTIL -- I BELIEVE, UNTIL DECEMBER. AND THEN HIS PAIN WORSENED AND HE WAS ON PERIDIN, WHICH IS DEMEROL. AND LATER --

Q. IS THAT A STRONGER PAIN RELIEF MEDICATION THAN CODEINE?

A. YES. AND HE ALSO RECEIVED MORPHINE, WHICH IS STRONGER YET.

Q. WERE THESE PAIN RELIEF MEDICATIONS COMPLETELY EFFECTIVE IN RELEAVING HIS PAIN?

A. IN GENERAL, THEY HAD REASONABLE CONTROL, I SUPPOSE. ALTHOUGH ONE ALWAYS HAS PAIN. IT'S NEVER TOTAL RELIEF.

Q. YOU MENTIONED THAT MR. GRASSO EXPRESSED FEAR AND ANGER TO YOU, AT LEAST AT ONE POINT. DID HE EVER EXPRESS THOSE EMOTIONS TO YOU AGAIN AS YOU WERE TREATING HIM UNTIL THE TIME OF HIS DEATH.

A. NO, -- FEAR, CERTAINLY. -- YOU KNOW, HUMAN REACTION, HE DIDN'T WISH TO DIE. HE WAS AN ACTIVE, ENTHUSIASTIC PERSON THAT WAS NOT LIKELY TO GIVE UP, BECOME PASSIVE.

Q. CAN YOU DESCRIBE HOW MR. GRASSO'S ILLNESS PROGRESSED DURING THE MONTHS OF SEPTEMBER, OCTOBER AND DECEMBER OF 1975?

A. WELL, HE HAD A CONTINUED DETERIORATION OVER ALL HIS -- HE HAD SOME RELIEF OF HIS PAIN WITH THE CHEMOTHERAPY WHILE HE WAS GETTING THE ADRIAMYCIN UNTIL DECEMBER. THE PULMONARY NODULES, THE SPREAD OF THE CANCER HAD NOT CHANGED APPRECIABLY. SO, HIS IMPROVEMENT WAS MARGINAL.

IN DECEMBER, HE FAILED TOTALLY ON THE ADRIAMYCIN AND WAS SWITCHED TO DIFFERENT CHEMOTHERAPY, WHICH WAS INEFFECTIVE. AND FROM DECEMBER UNTIL HIS DEATH IN JANUARY, HE DID PROGRESSIVELY WORSE, NO APPETITE, NO STRENGTH, NO VIGOR, PAIN, SHORTNESS OF BREATH.

Q. DOCTOR, YOU HAD MENTIONED BEFORE THAT CHEMOTHERAPY DRUGS THAT YOU ADMINISTERED HAD EFFECTS UPON PARTS OF THE BODY THAT MAKE OUR BLOOD CELLS. WAS MR. GRASSO'S BLOOD CONSTANTLY MONITORED DURING THE TIME HE WAS GIVEN CHEMOTHERAPY?

A. YES. THE MAJOR PROBLEM WE HAD WAS WITH HIS RED CELL COUNT. HE LOST BLOOD WHETHER HE COUGHED UP BLOOD. CHEMOTHERAPY PREVENTED HIM FROM MAKING IT WELL AND HIS DISEASE ALSO HAS AN EFFECT. AND HE WAS CONSISTENTLY ANEMIC, WHICH WOULD MAKE HIS

SHORTNESS OF BREATH WORSE AND HE REQUIRED MULTIPLE BLOOD TRANSFUSIONS.

Q. AND DID HE RECEIVE A CONSIDERABLE NUMBER OF BLOOD TRANSFUSIONS DURING HIS TREATMENT?

A. YES, HE DID.

Q. NOW, WAS MR. GRASSO REHOSPITALIZED IN DECEMBER OF 1976?

A. YES, HE WAS.

Q. WHAT WAS THE DATE OF HIS FIRST HOSPITALIZATION IN DECEMBER?

A. 12-23 TO 12-24.

Q. AND WHAT WAS HIS CONDITION UPON ADMISSION AT THAT TIME?

A. HE WAS WORSE. HE WAS SEVERLY ANEMIC. DURING THE HOSPITALIZATION, HE RECEIVED BLOOD TRANSFUSIONS. HIS LIFE WAS LIMITED. HE WAS DETERMINED TO GO HOME FOR CHRISTMAS.

Q. AFTER CHRISTMAS, WAS HE REHOSPITALIZED AGAIN?

A. YES, HE WAS.

Q. AND WHEN WAS THAT?

A. IT WAS 12-29, 1976.

Q. AND THAT WAS HIS LAST HOSPITALIZATION, WASN'T IT?

A. YES, IT WAS.
Q. DID HIS CONDITION CONTINUED TO DETERIORATE AT THAT POINT?
A. YES, IT DID.
Q. DID HE EVER THE SAME TYPES OF COMPLAINTS?
A. YES.
Q. WAS IT AT THIS POINT THAT HE BEGAN TO RECEIVE MORPHINE FOR CONTROL OF PAIN?
A. YES.
Q. DURING THE COURSE OF THAT LAST HOSPITALIZATION, WAS MR. GRASSO -- YOU SAW MR. GRASSO, I PRESUME, ON A DAILY BASIS THEN?
A. YES.
Q. WAS HE CONSCIOUS FOR THE MOST PART?
A. YES. DROWSY AT TIMES, WEAK.
Q. HE WAS VERY WEAK?
WHEN DID HE DIE, DOCTOR?
A. JANUARY 8, 1977.
Q. WAS AN AUTOPSY PERFORMED, DOCTOR?
A. YES, IT WAS.
Q. AT JEFFERSON?
A. YES.
Q. WHAT DID THE AUTOPSY REPORT INDICATE WAS THE CAUSE OF MR. GRASSO'S DEATH?

A. HE HAD MASSIVE INTRA-ABDOMINAL HEMORRHAGE WITH ANGIOSARCOMA OF THE LIVER.

Q. WAS THE INTRA-ABDOMINAL HEMORRHAGE, WAS THAT INTERNAL BLEEDING IN THE AREA OF THE ABDOMEN?

A. YES, FROM THE LIVER.

Q. IT WAS FROM THE LIVER?

A. YEAH.

Q. WAS THAT AS A RESULT OF THE ANGIOSARCOMA OF THE LIVER?

A. YES.

Q. DOCTOR, I'D LIKE YOU TO REFER TO THE NARRATIVE SUMMARY RECORD IN THE SECOND HOSPITALIZATION, THE ONE OF JULY, 1975.

DID YOU PREPARE THAT NARRATIVE SUMMARY?

A. I DID.

Q. AND THERE IS A REFERENCE IN THAT SUMMARY TO THE FACT, AMONG OTHERS, THAT MR. GRASSO HAS HAD EXPOSURE TO A VARIETY ORGANIC CHEMICALS AT PEDRICKTOWN, MARYLAND. APPARENTLY, THERE WAS A VINYL CHLORIDE PLANT.

OF WHAT SIGNIFICANCE WAS IT TO YOU THAT MR. GRASSO LIVED IN THE VICINITY OF A VINYL CHLORIDE PLANT?

A. BECAUSE ANGIOSARCOMA IS A RARE TUMOR AND THERE'S BEEN A LINK WITH VINYL CHLORIDE EXPOSURE.

Q. DOCTOR, BASED UPON YOUR REVIEW OF MR. GRASSO'S HOSPITAL RECORDS AND ALL OF THE TESTS STUDIES THAT WERE DONE ON HIM AND YOUR TREATMENTS OF HIS ILLNESS FOR APPROXIMATELY FIVE MONTHS AND BASED UPON YOUR EXPERIENCE AS A PHYSICIAN SPECIALIZING IN THE TREATMENT OF CANCER, DO YOU HAVE AN OPINION, BASED UPON A REASONABLE DEGREE OF MEDICAL PROBABILITY AS TO WHETHER -- AS TO WHEN MR. GRASSO'S ANGIOSARCOMA OF THE LIVER FIRST DEVELOPED?

A. I WOULD SUSPECT WITHIN THE LAST SIX MONTHS -- AT THE EARLIEST SIX MONTHS PRIOR TO HIS BRONCHOSCOPY. SO, I WOULD SUSPECT IT DEVELOPED IN THE SAME YEAR, 1976, ALMOST CERTAINLY. I BASE THAT --

Q. FOR MY OWN CLARIFICATION, DOCTOR, ARE YOU SAYING THAT HIS TUMOR PROBLEM DEVELOPED WITHIN A PERIOD SIX MONTHS FROM WHEN HE FIRST STARTED COUGHING UP BLOOD IN MAY OF 1976?

A. YES.

Q. WHAT IS THE BASIS FOR YOUR OPINION

THAT THE TUMOR DEVELOPED WITHIN THAT PERIOD OF TIME?

A. BASICALLY, IT HAS TO DO WITH ITS GROWTH RATE.

Q. CAN YOU EXPLAIN TO ME WHAT YOU MEAN BY THAT?

A. WELL, IN JUNE OF 1976 WHEN HE HAD HIS FIRST SYMPTOMS, HIS X-RAY WAS NEGATIVE, I HAD SHOWED NO NODULES AND HIS X-RAY WAS NONE REMARKABLE. HIS LIVER WAS NOT ENLARGED. BY JULY, HE HAD CLEAR PULONARY TUMOR NODULES ON HIS CHEST X-RAY AND HIS LIVER WAS DRAMATICALLY ENLARGED.

Q. AND WHAT CUT FROM THE GROWTH RATE OF A TUMOR. IS THIS KIND OF TIME MORE A RAPID GROWING TUMOR AT ALL STAGES OF ITS LIFE OR DOES IT GROW MORE RAPID AT THE BEGINNING OR THE END?

A. THE EVIDENCE SUGGESTIONS THAT FROM ANIMAL AND HUMAN EXPERIENCE THAT THEIR GROWTHS RATE IS GREATEST AT THE BEGINNING AND SLOWEST AT THE END.

Q. AND BASED -- YOU TREATED MR. GRASSO AT THE END OF HIS DISEASE; IS THAT CORRECT?

A. TO THE END, YES.

Q. TO THE END. AND DID YOU OBSERVE THE GROWTH RATE OF HIS TUMOR DURING THE END PERIODS OF HIS LIFE?

A. YES, IT SLOWED.

Q. IT SLOWED. BUT WOULD YOU CHARACTERIZE IT AS A RAPID --

A. YES, VERY RAPID.

Q. VERY RAPID. AND DID THAT INDICATE TO YOU THAT PRIOR TO THE TIME THAT HIS DISEASE WAS FOUND THAT THE TUMOR WAS GROWING EVEN MORE RAPIDLY?

A. YES.

Q. BASED UPON WHAT YOU JUST TOLD US?

A. YES.

Q. AND BASED UPON THAT, IT'S YOUR OPINION THAT HIS TUMOR PROBABLY DEVELOPED SOME TIME APPROXIMATELY SIX MONTHS BEFORE HE FIRST COUGHED UP BLOOD IN MAY OF 1975?

A. YES.

Q. DOCTOR, IN YOUR PRACTICE OF ONCOLOGY AND YOUR TEACHING OF ONCOLOGY TO -- AT THE JEFFERSON MEDICAL SCHOOL, ARE YOU CONCERNED AT ALL WITH THE CAUSES OF CANCER?

A. YES.

Q. WHY ARE YOU CONCERNED WITH THE CAUSES OF CANCER AS AN ONCOLOGIST?

A. WELL, PART OF THE JOB IS NOT JUST INDIVIDUAL PATIENTS. IT'S AN ATTEMPT TO PREVENT CANCER AS MUCH AS POSSIBLE. OFF TIMES WE HAVE PATIENTS WE CURE WITH DRUGS WHOM WE'VE -- WE GIVE CANCER TO BY GIVING THEM THE CHEMO THERAPY, BECAUSE OFF TIMES, THE AGENTS ARE CARCINOGEN. SO, NATURALLY, WE HAVE AN INTEREST.

Q. WOULD YOU CONSIDER YOURSELF AS ONE WHO KEEPS A BREAST OF SCIENTIFIC DEVELOPMENTS IN THE AREA OF CANCER CAUSATION?

A. YES.

Q. DOCTOR, THERE'S BEEN A CONSIDERABLE AMOUNT OF TESTIMONY SO FAR IN THIS CASE REGARDING WHERE MR. GRASSO LIVED, ITS PROXIMITY OR ITS RELATIONSHIP TO THE GOODRICH PVC PLANT. I'M GOING A -- YOU WEREN'T HERE TO HEAR THAT TESTIMONY, SO I'M GOING TO ASK YOU TO ASSUME CERTAIN FACTS AND THEN I'M GOING TO ASK YOU FOR AN OPINION.

DOCTOR, I ASK YOU TO ASSUME THAT JOHN GRASSO WAS BORN IN DECEMBER OF 1927, AND THAT PRIOR TO HIS LAST ILLNESS, HE HAD NO

[redacted] OR LIVER DISEASE;
AND THAT HIS PARENTS AND BROTHERS AND SISTERS
ALSO HAD NO PRIOR MEDICAL HISTORY OF CANCER
OR LIVER DISEASE.

I FURTHER ASK YOU TO ASSUME
THAT MR. GRASSO BEGAN WORKING AT THE DUPONT
CHAMBERS WORKS IN DEEPWATER, NEW JERSEY IN
APPROXIMATELY 1946 OR 1947; AND THAT EXCEPT
FOR PERIODS DURING WHICH HE WAS LAID OFF, HE
WORKED AT THAT FACILITY UNTIL MAY OF 1976.

I ASK YOU TO FURTHER ASSUME
THAT IN HIS EMPLOYMENT AT DUPONT, HE WAS NOT
EXPOSED TO ARSENIC OR ARSENIC COMPOUND OR TO
VINYL CHLORIDE; AND THAT DURING THE PERIODS
WHEN HE WAS LAID OFF FROM DUPONT FACILITY, HE
HELD VARIOUS JOBS RANGING FROM A GROCERY
CLERK, AN AUTO PARTS SALESMAN, A GAS STATION
ATTENDANT, AS A CONSTRUCTION LABORER ON A
HIGHWAY JOB, AS AN AUTO MECHANIC, A BUS
DRIVER AND A SHEET METAL WORKER; AND IN
CONNECTION WITH HIS POTENTIAL EXPOSURE TO
VINYL CHLORIDE IN THE AREA OF HIS HOME, I ASK
YOU TO ASSUME THAT DURING THE YEARS OF 1970
THROUGH 1975, MR. GRASSO WAS AWAY FROM HIS
HOME APPROXIMATELY 50 TO 55 HOURS PER WEEK,

AND THAT -- AND THAT, THEREFORE, HE WAS HOME OR IN THE AREA OF HIS HOUSE APPROXIMATELY 60 PERCENT OF THE TIME FOR THOSE YEARS. IN ADDITION TO BEING HOME 60 PERCENT OF THE TIME GENERALLY, DURING THE PERIOD OF FEBRUARY, 1973 TO DECEMBER OF 1973, MR. GRASSO WAS AT HOME OR IN THE AREA OF HIS HOME CONTINUOUSLY AS HE WAS RECUPERATING FROM A CORONARY ARTERY BYPASS SURGERY.

NOW, I FURTHER ASK YOU TO ASSUME THAT DURING THE PERIOD FROM MARCH OF 1970 TO DECEMBER OF 1975, THAT MR. GRASSO'S HOME WAS LOCATED APPROXIMATELY 1.7 MILES FROM A POLYVINYL CHLORIDE PLANT OPERATED BY THE B.F. GOODRICH COMPANY AND THAT DURING THE YEARS IN QUESTION, IT HAS BEEN ESTIMATED THAT THE GOODRICH PLANT EMITTED BETWEEN 1.4 AND OVER 4.3 MILLION POUNDS OF VINYL CHLORIDE INTO THE ATMOSPHERE ON AN ANNUAL BASIS; AND IT HAS ALSO BEEN ESTIMATED THAT DURING THE YEARS, THE PVC PLANT ALSO EMITTED INTO THE ATMOSPHERE DUST PARTICLES THAT RANGED IN SIZE FROM ONE TO TEN MICRONS AND THAT SUCH PVC DUST PARTICLES CONTAINED IN THEM ENTRAPPED LEVELS OF VINYL CHLORIDE THAT WOULD SLOWLY

DISSIPATE AND THOSE LEVELS OF ENLARGED VINYL CHLORIDE RANGED FROM ANYWHERE FROM 40 PARTS PER MILLION UP TO AN ESTIMATED 2,000 PARTS PER MILLION.

IT HAS BEEN FURTHER ESTIMATED THAT DURING THE YEARS 1970 THROUGH 1975, THAT THE LEVELS OF VINYL CHLORIDE IN THE AIR AROUND THE GRASSO HOME RANGED FROM A LOW OF 1.1 PARTS PER MILLION UP TO 28 PARTS PER MILLION FOR A TOTAL OF 1,508 HOURS DURING THAT FIVE AND A HALF, SIX YEAR PERIOD; AND THAT DURING THOSE YEARS, IN ADDITION TO THE RANGE OF EXPOSURES AT THAT TIME, DURING A NUMBER OF HAZY POLLUTION DAYS, THAT THE LEVELS OF EXPOSURE IN THE AREA OF GRASSO HOME RANGED AS HIGH AS FROM TEN TO 90 PARTS PER MILLION; AND FINALLY IN ADDITION TO ALL OF THAT, I ASK YOU TO ASSUME THAT DURING THE PERIOD FROM MARCH OF 1970 TO DECEMBER OF 1975, THERE WERE PERIODS DURING WHICH SHORT PERIODS OF EXPOSURE OF VINYL CHLORIDE IN THE AREA OF THE GRASSO HOME, RANGING FROM FIVE TO FIFTEEN MINUTES WOULD HAVE OCCURRED IN LEVELS UP TO SEVERAL HUNDRED PARTS PER MILLION.

NOW, DOCTOR, BASED UPON THOSE

FACTS AND BASED UPON YOUR KNOWLEDGE OF MR. GRASSO'S CONDITION AND YOUR TREATMENTS OF HIS CONDITION AND BASED UPON YOUR EXPERIENCE AND EXPERTISE AS A PHYSICIAN SPECIALIZING IN THE TREATMENT OF CANCER, DO YOU HAVE AN OPINION AS TO WHAT MAY HAVE CAUSED MR. GRASSO'S AN[illegible] OF EVEN A REASONABLE DEGREE OF MEDICAL PROBABILITY AS TO WHAT CAUSED MR. GRASSO'S ANGIOSARCOMA OF THE LIVER?

A. YES, I DO.

MR. RENNEISEN: YOUR HONOR, I OBJECT TO THE QUESTION. THERE IS NO EVIDENCE WHATSOEVER THAT IT IS DUST PARTICLES THAT MAY HAVE BEEN EMITTED FROM THE PLANT REACHED THE GRASSO HOME. THERE'S BEEN TESTIMONY AS TO DUST AND IT WAS WHITE, BUT THERE IS NO TESTIMONY THAT DUST WAS POLYVINYL CHLORIDE.

FURTHERMORE, ANY ESTIMATES MADE BY THE WITNESSES CONCERNING THE VINYL CHLORIDE CONTAINED IN THE DUST IS SO SPECULATIVE BECAUSE IT DEPENDS ON THE AGE AND THE DUST AND SO FORTH, THAT I THINK THAT PART OF THE QUESTION CLEARLY IS ADMISSIBLE.

MR. VASSALOTTI: YOUR HONOR, FIRST WITH RESPECT TO THE ADMISSION OF DUST

AND THE TRANSPORT TO THE AREA OF THE GRASSO HOME, PROFESSOR DAVIDSON TESTIFIED THAT THE PLANT WOULD CAUSE EMISSION OF PVC DUST PARTICLES AND SPECIFICALLY DUST PARTICLES WITHIN THE RANGE OF ONE TO TEN MICRONS, AS HE DESCRIBED IT. PROFESSOR DAVIDSON -- I'M SORRY, PROFESSOR PESKIN ALSO TESTIFIED THAT PARTICLE SIZES OF PVC DUST IN THE RANGE OF ONE TO TEN MICRONS WOULD BE CARRIED IN THE ATMOSPHERE IN A SIMILAR MANNER TO THE VINYL CHLORIDE GAS TO WHICH HE MODEL HAD -- AND I RECALL HIS TESTIMONY SPECIFICALLY THAT THOSE MATERIALS WOULD REACH THE AREA OF THE GRASSO HOME UNDER THE WIND CONDITIONS THAT HE DESCRIBED.

IN ADDITION, WE HAVE THE OBSERVATIONS OF MRS. GRASSO AND HER SON CONCERNING THE WHITE DUST AND I --

THE COURT: I'LL OVERRULE THE OBJECTION. I'LL ALLOW IT. LADIES AND GENTLEMEN, IT'S YOUR RECOLLECTION OF THE TESTIMONY, NOT WHAT COUNSEL MAY SAY AS THEIR RECOLLECTION. IT'S YOUR RECOLLECTION OF THE TESTIMONY. YOU MAY PROCEED.

BY MR. VASSALOTTI:

Q. DOCTOR, WHAT IS YOUR OPINION REGARDING THE CAUSE OF MR. GRASSO'S ANGIOSARCOMA OF THE LIVER?

A. VINYL CHLORIDE.

Q. AND IN YOUR OPINION, ARE YOU BASING THAT UPON THE VINYL CHLORIDE EXPOSURE LEVELS IN WHICH I HAVE JUST GIVEN YOU IN THE HYPOTHETICAL SITUATION THAT HE RECEIVED IN THE AREA OF HIS HOME?

A. YES.

Q. DOCTOR, THERE ARE OTHER -- ARE THERE OTHER KNOWN CAUSES OF ANGIOSARCOMA OF THE LIVER?

A. YES.

Q. WHAT ARE IT IS OTHER KNOWN CAUSES, TO YOUR KNOWLEDGE?

A. ARSENIC, ARSENIC COMPOUNDS AND THOROTRAST.

Q. IS THAT THOROTRAST?

A. YES.

Q. IN MY HYPOTHETICAL FACT SITUATION, DOCTOR, I DIDN'T MENTION TO YOU THOROTRAST. BUT LET ME ADD FURTHER THAT THERE IS NO KNOWLEDGE THAT MR. GRASSO -- NO ONE -- STRIKE THAT. THERE'S NO EVIDENCE THAT MR.

GRASSO HAD ANY DIAGNOSTIC X-RAYS IN WHICH A DIE OR RADIOACTIVE DIE WAS USED.

WHAT IS THOROTRAST USED FOR OR WHAT WAS IT USED FOR?

A. IT WAS A RADIOACTIVE DYE THAT WAS USED FOR BLOOD FLOW STUDIES TO -- FOR X-RAYS, ARTERIALGRAMS.

Q. AND HOW LONG HAS IT BEEN SINCE THAT MATERIALS BEEN USED FOR THAT PURPOSE?

A. I SUSPECT IT'S BEEN -- IT WAS KNOWN TO CAUSE DIFFICULTY IN THE THIRTIES AND ITS BEEN DISCONTINUED.

Q. DOCTOR LAUCIUS, YOU'VE TESTIFIED THAT VINYL CHLORIDE IS A KNOWN CAUSE OF ANGIOSARCOMA OF THE LIVER?

IF A HUNDRED PEOPLE WERE EXPOSED TO VINYL CHLORIDE IN A GIVEN CONCENTRATION AT ONE TIME, WOULD YOU EXPECT EVERYONE TO DEVELOP CANCER?

A. NO.

Q. WHY IS IT THAT SOME PEOPLE ARE SUSCEPTIBLE OR DEVELOP CANCER AS A RESULT TO EXPOSURE TO CANCER CAUSING MATERIALS AND OTHER PEOPLE DON'T?

A. THEORY OR EVIDENCE?

Q. WELL, DOES ANYONE NO INFORMATION FOR SURE?

A. IT'S UNKNOWN.

Q. IS IT KNOWN FOR SURE THOUGH THAT NOT EVERYONE REACTS THE SAME WAY TO A CANCER CAUSING MATERIAL?

A. YES.

Q. WHY IS IT THAT MR. GRASSO WOULD HAVE DEVELOPED ANGIOSARCOMA OF THE LIVER AND MRS. GRASSO HAS NOT?

A. ONE SUSPECTS CHANCE, CHANCE EVENT IS A POSSIBILITY.

Q. DOES IT HAVE ANYTHING TO DO WITH THE SUSCEPTIBILITY OF INDIVIDUALS TO -- FOR THE SENSITIZATION OF INDIVIDUALS TO THESE PARTICULAR TYPE OF CANCER MATERIALS?

A. THAT'S YOUR UNIFYING HYPOTHESIS FROM ANIMALS.

Q. DOCTOR, TO YOUR KNOWLEDGE, HAS ANY LEVEL OF EXPOSURE TO VINYL CHLORIDE BEEN ESTABLISHED AS BEING SAFE?

A. NO.

MR. VASSALOTTI: ALL RIGHT. THANK YOU DOCTOR, I HAVE NO FURTHER QUESTIONS.

THE COURT: CROSS-EXAMINE.

CROSS EXAMINATION BY MR. RENNEISEN.

Q. DOCTOR, HAVE YOU WRITTEN ANY PAPERS CONCERNING VINYL CHLORIDE ITS RELATIONSHIP TO ANGIOSARCOMA?

A. NO, I HAVE NOT.

Q. HAVE YOU MADE ANY STUDIES OF VINYL CHLORIDE IN ITS EFFECT AND ITS RELATIONSHIP TO ANGIOSARCOMA?

A. WELL, THIS MAN, JOHN I DID -- I DON'T KNOW WHETHER IT'S A STUDY. I HOPE TO INITIATE ONE. I DID CALL, WHEN I FOUND OUT HE HAD AN ANGIOSARCOMA, I DID CALL THE CARCINOGENESIS BRANCH OF THIS COMMUNICABLE DISEASE CENTER.

Q. IS THAT IN ATLANTA, GEORGIA?

A. YES.

Q. YOU HAD SOME CORRESPONDENCE WITH DOCTOR FAULK, DID YOU NOT?

A. HE NEVER RETURNED ANY OF MY CALLS. I FOUND OUT ABOUT THE SUBSEQUENTLY, I GUESS THROUGH PLAINTIFFS ATTORNEY.

Q. YOU ARE -- YOU ARE FAMILIAR WITH HENRY FAULK, ARE YOU NOT?

A. YES, I AM. HE'S THE PERSON I CALLED.

Q. AND HE IS ASSOCIATED WITH THE CENTER

FOR DISEASE CONTROL IN ATLANTA, GEORGIA, IS HE NOT?

A. YES, HE IS.

Q. HAVE YOU READ ARTICLES THAT HE'S WRITTEN ABOUT VINYL CHLORIDE IN CANCER?

A. YES, I HAVE.

Q. ARE YOU FAMILIAR WITH AN ARTICLE IN THE LANCET, L-A-N-C-E-T, DATED NOVEMBER 24, 1979 BY DOCTOR FAULK DISCUSSING ANOTHER CAUSE OF VINYL CHLORIDE?

THE COURT: ANOTHER CAUSE OF VINYL CHLORIDE.

BY MR. RENNEISEN:

Q. I'M SORRY, CAUSE OF ANGIOSARCOMA.

A. UM-HUM, YES, I AM.

Q. ARE YOU FAMILIAR WITH THAT ARTICLE?

A. UM-HUM.

Q. AND THAT ARTICLE DISCUSSES A FOURTH KNOWN CAUSE OF ANGIOSARCOMA, DOES IT NOT?

A. YES, IT DOES.

Q. AND WHAT IS THAT FORTH KNOWN CAUSE?

A. ANDROGENIC ANABOLIC STEROIDS.

Q. AND DOES THAT ARTICLE SAY FROM A GROUP OF CASES STUDIED BY DOCTOR FAULK AND HIS ASSOCIATE WHAT'S THAT APPROXIMATELY 25

PERCENT OF THE CAUSES OF ANGIOSARCOMA WERE KNOWN AND, THEREFORE, APPROXIMATELY 75 PERCENT WOULD BE UNKNOWN?

A. YES.

Q. DO YOU AGREE THAT MANY CAUSES OF ANGIOSARCOMA OR -- MANY CASES OF ANGIOSARCOMA ARE OF UNKNOWN ORIGIN?

A. WELL, THERE AREN'T THAT MANY CASES.

Q. HOW MANY CASES ARE THERE A YEAR?

A. I'M NOT AWARE, BUT I THINK IN 1976 WHEN HE WAS DESCRIBED, I THINK THERE WERE 60 IN A YEAR IN THE UNITED STATES.

Q. IN THIS ARTICLE, DOCTOR FAULK IS STUDYING ANGIOSARCOMA DATA REPORTED FROM 1964 TO 1974 AND HE REPORTED 168 SUCH DEATHS AND HE'S CONCLUDED 22 WERE ASSOCIATED WITH PREVIOUSLY KNOWN CAUSES, VINYL CHLORIDE, THOROTRAST AND ARSENIC AND 3.1 WITH THE STEROID THAT YOU MENTIONED, WHICH WOULD MEAN 75 PERCENT B.F. UNKNOWN CAUSES, IS THAT TRUE?

A. THAT'S WHAT HIS -- THAT'S WHAT HE STATES.

Q. AND HE IS CONSIDERED TO BE AN AUTHORITY IN THE FIELD, IS HE NOT, OF CANCER AND THE CAUSES OF CANCER?

A. YES, HE IS.

Q. HAVE YOU DONE -- FROM YOUR LITERATURE THAT YOU'VE READ -- AND I THINK YOU SAID YOU KEEP UP TO DATE, DO YOU HAVE AN OPINION AS TO WHAT THE LATENCY PERIOD IS FOR ANGIOSARCOMA? WELL LET'S FIRST DEFINE LATENCY PERIOD. HOW DO YOU DEFINE LATENCY PERIOD?

A. LATENCY IN CARCINOGENESIS?

Q. YES.

A. HAS TO DO WITH TIME TO EXPOSURE TO A CARCINOGEN TO THE DEVELOPMENT OF CANCER.

Q. FROM THE FIRST EXPOSURE TO DEVELOPMENT?

A. RIGHT.

Q. FROM YOUR LITERATURE, STUDIES, DO YOU KNOW WHAT THE LATENCY PERIOD IS FOR ANGIOSARCOMA?

A. GENERALLY, THE CASES THAT HAVE BEEN DESCRIBED HAVE BEEN LATENCY PERIODS OF TEN TO 20 TO 30 YEARS.

Q. AND WITH RESPECT TO MR. GRASSO, IT WOULD BE LESS THAN SIX YEARS, WOULD IT NOT?

A. YES, IT WOULD.

Q. YOU MENTIONED THAT ARSENIC WAS A CAUSE OF ANGIOSARCOMA; IS THAT CORRECT?

A. YES.

Q. DO YOU KNOW THAT ARSENIC IS USED IN INSECTICIDES?

A. YES.

Q. DO YOU KNOW THAT ARSENIC INSECTICIDES CONTAIN ARSENIC WERE USED OVER A LONG PERIOD OF TIME IN SALEM COUNTY ON THE FARMS DOWN THERE?

A. I DON'T KNOW, OF COURSE.

MR. VASSALOTTI: YOUR HONOR, MAY WE APPROACH THE BENCH?

A. YES, SIR.

(SIDE BAR DISCUSSION ON RECORD)

MR. VASSALOTTI: YOUR HONOR, I ASK FOR AN OFFER OF PROOF FROM THE DEFENDANT AT THIS POINT WITH REGARD TO THE REPEATED STATEMENTS THAT ARSENIC IS USED IN INSECTICIDES AND WAS USED HEAVILY IN THE SALEM COUNTY AREA.

THE COURT: LET THE RECORD REFLECT THAT MR. RENNEISEN HAS GIVEN TO COUNSEL FOR THE PLAINTIFF SOME DOCUMENT TO READ.

MR. RENNEISEN: IT'S A STUDY PERFORMED OF THE NEW JERSEY AGRICULTURE

DEPARTMENT, I BELIEVE.

MR. VASSALOTTI: THERE'S NO -- THIS IS AN EXTRACTION OF SOMETHING WITHOUT ANY TITLE, AUTHOR, DATE.

MR. RENNEISEN: YOUR HONOR, I WOULD LIKE TO ASK JOHN BULEY, MY ASSOCIATE TO COME UP AND IDENTIFY ON THE RECORD WHERE THIS DOCUMENT CAME FROM. SINCE MR. VASSALOTTI DOES NOT ACCEPT IT AS AN OFFICIAL DOCUMENT. I CAN IDENTIFY WHAT IT IS, BUT I'D RATHER IT BE CORRECT IN STATING WHERE IT CAME FROM.

THE COURT: WELL, I'M SORT OF HESITATE SOMEBODY SITTING IN THE AUDIENCE.

MR. RENNEISEN: HE'S FROM MY OFFICE. I CAN PUT IT ON THE RECORD. WE GOT THIS DOCUMENT FROM THE STATE OF NEW JERSEY. I CAN FIND IT IN MY NOTES, BUT I DON'T WANT TO BE INACCURATE. THERE IS NO DOUBT THAT ARSENIC WAS USED IN SALEM COUNTY IN OLDSMANS TOWNSHIP.

MR. VASSALOTTI: YOUR HONOR, THIS APPEARS TO BE --

THE COURT: LET ME SEE IT.

MR. VASSALOTTI: 35 PAGE DOCUMENT OR 25 PAGE DOCUMENT.

THE COURT: WHY DON'T YOU

CONFER WITH HIM AND GET THE -- YOU MAY CONFER WITH HIM AND GET THE CORRECT TITLE TO THIS.

MR. RENNEISEN: YOUR HONOR, THIS DOCUMENT WAS PREPARED BY THE PESTICIDE PROJECT -- DEPARTMENT -- NEW JERSEY DEPARTMENT OF HEALTH, TRENTON, NEW JERSEY. IT WAS SUPPLIED TO JOHN BULEY FROM MY OFFICE FROM DOCTOR TERRY SCHULTZ, S-C-H-U-L-T-Z, WHO IS EMPLOYED BY THE NEW JERSEY DEPARTMENT OF HEALTH.

MR. VASSALOTTI: JUDGE, I'M AT A COMPLETE LOSS. ARE YOU GOING TO OFFER THAT?

MR. RENNEISEN: IF YOUR WITNESS CONTINUES TO DENY THAT THEY CONSIDERED ARSENIC AS A CAUSE, THEN AS REBUTTAL, I'LL OFFER THAT INTO EVIDENCE. IF YOUR WITNESS ADMITS THAT ARSENIC IS A POSSIBLE CAUSE AND HE WAS EXPOSED TO ARSENIC, THEN I WON'T OFFER IT.

THE COURT: WELL, WHAT'S YOUR POSITION RIGHT NOW? HE HAS IDENTIFIED THE DOCUMENT WHICH HE'S USING FOR PURPOSE OF CROSS-EXAMINATION, WHICH HE -- NOW --

MR. VASSALOTTI: I WOULD OBJECT TO HIM USING THAT DOCUMENT AT THIS POINT TO CROSS EXAMINE THE WITNESSES.

I WOULD LIKE A COPY OF THE DOCUMENT. THE REASON I WOULD OBJECT TO HIM USING THE DOCUMENT IS BECAUSE WE DON'T EVEN KNOW WHAT IT IS. BUT MORE SO THAN THAT, IF HE WANTS TO QUESTION THE WITNESS REGARDING POSSIBLE ARSENIC EXPOSURES, FINE. BUT I WOULD -- I WOULD NOT WANT THAT DOCUMENT USED TO CROSS EXAMINE THIS WITNESSES.

MR. RENNEISEN: RIGHT NOW HE SAID HE DOESN'T KNOW.

THE COURT: THE POINT IS THIS: HE HAS A RIGHT TO UTILIZE A DOCUMENT ASKING QUESTIONS, BUT, OF COURSE, YOU'VE GOT TO IDENTIFY THE DOCUMENT AND ASK SOMEBODY IF HE'S FAMILIAR WITH THE DOCUMENT.

MR. RENNEISEN: I SAID DO YOU KNOW WHETHER OR NOT ARSENIC WAS USED. AND HE SAID, NO, HE DIDN'T NO, AND THAT'S THE END OF IT. THE NEXT QUESTION, WAS THAT USED, DID YOU MAKE ANY EFFORT TO DETERMINE WHETHER ARSENIC WAS USED.

THE COURT: THAT'S THE END

OF THAT. IF HE WANTS TO -- IF HE'S CROSS EXAMINED, GET AN EXPERT BASED ON THAT DOCUMENT, HE'S GOING TO DOCUMENT ASSESS A WITNESS, WHETHER HE CONSIDERS THAT AN AUTHORITATIVE SOURCE, THAT WHOLE BIT HAS GOT TO BE GOTTEN INTO.

MR. RENNEISEN: THAT'S TRUE, BUT I HAVEN'T GOTTEN TO THAT POINT.

(THE FOLLOWING TAKES PLACE IN OPEN COURT.)

BY MR. VASSALOTTI:

Q. DOCTOR, I WAS ASKING YOU WHETHER OR NOT YOU KNEW IF ARSENIC INSECTICIDES HAVE BEEN USED IN SALEM COUNTY IN THE AREA WHERE MR. GRASSO LIVED.

A. I OBVIOUSLY DON'T KNOW.

Q. DID YOU MAKE ANY EFFORTS TO FIND OUT?

A. NO, I DIDN'T.

Q. FOR HOW LONG MEDICALLY HAS THE DISEASE OF ANGIOSARCOMA OF THE LIVER BEEN KNOWN AND IDENTIFIED?

A. I CAN'T ANSWER THAT.

Q. WELL, IS IT -- IS IT A SHORT PERIOD OF TIME, TEN YEARS, ARE WE TALKING ABOUT 50 YEARS OR A HUNDRED YEARS?

A. I SUSPECT IT'S BEEN SINCE PATHOLOGY

STARTED, PERHAPS 80, 90 YEARS WOULD BE MORE LIKELY.

Q. SO THAT ANGIOSARCOMA OF THE LIVER EXISTED BEFORE THERE WAS VINYL CHLORIDE OR THOROTRAST, ISN'T THAT TRUE?

A. THAT'S CORRECT, PROBABLY CORRECT.

Q. HAVE YOU DONE ANY STUDIES CONCERNING -- STRIKE THAT QUESTION.

ARE YOU FAMILIAR WITH THE LITERATURE WHICH DISCUSSES THE CASES OF ANGIOSARCOMA WHICH THE MEDICAL PROFESSION HAS ATTRIBUTED TO VINYL CHLORIDE?

A. I'VE READ SOME OF THE ARTICLES, YES.

Q. AND GENERALLY SPEAKING, DO YOU KNOW WHAT JOB -- WHAT TYPE OF WORK THE MEN HAD WHO GOT ANGIOSARCOMA WHO WERE REVIEWED AND DISCUSSED IN THOSE ARTICLES?

A. YES.

Q. WHAT KIND OF JOBS DID THEY HAVE?

A. GENERALLY THE ONES THAT WERE FIRST LINKED HAD HIGH EXPOSURE JOBS WORKING ON THE PLANT, CLEANING OUT THE PLANT.

Q. THEY WORKED ON PVC PLANT, DID THEY NOT?

A. YES.

Q. AND THEY WERE PEOPLE WHO WITHIN THAT CATEGORY HAD HIGH EXPOSURE, DID THEY NOT?

A. YES, THEY DID.

Q. IS IT TRUE THAT THEY HAD EXPOSURES FOR -- WELL, DO YOU KNOW THE LENGTH OF THEIR EXPOSURES?

A. WELL, SOME OF THEM HAD EXPOSURES FOR VERY LONG LENGTHS OF TIME.

Q. DO YOU HAVE ANY -- DO YOU HAVE ANY KNOWLEDGE AS TO THE DEGREES OR THE CONCENTRATION TO WHICH THOSE GENTLEMEN WERE EXPOSED?

A. THEY WERE EXCEEDINGLY HIGH, HUNDREDS OF PARTS PER MILLION.

Q. MUCH HIGHER THAN MR. GRASSO'S; IS THAT CORRECT?

A. YES.

Q. WHAT -- WHAT IS YOUR REASON FOR DECIDING THAT VINYL CHLORIDE IS THE CAUSE -- WHAT IS YOUR REASON OR REASONS FOR DECIDING THAT VINYL CHLORIDE IS THE CAUSE OF THE ANGIOSARCOMA THAT MR. GRASSO HAD?

A. WELL, I SUSPECT I WAS LOOKING FOR A CAUSE OF CARCINOGENS. I TOLD DOCTOR NEELD. HE TOLD ME THERE WAS A B. F. GOODRICH. I LOOKED

IT UP IN CHEMICAL ENGINEERING NEWS; THERE WAS. I CALLED THE COMMUNICABLE DISEASE CENTER. THAT THEY HAD A POTENTIAL EIPDEMIOLOGICAL PROBLEM THERE. I SUSPECT IT WAS HYPOTHESIS, WHERE IS HIS EXPOSURE, FINDING AN EXPOSURE AND ATTRIBUTION; IS IT MERE COINCIDENCE THAT THE ONLY CASE OF VINYL CHLORIDE -- WELL, I TAKE IT BACK. THE ONLY CASE OF ANGIOSARCOMA I SEE AND MY PARTNERS SEEN IN TEN YEARS HAPPENS TO BE THE PERSON WHO LIVES NEXT TO A VINYL CHLORIDE PLANT. THAT'S ONE WAY OF LOOKING AT IT.

Q. OF COURSE, THERE WERE MANY PEOPLE WHO LIVE NEAR THE VINYL CHLORIDE PLANT WHO DON'T HAVE AN ANGIOSARCOMA; ISN'T THAT TRUE?

A. THAT'S TRUE.

Q. AND FROM THE LITERATURE, DO YOU KNOW THAT THERE ARE PEOPLE WHO LIVE NOWHERE NEAR VINYL CHLORIDE PLANT WHO GET ANGIOSARCOMA, TOO, ISN'T THAT TRUE?

A. THAT'S TRUE, ALSO. HOWEVER, THEY POTENTIALLY DO HAVE SOME EXPOSURES THAT HAVE NOW BEEN LIMITED ELSEWHERE, LIKE THE AIR FLOWS -- I MEAN THE PRODUCTS.

Q. IN OTHER WORDS, A PERSON LIVING IN

WYOMING NOWHERE NEAR A VINYL CHLORIDE PLANT COULD HAVE EXPOSURE TO VINYL CHLORIDE BECAUSE IT WAS USED AS A PROPELLANT IN SPRAY CANS, IS THAT CORRECT?

A. THAT'S CORRECT.

Q. SO, WHEN YOU SAID THE CAUSE OF MR. GRASSO'S DISEASE WAS VINYL CHLORIDE, YOU DIDN'T NECESSARILY MEAN IT WAS IN THE B.F. GOODRICH PLANT. IT COULD HAVE BEEN FROM AEROSOL CANS, IS THAT TRUE?

A. IT COULD HAVE BEEN, BUT YOU'RE ASKING WHY I BELIEVE WAS MOST PROBABLE. WE HAVE NO WAY OF DOING THE KIND OF STUDY YOU PROPOSE AND THAT IS EXPOSING EVERYBODY TO DIFFERENT PARTS PER MILLION OF VINYL CHLORIDE TO HUMANS AND WAITING FIVE YEARS AND SEEING HOW MANY END UP WITH ANGIOSARCOMA. I MEAN, ONE CAN'T SAY WITH CERTAINTY, BUT YOU CAN SAY WITH A DEGREE OF PROBABILITY.

Q. YOU FOUND A CASE AND A CAUSE AND YOU LINKED THEM TOGETHER; IS THAT RIGHT.

A. THE LITERATURE HAS LINKED THEM TOGETHER, THE MEDICAL INFORMATION.

Q. BUT THE MEDICAL LITERATURE AND THE FIRST ARTICLE I TALKED TO US, THAT 75 PERCENT

OF THE CASES ARE OF UNKNOWN ORIGIN? WHY DO YOU PICK ONE OF FOUR KNOWN ORIGINS INSTEAD SAYING, IT WAS OF UNKNOWN ORIGIN?

A. BECAUSE -- BECAUSE I THOUGHT -- THOUGHT IT WAS MOST LIKELY DO TO VINYL CHLORIDE. I STILL BELIEVE THAT. I MEAN, HOW WOULD YOU PROPOSE TO -- HOW WOULD YOU REASONABLY ASK ME TO CHANGE MY OPINION?

Q. WELL, LET ME ASK YOU THIS, DOCTOR.

THE COURT: WELL, LET ME SAY THIS. YOU CAN'T ASK QUESTIONS OF COUNSEL. THAT'S GETTING INTO AN ARGUMENTITIVE SITUATION. YOU ASK THE QUESTIONS, YOU ANSWER THEM.

THE WITNESS: OKAY.

BY MR. RENNEISEN:

Q. LET ME ASK YOU THIS, DOCTOR: IN MAKING YOUR DETERMINATION, DID YOU CONSIDER THAT THE MEDICAL LITERATURE INDICATES LATENCY PERIODS MUCH LONGER THAN MR. GRASSO'S?

A. IS THERE A QUESTION THERE? I MISSED IT.

Q. I THOUGHT IT WAS A QUESTION. LET ME ASK AGAIN.

IN MAKING YOUR DECISION THAT

IT'S VINYL CHLORIDE THAT CAUSED -- DID YOU CONSIDER THE FACT THAT THE MEDICAL LITERATURE INDICATES LATENCY PERIODS GREATER THAN MR. GRASSO'S LATENCY PERIOD?

A. I DID.

Q. IN MAKING YOUR DECISION, DID YOU CONSIDER THE FACT THAT OF THE KNOWN CASES WHICH THE MEDICAL PROFESSION HAS ATTRIBUTED TO VINYL CHLORIDE EXPOSURE TO ANGIOSARCOMA, THE PEOPLE WHO CONTRACTED ANGIOSARCOMA HAD INTENSE EXPOSURE IN THE WORK PLACE?

A. YES.

Q. AND, DID YOU CONSIDER THE FACT THAT MR. GRASSO DID NOT HAVE INTENSE EXPOSURE IN THE WORK PLACE; IS THAT CORRECT?

A. I CAN'T TESTIFY TO WHAT EXPOSURE HE REALLY HAD, WHERE HE WORKED. BUT I -- IF YOU TAKE THAT AS A GIVEN AND HE DIDN'T HAVE ANY EXPOSURE WHERE HE WORKED --

Q. THE EXPOSURE --

A. THEN I DID CONSIDER IT, YES.

Q. THE EXPOSURE YOU KNEW ABOUT WAS LIVING APPROXIMATELY TWO MILES FROM THE PLANT?

A. AND BEING TOLD BY DOCTOR NEELD AT DUPONT THAT THEY DIDN'T MAKE QUANTITIES OF

VINYL CHLORIDE.

Q. HE ACTUALLY TOLD YOU THEY HAD SOME, DIDN'T HE?

A. HE TOLD ME THEY HAD NONE, BUT I SUBSEQUENTLY LEARNED THAT THEY HAD SOME IN A DIFFERENT AREA WHERE HE DIDN'T WORK. I THINK IT WAS TO FILL -- FILL OUT THE AIR SOLES, I BELIEVE.

Q. DID YOU -- AND I THINK YOU'VE ALREADY TOLD ME THAT YOU DIDN'T MAKE ANY VESSELS TO ELIMINATE ARSENIC AS A CAUSE?

A. WHERE BLOOD ARSENIC LEVELS DONE ON HIS AUTOPSY, NO, BUT THE POSTMORTUM DIDN'T SHOW ANY EVIDENCE OF CHRONIC ARSENIC COMPOST AS FAR AS WE CAN TELL.

Q. INCIDENTALLY, DOCTOR, JUST SOMETHING THAT YOU SAID EARLIER, WHEN MR. GRASSO WAS -- WAS CAUGHING UP BLOOD, WAS THAT BECAUSE IT IS LIVER CANCER HAD SPREAD TO HIS LUNGS?

A. YES, I BELIEVE.

Q. SO THAT EVEN THOUGH THERE WERE NO TUMORS ON THE X-RAYS IN MAY OF 1976, IT WOULD HAVE MEANT THAT THERE WERE SOME BLOOD INVOLVEMENT BY THAT TIME; IS THAT CORRECT?

A. I HAVEN'T GOT A X-RAY. JUNE IS THE

EARLIEST X-RAY I'VE SEEN.

Q. WELL, HE WAS CAUGHING UP BLOOD IN MAY, I BELIEVE.

A. YES.

Q. ACCORDING TO THE TESTIMONY WE HAD HERE.

A. ONE WOULD SUSPECT THAT THE TUMOR IS PRESENT.

Q. IN THE LITERATURE THAT YOU WERE FAMILIAR WITH -- I GUESS THIS IS A VIOLATION OF THE COPYRIGHT LAWS -- BUT ARE YOU FAMILIAR WITH THIS DOCUMENT WHICH -- WHICH WAS A PUBLICATION OF THE NEW YORK ACADEMY OF SCIENCE, TOXICITY OF VINYL CHLORIDE, POLYVINYL CHLORIDE?

A. NO, I'M NOT.

THE COURT: ARE YOU GOING TO BE LONG.

MR. RENNEISEN: NO, I'M VERY CLOSE TO BEING FINISHED.

THE COURT: BECAUSE I'M HOLDING UP THE RECESS. WILL THERE BE REDIRECT, MR. VASSALOTTI?

MR. VASSALOTTI: JUST A COUPLE OF QUESTIONS, YOUR HONOR.

BY MR. RENNEISEN:

Q. WHEN YOU SAID THAT YOU WERE FAMILIAR WITH SOME LITERATURE IN THE FIELD THAT DISCUSSED THE RELATIONSHIP BETWEEN VINYL CHLORIDE AND ANGIOSARCOMA, DO YOU RECALL NOW WHO THE AUTHORS OF THAT LITERATURE WERE?

A. WELL, I HAD SOME OF THE LITERATURE OVER THERE THAT I BROUGHT ALONG THAT --

Q. I WON'T TEST YOUR MEMORY.

A. BUT I MEAN THE BASIC REVIEW ARTICLE IN THE MEDICAL COMMUNITY IS THE ANDERSON INTERNAL MEDICINE. AND I READ THAT.

Q. AND THESE ARE PUBLISHED BY ACCEPTED PUBLISHING HOUSES THAT KEEP THEM APPRISED OF LATEST DEVELOPMENTS; IS THAT RIGHT?

A. YES.

Q. AND THAT LITERATURE INDICATED TO YOU THE LONG LATENCY PERIODS THAT YOU AND I HAVE BEEN TALKING ABOUT; IS THAT CORRECT?

A. IT INDICATED THERE WAS A LATENCY PERIOD, YES.

Q. AND THAT SAME LITERATURE DISCUSSED THE CONCENTRATION LEVELS TO WHICH ANGIOSARCOMA -- ANGIOSARCOMA PATIENTS HAD BEEN EXPOSED WHEN THEY WERE EXPOSED TO VINYL

CHLORIDE; IS THAT TRUE?

A. YES, IT HAD SOME NUMERICAL PHYSICIAN, YES.

Q. AND THOSE FIGURES, AGAIN, WOULD YOU TELL ME WERE AGAIN IN HUNDREDS OF PARTS PER MILLION?

A. YEAH.

Q. ON A REGULAR BASIS IN THE WORK PLACE; IS THAT CORRECT?

A. YES.

MR. RENNEISEN: THANK YOU, DOCTOR.

THE COURT: REDIRECT.

MR. VASSALOTTI: NO, YOUR HONOR.

THE COURT: I HAVE NO FURTHER QUESTIONS.

THE COURT: LADIES AND GENTLEMEN, LET'S TAKE OUR MORNING RECESS, TEN MINUTES.

(JURY LEAVES THE COURTROOM.)

THE COURT: TEN MINUTES RECESS. YOU MAY STEP DOWN.

(RECESS.)

(THE FOLLOWING TAKES PLACE IN OPEN COURT WITH

THE JURY PRESENT.)

THE COURT: CALL YOUR NEXT WITNESS.

MR. VASSALOTTI: THANK YOU, YOUR HONOR. DOCTOR SAMUEL EPSTEIN.

SAMUEL EPSTEIN SWORN.

DIRECT EXAMINATION BY MR. VASSALOTTI.

Q. DOCTOR, BY WHOM ARE YOU PRESENTLY EMPLOYED?

A. THE UNIVERSITY OF ILLINOIS MEDICAL CENTER IN CHICAGO.

Q. AND WHAT IS YOUR POSITION WITH THE UNIVERSITY OF ILLINOIS MEDICAL CENTER?

A. I'M PROFESSOR OF OCCUPATIONAL AND ENVIROMENTAL MEDICINE.

Q. CAN YOU DESCRIBE THE AREA OF MEDICINE AND/OR TOXICOLOGY THAT YOU ARE INVOLVED WITH IN THAT POSITION?

A. MY MAJOR PROFESSIONAL INTERESTS RELATING TO THE TOXICS AND CANCER CAUSING OR CARCINOGENIC EFFECTS OF CHEMICALS IN THE ENVIRONMENT WITH PARTICULAR REFERENCE TO POLLUTANTS IN AIR, FOOD, WATER AND THE WORK PLACE.

Q. YOU ARE A MEDICAL DOCTOR?

THE SLIDES THAT YOU HAD SHOWN US WERE GRAPHS OR CHARTS OR CASES OF DIAGNOSED ANGIOSARCOMA AND EXPOSURE TO -- THE POPULATION EXPOSED AND COMPARING THE TWO; IS THAT CORRECT?

A. THE GRAPHS THAT I SHOWED WERE ALL OF THE CASES OF ANGIOSARCOMA RELATED TO VINYL CHLORIDE EXPOSURE.

Q. WELL, WHEN YOU SAY RELATED TO VINYL CHLORIDE EXPOSURE, WAS IT REALLY RELATED TO VINYL CHLORIDE EXPOSURE OR VINYL CHLORIDE EXPOSURE OF PVC WORKERS?.

A. NO. THE -- THE TERM PVC -- AND I THINK IN VINYL CHLORIDE, I USE, I THINK, A LITTLE MORE SEPARATELY. THE OCCURRENCE OF ANGIOSARCOMA HAS OCCURRED NOT IN THE PRODUCTION, THE MAKING OF VINYL CHLORIDE. IT HAS BEEN ASSOCIATED WITH VINYL CHLORIDE BEING USED TO FORM THE POLYMER, PVC. AND IT HAS NOT BEEN ASSOCIATED WITH THE POLYVINYL CHLORIDE BEING USED FOR FABRICATIONS. AND ALL THE ANGIOSARCOMA CASES THAT ARE SHOWN IN THERE ARE THOSE WHOSE DEVELOPMENT OF THE TUMOR AND THEIR WORK HISTORIES SHOW SOME OR VARYING DEGREES OF WORK-RELATED CONVERSION OF VINYL CHLORIDE TO POLYVINYLCHLORIDE.

Q. WHAT GROUP WAS THAT YOU STUDIED IN EPIDEMIOLOGICAL STUDIES. IT'S CALLED A COHORT, ISN'T IT? IS THAT WHAT YOU CALLED A GROUP?

A. THIS WAS NOT A COHORT STUDY. THIS SIMPLY IDENTIFIES ALL THE CASES THAT WE HAVE THAT WE KNOW OF IN THE LITERATURE, FROM OUR OWN EXPERIENCE, FROM OTHER PLANTS, AND WE'RE LOOKING AT THESE ANGIOSARCOMAS AND CHARACTERIZING GOING ON THEIR CLINICAL, HISTOLOGICAL, PHYSICAL CHARACTERISTICS, THEIR EXPOSURE HISTORIES.

Q. OKAY. IN YOUR DIRECT TESTIMONY, YOU MENTIONED THAT DOCTOR MATALONI HAD DONE SOME STUDIES ON THE CANCER-CAUSING EFFECTS OF VINYL CHLORIDE. I THINK YOU TESTIFIED THAT HE FOUND ANGIOSARCOMAS IN RATS EXPOSED TO 25 PARTS PER MILLION.

A. I BELIEVE THAT WAS THE LOWER DOSE WHICH HE FOUND OUT.

Q. DID HE FIND CHANGES YES, SIR OF ANY OTHER KINDS IN DOSES LOWER THAN THAT?

A. YES, HE REPORTED THAT.

Q. HOW FAR DOWN DID HE GO?

A. IF I RECALL CORRECTLY, I THINK HE

HAD A TUMOR IN ONE ANIMAL -- I'VE FORGOTTEN WHICH ORGAN SYSTEM -- ONE PART PER MILLION.

Q. ONE PART PER MILLION?

A. I THINK THAT'S CORRECT. I'D HAVE TO CHECK THE LITERATURE AGAIN. IT WAS EITHER AT ONE OR AT FIVE.

YOU AN ARTICLE THAT'S ENTITLED "VINYL CHLORIDE CARCINOGENICITY AND EXPERIMENTAL MODEL FOR CARCINOGENIC STUDIES." IT'S BY C. MATALONI. IS THAT THE PROFESSOR MATALONI THAT WE'VE BEEN TALKING ABOUT?

A. YES.

Q. PAGE 133 OF THIS PUBLICATION, THERE'S A CHART THAT INDICATES THE LEVELS OF EXPOSURE TO WHICH MR. MATALONI -- DOCTOR MATALONI EXPOSED THESE ANIMALS.

A. RIGHT.

Q. IS THERE A TEST FOR -- WAS A STUDY DONE AT ONE PART PER MILLION?

A. YES, THERE WAS.

Q. AND WERE ANY CANCER -- CANCEROUS FINDINGS LOCATED?

A. PART 12, FOUR FROM OTHER SITES AND EIGHT IN THIS CHART SHOWS THAT HE

DEMONSTRATED IN A 120 ANIMALS THAT THERE WERE A TOTAL OF 12 CANCERS OF WHICH FOUR WERE FROM UNSPECIFIED SITES AND EIGHT WERE WERE FROM MAMMILLARY CANCER.

Q. THAT WAS AT ONE PART PER MILLION?

A. THAT IS CORRECT.

Q. DOCTOR, IN A LOT OF THE ARTICLES THAT I'VE READ AND I THINK IN SOME OF YOUR TESTIMONY HERE TODAY, WHEN WE'VE BEEN CONCERNED ABOUT OR WHEN YOU AND THE PROFESSION HAVE BEEN CONCERNED ABOUT EXPOSURES OR DETERMINING WHAT THE EXPOSURE OF AN EMPLOYEE WAS TO VINYL CHLORIDE, IT'S COMMONLY BEEN QUANTIFIED IN TERMS OF PARTS PER MILLION; IS THAT CORRECT?

A. THAT'S CORRECT.

Q. 50 PARTS PER MILLION MEASURED AT ACTUALLY WHAT THE WORKERS WOULD HAVE BEEN EXPOSED TO; IS THAT CORRECT, OR ESTIMATED AT WHAT THE WORKERS WOULD HAVE BEEN EXPOSED TO?

A. THOSE ARE ESTIMATES, THAT'S CORRECT.

Q. IN OTHER WORDS, IF A MAN WERE CLEANING A REACTOR, BASED UPON THE INFORMATION YOU DESCRIBED AS TO HOW IT WAS DETERMINED THAT HE WAS EXPOSED TO HIGH LEVELS,

YOU WOULD SAY THAT WHILE HE WAS CLEANING THE REACTOR, HE WAS EXPOSED TO MAYBE UP TO 500, 500 PARTS PER MILLION OF VINYL CHLORIDE?

A. I COULD HAVE.

Q. WHILE HE WAS CLEANING IT?

A. YES.

Q. I NOTICE THAT IN NONE OF THE LITERATURE THAT I HAVE SEEN AND NONE OF YOUR TESTIMONY REGARDING THE LITERATURE IS THERE ANY TALK OF THE ANNUAL AVERAGE EXPOSURE OF THESE PEOPLE. IN DETERMINING OR IN TRYING TO ESTIMATE THE CANCER-CAUSING EFFECTS OF VINYL CHLORIDE, ARE YOU INTERESTED IN THE DIRECT EXPOSURE OF AN EMPLOYEE OR HIS ANNUAL AVERAGE EXPOSURE OR BOTH?

A. BOTH. THERE IS A CONCERN OVER ACCURACY WHEN ONE IS DOING ESTIMATES BASED ON PAST MEMORY. THAT IS ONE OF THE REASONS WHEN WE DID OUR STUDY, WE DID IT ON THE BASIS OF RANK ORDERING, BECAUSE IN THE RANK ORDERING DONE ON EACH INDIVIDUAL YEAR THAT AN INDIVIDUAL WORKS, IT TAKES INTO CONSIDERATION THAT WHATEVER VARIATION HAPPENED FROM YEAR TO YEAR, THAT VARIATION IS KEPT CONSTANT IN THE ENTIRE WORK POPULATION, SINCE YOU TREAT IT IN

THE SAME WAY WHEN YOU RANK THEM. THAT'S ONE OF THE REASONS WE THINK THE RANK SYSTEM FOR RETROSPECTIVE STUDIES HAS WORKED WELL.

FOR PROSPECTIVE STUDIES, THAT IS GOING FORWARD AND DOING SOMETHING, THE ACTUAL MEASUREMENT WOULD BE THE BEST. NOW, IF WE WERE TO TAKE OUR ESTIMATES IN ANY COMBINATION THAT YOU WANT AND USE TEN PARTS PER MILLION OR 50 OR A HUNDRED, AND ASSUME THAT IT'S ON A SEVEN DAY -- SEVEN HOUR A DAY, FIVE DAYS A WEEK, 50 WEEKS A YEAR PROCESS AND THEN AGAINST THE NUMBER OF YEARS, YOU FIND STILL THOSE INDIVIDUALS WITH TOTAL EXPOSURES IN -- UNDER THE RANGE OF WHAT WOULD HAVE BEEN EQUIVALENT TO OR APPROXIMATELY IN THE RANGE OF 50 PARTS PER MILLION, NOT SHOWING OR HAVING ANY ANGIOSARCOMA CASES AMONG THE WORKER POPULATION. AND THAT'S SURPRISING. ONE WOULD HAVE EXPECTED IF THE LOWER LEVELS WERE ABLE TO INDUCE CANCER FOR THAT EVENT TO OCCUR. NOW, SOME OF US FELT THAT WOULD EVENTUALLY SHOW UP, BUT IT'S NOW BEEN SEVEN YEARS SINCE IT WAS FIRST DISCOVERED AND WE STILL HAVEN'T SEEN IT. IN FACT, WE'VE SEEN JUST THE OPPOSITE. WE'VE

... THE DIMINUTION OF THE NUMBER OF CASES.

DOCTOR, YOUR EXPLANATION OF THE ...BOLISM OF VINYL CHLORIDE IN THE LIVER AND ... RELATIONSHIP TO THE CANCER PROMOTING ...ACTERISTICS OF VINYL CHLORIDE, IS THAT ...NY GENERALLY ACCEPTED IN THE MEDICAL ... AS DEFINING THE CAUSAL CONNECTION ...EEN VINYL CHLORIDE AND CANCER?

THE WAY SCIENTIFIC DATA IS ACCEPTED ...HAT AFTER YOU'VE DONE AN EXPERIMENT OR ...'VE DONE WORK, YOU WRITE IT UP AND YOU ...NT IT TO SCIENTIFIC JOURNALS WHERE YOUR ... PEOPLE OF EQUAL EXPERIENCE OR EQUAL ...STS, REVIEW THAT FOR ITS CREDIBILITY, ...CURACY, ITS SCIENTIFIC MERIT. AND THEN ... EITHER ACCEPTED OR IT'S NOT ACCEPTED FOR ...ICATION.

NOW, WHAT YOU CONCLUDE AS ... ACCEPTED AT THE TIME IS BASED ON ...AL KNOWLEDGE, SCIENTIFIC KNOWLEDGE. AND ...EORIES WE'VE PROPOUNDED OR I'VE ...OUNDED AND WRITTEN ABOUT IN PUBLICATIONS ...EEN SUBMITTED TO SCIENTIFIC JOURNALS, ...EEN ACCEPTED AND HAVE BEEN PUBLISHED. ...DON'T WANT TO SOUND IMMODEST, BUT I

PRESUME THAT MY PEERS HAVE FOUND THIS TO BE SCIENTIFICALLY ACCEPTABLE IN THE --

Q. YOUR METHODS ARE SCIENTIFICALLY ACCEPTABLE. BUT WHAT I'M INTERESTED IN, ARE YOUR CONCLUSIONS ACCEPTED BY THE MEDICAL COMMUNITY AS A DEFINITION OF THE MECHANICS OF HOW VINYL CHLORIDE CAUSES CANCER OR IS IT ACCEPTED AS A HYPOTHESIS?

A. YOU MEAN, IS THIS FACT?

Q. IS IT FACT?

A. A HUNDRED PERCENT, NO; THOSE ARE HYPOTHESES BASED ON THE DATA WE NOW PRESENTLY HAVE AND THIS HAS BEEN MODIFIED SINCE 1974 AND UPDATED. AND AS WE GATHER NEW FACTS, IT WILL BE MODIFIED MORE.

Q. BUT IT REMAINS A HYPOTHESIS AT THIS POINT?

A. THAT'S RIGHT.

Q. NO ONE KNOWS FOR SURE HOW VINYL CHLORIDE CAUSES CANCER?

A. THAT'S TRUE. WE DON'T KNOW HOW ANY AGENT CAUSES CANCER.

Q. DOCTOR, YOU'VE MENTIONED THAT YOU BELIEVE THAT EVEN IF MR. GRASSO WERE EXPOSED TO THREE PARTS PER MILLION OF VINYL

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CHLORIDE OVER THE FIVE AND A HALF, SIX YEAR PERIOD THAT WE HAVE HERE, THAT, IN YOUR OPINION, DOES NOT BE THE CAUSE OF HIS ANGIOSARCOMA OF THE LIVER.

A. WHAT --

Q. DOES THAT MEAN THREE PARTS PER MILLION IS A SAFE LEVEL OF EXPOSURE TO VINYL CHLORIDE?

A. WHAT I'VE SAID IS THAT I DO NOT BELIEVE THAT THERE'S A CAUSAL RELATIONSHIP HERE BECAUSE WE HAVE NO EPIDEMIOLOGICAL AND BIOLOGICAL DATA IN ANY OF THE OTHER STUDIES DONE THAT SHOW THAT THAT LEVEL OF EXPOSURE, EVEN FOR LONGER PERIODS OF TIME THAN MR. GRASSO HAD, HAVE DEVELOPED LIVER DISEASE OR ANGIOSARCOMA.

Q. EVERY INDIVIDUAL, THOUGH, IS DIFFERENT IN IN HIS SUSCEPTIBILITY TO A CHEMICAL CAUSING CANCER, ISN'T HE?

A. THAT'S TRUE. BUT I'M AGAIN GOING THIS ON THE BASIS OF THE FACT THAT WE'RE DEALING WITH NOT ABSOLUTES, BUT PROBABILITY.

Q. I UNDERSTAND THAT. NOW, YOU'VE PICKED THREE PARTS PER MILLION AVERAGE, APPARENTLY FOR SOME REASON. IS THAT THAT YOU

CONSIDER --

MR. RENNEISEN: OBJECTION, YOUR HONOR. THERE'S NO EVIDENCE IN THIS CASE THAT THERE WAS AN AVERAGE OF THREE PARTS PER BILLION AT ALL.

MR. VASSALOTTI: YOUR HONOR, I READ IN -- AND THE DOCTOR AGREED A HALF HOUR AGO THAT HE HAD TOLD SOMEONE -- AND I GOT THE INFORMATION FROM MR. RENNEISEN -- THAT EVEN IF MR. GRASSO WERE EXPOSED AT A LEVEL OF THREE PARTS PER MILLION DURING THIS ENTIRE TIME, THAT THAT WOULD NOT BE THE CAUSE OF HIS CANCER.

THE COURT MR. RENNEISEN YOU'RE SPEECHLESS.

MR. RENNEISEN: I ASKED THE DOCTOR IF PLAINTIFF PROVED THREE PARTS PER MILLION ON A --

THE COURT: I'M GOING TO ALLOW THE QUESTION. YOU MAY PROCEED. OBJECTION OVERRULED.

BY MR. VASSALOTTI:

Q. IS THAT WHERE YOU GOT THE THREE PARTS PER MILLION?

A. NO. WHAT I HAVE SIMPLY SAID, THAT

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STATE, THAT WE HAVE NO DATA THAT ANYTHING BELOW TEN PARTS PER MILLION IN HUMAN DATA, AS WELL AS ANIMAL DATA PRODUCES AN ANGIOSARCOMA. SO, SOMEONE HAS THREE, SON SOMEONE HAS TWO, SOMEONE HAS FIVE, I WOULD DRAW THE SAME CONCLUSION BASED ON THE DATA.

Q. BASED UPON YOUR OPINION THAT THAT IS NOT ENOUGH?

A. BASED ON A SCIENTIFIC --

Q. NOT ENOUGH OF AN EXPOSURE?

A. YEAH.

Q. IS THERE ANY PRESENTLY ACCEPTABLE WAY TO DETERMINE RELIABLY IF THERE'S ANY SAFE LEVEL OF EXPOSURE TO A CHEMICAL CARCINOGEN?

A. MAKING THE ASSUMPTION THAT NO CHEMICAL PRESENT, THEREFORE, NO CANCER, IS THE BASIS AND THE ONLY ABSOLUTE WE HAVE. SINCE WE CAN'T DO THIS ENVIRONMENTALLY IN HUMANITIES, WE ARE NOW DEALING WITH A CONCEPT OF WHETHER OR NOT THERE IS A LEVEL WHERE THE OCCURRENCE OF A CANCER WILL NOT BE ANY GREATER IN ONE INDIVIDUAL THAN IT WOULD BE IN ANY OTHER INDIVIDUAL. AND THAT'S WHAT THE EXPECTED AVERAGES OF TUMOR OCCURRENCES ARE ABOUT. AND WE HAVE

OR OTHERWISE AT PRESENT, THAT PEOPLE WHO ARE EXPOSED TO UNDER TEN PARTS PER MILLION HAVE ANY GREATER INCIDENCE OF LIVER ANGIOSARCOMA THAN THOSE THAT HAVE NO PARTS PER MILLION. AND SO, EPIDEMIOLOGICALLY, THE PROBABILITY IS THAT THAT'S NOT AN ASSOCIATION.

Q. WELL, LET ME ASK YOU THE QUESTION AGAIN, BECAUSE I DON'T KNOW IF YOU ANSWERED --

IS THERE ANY PRESENTLY ACCEPTABLE WAY IN THE MEDICAL COMMUNITY TO DETERMINE RELIABLY IF THERE'S A SAFE THRESHOLD LEVEL FOR A CHEMICAL CARCINOGEN?

A. YES, I THINK THE METHOD I'VE JUST OUTLINED IS A -- THE BEST AND MOST RELIABLE METHOD. IF YOU SHOW THAT AN INDIVIDUAL OR A GROUP OF INDIVIDUALS ARE AT NO GREATER RISK IN THE OCCURRENCE OF A TUMOR THAN ANOTHER GROUP THAT HAS TOTALLY NO EXPOSURE TO THE SAME ENVIRONMENT, YOU HAVE DEMONSTRATED AS BEST WE CAN THAT THEY'RE AT NO GREATER RISK.

Q. SO FAR, THERE'S BEEN NO GREATER RISK?

A. RIGHT.

Q. THAT'S YOUR OPINION, DOCTOR; IS THAT CORRECT?

A. NO, THAT IS A STANDARD PROCEDURE FOR SCIENCE IN GENERAL AND HAS BEEN THE WAY BY WHICH THE ORIGINAL STANDARD WAS SET. THE ORIGINAL --

Q. DOCTOR, ARE YOU FAMILIAR WITH A GROUP KNOWN AS THE INTERAGENCY REGULATORY LIAISON GROUP WHICH PUBLISHED A -- WHICH IS A GROUP CONSISTING OF MEMBERS OF THE JURY OF THE CONSUMER PRODUCTS SAFETY COMMISSION, THE ENVIRONMENTAL PROTECTION AGENCY, THE FOOD AND DRUG ADMINISTRATION AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION.

A. I'VE HEARD OF THE GROUP.

Q. ARE YOU FAMILIAR WITH THEIR PUBLICATION, SCIENTIFIC BASIS FOR IDENTIFICATION OF POTENTIAL CARCINOGENS AND EMISSIONS -- I'M SORRY, AND ESTIYATIONS OF RISKS?

A. NO, I'M NOT FAMILIAR WITH THAT PUBLICATION.

Q. IS THAT A GOVERNMENT BODY THAT DID THAT STUDY?

A. THOSE ARE GOVERNMENT BODIES. I DON'T KNOW THAT THAT'S A STUDY.

Q. WELL, LET ME SHOW YOU THE STUDY,

DOCTOR.

THIS IS IN THE JOURNAL OF THE NATIONAL CANCER INSTITUTE, JULY OF 1979. WOULD YOU TAKE A LOOK AT THAT? (HANDING.)

(BRIEF PAUSE.)

MR. RENNEISEN: YOUR HONOR, IF THE WITNESS IS BEING ASKED TO READ THE WHOLE THING, I --

THE WITNESS: I'M JUST READING THE ABSTRACT, IF THAT'S PERMISSIBLE.

MR. RENNEISEN: IF HE'S BEING ASKED TO READ THE WHOLE THING, I THINK IT'S TEN OR 15 MINUTES LONG.

MR. VASSALOTTI: I'D LIKE TO GIVE HIM A --

THE COURT: HE SAID HE'S READING THE ABSTRACT.

MR. RENNEISEN: HE SAID HE NEVER SAW THE DOCUMENT BEFORE.

THE WITNESS: THERE'S PARTS OF THIS DOCUMENT THAT HAVE BEEN PUBLISHED OTHER PLACES, BUT I'VE NEVER SEEN THIS PARTICULAR DOCUMENT.

BY MR. VASSALOTTI:

Q. LET ME REFER YOU TO PAGE 235 A --

ACTUALLY IT'S PAGES 264 AND 265. THERE'S A PARAGRAPH ENTITLED "LACK OF PREDICTABLE THRESHOLDS FOR AN EXPOSED POPULATION."

DOCTOR, DOES IT NOT SAY AT THE TOP OF PAGE 265 THAT THERE IS NO RELIABLE ACCEPTABLE WAY TO DETERMINE RELIABLY -- I'M SORRY. STRIKE THAT. LET ME START OVER AGAIN.

THERE IS PRESENTLY NO ACCEPTABLE WAY TO DETERMINE RELIABLY A THRESHOLD FOR A CARCINOGEN FOR AN ENTIRE POPULATION?

A. YES, IT DOES SAY THAT. BUT YOU'VE GOT TO REMEMBER THE WORD IS PREDICTABLE. AND WHAT I WAS POINTING OUT TO YOU EPIDEMIOLOGICALLY IT IS NOT PREDICTABLE. WHAT WE'RE DOING WITH EPIDEMIOLOGICAL STUDIES IS RETROSPECTIVELY SAYING THAT THAT LEVEL IS SAFE BASED ON EXPERIENCE. BUT THERE'S NO WAY TO PREDICT THAT A LEVEL WILL NOT PRODUCE A TUMOR WITHOUT ACTUALLY LOOKING AT THE EXPERIENCE. AND --

Q. ARE YOU SAYING THAT IF YOUR RETROSPECTIVE STUDIES SHOW THAT TEN PARTS PER MILLION IS SAFE, THAT YOU CAN'T ASSUME OR POSTULATE OR PREDICT THAT THAT LEVEL WILL BE

SAFE TOMORROW?

A. NO. I'M SAYING JUST THE OPPOSITE: THAT IF YOU HAVE ADEQUATE EXPERIENCE IN TIME, IN NUMBERS OF INDIVIDUALS, THAT SHOW THAT NO ONE'S DEVELOPED A DISEASE AT TEN PARTS PER MILLION, THAT THAT'S A REASONABLE PREDICTABLENESS THAT YOU WILL NOT DEVELOP THE DISEASE IN THE FUTURE.

Q. THAT'S YOUR OPINION?

A. NO, THAT'S SCIENTIFICALLY AN ACCEPTED PROCESS AND AS EACH SUCCESSIVE YEAR GOES ON, THAT'S HELD TRUE. YOU'RE MISREADING THAT. IT SAYS PREDICTING IT. WHAT WE'RE DOING IS BASING IT ON PAST EXPERIENCE, LONG YEARS OF EXPERIENCE AND BY CHARACTERIZATION OF THE DISEASE. AND YOU'RE SAYING ON THE BASIS OF THIS PAST EXPERIENCE, THIS VAST PAST EXPERIENCE, THAT BIOLOGICALLY, WE SHOULD NOT EXPECT SOMETHING TOO HAPPEN. AND THAT'S PREDICTABLE. BUT WHAT THEY'RE SAYING IS, YOU CANNOT SET UP ANY STUDY EITHER ANIMAL-WISE, HUMAN-WISE OR EPIDEMIOLOGICAL-WISE BEFORE THE FACT AND PREDICT WHETHER OR NOT A CHEMICAL WILL OR NOT NOT PRODUCE CANCER IN THE FUTURE. AND THAT'S TRUE.

Q. HOW ABOUT THE LAST SENTENCE OF THAT SECTION. COULD YOU READ THAT TO US?

A. "EVEN IF THRESHOLDS FOR CARCINOGENS COULD BE DEMONSTRATED FOR CERTAIN INDIVIDUALS OR FOR A DEFINED POPULATION, NO RELIABLE METHOD IS KNOWN FOR ESTABLISHING A THRESHOLD THAT COULD BE APPLIED TO THE TOTAL HUMAN POPULATION."

Q. DO YOU AGREE OR DISAGREE WITH THAT STATEMENT?

A. I WOULD AGREE WITH THAT STATEMENT.

Q. DOCTOR, ARE YOU FAMILIAR WITH THE GROUP KNOWN AS THE PRESIDENT'S COMMITTEE ON TOXIC SUBSTANCES STRATEGY?

A. I'VE HEARD OF THE GROUP.

Q. AND WAS THAT GROUP PUT TOGETHER TO STUDY TOXICOLOGICAL EFFECTS OF CHEMICAL SUBSTANCES, AMONG OTHERS?

A. YOU'RE ASKING THE QUESTION IN A FORMAT THAT IMPLIES THAT THEY WERE SET UP TO DO STUDIES.

Q. NO, I DON'T MEAN STUDIES.

A. THAT IS NOT MY UNDERSTANDING OF WHY THEY WERE SET UP. THEY WERE SET UP TO ADVISE AND MAKE RECOMMENDATIONS.

Q. MAKE RECOMMENDATIONS AS TO WHAT COURSE WE SHOULD TAKE IN HANDLING TOXIC CHEMICALS?

A. RIGHT.

Q. HAVE YOU SEEN THE REPORT OF THAT COMMITTEE?

A. ONLY PARTS OF IT.

Q. I HAVE THE WHOLE THING HERE. IT'S ENTITLED "TOXIC CHEMICALS AND PUBLIC PROTECTION, A REPORT TO THE PRESIDENT BY THE TOXIC SUBSTANCES STRATEGY COMMITTEE." THAT'S THE PRESIDENT OF THE UNITED STATES BY THE WAY. AND IT'S DATED MAY OF 1980.

I WANT TO READ TO YOU FROM PAGE ONE 53 OF THIS REPORT WHERE IT STATES: "METHODS -- " STRIKE THAT.

"METHODS NOW AVAILABLE FOR QUANTIFYING THE ESTIMATED HUMAN RISKS FROM A GIVEN EXPOSURE TO A POTENTIAL CARCINOGEN CAN BE -- " I'M SORRY, "CAN PROVIDE ONLY ROUGH APPROXIMATIONS OF THE ACTUAL RISKS."

YOU WANT ME TO READ THAT TO YOU AGAIN?

A. NO, I HEARD WHAT YOU SAID.

Q. DO YOU AGREE OR DISAGREE WITH THAT

STATEMENT?

A. I THINK ALL [illegible] DATA THAT I'VE STUDIED SAYS THAT'S [illegible] MAY BE DOING IT.

Q. ROUGH APPROX[illegible]TIONS?

A. WELL, THE AC[illegible] ROUGH --

Q. THAT'S WHAT [illegible]Y USE HERE. THAT'S WHY I'M ASKING YOU --

A. IF IN ROUGH [illegible]Y'RE TERMING BASED ON PROBABILITY, YES.

Q. DOCTOR, ARE [illegible] FAMILIAR WITH THE REGULATIONS OF THE DE[illegible]MENT OF OCCUPATIONAL SAFETY AND HEALTH REG[illegible]ING VINYL CHLORIDE?

A. I BELIEVE SO[illegible]E THEM.

Q. AND ARE YOU [illegible]LIAR -- WERE YOU INVOLVED AT ALL IN TH[illegible]RMULATION OF THOSE STANDARDS FOR LEVELS [illegible]TRYING TO SET UP CONTROLS ON THE LEVEL[illegible]F EXPOSURE TO VINYL CHLORIDE IN THE WORKP[illegible]?

A. NO, I WAS NO[illegible]

Q. ARE YOU FAMI[illegible]WITH THE REPORT OF THE NATIONAL INSTITUT[illegible]OCCUPATIONAL SAFETY AND HEALTH THAT WAS S[illegible]TTED IN CONNECTION WITH THE PREP[illegible]THAT REPORT REGARDING THE SAFETY OR [illegible]CITY OF VINYL CHLORIDE?

A. THERE WERE MANY REPORTS. IF YOU'RE SPEAKING TO THE FACT THAT THE ORIGINAL RECOMMENDATION HAD TO BE ZERO PARTS PER MILLION, YES.

Q. AND WHAT WAS THE LEVEL OF VINYL CHLORIDE EXPOSURE WHICH IS EMBODIED IN THE STANDARD OF THE OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION?

A. I BELIEVE IT TO BE ONE PART PER MILLION.

Q. DOCTOR, ARE YOU FAMILIAR WITH THE ENVIRONMENTAL PROTECTION AGENCY'S REGULATIONS REGULATE GOING ON THE EMISSION OF VINYL CHLORIDE GAS FROM VINYL CHLORIDE IN PVC PLANTS?

A. TO A LESSER DEGREE, YES.

Q. ARE YOU FAMILIAR WITH THE FACT THAT THE ENVIRONMENTAL PROTECTION AGENCY IN STUDIES THAT THEY MADE BEFORE ISSUING THIS STANDARD, DETERMINED THAT THERE WERE APPROXIMATELY 4.5 MILLION PEOPLE WHO LIVED WITHIN FIVE MILES OF VINYL CHLORIDE AND PVC PLANTS IN THE COUNTRY?

A. I HAVE HEARD THAT REPORT.

Q. AND THAT THIS POPULATION WAS EXPOSED

TO AN ANNUAL AVERAGE CONCENTRATION OF VINYL CHLORIDE IN THE RANGE OF 17 PARTS PER BILLION?

A. YES.

Q. AND BASED UPON THAT AND I'M SURE OTHER INFORMATION, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION -- I'M SORRY. THE ENVIRONMENTAL PROTECTION AGENCY, THIS IS THE FEDERAL AGENCY, PROMULGATED A STANDARD WHICH, IN EFFECT, INTENDED TO REDUCE EMISSIONS OF VINYL CHLORIDE FROM PVC PLANTS LIKE THE ONE IN QUESTION TO THE EXTENT OF 95 PERCENT?

A. YES.

Q. IN YOUR WORK FOR THE B.F. GOODRICH COMPANY, DOCTOR, AND THE GRANT THAT THEY GAVE YOU OR THE GRANTS, DID THE GOODRICH COMPANY PROVIDE YOU WITH ANY STUDIES REGARDING THE TOXICITY OR CARCINOGENICTY OF VINYL CHLORIDE THAT THEY HAD CONDUCTED BEFORE THEY RETAINED YOU?

A. NO, THEY DID NOT..

Q. DID YOU INQUIRE AS TO WHETHER ANY SUCH STUDIES HAD BEEN UNDERTAKEN?

A. YES, WE'VE DISCUSSED WHAT KINDS OF WORK THAT THEY HAD DONE AND WHAT OTHER COMPANIES HAD DONE.

Q. WELL, I'M LIMITING IT TO GOODRICH RIGHT NOW. HAD THEY DONE ANYTHING WHEN THEY FIRST CONTACTED YOU IN THIS AREA?

A. THEY HAD DONE STUDIES RELATED TO HUMANS, BUT NOT TO ANIMALS.

Q. THOSE STUDIES INVOLVED THE THREE CASES OF ANGIOSARCOMA THAT WERE DISCOVERED?

A. NO, THEY HAD ALREADY BEGUN A SCREENING PROGRAM, HAD DESIGNED THE SCREENING PROGRAM, HAD IMPLEMENTED A SCREENING PROGRAM, HAD LOOKED AT A NUMBER OF INDIVIDUALS WHO HAD NO CHEMICAL ABNORMALITIES, HAD MEDICALLY WORKED THEM UP; THEIR INITIAL SCREENING PROGRAM WAS REASONABLY STARTED BY THE TIME I ARRIVED AT THE UNIVERSITY OF LOUISVILLE.

Q. THAT WAS IN 1974?

A. 1974. THAT WAS BETWEEN JANUARY AND SEPTEMBER.

MR. VASSALOTTI: I HAVE NOTHING FURTHER, DOCTOR, THANK YOU.

THE COURT: ANY REDIRECT?

MR. RENNEISEN: I MAY HAVE JUST ONE QUESTION.

REDIRECT EXAMINATION BY MR. RENNEISEN.

BY MR. RENNEISEN:

Q. DOCTOR, AT THE END OF YOUR CROSS-EXAMINATION THERE, YOU WERE ASKED ABOUT AN E.P.A. REGULATION THAT REDUCED EMISSIONS FROM POLYVINYLCHLORIDE PLANTS. DO YOU KNOW THE DATE OF THAT REGULATION?

A. NO, I DON'T.

Q. DO YOU KNOW -- IT'S BEEN TESTIFIED TO EARLIER IN THIS CASE THAT THE ONE PART PER MILLION WORK PLACE REQUIREMENT WAS, I THINK, IN LATE 74; WAS THE OTHER REGULATION BEFORE OR AFTER THAT?

A. I THINK IT WAS AFTER.

MR. RENNEISEN: I HAVE NO FURTHER QUESTIONS.

THE COURT: ANYTHING FURTHER.

MR. VASSALOTTI: NOTHING, YOUR HONOR.

THE COURT: ALL RIGHT. THANK YOU VERY MUCH, DOCTOR. YOU MAY STEP DOWN.

ANY FURTHER WITNESSES?

MR. RENNEISEN: I HAVE NO FURTHER WITNESSES. I HAVE EXHIBITS TO OFFER INTO EVIDENCE, BUT I BELIEVE AFTER THE JURY IS DISMISSED.

THE COURT: WITH THE

EXCEPTION OF INTRODUCING SUCH EXHIBITS, THE DEFENSE RESTS; IS THAT CORRECT?.

MR. RENNEISEN: YES, YOUR HONOR.

THE COURT: DO YOU HAVE ANY REBUTTAL?

MR. VASSALOTTI: NOTHING, YOUR HONOR.

THE COURT: ALL RIGHT, SO YOU HAVE RESTED.

MR. VASSALOTTI: RESTED.

THE COURT: LADIES AND GENTLEMEN, I THINK WHAT WE'LL DO IS THIS: THIS CASE, FOR ALL INTENTS AND PURPOSES AS FAR AS TESTIMONY AND EVIDENCE IS CONCERNED, IS FINISHED. NOW, THERE ARE CERTAIN LEGAL ARGUMENTS I MUST HEAR AND CERTAIN PROCEDURES I MUST FOLLOW AT THIS TIME. AND THAT MAY TAKE SOME TIME. SO RATHER THAN FIND YOURSELVES IN THE POSITION OF HAVING SUMMATIONS AND CHARGE LATE IN THE DAY, I'M GOING TO EXCUSE YOU FOR THE BALANCE OF THE DAY AND WE'LL COME BACK TOMORROW MORNING AT 9:30, AT WHICH TIME THERE WILL BE SUMMATIONS BY COUNSEL, FOLLOWED BY MY CHARGE AS TO THE LAW AND THEN YOU WILL THEN

HAVE THE CASE AND WILL TAKE THE CASE WITH YOU TO THE JURY DELIBERATION ROOM AND DELIBERATE UNTIL YOU HAVE REACHED A DETERMINATION. SO, TOMORROW WILL BE A REAL WORKING DAY. OUR WORK HAS STOPPED AFTER TOMORROW AND YOUR WORK REALLY BEGINS. SO, I THINK THAT THIS IS THE BEST COURSE OF ACTION TO FOLLOW.

NOW, LADIES AND GENTLEMEN, AS I HAVE CAUTIONED YOU BEFORE AND WILL CONTINUE TO -- WELL, NO LONGER, BUT AS I'VE CAUTIONED YOU BEFORE, UNTIL THIS CASE IS SUBMITTED TO YOU FOR YOUR DELIBERATIONS, YOU MUST NOT DISCUSS THIS CASE WITH ANYONE OR REMAIN WITHIN HEARING OF ANYONE DISCUSSING IT. NEITHER SHOULD YOU READ ANY NEWSPAPER ARTICLE, LISTEN TO RADIO BROADCAST NOR VIEW ANY TELEVISION PROGRAM THAT DISCUSSES THIS CASE.

IF, HOWEVER, YOU SHOULD BECOME AWARE OF ANY SUCH STORY, ARTICLE OR NEWS REPORT, YOU ARE TO REPORT THAT MATTER TO ME IN MY CHAMBERS AT YOUR EARLIEST OPPORTUNITY SO THAT WE MAY DISCUSS IT.

NEEDLESS TO SAY, SHOULD YOU HAVE SUCH EXPOSURE, YOU SHOULD NOT MENTION THAT FACT TO ANY OF YOUR FELLOW JURORS. YOU

ARE TO KEEP AN OPEN MIND AND YOU MUST NOT DECIDE ANY ISSUE IN THIS CASE UNTIL THE CASE IS SUBMITTED TO YOU FOR YOUR DELIBERATIONS UNDER THE INSTRUCTIONS OF THE COURT.

NOW, WE'RE AT A VERY CRITICAL STAGE IN THIS CASE, SO, PLEASE, I WANT TO EMPHASIZE AGAIN, DON'T DISCUSS THIS WITH ANYONE, NOT EVEN AMONGST YOURSELVES. BECAUSE THE TIME TO DISCUSS THE CASE AMONGST YOURSELVES IS IN JURY ROOM WITH ALL OF YOU TOGETHER AND AFTER YOU HAVE HEARD THE SUMMATIONS AND MY CHARGE. SO, WITH THAT, I'LL EXCUSE YOU UNTIL TOMORROW MORNING AT 9:30.

(AT WHICH TIME THE JURY LEAVES THE COURTROOM.)

THE COURT: ALL RIGHT.

MR. RENNEISEN: I'LL TAKE THE EXHIBITS IN ORDER, YOUR HONOR, I THINK.

THE COURT: YES.

MR. RENNEISEN: YOUR HONOR, D-1 IS A SCETCH I MADE SHOWING WIND DIRECTIONS WHICH WAS PREPARED DURING THE CROSS-EXAMINATION OF PROFESSOR PESKIN.

THE COURT: ANY OBJECTION TO D-1?

MR. VASSALOTTI: NO, I HAVE NO OBJECTION.

THE COURT: IN EVIDENCE

(D-1 IS MARKED IN EVIDENCE.)

MR. RENNEISEN: D-2 IS ANOTHER SKETCH I MADE SHOWING WIND DIRECTION DURING THE EXAMINATION OF PROFESSOR PESKIN.

THE COURT: ANY OBJECTION?

MR. VASSALOTTI: NO OBJECTION.

THE COURT: IN EVIDENCE

(D-2 IS MARKED IN EVIDENCE.)

MR. RENNEISEN: D-3 IS PROFESSOR PESKIN'S REPORT WHICH I WITHDRAW.

D-4 IS AN ARTICLE THAT NEVER GOT A STICKER ON IT BECAUSE THE ONLY COPY I HAD WAS UNDERLINED AND I HAVE NOT BEEN ABLE TO LOCATE A CLEAN COPY OF IT. IT IS A REPORT THAT I WAS USING WHEN I CROSS-EXAMINED DOCTOR EPSTEIN BY PETER BAXTER PRINTED IN THE BRITISH MEDICAL JOURNAL, OCTOBER, 1977. I COULD PUT A STICKER ON IT.

MR. VASSALOTTI: YOU INTEND TO OFFER THAT INTO EVIDENCE?

MR. RENNEISEN: YES, I DO.

MR. VASSALOTTI: I OBJECT TO

THAT, YOUR HONOR.

THE COURT: SHOW ME THAT RULE THAT SAYS I CAN PUT THAT IN EVIDENCE.

MR. RENNEISEN: MY EXPLANATION FOR IT, WHY IT GOES INTO EVIDENCE IS BECAUSE THERE WAS A DIFFERENCE OF OPINION BETWEEN ME AND DOCTOR EPSTEIN AS TO WHAT THE REPORT SAYS.

THE COURT: WELL, THAT HAPPENS ALL THE TIME.

MR. VASSALOTTI: AND THAT'S ON THE RECORD.

MR. RENNEISEN: AND HE STATED THERE WERE CERTAIN CONCLUSIONS FROM THE REPORT WHICH I THINK ARE DIFFERENT FROM THE LANGUAGE CONTAINED IN THE REPORT AND I THINK THE JURY SHOULD HAVE THE RIGHT TO LOOK AT THE LANGUAGE IN THE REPORT AND SEE --

THE COURT: YOU SHOW ME THE FEDERAL RULE OF EVIDENCE THAT SAYS I CAN ADMIT IT. IN THE MEANTIME, I DENY YOUR APPLICATION UNTIL YOU CAN SHOW ME UNDER THE FEDERAL RULES THAT'S ADMISSIBLE. YOU POINT TO THE SPECIFIC RULE. YOU CAN USE IT FOR CROSS-EXAMINATION, NO QUESTION ABOUT THAT.

BUT CERTAINLY IT'S A BIG QUESTION IN MY MIND WHETHER IT CAN BE ADMITTED AS AN EXHIBIT.

MR. RENNEISEN: WELL, IT SEEMS TO ME IF YOU CAN USE IT FOR CROSS-EXAMINATION, I CAN POINT OUT AN INCONSISTENCY BETWEEN DOCTOR EPSTEIN'S TESTIMONY AND THE REPORT, THE JURY SHOULD BE ALLOWED TO DETERMINE WHETHER OR NOT THERE IS AN INCONSISTENCY. I'M GOING TO GIVE YOU THE OPPORTUNITY. YOU CHECK THE RULE AND YOU SHOW ME. WE'LL HOLD THAT IN ABEYANCE.

MR. RENNEISEN: ALL RIGHT. D-5 IS A CHART ENTITLED "ANNUAL AVERAGE EXPOSURE LEVELS DUE TO EMISSIONS FROM THE B.F. GOODRICH PLANT, MODEL AND DATA BASE COMPARISON" PREPARED BY --

THE COURT: ANY OBJECTION?

MR. VASSALOTTI: NO OBJECTION.

THE COURT: D-5 IN EVIDENCE.

(D-5 IS MARKED IN EVIDENCE.)

MR. RENNEISEN: D-6 IS ANOTHER CHART PREPARED BY MR. GUTFREUND, ANNUAL AVERAGE VINYL CHLORIDE EXPOSURE OF MR. GRASSO DUE TO EMISSIONS FROM THE B.F. GOODRICH PLANT.

THE COURT: ANY OBJECTION.

MR. VASSALOTTI: NO OBJECTION.

THE COURT: IN EVIDENCE.

(D-7 IS MARKED IN EVIDENCE.)

MR. RENNEISEN: D-7 IS ON THE BACK OF THIS BOARD AND IS ENTITLED "SHORT TERM EPISODIC CONCENTRATIONS AT GRASSO RESIDENCE CALCULATED BY RAMR." SHALL I TURN IT AROUND FOR YOU MR. VASSALOTTI.

MR. VASSALOTTI: NO, I HAVE NO OBJECTION.

THE COURT: IN EVIDENCE

D-7 IS (MARKED IN EVIDENCE.)

MR. RENNEISEN: NOW, THE LAST TWO DRAWINGS WHICH WERE MADE HAVE NEVER BEEN MARKED. ONE WAS MADE BY -- I GUESS THEY WERE BOTH MADE BY MR. GUTFREUND. I'LL CALL THE FIRST ONE EIGHT, WHICH HE WAS USING TO ILLUSTRATE THE PLUME OF A -- OF AN EMISSION FROM A -- FROM A STACK, AND NUMBER NINE --

THE COURT: FIRST OF ALL, ANY OBJECTION TO D-8.

MR. VASSALOTTI: NO OBJECTION.

THE COURT: D-8 IN EVIDENCE.

(D-[illegible] IS MARKED IN EVIDENCE.)

MR. RENNEISEN: NUMBER NINE IS ANOTHER SKETCH MADE BY MR. GUTFREUND SHOWING WIND DIRECTIONS AND ALSO SHOWING THE CHARACTERISTICS OF A PLUME WHEN YOU LOOK DOWN ON IT FROM ABOVE.

MR. VASSALOTTI: NO OBJECTION.

THE COURT: D-9 IN EVIDENCE

(D-9 IS MARKED IN EVIDENCE.)

THE COURT: DOES THAT TAKE CARE OF IT."

MR. RENNEISEN: YES, YOUR HONOR.

THE COURT: IS THERE ANYTHING FURTHER AT THIS TIME, GENTLEMEN.

MR. VASSALOTTI: YOUR HONOR, ONLY THAT IF MR. RENNEISEN FINDS THE BASIS TO ADMIT THE -- IS IT THE BAXTER ARTICLE, I'M SORRY, MR. RENNEISEN, YOU WANT THE BAXTER ARTICLE ADMITTED?

MR. RENNEISEN: YES.

MR. VASSALOTTI: I WOULD LIKE AN OPPORTUNITY TO OFFER IN REBUTTAL THE TWO REPORTS THAT I OFFERED DOCTOR TAMBURRO WITH WHICH HE DISAGREED.

THE COURT: WELL, MY HOLDING AT THE PRESENT TIME IS I DENIED HIS APPLICATION. I ALLOW HIM THE OPPORTUNITY OF SHOWING TO BE UNDER WHAT RULE OF EVIDENCE HE ASSERTS I SHOULD ADMIT IT.

MR. VASSALOTTI: WELL, JUDGE WHATEVER RULING HE SAYS --

THE COURT: WHAT'S SAUCE FOR THE GOOSE IS SAUCE FOR THE GANDER IS WHAT YOU'RE TELLING ME.

MR. VASSALOTTI: RIGHT, JUDGE..

THE COURT: ALL RIGHT. SO, I'LL WAIT TO HEAR -- THE BALL IS RIGHT NOW IS IN MR. RENNEISEN'S HANDS.

MR. RENNEISEN: THANK YOU, I'LL JUGGLE WITH IT.

THE COURT: NOW, IS THERE ANYTHING ELSE AT THIS POINT?.

MR. RENNEISEN: NO, SIR.

THE COURT: ALL RIGHT. HOW ABOUT IF WE DO THIS, GENTLEMEN? LET'S HAVE LUNCH AND IF YOU'LL COME BACK AT 1:30, I'D LIKE TO SEE YOU IN MY CHAMBERS AND WE'LL GET INTO THE RULE 51 HEARING WITH RESPECT TO THE CHARGE.

MR. VASSALOTTI: VERY GOOD, JUDGE.

THE COURT: ARE THERE ANY MOTIONS?.

MR. RENNEISEN: I HAVE A MOTION FOR DIRECTED VERDICT UNDER RULE 50 SUBMITTED TO THE COURT. I'LL GIVE YOU TWO COPIES.

THE COURT: JUST WAIT ONE SECOND.

ALL RIGHT. I'LL HEAR YOUR MOTION.

MR. RENNEISEN: YOUR HONOR, THE FACTUAL BASIS FOR THE MOTION FOR A DIRECTED VERDICT IS -- WAS SUMMARIZED WHEN I MADE A MOTION FOR DIRECTED VERDICT AT THE END OF THE PLAINTIFF'S CASE. DURING THE COURSE OF DEFENDANT'S CASE, IT HAS BECOME, I THINK, QUITE CLEAR THAT WITH RESPECT TO NEGLIGENCE, THERE SIMPLY IS NONE.

THE COURT: IN OTHER WORDS, YOU'RE REPEATING THE SAME ARGUMENTS YOU MADE AT THE CONCLUSION --

MR. RENNEISEN: AND I DON'T REALLY WANT TO BURDEN THE COURT WITH --

THE COURT: -- OF THE PLAINTIFF'S CASE.

MR. RENNEISEN: EXCEPT FOR THE FACT THAT THERE IS NOTHING IN DEFENDANT'S CASE WHICH IN ANY WAY CHANGES THE ARGUMENT THAT I MADE PREVIOUSLY, AND IN FACT, BOLSTERS THOSE ARGUMENTS WITH RESPECT TO NEGLIGENCE AND THE ACTIVITY CONDUCTED AT THE B.F. GOODRICH PLANT.

THE COURT: ALL RIGHT. EXCEPT, OF COURSE, THE COURT HAS HEARD TESTIMONY WHICH IT DID NOT HAVE AT THE TIME IT CONSIDERED THE PLAINTIFF'S -- THE MOTIONS MADE AT THE CONCLUSION OF THE PLAINTIFF'S CASE.

MR. RENNEISEN: THAT'S TRUE. THERE'S BEEN ADDITIONAL TESTIMONY. BUT THAT ADDITIONAL TESTIMONY, I THINK, STRENGTHENS THE DEFENDANT'S POSITION, IF WE'RE GOING TO TALK ABOUT NEGLIGENCE. IT'S CLEAR NOW THAT THE -- THE PLANT WAS DESIGNED AND CONSTRUCTED BY COMPETENT, QUALIFIED PEOPLE WHO TOOK INTO CONSIDERATION INDUSTRY STANDARDS AT THE TIME, WHAT WAS KNOWN ABOUT TOXICITY AND, IN FACT, THE PLANT HAS BEEN

GRANTED NUMEROUS PERMITS BY THE ENVIRONMENTAL PROTECTION AGENCY OF THE STATE OF NEW JERSEY --

THE COURT: ISN'T THAT AN ISSUE FOR THE JURY TO DETERMINE?

MR. VASSALOTTI: JUDGE, WE DON'T CONTEND THAT THE PLANT WAS NEGLIGENT WHEN BUILT. WE DIDN'T PUT IN ANY PROOF THAT THE PLANT WAS NOT BUILT OR WAS BUILT IN A NEGLIGENT FASHION. MR. PENNEISEN SAYS IT'S TRUE, IT WAS BUILT -- .

THE COURT: YOU'RE TALKING ABOUT NEGLIGENT OPERATION, AREN'T YOU.

MR. VASSALOTTI: WE'RE TALKING ABOUT --

THE COURT: WHAT IS YOUR BASIC NEGLIGENCE CLAIM? WHAT DO YOU SAY WAS THE NEGLIGENCE OF THE GOODRICH COMPANY?

MR. VASSALOTTI: THAT THE GOODRICH COMPANY FAILED TO CONDUCT ANY TESTS OR STUDIES REGARDING THE CARCINOGENICITY OR TOXICITY OF VINYL CHLORIDE, EVEN THOUGH THEY KNEW UNTIL THE CONSTRUCTION OF THIS PLANT THAT MR. BIXBY BUILT AND WHICH HE TESTIFIED TO, EVEN THOUGH THEY KNEW THAT THE VINYL

CHLORIDE WAS GOING TO BE EMITTED AND WOULD CARRY OVER THE FENCE LINE.

THE COURT: THAT IS THE SOLE BASIS OF YOUR CLAIM FOR NEGLIGENCE; IS THAT CORRECT?

MR. VASSALOTTI: I BELIEVE SO.

THE COURT: IN OTHER WORDS, NOT FAILURE TO CONDUCT STUDIES BEFORE THEY BUILT THE PLANT.

MR. VASSALOTTI: OH, YEAH, THAT'S IT, THAT THEY FAILED TO CONDUCT THOSE STUDIES. THEY FAILED TO CONDUCT ANY TESTS BEFORE OR AFTER. THEY JUST WENT AHEAD AND DID IT.

THE COURT: IN OTHER WORDS, YOU'RE SAYING THAT B.F. GOODRICH WAS NEGLIGENT IN NOT CONDUCTING PROPER TESTS OR STUDIES EITHER BEFORE IT OPENED THE POLYVINYLCHLORIDE PLANT IN PEDRICKTOWN OR AFTER THE OPENING OF THE PLANT; IS THAT CORRECT?

MR. VASSALOTTI: THAT'S RIGHT, CANCER CAUSING OR TOXIC OR ANY HARMFUL EFFECTS.

THE COURT: NOW, THESE TESTS

ARE SUFFICIENTLY BROAD. NOW, ARE YOU ALSO INCLUDING WITHIN THEM, THE FAILURE TO MONITOR THE AIR IN THE AREA.

MR. VASSALOTTI: I'M SORRY.

THE COURT: I MEAN, I'M READING FROM THE ALLEGATIONS OF THE PLEADINGS AND THOSE SET FORTH IN YOUR TRIAL MEMORANDUM.

MR. VASSALOTTI: I'M, SORRY, YOUR HONOR.

THE COURT: ARE YOU AND I ON THE SAME WAVELENGTH OR HAVE WE DEPARTED SOMEWHAT.

MR. VASSALOTTI: THERE ARE ADDITIONAL CONTENTIONS THAT ARE SOME-HAT RELATED. THE ONE IS THAT THEY DIDN'T MONITOR IN THE RESIDENTIAL AREAS. THE OTHER IS THAT THEY NEVER WARNED OR ADVISED THE PEOPLE OF PEDRICKTOWN AS TO WHAT WAS BEING EMITTED OR ITS CANCER CAUSING --

THE COURT: THE FACT REMAINS YOU'RE NOT MAKING ANY CLAIM THAT THE DEFENDANT WAS NEGLIGENT IN ANY WAY IN THE CONSTRUCTION -- IN THE PLANNING OR CONSTRUCTION OF THAT PLANT.

MR. VASSALOTTI: UNLESS YOU

CONSIDER PLACING A MONITOR IN THE RESIDENTIAL AREAS AS PART OF THE PLANNING AND CONSTRUCTION OF THE PLANT.

THE COURT: ALL RIGHT.

MR. VASSALOTTI: I AGREE WITH THAT.

THE COURT: ALL RIGHT. YOU MAY CONTINUE, MR. RENNEISEN.

MR. RENNEISEN: WITH RESPECT TO WARNING THEM, I'LL LIMIT MY DISCUSSION TO THOSE -- WHAT I UNDERSTAND TO BE THREE THEORIES: ONE, NO TESTS WERE CONDUCTED TO DETERMINE CARCINOGENICITY. THEY DIDN'T MONITOR FROM 1970 TO 1976 AND SOMEHOW, THEY DIDN'T WARN THE PEOPLE IN THE PEDRICKTOWN AREA.

SINCE THIS IS -- THIS IS A NEGLIGENCE COUNT, WE'RE TALKING ABOUT WHAT IS REASONABLE AND PRUDENT UNDER THE CIRCUMSTANCES. IN 1970, PLAINTIFF'S CASE HAS SHOWN -- PLAINTIFF'S CASE HAS SHOWN FROM 1949 TO 1970, THE ONLY KNOWLEDGE ABOUT THE HARMFUL EFFECTS OF VINYL CHLORIDE WERE, ONE, TOXICITY AND, TWO, TO PEOPLE IN THE WORK PLACE. NOT ONLY WAS THERE NO KNOWLEDGE OF

CANCER, THERE WAS NO KNOWLEDGE OF ANY HARMFUL EFFECTS WHATSOEVER TO ANYBODY SOMEPLACE ELSE. SO, IT WOULD SEEM TO ME THAT IT IS NEITHER REASONABLE, SENSIBLE, PRUDENT OR ANY OTHER WORD YOU USE TO DESCRIBE NEGLIGENCE TO FAIL TO TEST FOR THE EFFECTS OF -- ON THAT SUBSTANCE ON PEOPLE AT A DISTANCE, PARTICULARLY WHEN THE SUBSTANCE HAD BEEN EXPERIMENTED WITH BY THE MEDICAL PROFESSION AS AN ANESTHETIC WITHOUT ANY CANCEROUS SIDE EFFECTS, PARTICULARLY WHEN IT WAS BEING USED AS A PROPELLANT IN SPRAY CANS ALL OVER THE COUNTRY AND WITH KNOWLEDGE THAT IN THE MANUFACTURING PROCESS, THE ONLY TOXICITY THAT THERE WAS A CONCERN ABOUT WAS THE ACROOSTEOLYSIS, PLUS EXPLOSION AND DROWSINESS, ALL OF WHICH WERE TAKEN CARE OF WHEN THE PLANT WAS DESIGNED. SO THAT I DON'T THINK THAT IT'S REASONABLE TO EXPECT THAT KIND OF A TEST.

THE SAME ARGUMENT GOES TO THE MONITORING. IF THERE'S NO REASON TO EXPECT A DANGER, THERE'S NO REASON -- NO REASON TO MONITOR. AND THE SAME GOES TO WARNINGS. IF THERE'S NO REASON TO EXPECT A DANGER, THERE

IS NO DUTY TO WARN. FURTHERMORE, THE MERE FACT THAT MRS. GRASSO STILL LIVES IN FREDRICKTOWN OBVIOUSLY SHOWS THAT THE FAILURE TO WARN IS NOT THE APPROXIMATE CAUSE OF ANYTHING. SHE HAS --

MR. VASSALOTTI: I OBJECT TO THAT, YOUR HONOR.

MR. RENNEISEN: SHE HAS KNOWN KNOWN ABOUT --

MR. VASSALOTTI: I TAKE EXCEPTION TO THAT BECAUSE HE IMPLIES THAT MRS. GRASSO IS FINANCIALLY ABLE TO MOVE WHEREVER SHE WANTS TO MOVE. AND THAT MAY NOT BE THE CASE.

THE COURT: WELL, EITHER WAY, YOU GIVE ME THAT ARGUMENT AFTER HE'S FINISHED.

MR. VASSALOTTI: WELL, YOUR HONOR, THAT REALLY HAS NOTHING TO DO WITH THE CASE.

THE COURT: IT MAY OR MAY NOT, BUT THAT'S HOW YOU RESPOND TO IT.

MR. RENNEISEN: IN ANY EVENT, THE DUTY TO WARN RELATES TO KNOWLEDGE OF A DANGER ABOUT WHICH THE WARNING SHOULD BE GIVEN AND CLEARLY THERE WAS NO REASON FOR THE

B. F. GOODRICH COMPANY TO KNOW THAT VINYL CHLORIDE UNDER ANY CIRCUMSTANCES WOULD HAVE A HARMFUL EFFECT ON PEOPLE IN THE VICINITY. SO, THAT'S -- THAT'S THE BASIC ARGUMENT WITH RESPECT TO NEGLIGENCE.

THE REST OF MY ARGUMENT I WILL BE GLAD TO DEFER AT THE POINT WHERE WE'RE TALKING ABOUT THE CHARGE TO THE JURY BECAUSE IT RELATES TO LEGAL THEORY UNDER WHICH THE CASE IS SUBMITTED TO THE JURY OTHER THAN NEGLIGENCE. IF NUISANCE IS STILL IN THE CASE, THE WAY I READ THE RESTATEMENT IS THAT THE CONDUCT MUST BE INTENTIONAL AND UNREASONABLE AND UNREASONABLE IS A NEGLIGENCE CONCEPT AND THE SAME WOULD RELATE TO NUISANCE AS RELATES TO THE -- THE OPERATION OF THE PLANT.

IF WE'RE TALKING ABOUT THE CITY OF THE BRIDGETON THEORY AND THE THEORY THAT'S SET FORTH IN SECTION 519 OF THE RESTATEMENT OF TORTS, IT IMPOSES LIABILITY ON AN ABNORMALLY DANGEROUS ACTIVITY. IT SEEMS TO ME THAT THE CONSTRUCTION AND OPERATION OF A POLYVINYLCHLORIDE PLANT HAS NOT BEEN PROVED TO BE AN ABNORMALLY DANGEROUS ACTIVITY, EVEN

IF YOU ACCEPT THE PREMISE THAT MR. GRASSO IS A UNIQUE CASE AND VERY, VERY SUSCEPTIBLE TO CANCER AND, IN FACT, HIS DISEASE WAS CAUSED BY THE PLANT. I STILL DO NOT BELIEVE THAT THE ACTIVITY OF THE B. F. GOODRICH COMPANY IS ABNORMALLY DANGEROUS SIMPLY BECAUSE OF A SINGLE RESULT.

THE COURT: HOW ABOUT THE EMISSION, THE EMISSION OF THE VINYL CHLORIDE, THE ALLOWANCE OF THAT EMISSION?.

MR. RENNEISEN: BASED ON ALL THE KNOWLEDGE, MY POSITION IS THAT IS NOT AN ABNORMALLY DANGEROUS CONDITION.

THE COURT: ISN'T VINYL CHLORIDE AN ABNORMALLY DANGEROUS SUBSTANCE?

MR. RENNEISEN: VINYL CHLORIDE -- VINYL CHLORIDE IS A HYDROCARBON AND AS SUCH, IT'S PROBABLY LIKE GASOLINE AND ABNORMALLY DANGEROUS IF IT EXPLODES.

THE COURT: HOW ABOUT IF IT'S INHALED BY ITSELF IN ITS PURE STATE, IT'S INHALED? HASN'T THERE BEEN ENOUGH TESTIMONY HERE TO INDICATE THAT IT'S DANGEROUS?

MR. RENNEISEN: IN ITS PURE

STATE INHALED, IT COULD MAKE YOU DIZZY, IT COULD KILL YOU. SO COULD OXYGEN IF YOU BREATHE ENOUGH OF IT. BUT IN THE AMOUNTS BEING EMITTED IN 1979 OR TODAY, THERE IS NO EVIDENCE THAT THERE IS -- THAT IT'S ABNORMALLY DANGEROUS OR IN THE LANGUAGE OF 520, THAT THERE'S AN EXISTENCE OF A HIGH RISK OF HARM.

THE COURT: WELL, ISN'T THAT SOMETHING FOR THE JURY TO DECIDE? ISN'T THAT A QUESTION HERE PRESENTED BY THE TESTIMONY? I MEAN, ONE SIDE SAYS ONE THING, ANOTHER SIDE SAYS ANOTHER. HIS EXPERTS DON'T AGREE WITH YOURS AND YOURS DON'T AGREE WITH HIS. DOESN'T THAT PRESENT A JURY QUESTION? DOESN'T THE JURY HAVE TO FIND THIS?

THE COURT: YOUR HONOR, THERE ARE THREE ALTERNATIVES. YOU FIND IT -- YOU FIND THE ACTION -- YOU FIND THAT THERE IS OR THERE ISN'T OR THE JURY FINDS IT. AND IF -- AND I THINK THAT UNDER THE FACTS OF THE CASE, THERE IS SUFFICIENT EVIDENCE FOR YOU TO FIND -- FIND THAT'S NOT ABNORMALLY DANGEROUS. BUT THE ALTERNATIVE IS TO HAVE THE CASE SUBMITTED TO THE JURY ON THAT BASIS,

AS A MAJOR MANUFACTURER OF CHEMICAL PRODUCTS, AS A MANUFACTURER WHO KNOWS THAT THEIR PLANT IS CONSTRUCTED IN SUCH A WAY THAT THIS MATERIAL IS GOING TO GET OUT, TO CONDUCT TESTS AND STUDIES TO DETERMINE WHETHER IT'S GOING TO BE HARMFUL TO ANYBODY. AS A MATTER OF FACT, TESTS AND STUDIES WERE DONE LATER WHICH SHOWED THAT IT WAS HARMFUL. THERE IS EVIDENCE IN THE CASE THAT THE METHODS THAT WERE USED TO CONDUCT THOSE TESTS AFTER THIS WERE AVAILABLE BEFORE. THERE'S INDICATIONS -- I'M SORRY.

THERE'S TESTIMONY IN THE CASE REGARDING THE AVAILABILITY OF MONITORS TO MONITOR THIS MATERIAL TO SEE IF THERE WAS ANY HEALTH HAZARD. THE GOODRICH COMPANY DID NOTHING AND AS MR. RENNEISEN POINTED OUT, YOU HAVE TO MEASURE THEIR CONDUCT -- THE CONDUCT OF THE GOODRICH COMPANY IN LIGHT OF WHAT A REASONABLE PERSON IN THEIR POSITION WOULD HAVE DONE.

WELL, WE'RE NOT TALKING ABOUT A REASONABLE PERSON, WE'RE TALKING ABOUT A CHEMICAL COMPANY. AND THE LAW AS WE CITE IN OUR BRIEF AND I HAVE IN REQUEST FOR CHARGE,

MEASURES THE REASONABLENESS OF CONDUCT BY ONE'S POSITION OR ONE'S KNOWLEDGE OR ACCESS TO KNOWLEDGE REGARDING THE GIVEN HAZARD. AND I THINK IN THIS CASE, IT'S CLEARLY A JURY QUESTION AS TO WHETHER GOODRICH CONDUCTED ITSELF IN A REASONABLE MANNER IN CONSTRUCTING THIS PLANT, ALLOWING THE EMISSIONS TO COME OUT WITHOUT HAVING DONE ANY GROUNDWORK, TESTING OR STUDIES TO DETERMINE IF IT WOULD CAUSE ANYONE ANY HARM.

NOW, THAT'S WITH RESPECT TO NEGLIGENCE. AND THE SAME ARGUMENT APPLIES WITH THE MONITOR AND THE FAILURE TO WARN. IN 1978, THEY KNEW THAT VINYLS FOUND THAT THE MATERIAL CAUSED CANCER. THEY DIDN'T CONDUCT ANY TESTS THEN EITHER. THEY DIDN'T PUT ANY MONITORS OUT THEN TO DETERMINE HOW MUCH OF THIS MATERIAL WAS GETTING OUT, EVEN THOUGH THEY KNEW IT WAS GETTING OUT. THEY DIDN'T TELL THE PEOPLE AT PEDRICKTOWN, "HEY, THIS STUFF WE'RE PUTTING OUT HAS BEEN DETERMINED TO CAUSE CANCER, BUT DON'T WORRY ABOUT IT." THEY DIDN'T EVEN TELL THEM THAT TO ALLOW PEOPLE LIKE MR. GRASSO TO TAKE WHATEVER PROTECTIVE ACTION THEY WOULD HAVE LIKED TO

HAVE TAKEN AT THAT TIME. AND IT ALL STEMS FROM THEIR LACK OF GROUNDWORK WHEN HE THEY STARTED THIS WHOLE PROJECT. AND THAT'S WHAT WE'RE CONTENDING THE CORE OF THEIR NEGLIGENCE IS.

NOW, WITH REGARD TO THE STRICT LIABILITY, I DISAGREE WITH MR. REMMEISEN THAT THE RESTATEMENT RULINGS ARE WHAT GOVERN HERE. I THINK THE CITY OF BRIDGETON CASE AND THE P.S.C. CASE -- I THINK THAT'S IT -- ADOPTED THE RULE OF STRICT LIABILITY FOR A POLLUTER AND RECOGNIZE AN ENVIROMENTAL TORT AND I THOUGHT YOUR HONOR IN YOUR RULING AT THE END OF PLAINTIFF'S CASE HAD INDICATED THAT YOU BELIEVED THAT THE NEW JERSEY SUPREME COURT WOULD EMBRACE SUCH A DOCTRINE. AS UNDER THE RULES IN THOSE CASES, THE ESTABLISHMENT OF, ONE, THAT VINYL CHLORIDE IS A HAZARDOUS MATERIAL; TWO, IT WAS EMITTED FROM THE PLANT; THREE, MR. GRASSO WAS EXPOSED TO IT; AND, FOUR, THAT EXPOSURE CAUSED HIS ANGIOSARCOMA OF THE LIVER ARE THE ELEMENTS OF THE PLAINTIFFS CASE AND THAT'S STRICT LIABILITY THEORY -- NOT THE ELEMENTS IN RESTATEMENT 520 WHICH TALK ABOUT

WHETHER IT WAS REASONABLE TO KNOW OR -- FOR GOODRICH TO KNOW OF THIS MATERIAL BEING DANGEROUS OR NOT. THAT'S NOT WHAT IS ADOPTED IN THOSE TWO CASES. THE STRICT LIABILITY RULE ADOPTED IN THOSE TWO CASES WAS TAKEN UPON THE SAME PRINCIPALS AS STRICT LIABILITY DEVELOPED IN THE PRODUCTS SITUATION; THAT IS, THE MANUFACTURER OR THE PLANT OWNER IS IN BEST POSITION TO KNOW WHAT'S COMING OUT OF HIS PLANT AND TO TAKE CORRECTIVE ACTION REGARDING THAT. IT IS ALWAYS IN THE BEST POSITION AND CERTAINLY IS SOCIALLY RESPONSIBLE TO PAY FOR ANY DAMAGE CAUSED BY HIS PROFIT-MAKING CHEMICAL PLANTS.

THE COURT: ALL RIGHT. NOW, ARE YOU SAYING THAT THE -- THAT THE MATERIAL WHICH WITH WE'RE CONCERNED ABOUT IS EMISSION OF VINYL CHLORIDE GOODS OR POLYVINYL -- POLYVINYL DUST.

MR. VASSALOTTI: WELL, YOUR HONOR, WE'RE CONCERNED WITH THE VINYL CHLORIDE GAS, BUT THE PVC DUST, I THINK THERE'S BEEN CLEAR TESTIMONY FROM BOTH SIDES CONTAINED WITHIN IT ENTRAPPED VINYL CHLORIDE GAS WHICH COME OUT. WE'RE NOT SAYING THAT THE

PVC DUST ITSELF CAUSES CANCER, BUT THERE'S TESTIMONY THAT IT WAS EMITTED, THAT IT RANGED FROM ONE TO TEN MICRONS, THAT IT COULD HAVE TRAVELED FROM THE DISTANCE -- WOULD HAVE TRAVELED THE DISTANCE FROM THE -- FROM THE PLANT TO THE HOME AND THAT IT WAS OF RESPIRABLE SIZE AND WOULD GET ENTRAPPED IN THE LUNGS. THERE'S ALSO TESTIMONY OF THE LEVELS OF VINYL CHLORIDE THAT WERE CONTAINED IN THAT DUST. SO, THAT'S THE ONLY RELATIONSHIP OF THE PVC DUST.

THE COURT: IN OTHER WORDS, THE VINYL CHLORIDE WAS CONTAINED WITHIN THE DUST.

MR. VASSALOTTI: CORRECT.

THE COURT: AND THAT WAS ALLEGEDLY INHALED.

MR. VASSALOTTI: THERE WAS TESTIMONY THAT IT DIFFUSES OUT OF THE DUST. AND --

THE COURT: IN THE ATMOSPHERE BECOMES A GAS AND INHALED ALONG WITH THE AIR, ISN'T THAT WHAT YOU'RE SAYING?

MR. VASSALOTTI: INHALED ALONG WITH THE AIR OR IF YOU INHALE A PIECE

OF THE DUST ITSELF, IT'S GOING TO DISSEMINATE IN YOUR BLOODSTREAM.

THE COURT: OKAY.

THE COURT: NEXT THEORY?

MR. VASSALOTTI: THE NUISANCE THEORY.

THE COURT: YES.

MR. VASSALOTTI: YOUR HONOR, I THINK THE CASE IS MADE OUT FOR THE NUISANCE THEORY. HOWEVER, I THINK THAT SUBSTANTIALLY OVERLAPS WHAT I PERCEIVE TO BE OUR THEORY UNDER STRICT LIABILITY. AND DEPENDING ON WHICH -- ON WHAT YOUR HONOR PERCEIVES THAT THEORY TO BE, I'D BE WILLING TO FOREGO THE NUISANCE THEORY TO THE JURY.

THE COURT: WELL, WE'LL DISCUSS THAT IN MY CHAMBERS. ANYTHING FURTHER?

MR. VASSALOTTI: NOTHING FURTHER.

THE COURT: YOUR MOTION IS DENIED, MR. RENNEISEN, FOR THE REASONS SET FORTH WHEN YOU MADE THE SAME MOTION AT THE CONCLUSION OF PLAINTIFF'S CASE. THERE ARE JURY QUESTIONS HERE THAT HAVE TO BE PRESENTED TO THAT JURY.

ALL RIGHT, GENTLEMEN, WE'LL SEE YOU THEN. -- I SEE SOME TIME'S GONE BY, SO LET'S MAKE IT QUARTER TO TWO INSTEAD OF 1:30.

C E R T I F I C A T E

I, P. LYNNE BELL, A NOTARY PUBLIC AND CERTIFIED SHORTHAND REPORTER OF THE STATE OF NEW JERSEY DO HEREBY CERTIFY THAT THE FOREGOING IS A TRUE AND ACCURATE TRANSCRIPT OF THE TESTIMONY AS TAKEN STENOGRAPHICALLY BY AND BEFORE ME AT THE TIME, PLACE AND ON THE DATE HEREINBEFORE SET FORTH.

I DO FURTHER CERTIFY THAT I AM NEITHER A RELATIVE NOR EMPLOYEE NOR ATTORNEY NOR COUNSEL OF ANY OF THE PARTIES TO THIS ACTION, AND THAT I AM NEITHER A RELATIVE NOR EMPLOYEE OF SUCH ATTORNEY OR COUNSEL AND THAT I AM NOT FINANCIALLY INTERESTED IN THIS ACTION.

P. LYNNE BELL, C.S.R.
NOTARY PUBLIC, STATE OF NEW JERSEY
MY COMMISSION EXPIRES 5/10/91
DATE: JANUARY 27, 1991

C E R T I F I C A T I O N

I, STEPHEN J. DANER, OFFICIAL COURT REPORTER FOR THE UNITED STATES DISTRICT COURT, FOR THE DISTRICT OF NEW JERSEY, DO HEREBY CERTIFY THAT THE FOREGOING MATTER IS A TRUE AND ACCURATE TRANSCRIPT OF MY STENOGRAPHIC NOTES TAKEN AT THE TIME AND PLACE HEREINBEFORE SET FORTH.

STEPHEN J. DANER, CP, RPR

OFFICIAL U. S. REPORTER

DATE: 1-27-81

MR. RENNEISEN: DOCTOR TAMBURRO.

[redacted] PREVIOUSLY SWORN.

DIRECTION EXAMINATION.

MR. RENNEISEN: MAY I PROCEED, YOUR HONOR.

THE COURT: YES, SIR.

Q. DOCTOR TAMBURRO, WOULD YOU TELL US WHAT ANGIOSARCOMA OF THE LIVER IS?

A. THIS IS A CANCER OF THE SUPPORTING CELLS OF THE LIVER, MAINLY THOSE CELLS WHICH LINE THE VASCULAR SEGMENTS OF THE LIVER.

Q. AND HOW IS IT DIAGNOSIED?

A. WELL, I THINK I COULD BEST ILLUSTRATE WITH SLIDES.

THIS IS SIMPLY AN ILLUSTRATION TO POINT OUT WHERE THE LIVER IS. THOUGH MOST PEOPLE I THINK HAVE A CONCEPT, IT IS A VERY LARGE ORGAN WHOSE MAJOR PURPOSE IS SOME SYNTHESIZE OR MAKE BODY PROTEIN, BODY FATS, BODY HYDROCARBONS, IT'S THE ENERGY SYSTEM FOR IT IS BODY. IT ALSO HAPPENS TO HAVE AS A MAJOR FUNCTION THE REMOVAL OF WASTE PRODUCTS AND TOXIC MATERIALS. IT IS THE MAJOR DETOXIFYING OR TOXIC REMOVING ORGAN OF THE

BODY. AND IT ALSO HAS A DUAL SYSTEM OR GETTING RID OF THESE TOXIC MATERIALS, NOT ONLY BY BURNING THEM OR BY METABOLIZING THEM OR ALSO BY EXTRUDING THEM TO THE GALL BLADDER INTO THE INTESTINES. IN ADDITION TO THIS, IT HAS A BLOOD SUPPLY SYSTEM, ONE COMING FROM ARTERIES OF THE BODY AND A BODY SUPPLY SYSTEM THAT COMES FROM THE GASTROINTESTINAL TRACT THAT CARRIES OXYGENATED BLOOD TO THE LIVER.

NOW, IF ONE WILL TAKE A LOOK AT THE VASCULAR SYSTEM SPREAD OUT THROUGHOUT THE LIVER, IT LOOKS DIFFERENTLY AND THE LIVER IS CUT IN SLICES. AND UP HERE IN THIS CORNER AS AN ARTISTS VIEW OF THE LIVER WHEN IT'S CUT IN SLICES AND THESE RED CUBOIDAL OR RECTANGULAR CELLS ARE THE LIVERS MAIN CELLS, THE CELLS THAT DO ALL THE BUILDING AND ALL THE DETOXIFYING. BUT THE SPACE IN BETWEEN HERE, THIS AREA IN HERE (INDICATING) IS THE BLOOD PASSAGEWAYS, AND THERE CALLED SINUSOIDAL. AND IT IS THESE CELLS INSIDE HERE, IF YOU CAN SEE THIS BETTER HERE (INDICATING) THESE BLOOD VESSELS THAT LINE THESE CORDS OF LIVER CELLS THAT HAVE -- THAT ARE MADE UP OR CONSTRUCTED OF WHAT WE CALL ENDOTHELIAL

CELLS. AND IT IS THESE CELLS THAT ARE HERE -- I THINK THIS IS BEST, I'LL -- THESE ARE THE LIVER CELLS. AND THESE ARE THE CELLS OF THE BLOOD VESSEL WALL THAT LINE THE BLOOD PASSAGE CENTER. AND THESE ARE THE CELLS THAT BECAME MALIGNANT IN ANGIOSARCOMA. THAT'S WHY THE TERM, ANGIO WHICH MEANS BLOOD VESSEL AND SARCOMA WHICH MEANS A TUMOR FROM THE SUPPORTING STRUCTURE OF THE ORGAN AND THERE'S WHERE THE TERM COMES FROM. THERE HAVE BEEN OTHER TERMS USED WHICH ARE ALSO BLOOD RELATED IN THE PAST, BUT THEY ALL MEAN THE SAME THING. THEY'RE IN ADDITION, OTHER CELLS INSIDE THE BLOOD SYSTEM THAT CONSUME, EATS UP PARTICULATE BODY THAT THE BODY MAY HAVE CIRCULATING IN ITS BLOOD AND THESE ARE CALLED MACROPHAGES OR CUPFFER CELLS. NOW, THESE LIVER CELLS ALSO CAN BECOME MALIGNANT, BUT WHEN THEY DO, THEY FORM A DIFFERENT TYPE OF LIVER TUMOR CALLED A PRIMARY LIVER CELL TUMOR. AND THAT'S THE DIFFERENCE BETWEEN THE ANGIOSARCOMA AND LIVER TUMOR.

NOW, WHEN ONE GOES TO DIAGNOSE THIS, YOU NEED TO TEST THE SYSTEM THAT TESTS FOR THE BLOOD VESSELS AND MOST

MEDICAL TEST SYSTEMS ONLY TEST FOR THE LIVER CELL. AND SO, THE DIAGNOSIS OF ANGIOSARCOMA IN ITS EARLY DEVELOPMENT IS VERY DIFFICULT. IN FACT, IN THE EARLIEST STAGES, A PERSON MAY HAVE NO ABNORMALITIES OF ANY TEST THAT WE NORMALLY USE. AND SO, ONE HAS TO USE VERY SPECIALIZED TESTS WHERE YOU ACTUALLY INJECT MATERIAL INTO THE BLOOD VESSELS AND OUTLINE THEM AND SHOW THAT THERE'S BEEN A DISTORTION; BLOOD VESSELS AT A TIME WHEN ALL THE TESTS THAT WE USE FOR THE LIVER AND HOW IT FUNCTIONS APPEAR NORMAL.

Q. ALL RIGHT. AT ITS LATER STAGES, CAN ANGIOSARCOMA OF THE LIVER BE DIAGNOSIED FROM OTHER TYPES OF LIVER CANCER BY A TRAINED PHYSICIAN?

A. IT CAN. THIS REQUIRES A PATHOLOGIST AND A LIVER BIOPSY TO BE OBTAINED.

Q. AND WHAT DOES THE PATHOLOGIST DO THEN?

A. WELL, HE ACTUALLY LOOKS AT THE LIVER TISSUE AND DISTINGUISHES WHICH CELL IS ABNORMAL. AND I HAVE SOME ILLUSTRATIVE SLIDES THAT SHOW THE PROGRESSION OF THIS FROM ITS NORMAL STAGE TO THE ACTUAL STAGE OF THE

ANGIOSARCOMA.

Q. YOU WANT TO SHOW THOSE TO US, THEN?

A. NOW, THIS IS THE REAL -- THIS IS NOT AN ARTISTS DRAWING, BUT THIS IS THE REAL LIVER FROM A NORMAL INDIVIDUAL SHOWING THE LIVER CELLS HERE. EACH ONE OF THESE (INDICATING) IS THE NUCLEUS OR THE CENTRAL CONTROL CENTER FOR EACH OF THE CELLS. AND THEY ARE IN CORDS, ONE ATTACHED TO THE OTHER. AND ON BOTH SIDES OF THE CELL, THERE ARE THESE BLOOD VESSELS WHICH ARE LINED WITH CELLS THAT ARE THE ENDOTHEIAL LINING CELLS OR THE CELLS THAT BECAME MALIGNANT IN ANGIOSARCOMA.

NOW, THESE SLIDES COME FROM A COMPOSIT OF INDIVIDUALS WHO HAD TO HAVE BIOPSYS FOR MEDICAL REASONS OR BECAUSE IN OUR SCREENING PROGRAM, THEY HAD SOME ABNORMALITY WHICH MEDICALLY INDICATED OUR GETTING A LOOK AT THEIR LIVER TISSUE.

NOW, THIS IS THE EARLIEST CHANGE THAT ONE SEES WITH CHEMICAL EXPOSURES TO VINYL CHLORIDE AND ONE BEGINS TO SEE THESE LINING CELLS HERE BEGINNING TO CHANGE IN THEIR SHAPE AND IN THEIR SIZE WHILE THE LIVER CELL ITSELF DOES NOT.

AT A LATER STAGE, THE CELLS BECOME EVEN MORE CHANGED AND DISTORTED IN THEIR CONFIGURATION, IN THEIR SHAPE. NOW, AT THIS TIME, THERE ARE ONLY THE MOST REFINED AND SENSITIVE TESTS OF ABNORMALITIES, THE THINGS THAT WE WOULD USE FOR ONLY RESEARCH PURPOSES. THESE ARE VARIOUS TESTS. IT MEANS WE HAVE TO INJECT THINGS AND LOOK AT PEOPLE AND IN THE STANDARD PRACTICE OF MEDICINE, THESE WOULD NOT BE DETECTED. AT THIS STAGE, THE PEOPLE WERE "SYMPTOMATIC ". IT MEANS THEY HAD NO COMPLAINTS. THE REASON WE DISCOVERED THIS, BECAUSE AT THAT TIME, WE WERE DELIBERATELY LOOKING FOR POSSIBLE PROBLEMS.

THIS IS A MUCH LATER STAGE IN WHICH THE CELLS THAT LINE THE SINUSOIDAL OR THE VESSEL SURFACE HAVE NOW BEGUN TO REPLICATE, GROW, SO, THIS IS THE EARLIEST STAGES OF MALIGNANCY. AND AT THIS PARTICULAR STAGE, THE X-RAYS, THE LABORATORY TESTS THAT ARE COMMONLY USED WERE NORMAL. AND AT THIS POINT, THE PATHOLOGIST WAS REASONABLY SURE THAT THIS WAS A MALIGNANCY, BUT STILL HAD SOME CONCERNS BECAUSE THESE ARE VERY TYPICAL

CELLS. HERE, THIS NUCLEUS HAS BEEN BROKEN UP AND THE CELL IS ABOUT TO DIVIDE. AND FOR THIS PARTICULAR REASON, ONE SEES THE DEVELOPMENT OF ANGIOSARCOMA PRESENTING ITSELF IN COMPLAINTS BY THE PATIENT VERY, VERY LATE IN THE STAGE OF THE DISEASE PROCESS.

AND FINALLY, THIS IS THE MALIGNANCY ITSELF. AT THIS STAGE, THE PERSON IS SYMPTOMATIC, LABORATORY TESTS ARE ABNORMAL AND THIS IS ONE OF THE LATER PHASES OF THE DISEASE PROCESS.

NOW, IF WE WERE ALSO FORTUNATE IN HAVING THE OPPORTUNITY TO FIND X-RAYS, VASCULAR X-RAYS, IN SOMEONE HAD BEEN MEDICALLY EXAMINED FOR ANOTHER REASON AND THOSE X-RAYS, WHEN WE LOOKED AT THEM RETROSPECTIVELY, HAD THE SAME VASCULAR CHARACTERISTICS AS WE FOUND IN THE SAME INDIVIDUAL FOUR YEARS LATER WHEN HE HAD THE TUMOR IN THE EXACT SAME SPOT. SO, FROM THESE TWO GROUPS OF STUDIES, WE HAVE EVIDENCE THAT THE TUMOR MAY BE PRESENT AS EARLY AS FOUR YEARS BEFORE THE INDIVIDUAL BECOMES SYMPTOMATIC OR ILL OR AS LATE AS ONE YEAR. AND THIS IS REASONABLE WITH WHAT WE

UNDERSTAND THE GROWTH OF TUMORS TO BE; THAT THEY ARE PRESENT FOR A CONSIDERABLE AMOUNT OF TIME BEFORE THE PERSON IS AFFECTED BY IT. AND ESPECIALLY WHEN IT INVOLVES THE LIVER, SINCE IT IS SUCH A ENORMOUS ORGAN, HAS SUCH GREAT RESERVE, THAT IT TAKES A CONSIDERABLE AMOUNT OF TIME BEFORE ONE REDUCES THE RESERVE IN ORDER FOR SOMEONE TO BECOME -- HAVE SYMPTOMS.

Q. DOCTOR, WHAT ARE -- OTHER THAN VINYL CHLORIDE, WHAT ARE OTHER KNOWN CAUSES OF ANGIOSARCOMA OF THE LIVER?

A. I BELIEVE YOU'VE HEARD THEM ALL, BUT NOW REPEATING THEM, OTHER THAN VINYL CHLORIDE, WE HAVE GOOD BIOLOGICAL EVIDENCE THAT ARSENIC, A MINERAL, CAUSES ANGIOSARCOMA; THAT A RADIOACTIVE ISOTOPE CALLED THOROTRAST PRODUCES THIS, AND I THINK WE HAVE VERY GOOD EVIDENCE THAT A MALE HORMONE CALLED ANDROGENIC ANABOLIC STEROIDS ALSO CAUSES ANGIOSARCOMAS.

Q. FOR THESE FOUR KNOWN CAUSES, ARE THERE ANY PHYSICAL OR CHEMICAL SIMILARITIES IN THE CAUSATIVE AGENT OR ARE THEY ALL DIFFERENT OR ALL THE SAME?

A. NO, THESE ARE ALL DIFFERENT AGENTS AND WE HAVE SOME EVIDENCE THAT THE MECHANISM BY WHICH THEY CAUSE THE TUMOR OR THE MECHANISM WE BELIEVE CAUSE THE TUMOR IS DIFFERENT. FOR INSTANCE, IN THE CASE OF THOROTRAST, THIS IS A RADIOACTIVE MATERIAL THAT IS ATTACHED TO A PROTEIN THAT IS INJECTED INTO THE INDIVIDUAL AND IS TAKEN UP BY THOSE BLOOD VESSEL LINING CELLS AND HELD THERE. AND THEN ONE IS ABLE TO TAKE A FILM OR A X-RAY OF ONES LIVER WITH THESE RADIOACTIVE MATERIALS OUTLINING ON IT.

IN THE EARLY DAYS OF RADIO ISOTOPES, WE DID NOT REALIZE THE LIFE OR THE DURATION OF THESE RADIATION EMITTING MATERIALS AND THE THOROTRAST HAPPENS TO BE 500 YEARS. SO, IN THIS PARTICULAR CASE, ONE RETAINS THE RADIOACTIVE MATERIAL AND THE RADIATIONS THAT WE BELIEVE CAUSES THE ANGIOSARCOMA IN THAT CASE; WHEREAS, THE VINYL CHLORIDE IS BECAUSE OF THE WAY THE BODY METABOLISES IT. IN THE CASE OF ARSENIC, WE'RE NOT AS CLEAR ON WHAT THE MECHANISM IS. IN THE CASE OF THE STEROID, THESE ARE STIMULATORS FOR GROWTH AND WE FEEL THAT HAS -- PLAYS A

ROLE IN WHY THE CELL DEVELOPS INTO A TUMOR.

Q. APPROXIMATELY HOW MANY CASES OF ANGIOSARCOMA ARE DIAGNOSIED IN THE YEAR IN THE UNITED STATES?

A. WELL, THE ESTIMATES HAVE VARIED ANYWHERE FROM ONE CASE IN EVERY FOUR MILLION PEOPLE TO AS FEW AS ONE CASE IN EVERY 20 MILLION. BUT ROUGHLY 25 TO 30 CASES A YEAR HAVE BEEN DOCUMENTED IN VARIOUS SURVEYS.

Q. ARE ALL CASES OF ANGIOSARCOMA ATTRIBUTED TO ONE OF THE FOUR CAUSES YOU JUST DISCUSSED?

A. NO. ONLY ABOUT A QUARTER, 25 PERCENT OF THEM ARE.

Q. DO YOU HAVE AN OPINION AS TO WHETHER OR NOT ADDITIONAL CAUSES WILL BE DISCOVERED AS MORE RESEARCH IS DONE?

A. FROM WHAT WE UNDERSTAND ABOUT BIOLOGY AND OUR EXPERIENCE WITH OTHER TUMORS, I WOULD SUSPECT THAT WE WILL FIND AT LEAST ONE; MOST LIKELY MANY MORE CAUSES FOR A TUMOR. I KNOW OF NO TUMOR THAT DEVELOPS BECAUSE OF A SINGLE CAUSE. THE MECHANISM BY WHICH IT MAY EVOLVES MAY BE THE SAME, BUT THERE ARE MANY, NUMEROUS, I SHOULD SAY, AGENTS WHICH WILL

CAUSE THE SAME KINDS OF TUMORS.

Q. FROM YOUR -- FROM YOUR STUDIES -- I THINK YOU SUGGESTED THAT IN AN EARLIER ANSWER -- DO YOU HAVE INFORMATION CONCERNING HOW VINYL CHLORIDE IS ACTUALLY HANDLED BY THE LIVER?

A. WELL, WE'VE CONDUCTED BOTH ANIMAL AND HUMAN STUDIES RELATED TO THIS. AND I'M -- IT IS, I THINK, NECESSARY TO EXPLAIN A LITTLE BIT ABOUT HOW THE BODY HANDLES CHEMICALS TO UNDERSTAND WHY WE SEE VARIATION AND WHY WE THINK WE'RE CORRECT IN WHAT WE SEE. AND AGAIN, I'D LIKE TO USE, IF I MIGHT, SOME ILLUSTRATION TO DEMONSTRATE THIS AND MAKE IT, I HOPE, CLEARER.

THE LIVER IS A VERY, VERY INTERESTING ORGAN IN THE SENSE THAT IT IS BIOLOGICIALLY DESIGNED TO GET RID OF ABNORMAL PRODUCTS. BUT THE CREATOR MAY OR MAY NOT HAVE ANTICIPATED THAT WE'D USE SYNTHETIC AGENTS. BUT IT IS DESIGNED EVOLUTIONARY-WISE TO HANDLE NATURAL AGENTS. NOW, WHEN IT GETS A SYNTHETIC PARTICULATE, IT HAS A LIMITED NUMBER OF MECHANISMS BY WHICH TO HANDLE THESE AGENTS.

NOW, THIS SIMPLY ILLUSTRATES THE CHEMICAL FORMULA FOR VINYL CHLORIDE DOWN HERE. IT'S A VERY SIMPLE MOLECULE. IT HAS TWO CARBON ATOMS AND THEN A CHLORIDE. AND THESE ARE JUST SIMILAR STRUCTURAL AND SYNTHETICS.

NOW, IT'S THESE TWO CARBONS THAT ARE ATTACHED BY BONDS, AND THESE BONDS CAN BE BROKEN, IN FACT, THAT'S HOW YOU METABOLIZE SOMETHING, YOU BREAK THE BONDS OF A MOLECULE IN THE SUBSTANCE DEGRADATED.

NOW, THE CHEMISTS AT DOW AND AT SOME OF THE UNIVERSITIES IN NEW YORK HAD BEEN DOING SOME CHEMICAL STUDIES ON HOW VINYL CHLORIDE MULTIPLYS. AND THESE ARE THREE STEPS BY WHICH IT IS METABOLIZED. THE FIRST STEP .-- AND THIS IS VINYL CHLORIDE.

THE COURT: DOCTOR, WHAT DO YOU MEAN BY METABOLIZE, SO THE JURY WILL KNOW.

THE WITNESS: METABOLISM IS A WAY OF BREAKING DOWN A SUBSTANCE, BURNING IT UP. THE SAME THING ONE WOULD DO IN BURNING COAL. YOUR CONSUMING IT OR CHANGING IT IN ITS STRUCTURE. AND IT'S A GENERAL TERM FOR THAT.

THE ALCOHOL -- THE FIRST STEP IS THE SAME ROUTE THAT IS TAKEN FOR

METABOLIZING OR BURNING UP ALCOHOL, WHICH IS ANOTHER CHEMICAL. AND THIS OCCURS ONLY AT VERY LOW LEVELS OF VINYL CHLORIDE EXPOSURE. IT APPEARS THAT AS ITS LEVEL BEGINS TO RISE OR THE EXPOSURE IS INCREASED, THE LIVER CELL TAKES ON ADDITIONAL MECHANISM IN ORDER TO BREAKDOWN THE PRODUCT. NOW, THE THIRD STEP OCCURS AT THE HIGHER LEVELS, PROBABLY IN THE RANGE OF 200 PARTS PER MILLION IN WHICH THE LIVER ITSELF CONVERTS TO VINYL CHLORIDE INTO WHAT WE CALL AN APOXSIDE. IT MEANS SIMPLY THAT OXYGEN IS ATTACHED TO WHERE THE DOUBLE BONDS ARE. NOW, THIS MOLECULE IS VERY, VERY REACTIVE AND HAS BEEN SHOWN BY ANIMAL EXPERIMENTS TO INJURE -- IT IS GENETIC MATERIAL OF A CELL SO THAT IT CAN BE DISTORTED WITHOUT KILLING THE CELL. AND IN THAT WAY, ALLOW THE CELL TO BECOME MUTAGENICALLY CHANGED, THAT IS TO FORM ABNORMALITIES OR EVEN TO GO ON TO MALIGNANCY. AND THE PRESENT LIFE THAT THIS METABOLISTIC IS THE SOURCE OF THE ANGIOSARCOMA AND THAT THE LIVER NORMAL CELLS, THE LIVERS MAIN CELLS, ARE RESPONSIBLE FOR THAT CONVERSION. SO THAT THE LIVER ACTUALLY IS TAKING SOMETHING WHICH

IS A STABLE SUBSTANCE AND MAKING IT INTO A CANCER PRODUCING SUBSTANCE.

NOW, THE LIVER, ALSO WHILE IT'S DOING THIS, GETS RID OF IT BY A MECHANISM OF CONVERGING ON THIS WITH WATER AND THEN BEING ABLE TO RELEASE IT OR EXCRETE IT INTO THE BODY. AND THIS BALANCE BETWEEN HOW MUCH IS MADE AND HOW MUCH IS GOTTEN RID OF WE BELIEVE IS A CRITICAL FACTOR IN WHETHER THE TUMOR IS DEVELOPED.

NOW, THIS IS JUST A DRAWING ILLUSTRATING ON A LIVER CELL, THAT SQUARED CELL AND THEN THE LINING CELL, THAT'S AT THE SURFACE. IT IS OUR PRESENT BELIEF THAT VINYL CHLORIDE AND POSSIBLY OTHER CHEMICALS SIMILAR TO IT ARE TAKEN UP BY THE MAJOR LIVER CELLS AND THERE THE INTERMEDIATE ACTIVE SUBSTANCE, THE APPOXY, IS FORMED. AND DEPENDING UPON HOW WELL THE LIVER CAN GET RID OF THAT IS A CRITICAL FACTOR IN WHETHER OR NOT THE LIVER CELLS BECOMES MALIGNANT OR WHETHER IT BECOMES INJURED AND DIES.

NOW, THIS ALSO HAPPENS TO HOLD TRUE FOR THE LINING CELLS. IN FACT, FOR ANY CELL IN THE BODY. IT DEPENDS ON THEIR

ABILITY TO GET RID OF THIS SUBSTANCE THAT'S MADE. AND DEPENDING UPON THAT CAPABILITY, ONE FINDS THE RISK OF CANCER INCREASING WITH THE DECREASED ABILITY OR REVERSE.

NOW, WE BELIEVE THIS CAN ACCOUNT OR WHY SOME PEOPLE DEVELOP MALIGNANCY AND OTHERS DON'T AT VERY, VERY LOW LEVELS. THE LIVER CELL CAN HANDLE THE METABOLISM OF THIS COMPOUND AND ALSO ITS REMOVAL OF THE INTERMEDIATE MATERIAL. AT A MORE MODERATE LEVEL, IT MAYBE OVERWHELMED AND ALLOW THE APOXSIDE TO BE AROUND AND DO DAMAGE TO THE NUCLEUS OR TO THE GENETIC MATERIAL AND THEN THAT INJURED CELL CAN GO IN THE FUTURE AND DEVELOP CANCER. AT VERY HIGH LEVELS, IT ACTUALLY KILLS THE CELL AND THEN THE BODY REPLACES IT WITH ANOTHER ONE AND THERE IS THEN NO DEVELOPMENT OF CANCER BECAUSE THE CELL THAT WAS INJURED HAS DIED. AND SO, THERE MAY BE PEOPLE WHO CAN GET THE SAME LEVEL OF EXPOSURES IN WHOM THERE'S CELLS THAT HAVE BEEN GENETICALLY TRANSFORMED, DIED AND THEREFORE, THOUGH THEY'VE BEEN EXPOSED IN THE SAME LEVELS, THEY DO NOT DEVELOP TUMORS.

Q. DOCTOR, HAVE YOU ACTUALLY TREATED

ANGIOSARCOMA PATIENTS?

A. YES, WE HAVE.

Q. WHERE AND HOW MANY AND --

A. WE HAVE TREATED SIX ANGIOSARCOMA, FIVE ARE VINYL CHLORIDE EXPOSED INDIVIDUALS AND A SIXTH WAS ONE WE DON'T REALLY HAVE THE SOURCE OF THE ANGIOSARCOMA.

Q. WITH RESPECT TO THE VINYL CHLORIDE EXPOSED PATIENTS, DO YOU KNOW WHAT THE ESTIMATED LEVEL OF VINYL CHLORIDE WAS?

A. IN ALL FIVE CASES FROM OUR DETAILED OCCUPATIONAL RECORDS, THEIR EXPOSURES LEVELS WERE ABOVE 50 PARTS PER MILLION AND WE ESTIMATE SOMEWHERE IN THE RANGE OF 200 TO 500 DURING A GREATER PROPORTION OF THEIR WORK HISTORY.

Q. DOCTOR; WHAT IS EPIDEMIOLOGY?

A. THIS IS THE STUDY OF THE DEVELOPMENT OF DISEASE IN POPULATION. WE CAN STUDY IT IN AN INDIVIDUAL, BUT THERE ARE ALSO TIMES WHEN WE WANT TO STUDY THE OCCURRENCE OF DISEASE IN GROUPS OF INDIVIDUALS, WHERE WE'RE NOT ACTUALLY STUDYING THE INDIVIDUAL DISEASE PROCESS ITSELF. AND IT IS THIS AREA OF MEDICINE THAT ALLOWS US TO DETERMINE THE

FREQUENCY WITH WHICH DISEASES ARE OCCURRING AND CHANGING AND ALSO ALLOWS US TO DETERMINE WHETHER OR NOT THE PROBLEM THAT A DISEASE IS OCCURRING IN A CERTAIN AREA IS DUE TO OR COULD BE RELATED TO SOME ENVIRONMENTAL OR SOCIAL OR VIRAL CAUSE.

Q. AND GENERALLY, WOULD YOU DESCRIBE HOW EPIDEMIOLOGICAL STUDIES ARE DONE?

A. WELL, THIS IS DONE WITH THE BASIS BEING IN STATISTICS OR PROBABILITY. AS YOU'VE HEARD BEFORE, IN MEDICINE, WE REALLY DO NOT DEAL WITH THE ABSOLUTE. THERE IS SO MUCH NATURAL VARIATION BETWEEN HUMANS THAT WE CANNOT BE ABSOLUTE PREDICTORS. AND SO, WE DEAL WITH WHAT WE CALL PROBABILITY; THAT IS, WHAT IS LIKLIHOOD THAT AN EVENT, DEVELOPMENT OF A DISEASE WOULD OCCUR IF CERTAIN ENVIROMENTAL THINGS WERE CHANGED. WE DO THIS WITH VIRUS -- IF YOU HAVE A CERTAIN VIRUS PRESENT, THERE'S A CERTAIN FREQUENCY, OR A CERTAIN OCCURRENCE OF THIS DISEASE PROCESS. WE TAKE THE VIRUS AWAY, THAT DOESN'T HAPPEN NOW, YOU MAKE THOSE STUDIES BY LOOKING AT A POPULATION OF PEOPLE WHO HAVE THAT PARTICULAR AGENT OR MATERIAL PRESENT AND YOU LOOK AT A

COMPARABLE POPULATION THAT DOES NOT. AND THEN YOU FIND OUT WHETHER THE OCCURRENCE OF THE DISEASE OCCURS ANY GREATER IN ONE POPULATION VERSUS ANOTHER. NOW, IF IT DOES, THEN YOU HAVE A VERY HIGH PROBABILITY, 95 CHANCES OUT OF A HUNDRED, THAT THAT IS RELATED TO THE ENVIRONMENT OR TO THE AGENT YOU'VE IDENTIFIED IN ANOTHER. AND BY REPEATING THAT SAME STUDY IN WHICH POPULATION AND FINDINGS THE SAME RESULTS, YOU INCREASE THE RELIABILITY THAT THAT'S A TRUE EVENT, THAT DID NOT HAPPEN BY CHANCE.

Q. ARE YOU FAMILIAR WITH EPIDEMIOLOGICAL STUDIES DONE WITH RESPECT TO VINYL CHLORIDE AND ANGIOSARCOMA?

A. MOST I AM.

Q. AND HAVE YOU DONE STUDIES YOURSELF?

A. WE HAVE.

Q. WITH RESPECT TO THE STUDIES THAT YOU'VE DONE YOURSELF, WHAT GROUP OF PEOPLE DID YOU -- WHICH GROUPS OF PEOPLE DID YOU COMPARE?

A. WELL, IT IS NOT ALWAYS EASY. ONE OF THE MAJOR LIMITATIONS TO EPIDEMIOLOGICAL STUDIES IS THAT WE HAVE DIFFERENT POPULATION.

WE HAVE DIFFERENT RACES, OF DIFFERENT SEX, WE HAVE DIFFERENT EATING PATTERNS, DIFFERENT LIVING PATTERNS, DIFFERENT ENVIRONMENTAL PATTERNS. SO, YOU TRY TO GET A MATCH IN THE POPULATION AS BEST YOU CAN.

NOW, THE VARIATION TO THIS, YOU CAN TAKE ONE POPULATION AND DIVIDE IT INTO TWO GROUPS AND MAKE A COMPARISON IN THAT WAY, OR YOU CAN GET TWO GROUPS FROM DIFFERENT AREAS AND MAKE A COMPARISON. WHAT WE WERE ABLE AND WERE FORTUNATE ENOUGH TO DO IS TO HAVE A POPULATION OF INDIVIDUALS WHO WERE EXPOSED FOR A VERY LONG TIME AT WHAT IS BELIEVED TO BE THE HIGHEST LEVELS AND ALSO THE LOWEST LEVELS OF VINYL CHLORIDE. AND ABOUT 1,200 OF THESE INDIVIDUALS AND ABOUT 600 RETIREES WHO HAD WORKED IN A PROLONGED PERIOD OF TIME AND WE WATCHED THEIR DEVELOPMENT. AND WE WERE ABLE TO SEPERATE IN THAT GROUP BETWEEN THE GROUP THAT WORKED WITH VINYL CHLORIDE AND THE GROUP THAT WORKED WITH SYNTHETIC RUBBER OR WAS ABLE TO SHOW THERE WAS A DIFFERENCE IN THE TYPES OF DISEASES IN THESE TWO GROUPS AND THAT IT WAS RELATED TO WORK. WE WERE ALSO DOING STUDIES IN

FABRICATORS WHO WORKED AT OTHER PLANTS AND LOOKING FOR THE OCCURRENCE OF LIVER DISEASE AMONG THEM AS EVIDENCE OF EXPOSURE TO THE CHEMICAL IN COMPARISON TO OTHER GROUPS WHO WORKED WITH DIFFERENT KIND OF AGENTS. AND THIS WAY, WE'VE BEEN ABLE TO FIND OUT WHETHER OR NOT THERE WAS A GREATER OCCURRENCE OF LIVER DISEASE OR OTHER KINDS OF DISEASE AMONG THESE WORKERS. LET'S TAKE THE HIGHLY EXPOSED GROUP. DID YOU FIND A HIGHER INCIDENCE THAN EXPECTED IN ANGIOSARCOMA AMONG THAT GROUP?

A. YES, AND WE WERE ABLE TO IDENTIFY THE AGENT BY THESE EPIDEMIOLOGICAL STUDIES.

Q. AND WHAT WAS THE EXPOSURE LEVEL OF THAT GROUP?

Q. EXPOSURE LEGAL OF VINYL CHLORIDE?

A. WE HAVE TO DO THIS ON THE BASIS OF HISTORY, BECAUSE WE DO NOT HAVE ABSOLUTE DATA. SO, I WOULD LIKE, IF I CAN, TO ILLUSTRATE HOW WE WENT ABOUT DOCUMENTING THAT THE EXPOSURE WAS HIGH AND THEN TO SHOW WHAT EVIDENCE WE HAD AND WHAT THAT EXPOSURE -- THAT, QUOTE, HIGH EXPOSURE WAS, IF I MIGHT. WHEN DOCTOR CREECH AND DOCTOR JOHNSON HAD DISCOVERED THE ANGIOSARCOMA IN MAN, WE HAD A UNIQUE

SITUATION BECAUSE WE HAD ANIMAL STUDIES EVEN BEFORE THAT OR AT THE SAME TIME, WHICH HAD SHOWN THAT IF YOU USE ONLY VINYL CHLORIDE, YOU PRODUCE THE TUMOR. BUT IN THE EARLY STAGES, IT WAS UNCLEAR WHETHER OR NOT IT WAS THE VINYL CHLORIDE ITSELF, THE MONOMER THAT YOU HEARD ABOUT, OR WHETHER IT WAS THE POLYMER OR THE POLYVINYLCHLORIDE, THE PRODUCT, THAT CAUSED THIS. AND SO, AS PART OF OUR NATIONAL CANCER INSTITUTE GRANT, WE WENT ABOUT SETTING UP A SYSTEM THAT WOULD ALLOW US TO DETERMINE EXPOSURE BASED ON WHERE PEOPLE HAD WORKED, HOW LONG THEY HAD WORKED AND WHETHER OR NOT THOSE JOBS WERE ASSOCIATED WITH VINYL CHLORIDE IN A -- WHAT WE CALL A RANK ORDERING; THAT IS, THAT WE WOULD TAKE A SETS OF INDIVIDUALS, SIX THAT WE TOOK, MAKING ZERO PEOPLE WHO WERE OUTSIDE THE PLANT ALTOGETHER, ONE WOULD BE THE MINIMUM AMOUNT OF POSSIBLE EXPOSURE ONE COULD HAVE, AND SIX BEING THOSE PEOPLE WHO WERE INTIMATELY INVOLVED WITH THAT. AND BY THE USE OF THIS RANK ORDERING AND THE KINDS OF JOBS THAT THE INDIVIDUALS HAD, WE WERE ABLE TO DESIGN AN ESTIMATE THAT DID NOT HAVE AN ABSOLUTE FIGURE

ON WHO HAD THE MOST EXPOSURE RELATIVE TO THEIR COMPANY WORKERS. AND BY DOING THIS, WE WERE ABLE TO SEE WHETHER OR NOT THOSE INDIVIDUALS WITH THE HIGHEST DEGREE OF EXPOSURE ON THESE ESTIMATES WERE MORE ASSOCIATED WITH ANGIOSARCOMA THAN THOSE WHO HAD LESS. AND WHAT THIS DEMONSTRATED WAS THE FOLLOWING: EACH OF THESE COLUMNS HAS MADE UP OF LITTLE STACKS. EACH STACK IS AN INDIVIDUAL WHO HAS A WORK HISTORY ESTIMATE OF THEIR EXPOSURE TO A CHEMICAL CALLED ACRYLONITRILE. WE EXAMINED 22 CHEMICALS. THIS IS JUST SIMPLY ONE TO ILLUSTRATE THIS. THIS IS THE BASE CHEMICAL FOR THE FORMATION OF SYNTHETIC RUBBER.

NOW, WE HAD FOUND FOUR ANGIOSARCOMAS DURING THIS TIME OF 1974 TO 1977. AND EACH ANGIOSARCOMA CASE IS ILLUSTRATED IN RED. NOW, THE POSITION THE ANGIOSARCOMA HAS IN THESE GROUPS OF INDIVIDUALS IS RELATIVE TO THEIR EXPOSURE TO THIS PARTICULAR CHEMICAL. AND WHAT THIS SIMPLY ILLUSTRATES IS THAT FOR MEN OF THE SAME SEX, ROUGHLY THE SAME AGE, PLUS OR MINUS A YEAR WHO WORKED FOR THE SAME NUMBER OF

YEARS, THEIR TOTAL ESTIMATED EXPOSURE TO THIS PARTICULAR CHEMICAL PUT THEM SOMEWHERE IN THE MIDDLE OR THE LOWER END OF THIS CHEMICAL, INDICATING THAT THE ANGIOSARCOMA CASES DID NOT HAVE A HIGH ASSOCIATION WITH THIS CHEMICAL.

NOW, WHEN WE LOOK AT VINYL CHLORIDE, WE SEE THAT THE ANGIOSARCOMA CASES ARE THE HIGHEST OR AMONG THE HIGHEST IN THEIR EXPOSURE TO VINYL CHLORIDE, ILLUSTRATING ON -- THEN FROM AN EPIDEMIOLOGICAL POINT OF VIEW, THAT IT IS VERY HIGHLY PROBABLE THE CHANCES OF US MAKING THE ERROR IN THESE PARTICULAR CASES STATISTICALLY IS ONLY ONE IN A THOUSAND, SO, IT'S A 99 -- 900-99 CHANCES WE'RE RIGHT WITH THIS HYPOTHESIS AND ONE CHANCE WE'RE WRONG, THAT THIS PARTICULAR TUMOR IS ASSOCIATED WITH VINYL CHLORIDE EXPOSURE.

NOW, OF THE 22 CHEMICALS THAT WE HAVE A CHANCE TO LOOK AT, ONLY FOUR SHOWED THIS ASSOCIATION. NOW, ANY TIME YOU TRY TO TAKE A LARGE NUMBER OF POSSIBILITIES AND PUT THEM TOGETHER, BY CHANCE, YOU'LL COME UP WITH AN ASSOCIATION. IT'S ESTIMATED THAT IF YOU

HAD 20 POSSIBILITIES, YOU'D HAVE AN AT LEAST ONE BY CHANCE, MEANING IT WASN'T REAL, JUST HAPPENED BY CHANCE THAT YOU SAW THAT ASSOCIATION. WELL, WE CAME UP WITH FOUR. WE WERE RATHER SURPRISED BECAUSE THAT WAS HIGHER THAN WE WOULD HAVE EXPECTED. AND HAVE SOURCE, WE DID EXPECT THE VINYL CHLORIDE, BUT WE HAD TWO OTHER -- THREE OTHER AGENTS; ONE OF WHICH WERE CATALYSTS THAT WE USED WITH VINYL CHLORIDE TO CONVERT IT INTO THE POLYMER. THE SECTION WAS A SOLVENT, SOMETHING TO DISOLVE THE CATALYST. AND THE THIRD, WHICH IS SPECIALIZED CATALYST USED IN VINYL CHLORIDE. SO, ALL OF THE SYNTHETIC RUBBER CHEMICALS, THE ONES USED FOR RUBBER MANUFACTURING DID NOT SHOW ANY ASSOCIATION. BUT THE AGENTS THAT WERE USED WITH VINYL CHLORIDE SHOWED THAT IT DID. AND THIS FURTHER DOCUMENTED THAT OUR ESTIMATES, OUR WORK ESTIMATES ABOUT THEIR EXPOSURE WERE CORRECT EPIDEMIOLOGY AND THIS WAS ASSOCIATED WITH THE DEVELOPMENT OF CANCER.

NOW, WHEN WE WENT TO LOOK AT LUNG CANCER, WHICH IS ALSO HIGHLY SUSPECTED OF BEING ASSOCIATED WITH VINYL CHLORIDE, WE WERE UNABLE AMONG OUR SEVEN CASES OF LUNG

CANCER TO SHOW THAT THERE WAS ANY ASSOCIATION WITH ANY OF THE RUBBER CHEMICALS AS ILLUSTRATED BY ACRYLONITRILE AND ALSO THAT THERE WASN'T ANYTHING ASSOCIATED WITH VINYL CHLORIDE. NOW, THIS HAS LED US TO SIMPLY CONCLUDE THAT THERE IS AN INCREASE IN CANCER OF THE LUNG, BUT THAT IT IS NOT ASSOCIATED EPIDEMIOLOGY WITH THE CHEMICALS WE LOOKED AT AND THAT MEANS WE STILL HAVE TO FIND THE AGENT.

Q. DOCTOR, IN YOUR SIX CATEGORIES OF EXPOSURES FROM PEOPLE OUTSIDE THE PLANT UP THROUGH THE VARIOUS LEVELS, IN WHICH CATEGORY DID YOUR -- THE ANGIOSARCOMA CASES THAT YOU FOUND FALL?

A. THEY WERE MOSTLY IN CATEGORIES OF FOUR, FIVE AND SIX. WE FOUND NONE WHO FELL INTO THE CATEGORIES OF ZERO, ONE, TWO OR THREE.

Q. AND WHAT TYPES OF JOBS DID FOUR, FIVE AND SIX HAVE?

A. WELL, THE INDUSTRY HAD A -- FORGIVE ME FOR USING THE WRONG TERM, I ASSUME THEY HAD SOME SORT OF SENIORITY ORDER. EVERYONE WHO CAME TO WORK DID ONE JOB FIRST

AND THAT WAS WORKING IN THE CLEANING ON OF THE BIG VATS. AND SO, /TKAB AS THE WORKER THEN WOULD BE PROMOTED, HE WOULD LEAVE THAT JOB. SOME STAYED ON THAT JOB LONGER TIMES THAN OTHERS, BUT ALL OF THEM HAD WORKED FOR CONSIDERABLE PERIODS OF TIME IN THESE VATS OR AROUND THESE VATS.

[redacted]

THAT HAS LIVED AROUND THE PLANTS ENVIRONMENT, THEN ONE WOULD HAVE EXPECTED THAT DIDN'T. NOW, IT -- IT BECOMES SUSPICIOUS WHEN ONE SEES CASES AND THAT IS WHY ONE DOES EPIDEMIOLOGICAL STUDIES, TO FIND OUT WHETHER YOUR SUSPICIONS ARE CHANCE HAPPENINGS OR WHETHER OR NOT SINCE YOU'RE REALLY SEEING SOMETHING THAT'S REALLY HAPPENING.

Q. DOCTOR EPSTEIN TESTIFIED CONCERNING ANGIOSARCOMA AT LOW LEVELS OF EXPOSURE. I BELIEVE HE DISCUSSED PVC FABRICATE FORCE EXPOSED TO LEVELS OF NONE DETECTABLE TO TWO PARTS PER MILLION. AS A RESULT OF STUDIES DONE BY YOU OR YOUR RESEARCH, DO YOU KNOW IF THERE IS ANY HIGHER INCIDENCE OF ANGIOSARCOMA AMONG PVC FABRICATE FORCE?

A. BOTH BY OUR STUDIES AND THOSE THAT HAVE BEEN PUBLISHED, WE HAVE NOT FOUND ANY EVIDENCE THAT THE PVC PRODUCTION WORKERS OR FABRICATORS HAVE ANY INCREASED INCIDENCE OF EITHER INJURY ASSOCIATED WITH CHEMICALS OR WITH ANGIOSARCOMA.

Q. IF AN AGENT IS KNOWN TO CAUSE A PARTICULAR -- I'M SORRY. IF AN AGENT IS KNOWN TO CAUSE CANCER IN A PARTICULAR PART OF

THE BODY, WILL IT NECESSARILY CAUSE CANCER TO OTHER PARTS OF THE BODY?

A. ONE HAS TO UNDERSTAND THAT EVER CELL HAS A DIFFERENT JOB AND HAS DIFFERENT CAPABILITIES. AND THE REASON WE BELIEVE ONE CELL DEVELOPS CANCER AND ANOTHER DOESN'T IS DEPENDENT UPON THESE CAPABILITIES. AND AS YOU SAW ILLUSTRATED IN THE LIVER ITSELF WITH TWO DIFFERENT CELLS, DEPENDING ON THEIR ABILITY, THEY EITHER DEVELOP CANCER OR THEY DON'T. IN GENERAL, YOU CAN BE HIGHLY SUSPICIOUS THAT ONE CHEMICAL, IF IT DEVELOPS A CANCER IN ONE TISSUE MAY DO IT IN OTHERS. BUT YOU CANNOT SAY BECAUSE IT DEVELOPED IT IN ONE TISSUE, IT WILL DEVELOP IT IN OTHERS. AND ONE HAS TO TAKE INTO CONSIDERATION HOW THAT PARTICULAR AGENT IS HANDLED BY THE CELLS AND WHETHER THE CELL HAS THE CAPABILITIES OF DEFENDING ITSELF. AND THOSE CELLS THAT DON'T, THEN THE PROBABILITY IS GREATER THAT THEY'LL HAPPEN. AND IF IT DOESN'T, IT WON'T. AND SO, YOU CAN'T JUST MAKE A SIMPLE STATEMENT THAT CANCER DEVELOPMENTS IN ONE TISSUE WILL DEFINITELY DEVELOP IN ANOTHER. YOU CAN BE SUSPICIOUS, BUT YOU HAVE TO DEMONSTRATE IT.

Q. DOCTOR EPSTEIN HAS DISCUSSED EIGHT CASES OF ANGIOSARCOMA IN INDIVIDUALS LIVING WITHIN TWO MILES OF PVC PLANTS AND HE REFERRED TO ARTICLES BY CHRISTIAN, BAXTER AND BRADY. FIRST OF ALL, ARE YOU FAMILIAR WITH THOSE ARTICLES?

A. YES.

Q. DOES THE EXISTENCE OF THESE EIGHT CASES MEAN THERE IS A SUBSTANTIAL MEDICAL PROBABILITY THAT THEIR ANGIOSARCOMAS WERE CAUSED BY VINYL CHLORIDE?

MR. VASSALOTTI: EXCUSE ME. ARE YOU ASKING THE DOCTOR IN HIS OPINION.

MR. RENNEISEN: YEAH, IN HIS OPINION, I'M SORRY. SHALL I REPHRASE THE QUESTION?

MR. VASSALOTTI: NO, I JUST WANTED IT CLEAR.

BY MR. RENNEISEN:

Q. IN YOUR OPINION, DOCTOR, DOES THE EXISTENCE OF THESE EIGHT CASES MEAN THAT THERE IS A SUBSTANTIAL MEDICAL PROBABILITY THAT THOSE INDIVIDUALS HAD ANGIOSARCOMA CAUSED BY VINYL CHLORIDE?

A. WELL, THE PRESENCE OF THESE CASES

HAVE MADE US ALL SUSPICIOUS THAT THIS POSSIBILITY MIGHT EXIST AND THAT'S WHY THE EPIDEMIOLOGICAL STUDIES WERE CARRIED OUT. NOW, THOSE EPIDEMIOLOGICAL STUDIES HAVE NOT VALIDATED THAT THERE IS A CAUSAL RELATIONSHIP. NOW, IN EPIDEMIOLOGY, WE CANNOT PROVE A NEGATIVE. YOU PROVE ONLY A POSITIVE. AND SO, WHAT WE HAVE IS INCREASING ATTEMPTS TO PROVE THE POSITIVE COMING UP WITH THE NEGATIVE. AND SO LONG AS THAT CONTINUES ON, WE DO NOT HAVE SCIENTIFIC DATA THAT SAYS THAT THESE CASES WERE -- DID NOT HAPPEN BY CHANCE.

Q. I'D LIKE TO ASK YOU A HYPOTHETICAL QUESTION: DOCTOR, ASSUME THAT JOHN C GRASSO WAS BORN ON DECEMBER 27, 1927 AND WAS EMPLOYED AT THE DUPONT CHAMBERSWORKS FROM 19 44 UNTIL 1976 WITH A PERIOD AROUND 1950 WHEN HE HAD OTHER TYPES OF EMPLOYMENT; ASSUME THAT MR. GRASSO LIVED 1.7 MILES FROM THE B.F. GOODRICH PEDRICKTOWN PLANT FROM THE DATE IT OPENED IN 1970 UNTIL HIS DATE OF DEATH IN 1977. ASSUME FURTHER THAT THE PEDRICKTOWN PLANT IS IN SALEM COUNTY, WHICH GENERALLY IS A RURAL AREA AND ASSUME THAT WHEN MR. GRASSO WAS AT DUPONT, DUPONT USED A GREAT NUMBER OF

CHEMICALS; ASSUME THAT MR. GRASSO WAS HOSPITALIZED IN JUNE OF 1976 WHEN HE BEGAN COUGHING UP BLOOD AND HAD OTHER SYMPTOMS AND CONDITIONS AS DESCRIBED IN THE HOSPITAL RECORDS WHICH I'VE SUBMITTED TO YOU FOR YOUR REVIEW. ASSUME THAT MR. GRASSO WAS HOSPITALIZED AT THOMAS JEFFERSON MEDICAL COLLEGE IN AUGUST OF 1976 AND THAT ON AUGUST 5, 1976, THE DIAGNOSIS OF ANGIOSARCOMA OF THE LIVER WAS MADE. ASSUME THAT THE PLANT IN PEDRICKTOWN DID OPEN ON MARCH 25, 1970 AND IT MANUFACTURED POLYVINYLCHLORIDE. DURING THE COURSE OF THE MANUFACTURING PROCESS, VINYL CHLORIDE GAS WAS EMITTED INTO THE ATMOSPHERE. ASSUME THAT CONCENTRATIONS OF VINYL CHLORIDE WERE FOUND IN THE AREA OF THE GRASSO HOME IN THE RANGE OF SIX TO NINE PARTS PER BILLION AND THAT MR. GRASSO ON AN ANNUAL AVERAGE THAT MR. GRASSO HIMSELF HAD AN ANNUAL AVERAGE EXPOSURE OF FIVE TO EIGHT PARTS PER BILLION. ASSUME THAT THE HIGH 24 HOUR AVERAGE FOR MR. GRASSO WOULD HAVE BEEN 260 PARTS PER BILLION AND ON AN HOURLY BASIS ON TWO TO FOUR TIMES A YEAR, AN HOURLY AVERAGE WOULD HAVE BEEN AS HIGH AS FIVE TO SIX PARTS PER MILLION. ASSUME

THAT MR. GRASSO WAS EXPOSED AS A RESULT OF EPISODIC EMISSIONS OCCURRING APPROXIMATELY 20 TIMES IN SIX YEARS FOR PERIODS OF TWO TO 15 MINUTES AND DURING THOSE EXPOSURE PERIODS, THE VINYL CHLORIDE LEVEL -- THE VINYL CHLORIDE CONCENTRATION WAS SEVERAL HUNDRED PARTS PER MILLION.

FIRST BASED ON THOSE ASSUMED FACTS AND YOUR KNOWLEDGE OF THE MEDICAL RECORDS, DO YOU HAVE AN OPINION WITH SUBSTANTIAL MEDICAL PROBABILITY AS TO WHEN THE LIVER TUMOR DIAGNOSIED ON AUGUST 5, 1976 FIRST WAS PRESENT IN MR. GRASSO?

A. YES, I DO.

Q. AND WHAT IS THAT OPINION?

A. FROM OUR OWN EXPERIENCE WITH THE DISEASE AND FROM THAT THAT'S IN THE LITERATURE, I WOULD SUSPECT THAT THE TUMOR HAD BEEN PRESENT AT A MINIMUM OF A YEAR AND POSSIBLY UP TO FOUR.

Q. AND THAT'S -- YOU'VE TESTIFIED AS TO YOUR EXPLANATION OF THAT PREVIOUSLY, HAVE YOU NOT?

A. WELL, THE REASON WE CHARACTERIZED A DISEASE IS BECAUSE WITH EACH CASE OF A

DISEASE THAT WE SEE, WE CONTINUED TO COLLECT INFORMATION AS TO THE NATURAL PROGRESSION OF THE DISEASE. AND THAT BECOMES A DESCRIPTION OF THE DISEASE PROCESS. THAT'S HOW ONE DISEASE IS DIFFERENTIATED FROM ANOTHER. AND ONE ACCUMULATES THIS BY THE CASES THAT ONE SEES, SO THAT THE FIRST CASE -- THE FIRST AND ONLY CASE OF A NEW DISEASE MAY NOT SHOW YOU ALL THE VARIATIONS. BUT AS ONE BEGINS TO CONTINUE TO INCREASE THE NUMBER OF CASES ONE, ONE BEGINS TO MORE CLEARLY DEFINE THE VARIATION. AND SO WE NOW HAVE A NUMBER OF CASES SHOWING US A VARIATION IN THE TIME OF THE TUMOR OCCURRENCE. IT'S ON THAT THAT WE BASE THAT OPINION.

Q. DOCTOR, DO YOU HAVE AN OPINION WITH SUBSTANTIAL MEDICAL PROBABILITY AS TO WHETHER OR NOT VINYL CHLORIDE EMITTED BY THE B.F. GOODRICH PLANT IN PEDRICKTOWN CAUSED MR. GRASSO'S ANGIOSARCOMA IN?

A. YES, I DO.

Q. WHAT IS YOUR OPINION?

A. BASED ON OUR MEDICAL KNOWLEDGE, I DO NOT BELIEVE THAT THAT IS THE SOURCE OF MR. GRASSO'S ANGIOSARCOMA.

Q. AND CAN YOU EXPLAIN FOR THE JURY HOW YOU ANALYZED THAT SITUATION IN ORDER TO GIVE ME THAT ANSWER.

A. I'D LIKE TO. I'D LIKE AGAIN TO USE SOME SLIDES TO ILLUSTRATE WHAT WE KNOW ABOUT THE ANGIOSARCOMA FROM ALL THE CASES THAT HAVE BEEN OBTAINABLE IN THE WORLD RELATED TO VINYL CHLORIDE.

THIS IS A CHART ILLUSTRATING ALL THE REPORTED CASES THAT HAVE BEEN VERIFIED BY PATHOLOGISTS AND MEDICAL EXPERTS THAT THESE ARE TRULY ANGIOSARCOMAS, NOT SOME OTHER KINDS OF TUMOR, AND WE ALSO KNOW THE EXPOSURES OF THESE INDIVIDUALS AND ALL OF THEM HAD BEEN WORKING WITH VINYL CHLORIDE FOR VARYING PERIODS OF TIME. THERE IS ROUGHLY 80 SOME CASES WITH AN ADDITIONAL TWO IN 1979 AND ONE IN 1980. THAT IS NOT ON THIS CHART.

THE ONES THAT ARE IN RED ARE THOSE FROM THE UNITED STATES AND THE ONES IN WHITE ARE FROM THE NORTH AMERICA, CANADA AND FROM ALL OF EUROPE AND ASIA.

NOW, IF ONE LOOKS AT WHEN -- WHEN THESE CANCER OCCURRED, THAT IS, WHEN THEY WERE DIAGNOSIED IN THE VARIOUS

COUNTRIES, I'VE ILLUSTRATED FOUR COUNTRIES, BECAUSE THESE ARE THE COUNTRIES THAT HAVE OR ACCOUNT FOR 90 PERCENT OF ALL THE ANGIOSARCOMAS AMONG VINYL CHLORIDE WORKERS. WHAT YOU SEE HERE IS THE NAME OF THE COUNTRY AND THE DATE -- MEANING 1941 IS ROUGHLY THE EARLIEST EXPOSURE OF ANY OF THE INDIVIDUALS IN THIS GROUP OF INDIVIDUALS.

Q. DOCTOR, AS YOU GO THROUGH, TELL US THE NAME OF THE COUNTRY, BECAUSE --

A. SURE, CANADA IS AT THE TOP. THEIR PLANT STARTED IN 1939, 1940'S. THE AMERICAN PLANTS -- THIS IS AN ERROR, THAT SHOULD HAVE BEEN 1941 -- IS -- I'M SORRY. THAT IS NOT AN ERROR. THERE IS A PLANT IN THE UNITED STATES THAT BEGAN ITS EXPOSURES IN 1939, FORGIVE ME. THEN FRANCE, THEY STARTED IN 1941, BUT THE MAJORITY OF THEM WERE IN THE FIFTIES. AND IN GERMANY, THEY STARTED IN THE MID 1950'S AND LATE 1950'S. SO THAT THE COUNTRIES ARE LISTED IN THE OLDEST PLANTS TO THE MORE RECENT ONES. AND YOU'LL NOTICE THAT THE OLDER OR THE PLANTS THAT WERE STARTED IN THE EARLIER TIMES HAVE THE EARLIEST DEVELOPMENT OF ANGIOSARCOMAS, STARTED IN THE

FORTIES, BEGUN TO BE IDENTIFIED IN THE FIFTIES, AND THOSE THAT STARTED IN THE LATE FIFTIES BEING IDENTIFIED IN THE SIXTIES. SO THAT THIS TREND, AS WELL AS THE PEAK NUMBER -- THAT IS, THE MOST FREQUENT OCCURRENCE OF ANGIOSARCOMAS -- ALSO SHOWS -- SHOWN IN YELLOW, THE SAME OCCURRENCE. NOW, THIS TELLS US THAT THE ON SET OF EXPOSURE AND WHEN ONE BEGINS TO DEVELOP THE TUMOR, AS WELL AS ONE REACHES THE MAXIMUM NUMBER OF CASES APPEARS TO BE THE SAME, WHETHER THEY ARE IN CANADA, THE UNITED STATES, FRANCE OR GERMANY. SO, THIS GIVES US AN IDEA ABOUT THE DISEASE PROCESS AS HAVING CERTAIN CHARACTERISTICS WHICH ARE CONSISTENT.

THIS TAKES NINE SAME CASES BUT DISTRIBUTES THEM UNDER DIFFERENT CIRCUMSTANCES. THIS HAS THE TOTAL NUMBER OF YEARS OF EXPOSURE OF EACH OF THE CASE WHO DEVELOPED HEPATIC ANGIOSARCOMA, LIVER ANGIOSARCOMA, IN THESE VINYL CHLORIDE WORKERS. AND THIS INDICATES THEIR NUMBER -- TOTAL NUMBER OF YEARS OF EXPOSURE. AND AS YOU SEE, THIS RANGES ANYWHERE FROM ABOUT THREE YEARS TO AS MUCH AS 33 YEARS OF EXPOSURE.

NOW, I PUT A NUMBER OF THESE IN RED. AND THAT'S BECAUSE THERE APPEARS TO BE TWO PEAKS. THERE ARE A GROUP, ABOUT EIGHT, WHO DEVELOPED ANGIOSARCOMA WITH ONLY THREE TO SIX YEARS OF EXPOSURE AND THEN THE MAJORITY OF CASES THAT HAD TEN TO 30 YEARS WITH THE MEAN BEING AROUND 15 TO 20. IN FACT, THERE MAY BE THREE PEAKS. BUT, THIS GROUP WAS THOUGHT TO BE POSSIBLY A UNIQUE GROUP. AND I ILLUSTRATE THEM IN ANOTHER CONTEXT. AS WE DESCRIBED -- AS WHERE UPON THEN LOOK AT THE SAME THING, WE LOOK NOW AT LATENCY. AS YOU KNOW, THAT'S THE TIME FROM THE FIRST EXPOSURE TO THE TIME THE PATIENTS BECOMES DIAGNOSIED AS HAVING THE TUMOR. AND THIS IS CONSIDERED A VERY IMPORTANT FACTOR IN CANCER, SINCE THERE APPEARS TO BE A TIME REQUIREMENT FOR THE DEVELOPMENT OF CANCER AND THIS IS USUALLY FELT TO BE RELATED TO THE DOSE OF EXPOSURE. THE LOWER THE DOSE OF EXPOSURE, IT'S BELIEVED THE LONGER IT TAKES TO DEVELOP CANCER. SO, THEY THOUGHT THAT THESE LOW EXPOSED GROUPS SHOULD THEN HAVE THE LONGEST LATENCY. AND AS YOU SEE, THAT'S NOT QUITE TRUE. THESE EIGHT, WHICH ARE SHOWN IN RED, HAVE LATENCIES WHICH

VARY FROM AS SHORT AS FOUR YEARS TO AS LONG AS 44 YEARS. AND IN FACT, THAT FOLLOW THE PATTERN OF ALL THE ANGIOSARCOMAS, SO THAT THE LATENCY TELLS US THAT THOUGH WHATEVER THE EXPOSURE MAY BE, IT STILL REQUIRES AT LEAST NINE TO TEN YEARS FOR THE DISEASE TO EVOLVE AND DEVELOP; AND THAT SOME PEOPLE REQUIRE A SMALLER EXPOSURE DOSE IN ORDER TO SET THIS PROCESS IN MOTION THAN OTHERS, BUT THAT THE LATENCY DOES NOT STRICTLY FOLLOW THOSE RULES.

Q. DOCTOR, WHAT IS THE AVERAGE LATENCY PERIOD?

A. THE AVERAGE LATENCY PERIOD HERE IS SOMEWHERE BETWEEN 20 TO 25 YEARS, THE MAJOR PEAK IS THERE.

Q. AND LATENCY IS DEFINED AS HOW?

A. AS THE TIME INTERVAL FROM THE FIRST EXPOSURE TO THE TIME THE DIAGNOSIS IS MADE.

Q. FINE, THANK YOU.

A. NOW, THE LAST SLIDE SHOWS OUR DEPICTING ON ALL OF THESE CASES OF ANGIOSARCOMA BASED ON THE YEAR THEY BEGIN THEIR EXPOSURE AND AS ONE SEES, ALL THE CASES BEGAN THEIR EXPOSURE AFTER THE 1940'INTERVAL BY THEIR REPORTS AND EVEN THOUGH THE PLANTS

HAVE BEGUN OPERATING IN 1938, NONE OF THE WORKMEN WHO DEVELOPED ANGIOSARCOMA INDICATED THEIR EXPOSURE OR THEIR WORK RECORDS INDICATED THEY HAD BEGUN WORKING BEFORE 1940.

NOW, IT ALSO STOPS AT 1965. DESPITE THE FACT NOW THAT IT IS ALMOST 15, 15 YEARS, THERE HAVE BEEN NO KNEW ANGIOSARCOMAS WHOSE EXPOSURE BEGAN AFTER 1965. AND IF ONE LOOKS AT THE NUMBERS THAT BEGAN, ONE BEGINS TO SEE THAT THERE'S A DECREASE IN THE NUMBERS BEING EXPOSED AS ONE GOES ON IN TIME.

NOW, FROM THE BEST DATA THAT WE CAN GATHER, THE EXPOSURE LEVELS THAT WERE CONSIDERED TO BE COMMON AROUND THE PLANTS IN THE 1940'S AND 1945 HAD BOTH EUROPE AND IN THE UNITED STATES WERE THOUGHT TO BE AROUND THE RANGE OF 2,000 PARTS PER MILLION; THAT THIS WAS GRADUALLY REDUCED FOR ENGINEERING REASONS SO THAT IN THE LATE FIFTIES AND SIXTIES, IT WAS ESTIMATED AND REPORTED OCCASIONALLY OF BEING 200 TO 500 PARTS PER MILLION AND THAT IN THE LATE SIXTIES AND EARLY SEVENTIES HAD BEEN REDUCED TO 50 TO 200 PARTS PER MILLION ABOUT THE TIME THE ACROOSTEOLYSIS OR THE BONE DISSOLVING PROCESS

IN THE FINGERS WAS DISCOVERED.

NOW, THIS GIVES US SOME EPIDEMIOLOGICAL INDICATION OF HOW MUCH EXPOSURE IS REQUIRED IN ORDER TO START THIS PARTICULAR DISEASE PROCESS IN ANY AREA IN THE PROCESS AND IT APPEARS THAT THERE ARE NO CASES UNDER 50 PARTS PER MILLION AND THAT THEY CAN GOING ON UP TO 2,000 PARTS PER MILLION. AND THIS, WOULD, AGAIN, GOING ON ALONG WITH WHAT WE KNOW IN ANIMAL STUDIES. IN ANIMAL STUDIES, WE'VE NOT BEEN ABLE TO INDUCE THE TIME MORE UNDER 25 PARTS PER MILLION AND HAVE NOT BEEN ABLE TO INCREASE THE NUMBER OF TUMORS WHEN WE GO BEYOND FIVE OR 6,000 PARTS PER MILLION. AND I THINK THIS CAN BE EXPLAINED AGAIN BY THE BIOLOGICAL FACT THAT AN AGENT IN SMALL QUANTITIES CAN BE HANDLED BY THE NORMAL BODY TISSUE; THAT AS IT REACHES AN INTERMEDIATE STAGE, THAT THE BODY MAY NOT HANDLE ADEQUATELY, BUT THAT THE CELLS MAY SURVIVE WITH THE INJURY AND THEN LATER GO ON TO DEVELOP CANCER. AND THEN AT THE HIGHER LEVELS, THE CHEMICAL OR AGENT MAY THEREFORE KILL THE CELL AND, THEREFORE, NOT EVOLVES INTO A TUMOR. AND THAT WOULD EXPLAIN WHY ONE

SEES AN INCREASE IN OCCURRENCE OF THE TUMORS FROM 50 PARTS TO ABOUT 2,000 OR 3,000 AND THEN SEES THE OCCURRENCE TRAIL OFF.

NOW, THIS WOULD ALSO EXPLAIN WHY THE PEAK OF THE ANGIOSARCOMAS CASES BEING REPORTED WAS REACHED IN 1975. WHEN WE BEGAN OUR STUDY, OUR PROTOTYPE STUDY IN 1975, WE ANTICIPATED THAT THE POPULATION WE WERE STUDYING SHOULD CONTINUED TO DEVELOP ANGIOSARCOMAS BASED ON THEIR PAST EXPOSURE FOR AT LEAST ANOTHER TEN YEARS, BECAUSE THE EXPOSURE WAS NOT REDUCED TO ONE PART PER MILLION UNTIL 1974, 1975; AND THEN WE HAD STILL ALL THOSE PEOPLE WHO HAD BEEN EXPOSED BEFORE THAT TIME.

NOW THIS HAS SURPRISED US, BECAUSE THERE'S BEEN A MARKED, A RAPID DROP IN THE NUMBER OF CASES REPORTED IN THE UNITED STATES, IN GERMANY, IN FRANCE AND OTHER COUNTRIES. AND THAT IT IS NOW FURTHER SUPPORTIVE DATA THAT WE MAY HAVE WHAT WE CALL A BIOLOGICAL THRESHOLD -- THAT IS, A LEVEL AT WHICH MOST PEOPLE COULD HANDLE THE AGENTS WITHOUT INDUCING THE CANCER WITHIN THEIR LIFETIME. NOW, WE WILL KNOW MORE ABOUT THIS

AS YEARS GO ON, BECAUSE AS EACH YEAR GOES ON, IT IS DOCUMENTATION THAT THIS IS A TRAILING OFF EFFECT WILL BE FURTHER DOCUMENTED.

Q. DOCTOR, IF INSTEAD OF ANNUAL EXPOSURES OF SIX TO NINE PARTS PER BILLION, IF YOU WERE TO ASSUME THE AVERAGE ANNUAL EXPOSURES WERE 20 TO 25 PARTS PER BILLION, WOULD YOU'RE ANSWERING CHANGED?

A. NO, IT WOULD NOT.

Q. NOW, -- NOW, YOU WERE PRESENT YESTERDAY WHEN DOCTOR JOHNSON TESTIFIED AND I THINK YOU WERE PRESENT WHEN DOCTOR EPSTEIN HAS TESTIFIED -- TESTIFIED, AND EACH ONE OF THEM WERE READ A LONG HYPOTHETICAL QUESTION. I'M NOT GOING TO REPEAT THAT QUESTION. I WOULD LIKE YOU TO ASSUME THE FACTS THAT WERE IN THE LONG QUESTION THAT I READ TO DOCTOR JOHNSON YESTERDAY AND THAT MR. VASSALOTTI READ TO DOCTOR EPSTEIN LAST WEEK AND PARTICULARLY ASSUME THAT THE CONCENTRATIONS AT THE GRASSO HOME WERE FROM 1.1 TO 20 PARTS PER MILLION FOR 1,503 HOURS, FOR FIVE AND A HALF YEARS AND THAT THE EXPOSURE -- THE CONCENTRATION LEVEL WAS TEN TO 90 PARTS PER MILLION AND 11 ON 11 TO 15 HAZY DAYS A YEAR

FOR A PERIOD OF APPROXIMATELY FOUR HOURS A DAY.

ASSUMING THOSE FACTS, WOULD IT CHANGE YOUR OPINION CONCERNING WHETHER OR NOT MR. GRASSO'S DISEASE WAS CAUSED -- YOUR OPINION WITH -- LET ME GET THE WORDS THE SAME SO THE QUESTIONS PARALLEL.

WOULD THAT CHANGE YOUR OPINION AS TO WHETHER OR NOT MR. GRASSO'S DISEASE WAS CAUSED BY VINYL CHLORIDE WITH SUBSTANTIAL MEDICAL PROBABILITY?

A. NO, IT WOULD NOT CHANGE MY OPINION.

Q. AND YOUR OPINION AGAIN IS WHAT?

A. BASED ON WHAT WE NOW FROM ALL THESE CASES AND THE CHARACTERIZATION OF THE DISEASE, IT DOES NOT HAVE THOSE CHARACTERISTICS AND, THEREFORE, I DO NOT THINK THAT THIS IS THE SOURCE OF THE ANGIOSARCOMA IN THIS CASE.

Q. DO YOU KNOW WHAT DID CAUSE MR. GRASSO'S ANGIOSARCOMA?

A. I HAVE SOME THEORIES, BUT I HAVE NO GOOD MEDICAL DATA TO SUPPORT THAT.

Q. IS THIS UNUSUAL WITH RESPECT TO VINYL CHLORIDE AND ANGIOSARCOMA, NOT TO HAVE AN OPINION?

A. I'M NOT SURE I UNDERSTAND.

Q. LET ME ASK THE QUESTION THIS WAY: IS IT UNUSUAL FOR THE MEDICAL PROFESSION TO BE UNABLE TO DETERMINE THE CAUSE OF ANGIOSARCOMA OF THE LIVER?

A. NO. AS I'VE STATED BEFORE, AND AS OTHER PEOPLE HAVE INDICATED, THE MAJORITY OF ANGIOSARCOMAS WE DO NOT KNOW THE ETIOLOGY TO.

Q. WHAT ABOUT OTHER CANCER, DO WE KNOW THE ETIOLOGY OF OTHER CANCER?

A. NO, THE MAJORITY OF CANCER WE'RE NOT SURE OF THE ETIOLOGY. THERE ARE A FEW WHICH CAUSE IS CLEARLY DOCUMENTED, BUT NOT -- I DON'T KNOW OF ANY CANCER THAT HAS A SINGLE SOURCE.

Q. AND WOULD YOU TELL ME AGAIN THE PERCENTAGE OF ANGIOSARCOMAS WHICH ARE ATTRIBUTED BY THE MEDICAL PROFESSION TODAY TO UNKNOWN CAUSES?

A. IT IS ESTIMATED BETWEEN 70 TO 75 PERCENT OF THEM.

MR. RENNEISEN: THANK YOU, I HAVE NO FURTHER QUESTIONS.

THE COURT: MR. VASSALOTTI.

BY MR. VASSALOTTI:

Q. DOCTOR TAMBURRO, ABOUT THAT 70 TO 75 PERCENT OF UNKNOWN CAUSES, HOW WERE THOSE STUDIES CONDUCTED TO DETERMINE FIRST THE NUMBER OF CASES OF ANGIOSARCOMA AND THEN TRYING TO ATTRIBUTE A CAUSE? ARE YOU FAMILIAR WITH HOW THEY WERE CONDUCTED?

A. WHICHEVER TWO OF THEM, YES.

Q. AND WHO CONDUCTED THE STUDIES?

A. ONE WAS CONDUCTED IN NEW YORK AND THE OTHER WAS --

Q. WELL, WHO CONDUCTED THAT ONE?

A. WELL, YOU'LL FORGIVE ME. ONE OF THE THINGS I HAVE NOT A TENDENCY TO DO IS REMEMBER NAMES. BUT I CAN GET YOU THE LITERATURE FOR THAT IF YOU DON'T HAVE IT. THEY CONDUCTED A SURVEY IN -- BY USING THE REGISTRY IN NEW YORK.

Q. WHAT REGISTRY IS THAT?

A. THERE'S A CANCER REGISTRY IN THE STATE OF NEW YORK WHICH RECORDS THE CAUSES OF DEATH DUE TO CANCER. THERE'S A REGISTERING IN CONNECTICUT. THERE ARE A NUMBER OF STATES THAT HAVE CANCER --

Q. HOW DOES A CANCER GET REGISTERED IN THIS CANCER REGISTRY?

A. EVERY INDIVIDUAL WHO DIES IS REQUIRED IN THE STATE TO HAVE A DEATH CERTIFICATE. AND ALL THOSE DEATH CERTIFICATES WHICH ARE RECORDED AS BEING DUE TO OR ASSOCIATED WITH A MALIGNANCY ARE THEN RECORDED IN THE CANCER REGISTRY.

Q. HOW DOES SOMEONE MAKE A DETERMINATION THAT A DEATH IS CAUSED BY A MALIGNANCY?

A. SINCE EVERY DEATH CERTIFICATE IS SIGNED BY A PHYSICIAN, THE PRESUMPTION IS MADE THAT THE DOCTOR, KNOWING THE DOCTOR DIAGNOSIS, IS THE MOST INFORMED INDIVIDUAL AS TO WHETHER OR NOT THE PRESENCE OR ABSENCE OF A DISEASE IS PRESENT?.

Q. SO, AN AUTOPSY ISN'T DONE IN EVERY CASE?

A. THAT'S CORRECT.

Q. IN APPROXIMATELY -- APPROXIMATELY WHAT PERCENTAGE OF THE CASES IN THE REGISTRY HAS AN AUTOPSY BEEN DONE, DO YOU KNOW?

A. THE SMALLER NUMBER, PROBABLY IN THE RANGE, DEPENDING ON THE AREA AND IT IS LOCATION, ANYWHERE FROM 5 TO MAYBE 35 PERCENT.

Q. FIVE TO 35 PERCENT WOULD BE TRULY

--

A. HISTOLOGICALL PROVEN EITHER TO HAVE OR NOT TO HAVE A TUMOR.

Q. NOW, WE'VE HAD SOME TESTIMONY IN THIS CASE THAT IT WASN'T REALLY UNTIL 1973 OR 1974 WHERE THE MEDICAL COMMUNITY BECAME CONCERNED ABOUT THE RELATIONSHIP BETWEEN VINYL CHLORIDE AND ANGIOSARCOMA OF THE LIVER. AND AS A MATTER OF FACT, I THINK DOCTOR JOHNSON TESTIFIED THAT A COUPLE OF THE CASES THAT B.F. GOODRICH WERE MISS DIAGNOSIED AS PRIMARY LIVER CANCER. ARE YOU AWARE OF THAT?

A. YES.

Q. THOSE WERE CASES WHERE AUTOPSIES WERE PERFORMED, WEREN'T THEY?

A. THAT'S CORRECT.

Q. AND THEY WERE STILL MISS DIAGNOSIED.

A. THAT'S CORRECT.

Q. IS THERE A CHANCE -- I'LL JUST ASK YOU THIS: IS THERE A CHANCE THAT IN THESE CANCER REGISTRIES THAT NOT ALL ANGIOSARCOMAS OF THE LIVER THAT ACTUALLY HAPPEN ARE LISTED?

A. WELL, IT'S NOT A CHANCE. THAT IS A FACT.

Q. THAT'S A FACT.

A. THAT'S TRUE OF EVERY CANCER.

Q. AS A MATTER OF FACT, THAT'S TRUE OF EVERY CANCER, CORRECT?

A. WE WOULD NOT KNOW THE TRUE INCIDENCE OF CANCER DISEASE UNLESS WE HAD AN AUTOPSY ON EACH AND EVERY INDIVIDUAL WHO DECIDE. AGAIN, THAT'S WHY EPIDEMIOLOGICAL STUDIES ARE USED TO DETERMINE, BASED ON THE NUMBER OF AUTOPSIES, WHAT THE POSSIBILITY IS THAT THE DATA YOU HAVE CAN DRAW A CORRECT CONCLUSION.

Q. WELL, YOU JUST TALKED ABOUT CANCER REGISTRIES THAT INCLUDE DATA THAT IS OBTAINED FROM OTHER THAN AUTOPSIES.

A. RIGHT.

Q. THAT WAS INCLUDED IN YOUR EPIDEMIOLOGICAL STUDIES, CORRECT?

A. WOULD YOU KINDS REMEMBER REPEAT THE QUESTION. I'M NOT --

Q. THE DATA FROM THE CANCER BANKS OR REGISTRIES --

A. YES.

Q. -- THAT'S WHAT THESE EPIDEMIOLOGICAL STUDIES THAT YOU REFER TO WERE BASED UPON, WEREN'T THEY?

A. YES. NOT TOTALLY. THAT WAS ONE --

Q. ONE SOURCE OF THE INFORMATION?

A. RIGHT, BUT THERE ARE OTHERS.

Q. NOW, ONCE THEY -- THESE -- THIS STUDY IN NEW YORK THAT YOU PARTICULARLY REFER TO WENT BACK AND LOOKED THROUGH THE CANCER REGISTRY AND I ASSUME THEY LOOKED FOR ALL ANGIOSARCOMA CASES?

A. YES.

Q. I ALSO ASSUME -- I DON'T MEAN TO BE FACETIOUS THAT THESE PEOPLE ARE ALREADY DEAD IN THERE IN THE CANCER REGISTRY. HOW DO THEY GO ABOUT ATTRIBUTING A CAUSE TO THESE PEOPLE CANCER?

A. UNFORTUNATELY, AS YOU PROBABLY HEARD FROM OTHER SOURCES, THE OCCUPATION IS A REQUESTED PIECE OF INFORMATION, BUT NOT A REQUIRED ONE ON DEATH CERTIFICATES. SO IT IS REQUIRED THAT THE INDIVIDUAL WHO'S INTERESTED IN DETERMINING WHAT POSSIBLE CORRELATIONS ARE, WILL GO BACK TO EACH AND EVERY CASE, EITHER BY DIRECT, VISITING THE RELATIVES OR THE HOSPITAL OR THE DOCTOR WHO CARED FOR THEM, AND DETERMINE WHAT THE INDIVIDUAL DID AS AN OCCUPATION. AND THEN FROM THAT DATA, ONE THEN ATTEMPTS TO DRAW SOME CONCLUSIONS AS TO

V 15a

WHETHER THERE'S A RELATIONSHIP BETWEEN THEIR WORK IS HISTORIES AND THE DISEASE THEY HAVE.

Q. SO, IN THE MID NINETEEN SEVENTIES, PEOPLE WERE CONCERNED ABOUT THE OCCUPATION -- PEOPLE STUDYING THE EPIDEMIOLOGICAL SIGNIFICANCE OF ANGIOSARCOMA WERE CONCERNED WITH THE OCCUPATIONAL HISTORY OR THE OCCUPATION, I THINK YOU SAID, OF THE PEOPLE WHO DIED OF ANGIOSARCOMA; IS THAT CORRECT?

A. YES.

Q. NOW, WHEN DATA IS GIVEN ON A DEATH CERTIFICATE AS TO OCCUPATION, THAT'S ONLY THE LAST OCCUPATION OF THE PERSON, ISN'T IT?

A. THAT IS ABSOLUTELY CORRECT. YOU -- THAT'S USUALLY THE THING.

Q. IN THE MID NINETEEN SEVENTIES, WAS THERE ANYONE CONCERNED ABOUT PROXIMITY OF LOCATION OF THE PEOPLE WHO DIED OF ANGIOSARCOMA TO A PVC OR VC PLANT IN THE STUDIES THAT YOU RELIED UPON?

A. YES, THEY WENT AND LOOKED AT WHERE THE PEOPLE ACTUALLY LIVED TO DETERMINE WHETHER OR NOT --

Q. AT WHAT POINT IN THEIR LIVES DID THEY -- AGAIN, WE'RE RELYING ON LAST

ADDRESS; IS THAT CORRECT?

A. ONE WOULD HAVE TO DEPEND ON LAST ADDRESS. WELL, IT WOULD AGAIN DEPEND -- DEPEND THIS IS NOT IN THE STUDIES. I MEAN ONE DOESN'T KNOW IN A PUBLICATION THE ACTUAL EXTENT OF THE INVESTIGATORS' EFFORTS TO DETERMINE ALL LOCATIONS. IN SOME CASES, THEY MAY HAVE KNOWN ALL THE LOCATIONS THE INDIVIDUAL LIVED AT AND IN SOME CASES NOT. SO, ONE PRESUMES THAT WE'RE DEALING PREDOMINANTLY WITH THE LAST LOCATION.

Q. DOCTOR, ISN'T IT FAIR TO SAY THAT PERCENT OF THE ANGIOSARCOMAS THAT HAVE BEEN FOUND SO FAR -- THIS IS BASED UPON WHAT WE JUST TALKED ABOUT -- HAVE BEEN ASSIGNED AN UNKNOWN CAUSES BECAUSE WE DON'T HAVE ENOUGH INFORMATION TO DETERMINE WHAT THE CAUSE WAS?

A. YES, THAT IS A POSSIBILITY. BUT I THINK ONE HAS TO LOOK AGAIN AT THE FACT THAT SINCE 1974, PEOPLE HAVE ACTIVELY BEEN LOOKING TO LINK UP ALL THEIR ANGIOSARCOMAS WITH THE KNOWN CAUSES, SO THAT IT IS UNLIKELY THAT AN ANGIOSARCOMA DIAGNOSIED AFTER 1974, HAVING ANY POSSIBILITY OF BEING ASSOCIATED WITH ANY OF THE FOUR CAUSES, WOULD NOT BE ATTEMPTED TO

BE LINKED. THAT'S JUST A NATURAL TENDENCY. YOU KNOW WHAT IT IS AND YOU TRY TO LINK IT UP WITH WHAT YOU KNOW. THE FACT THAT THERE ARE STILL, DESPITE THAT, A NUMBER OF ANGIOSARCOMAS THAT WE CANNOT LINK UP WITH ANY REASONABLE PROBABILITY OF BEING CORRECT, INDICATES THAT WE HAVEN'T YET EXCLUDED ALL THE SOURCES OF ANGIOSARCOMA.

Q. DOCTOR, I WAS SUPPLIED SOME INFORMATION WHICH INDICATED THAT -- I'LL QUOTE IT TO YOU: YOU WILL TESTIFY THAT EVEN AT THE -- EVEN IF THE EXPOSURE LEVEL AT THE GRASSO HOME WAS A YEARLY AVERAGE OF THREE PARTS PER MILLION, THAT THAT DOSE WOULD BE INSUFFICIENT TO CAUSE MR. GRASSO'S ANGIOSARCOMA. DID YOU TELL ANYBODY THAT?

A. I'VE SAID THAT A NUMBER OF TIMES.

Q. THAT'S THREE PARTS PER MILLION, 24 HOURS A DAY?

A. IF THAT ASSUMPTION WAS MADE BASED ON THE CHARACTERISTICS OF HIS DISEASE, HIS ONSET, THE PROGRESSION OF THE DISEASE, I'D STILL DRAW THAT CONCLUSION.

Q. NOW, GETTING BACK TO HOW VINYL CHLORIDE IS HANDLED IN THE BODY, YOU'VE

SHOWED US SOME ACTUAL TISSUE SLIDES, I BELIEVE. WERE THOSE SLIDES TAKEN FROM GOODRICH WORKERS WHO HAD ANGIOSARCOMA?

A. AND THOSE WITHOUT ANGIOSARCOMA.

Q. BUT THEY WERE FROM GOODRICH WORKERS?

A. THOSE PARTICULAR SLIDES, YES.

Q. AND WHEN YOU WERE TALKING ABOUT HOW THE LIVER METABOLISES OR CHANGES VINYL CHLORIDE, YOU -- AND YOU HAD A SLIDE ON THERE SHOWING THREE DIFFERENT LEVELS OF METABOLIZATION. YOU KEPT REFERRING TO WE HAVE DEVELOPED THIS APPROACH. WHO IS THE WE THAT YOU REFER TO?

A. WELL, IT'S SORT OF UNFAIR TO SAY I DID IT, SINCE WE ARE MULTIPLE WORKERS IN THE AREA AND ALSO THE FACT THAT THERE ARE OTHER COLLEGUES AT OTHER INSTITUTIONS WHO HAVE DONE IT. SO, I USE WE IN AN EDITORIAL SENSE. IT'S SIMPLY INDICATING THAT WE'VE DONE SOME WORK OURSELVES.

Q. WHO IS THE WE WE'VE DONE --

A. MYSELF, MY BIOCHEMISTS, MY IMMUNOLOGISTS, MY LABORATORY TECHNICIANS, MY COLLEGUES WHO DO THE HISTOLOGY. NOT EVERYTHING THAT WE PRESENT IS PERSONALLY DONE

BY ME. I MEAN, I'M NOT CAPABLE --

Q. I UNDERSTAND THAT. I JUST WANT TO BE CLEAR. BECAUSE YOU MENTION SOME WORK WAS DONE BY THE DOW CHEMICAL COMPANY?

A. YES.

Q. DID YOU WORK WITH THEM?

A. THERE ARE TWO VERY PROMINENT CHEMISTS WHO HAVE DONE A GREAT DEAL OF THE RADIOACTIVE METABOLISM OF VINYL CHLORIDE, ALL RIGHT. AND THEY HAVE PUBLISHED THAT MATERIAL. AND PROBABLY THEY'VE DONE THE CORE WORK RELATED TO THAT.

Q. THEY'VE DONE THE PRINCIPAL WORK IN TRYING TO SHOW THAT AT LOWER LEVELS, VINYL CHLORIDE IS NOT A CANCER CAUSING AGENT; IS THAT CORRECT?

A. FROM A METABOLIC POINT OF VIEW. FROM A HISTOLOGY POINT OF VIEW, OTHERS HAVE DONE MORE.

Q. THAT WAS IT THE DOW CHEMICAL COMPANY WHO DID THAT?

A. DOCTOR WATANOBY, THAT'S CORRECT.

Q. AND THE STUDIES THAT YOU DID -- AND WHEN I MEAN YOU, I DON'T MEAN YOU PERSONALLY, I MEAN YOUR WHOLE GROUP -- WITH

REGARD TO THE METABOLISM OF VINYL CHLORIDE IN THE LIVER, WHO FUNDED THOSE STUDIES?

A. THAT CAME FROM THREE SOURCES: PRIVATE ENDOWMENT, MANUFACTURING CHEMISTS' ASSOCIATION, AND THE NATIONAL INSTITUTE OF HEALTH.

Q. DID THE GOODRICH COMPANY PROVIDE ANY FUNDING FOR THOSE STUDIES?

A. NOT THE ONES RELATED TO METABOLISM. THEY PROVIDED SOME OF THE ORIGINAL MATERIAL THAT WE USED FOR DEVELOPING SCREENING TESTS FOR DETECTING THE ANGIOSARCOMA.

Q. THAT WAS TO DETERMINE WHETHER THEIR EMPLOYEES ACTUALLY HAD ANGIOSARCOMA, TRYING TO GET IT IN AN EARLY STAGE. IS THAT WHAT YOU MEAN BY SCREENING TESTS?

A. NO, WHAT WE WERE WORKING ON IS WHETHER OR NOT WE COULD IDENTIFY GENETIC MARKERS WHICH WOULD TELL US WHICH PEOPLE DO NOT HANDLE CHEMICALS WELL, SPECIFICALLY VINYL CHLORIDE. SO, WE WERE SETTING UP A SYSTEM FOR LOOKING AT WHAT IS CALLED H L A TISSUE TYPING. THAT IS, THERE ARE CERTAIN MOLECULES ON CELLS THAT IDENTIFY IT AS HAVING CERTAIN KINDS OF GENETIC CHARACTERISTICS AND THERE ARE CERTAIN

DISEASES THAT OCCUR WITH MUCH GREATER FREQUENCY IN PEOPLE THAT HAVE THAT KIND OF GENETIC SETUP. AND WE WERE TRYING TO SEE IF WE COULD DESIGN A SYSTEM TO IDENTIFY WHO WOULD BE AT HIGH RISK

THE SECOND SET OF STUDIES WE WERE DOING WERE ALSO TO LOOK --

Q. LET'S TALK ABOUT THAT FIRST ONE.

IT'S FAIR TO SAY THAT DIFFERENT PEOPLE HAVE DIFFERENT SENSITIVITIES TO CANCER CAUSING CHEMICALS; ISN'T IT?

A. THAT'S CORRECT.

Q. SOME PEOPLE MAY BE ABLE TO WORK WITH IT 40 YEARS AND NEVER HAVE ANY EFFECT AND SOME PEOPLE MAY BE ABLE TO WORK WITH IT FOR THREE YEARS AND DEVELOP ANGIOSARCOMA OF THE OF THE LIVER; ISN'T THAT CORRECT?

A. THAT'S A POSSIBILITY.

Q. AS A MATTER OF FACT, PEOPLE WHO GOT THE ANGIOSARCOMA OF THE LIVER AT THE GOODRICH PLANT -- AND I BELIEVE AT THE OTHER PVC PLANTS -- WERE, AS I THINK YOU SAID, REACTION CLEANERS, REACTOR CLEANERS?

A. MOST OF THEM WERE.

Q. HOW MANY OTHER PEOPLE IN THOSE

PLANTS WERE REACTOR CLEANERS OR HAD WORKED AS REACTOR CLEANS AREA AT ONE POINTS IN THEIR LIVES?

A. WELL, IN THE SLIDE WE SHOWED WITH THE INDEX CASES IN RED, EVERY ONE THOSE WORKERS, BECAUSE THOSE INDIVIDUALS WERE MATCHED FOR THEIR WORK EXPOSURE AREAS. AND SINCE ALL OF THEM -- SINCE IT WAS THE POLICY OF THE COMPANY THAT EVERYONE HAD TO COME WHEN THEY FIRST WORKED IN THE PLANTS TO WORK AS A POLY CLEANER, ALL OF THEM HAD SOME EXPERIENCE WORKING IN THE REACTORS.

Q. SO, ALL OF THE PEOPLE IN THE PLANT AT ONE POINT OR ANOTHER PROBABLY HAD EXPERIENCE -- EXPERIENCED CLEANING REACTORS?

A. YES, BUT THE REACTORS WERE TWO TYPES. YOU KNOW, THEY DID HAVE REACTORS THAT HAD TO DO WITH SYNTHETIC RUBBER AND THOSE DOING WITH SYNTHETIC PLASTICS. SO, THOUGH SOME OF THEM WERE IN THE PLANTS WITH VINYL CHLORIDE IN THE ATMOSPHERE, THEY WERE WORKING AT DIFFERENT -- WORKING MORE IMTIMATELY WITH DIFFERENT SETS OF CHEMICALS.

Q. HOW MANY PEOPLE IN TOTAL AT THE GOODRICH PLANTS WERE EXPOSED TO WHAT YOU

CALLED HIGH LEVELS OF VINYL CHLORIDE. I THINK YOU SAID 50 TO 200 PARTS PER MILLION.

A. SOMEWHERE IN THE TUNE OF ABOUT 400, 500 OF THE 1,200.

Q. AND HOW MANY CASES OF ANGIOSARCOMA WERE THERE WITHIN THAT GROUP?

A. IN THE TIME WE LOOKED AT IT, FOUR.

Q. AND THERE WERE NO FURTHER --

A. NO.

Q. -- CASES IDENTIFIED?

A. YOU'RE ASKING ME ABOUT THE 1,200 PEOPLE WE'VE STUDIED. THOSE WERE PEOPLE EMPLOYED FROM 1974 UNTIL NOW. NOW, IN TOTO, THERE'S BEEN ABOUT 56 HUNDRED EMPLOYEES AT B.F. GOODRICH SINCE THE START OF THE PLANT AND HAVE THEM, THERE'S BEEN 11 CASES OF ANGIOSARCOMA.

Q. SO, 56 HUNDRED PEOPLE HAD RELATIVELY HIGH EXPOSURES AND 11 DEVELOPED ANGIOSARCOMA OF THE LIVER?

A. I THINK IT WOULD BE FAIR TO SAY THAT PROBABLY ROUGHLY HALF.

Q. OKAY. 20 --

A. SAY 25.

Q. 25 HUNDRED, 11 DEVELOPED

ANGIOSARCOMA.

WHY DIDN'T THE OTHER 25,000

000 39 GET IT?.

MR. BENNEISEN: I EXCEPT --

MR. VASSALOTTI: I'M SORRY.

BY MR. VASSALOTTI:

Q. THE OTHER 0.2,500. 12,539

A. WELL, AS I POINTED OUT, THERE IS, AS YOU'VE INDICATED AS A POSSIBILITY, THAT THERE IS A BIOLOGICAL VARIATION IN PEOPLE IN HOW THEY HANDLE THE CHEMICAL. THERE IS, ALSO, A DIFFERENCE BY WHICH THE CHEMICAL HAS THE CHANCE TO PRODUCE THE GENETIC INJURY. NOW, SIMPLY BECAUSE YOU PRODUCE THE AGENT DOES NOT NECESSARILY MEAN YOU'RE GOING TO PRODUCE THOSE GENETIC INJURIES WHICH ARE GOING TO LEAD THE CELL TO EVENTUALLY DEVELOP A MALIGNANCY. NOW, EVEN IN THE ANIMAL STUDIES, THE LARGEST PERCENTAGE THAT WAS ABLE TO BE INDUCED WITH VINYL CHLORIDE EXPOSURE WAS 12 PERCENT. THAT MEANT THAT THE MAJORITY OF THE ANIMALS WERE ABLE TO HANDLE THAT WHOLE RANGE OF EXPOSURE WITHOUT THAT MULTIPLE COMPLEX EVENT OCCURRING THAT ALLOWED THE DNA TO BE INJURED.

NOW, IT'S THAT AREA THAT WE REALLY LACK ADEQUATE KNOWLEDGE TO SAY SPECIFICALLY WHY. THERE IS A LIMIT AS TO HOW THESE TOXIC AGENTS CAN MANAGE THEIR TRIP FROM THE CELL TO THE GENETIC MATERIAL. NOW, THOSE THAT GET THROUGH HAVE THOSE POSSIBILITIES OF DEVELOPING THE TUMOR. AND I THINK THAT EXPLAINS, AT LEAST GIVES AN IDEA OF WHY.

Q. THAT'S MY POINT. THE FACT THAT NOT A HUNDRED PERCENT OF THE PEOPLE EXPOSED -- AS A MATTER OF FACT, THE MAJORITY OF THE PEOPLE EXPOSED TO THIS CHEMICAL DID NOT DEVELOP ANGIOSARCOMA OF THE LIVER IS NOT AN INDICATION THAT THIS CHEMICAL DOES NOT CAUSE THAT CANCER.

A. OH, THERE'S ABSOLUTELY NO DOUBT IN ANYONE'S MINDS, AT LEAST NOT FROM A SCIENTIFIC POINT OF VIEW, THAT VINYL CHLORIDE DOES CAUSE ANGIOSARCOMA. THE QUESTION THAT ONE IS ASKED IS IN EVERY CASE OF ANGIOSARCOMA, IS IT VINYL CHLORIDE. AND THAT, I THINK, HAS TO BE PROVEN BY EPIDEMIOLOGICAL OR BY EXPERIMENTAL DATA.

Q. NOW, YOU'VE INDICATED, I THINK, THAT THE LOW -- LOWER LEVEL OF EXPOSURE THAT THE

LIVER METABOLISES THE AMOUNT OF VINYL CHLORIDE THAT GETS INTO THE BLOODSTREAM; IS THAT CORRECT?

A. YES.

Q. YOU HAVE TO GIVE US VERBAL ANSWER, DOCTOR.

A. YES, YES, I'M SORRY.

Q. HOW DID YOU DETERMINE THIS? DID YOU DETERMINE THAT OR WAS THAT THE DOW CHEMICAL COMPANY?

A. THESE WERE STUDIES DONE AT DOW AND BY OUR OWN CHEMISTS AT THE UNIVERSITY OF LOUISVILLE, DOCTOR WONG.

Q. AND WERE THESE IN HUMAN STUDIES OR IN ANIMAL STUDIES?

A. THESE WERE ALL IN ANIMAL STUDIES.

Q. HOW DID YOU DO THESE ANIMAL STUDIES?

A. TAKE AN ANIMAL OF A CERTAIN SPECIE AND GENETIC BREEDING ON AND LET THEM BREATHE IN VINYL CHLORIDE AT DIFFERENT LEVELS OF PARTS PER MILLION AND THEN DETERMINE BY RADIOACTIVELY TAGGING THE VINYL CHLORIDE HOW MUCH OF IT IS CONVERTED INTO ITS BYPRODUCTS AND WHICH ROUTE. AND THIS IS DONE ON THE TISSUE OF THE ANIMAL AFTER THE ANIMAL IS

EXPOSED TO IT. THERE ARE OTHER EXPERIMENTS WHERE ONE ACTUALLY TAKES THE ANIMAL TISSUE FROM A NON-EXPOSED ANIMAL AND ACTUALLY TAKES A CULTURE. WE BREAK DOWN THE CELLS AND GENERATE THEM OUT AND YOU ACTUALLY GROW THE CELLS INDEPENDENTLY AND YOU EXPOSE THEM TO THE AGENT AND THEN WATCH IN THE FLUID THAT THE CELLS ARE LIVING AND HOW MUCH OF THE PRODUCT IS PRODUCED.

Q. SO, YOU EXPOSED ANIMALS, RATS, HAMSTERS, MICE, WHATEVER, TO AIR AND VINYL CHLORIDE, MEASURED WHAT HAPPENED TO THE VINYL CHLORIDE. AND THESE STUDIES SHOWED THAT AT LOWER LEVELS UNDER THOSE SITUATIONS AT LOWER LEVELS OF EXPOSURE -- AND WHAT DO WE MEAN BY LOWER LEVELS OF EXPOSURE?

A. BY LOWER LEVELS, I'M USUALLY SPEAKING ABOUT UNDER 25 PARTS PER MILLION.

Q. AND AT LOWER LEVELS OF EXPOSURE, THE LIVER OF THESE ANIMALS METABOLIZED ALL OF THE VINYL CHLORIDE AND RESULTED IN NON CANCER CAUSING METABOLITES; IS THAT CORRECT?

A. THAT'S THE CONCLUSION THAT WAS DRAWN ON THE BASIS OF THE FACT THAT NONE OF THE ANIMALS EXPOSED AND WERE ALLOWED TO LIVE

DEVELOPED THAT KIND OF TUMOR, THAT THERE WAS NO EVIDENCE THAT WHEN THESE ANIMALS WERE EXPOSED, THAT THE LIVER CELLS SHOWED HISTOLOGICAL EVIDENCE OR BIOCHEMICAL EVIDENCE OF INJURY, AND THAT THE MATERIALS, THE SUBSTANCES THAT DETOXIFY THESE AGENTS WAS IN SUFFICIENT QUANTITIES SO THAT LIVER CELL DIDN'T HAVE TO MAKE MORE.

THE COURT: MR. VASSALOTTI, WHEN YOU REACH A POINT WHERE YOU WANT TO STOP, WE'LL TAKE OUR RECESS.

MR. VASSALOTTI: YOUR HONOR, I'D JUST LIKE TO GO ON WITH A COUPLE MORE QUESTIONS AT THIS POINT.

THE COURT: I'LL LEAVE IT AT YOUR DISCRETION.

BY MR. VASSALOTTI:

Q. DOCTOR, YOU STARTED AT THE BEGINNING OF YOUR TESTIMONY THIS MORNING AND YOU SAID THAT THE MAJOR FUNCTION OF THE LIVER IS TO DETOXIFY CHEMICAL AGENTS -- NOT SO MUCH CHEMICAL AGENTS, ANY FOREIGN AGENTS IN OUR BODY; IS THAT CORRECT?

A. WELL, IT IS THE MAJOR DETOXIFYING. IT IS NOT THE ONLY ONE.

Q. THAT'S WHAT I MEANT TO SAY. THE LIVER IS THE PART OF OUR BODY THAT TRIES TO CLEAN OUT IMPURITIES OR THINGS THAT SHOULD NOT BE THERE AND IT DOES IT BY METABOLIZING THEM?

A. YES.

Q. NOW, FROM YOUR ANIMAL STUDIES, IT APPEARS AS THOUGH THE MORE VINYL CHLORIDE THAT WAS GIVEN TO THESE ANIMALS -- AS MORE VINYL CHLORIDE WAS GIVEN TO THESE ANIMALS, THE LIVER REACHED A LEVEL WHERE IT COULDN'T METABOLIZE IT FAST ENOUGH; IS THAT CORRECT?

A. THAT'S CORRECT.

Q. IS THAT A FAIR CHARACTERIZATION?

A. THAT'S CORRECT.

Q. AND THESE ANIMALS WERE ONLY EXPOSED TO VINYL CHLORIDE?

A. THAT'S CORRECT.

Q. IN MR. GRASSO'S CASE, YOU WERE AWARE THAT HE WORKED AT AN A CHEMICAL PLANT FOR OVER 20 YEARS, WEREN'T YOU?

A. YES.

Q. WERE YOU AWARE THAT HE WAS ALSO EXPOSED TO VARIOUS TYPES OF ORGANIC AND INORGANIC CHEMICALS THERE?

A. YES.

Q. WOULDN'T HIS LIVER BE WORKING TRYING TO METABOLIZE THE MATERIALS THAT HE WAS EXPOSED TO AT DUPONT?

A. YES.

Q. AND THAT'S DIFFERENT FROM THE ANIMALS THAT YOU STUDIED WHO WERE ONLY EXPOSED TO VINYL CHLORIDE; IS THAT CORRECT?

A. YES.

Q. HAVE YOU EVER MADE ANY ANIMAL STUDIES WHERE, IN ADDITION TO EXPOSURE TO VINYL CHLORIDE, THE ANIMALS WERE EXPOSED TO MULTIPLE OTHER CHEMICAL AGENTS?

A. OUR GROUP HAS PARTICIPATED IN SUCH STUDIES. WE HAVE NOT CONDUCTED THEM.

Q. AND ISN'T IT A FACT THAT MR. GRASSO OR THE ANIMALS IN THE STUDY ARE EXPOSED TO OTHER CHEMICAL AGENTS, IN THIS CASE TO VINYL CHLORIDE, AFFECT THE WAY THE LIVER -- THE LIVER IS ABLE TO CLEAN OUT OUR SYSTEM AND METABOLIZE THIS MATERIAL?

A. YES.

Q. IN OTHER WORDS, THE VINYL CHLORIDE THAT HE WAS EXPOSED TO WOULD HAVE TO STAND IN LINE AND WAIT FOR WHATEVER OTHER TOXINS WERE

IN HIS SYSTEM TO BE CLEANED OUT BY HIS LIVER BEFORE IT WOULD BE METABOLIZED; ISN'T THAT CORRECT?

A. WELL, FROM A -- YES AND NO. IN THE SENSE THAT THIS IS -- THE STANDING IN LINE BUSINESS MAY NOT BE CORRECT.

Q. WELL, I DON'T MEAN THAT IT ACTUALLY STANDS IN LINE. I'M A LAYMAN, DOCTOR. I DON'T UNDERSTAND EXACTLY HOW THE LIVER WORKS.

A. WELL, WHAT YOU'RE SAYING IS THAT THERE WAS A COMPETITION FOR THE ABILITY OF THE LIVER CELL TO GET RID OF THESE SUBSTANCES. AND THAT'S TRUE OF ALL SUBSTANCES. NOW, WHETHER THE LIVER SELECTIVELY TAKES CARE OF ONE AGENT OR ANOTHER, THAT YOU CAN'T BE AS SIMPLISTIC ABOUT IT. THE LIVER WILL DO THAT AT TIMES.

Q. DOES IT DO THAT WITH VINYL CHLORIDE?

A. PARDON?

Q. DOES IT DO THAT WITH VINYL CHLORIDE?

A. IT WOULD HAVE TO DEPEND ON A GREAT DEAL WHAT AGENTS IT WAS COMPETING WITH. CERTAIN AGENTS WOULD IMPEDE IT, CERTAIN AGENTS WOULD DO NOTHING AND CERTAIN AGENTS WOULD SPEED IT UP.

Q. WOULD IT BE FAIR TO SAY THAT MR. GRASSO'S EXPOSURE TO THESE CHEMICALS WOULD DEFINITELY AFFECT THE RATE AT WHICH THE VINYL CHLORIDE WAS METABOLIZED IN HIS LIVER?

A. I CAN ONLY SPECULATE TO THAT.

Q. WHAT WOULD YOUR SPECULATION BE.

MR. RENNEISEN: OBJECTION, YOUR HONOR.

THE COURT: SUSTAINED. IS IT TIME TO STOP, MR. VASSALOTTI, FOR OUR RECESS?

MR. VASSALOTTI: OKAY, YOUR HONOR.

THE COURT: LET'S TAKE A TEN MINUTE RECESS, LADIES AND GENTLEMEN.

(AT THIS TIME THE JURY LEAVES COURTROOM.)

THE COURT: WE'LL STAND IN RECESS FOR TEN MINUTES.

(SHORT RECESS.)

THE COURT: MR. VASSALOTTI, YOU MAY CONTINUE WITH YOUR CROSS-EXAMINATION.

BY MR. VASSALOTTI:

Q. DOCTOR TAMBURRO, WHEN WE BROKE, WE WERE TALKING ABOUT METABOLISM IN THE LIVER AND HOW THE VARIOUS IMPURITIES WITHIN THE BODY WOULD HAVE TO COMPETE WITH EACH OTHER TO

BE METABOLIZED AND PURIFIED FROM THE LIVER; IS THAT CORRECT?

A. YES.

Q. YOU MENTIONED THAT VINYL CHLORIDE IS A HYDROCARBON; IS THAT CORRECT?

A. I DON'T THINK I DID, BUT IT IS.

Q. I THOUGHT YOU TESTIFIED TO THAT IN YOUR DIRECT.

ARE ALL OF US EXPOSED TO HYDROCARBONS IN -- FROM OTHER SOURCES THAN VINYL CHLORIDE?

A. I THINK THAT'S A REASONABLE ASSUMPTION.

Q. AS A MATTER OF FACT, EMISSIONS FROM AUTOMOBILES ARE HYDROCARBONS?

A. CORRECT.

Q. AND WHEN THESE HYDROCARBONS ARE BREATHED IN OR INHALED AND ABSORBED IN THE BLOODSTREAM, THEY, TOO, HAVE BEEN METABOLIZED BY THE LIVER; IS THAT CORRECT?

A. YES.

Q. DID YOU GIVE THE -- YOU DIDN'T DO IT. DID THE PEOPLE WHO STUDY THE METABOLISM OF VINYL CHLORIDE IN THE RATS EXPOSE THE RATS TO ANY OTHER HYDROCARBONS?

A. TO MY KNOWLEDGE, I ONLY KNOW OF ONE GROUP THAT HAS DONE ANY LONG TERM EXPERIMENTS OF MULTIPLE AGENTS.

Q. YOUR GROUP DIDN'T DO IT, THOUGH?

A. NO, WE COLLABORATED WITH THE GROUP THAT DID.

Q. AND DID THOSE RESULTS SHOW THERE WAS A COMPETITION BETWEEN THE VARIOUS HYDROCARBONS FOR METABOLISM?

A. NO, THIS WAS A STUDY BY DOCTOR RADICKE. WHAT THE STUDY SHOWED WAS THAT THE COMBINED ASSOCIATION OF ALCOHOL AND VINYL CHLORIDE INCREASED THE NUMBER OF TUMORS IN THE ALCOHOL TREATED GROUP IN COMPARISON TO THE VINYL CHLORIDE TREATED OR THE ALCOHOL TREATED ALONE OR THE NONE-TREATED TREATED ALONE.

Q. LET'S TALK ABOUT THAT. THAT'S THE RADICKE WORK THAT DOCTOR EPSTEIN TALKED ABOUT. YOU WERE HERE WHEN HE TESTIFIED.

A. THAT'S CORRECT.

Q. I THINK HE MENTIONED THAT IN A DISCUSSION OF SYNERGISTIC EFFECTS OF CHEMICALS. AGAIN, SYNERGISTIC EFFECTS OF --

A. THAT WAS HIS INTERPRETATION. THAT A

SYNERGISTIC EFFECT IS THAT ONE AGENT, WHEN ADDED TO ANOTHER AGENT INCREASES THE NUMBER OF EVENTS THAT WOULD OCCUR THAT'S GREATER THAN ADDING THEM TOGETHER. SO, IF ONE AGENT COULD PRODUCE FIVE EVENTS, ANOTHER AGENT COULD PRODUCE FIVE EVENTS, INSTEAD OF ENDING UP WITH TEN, YOU END UP WITH 15 OR 20 OR SOME NUMBER GREATER THAN THE TEN.

Q. NOW, DOCTOR, THESE STUDIES THAT YOUR GROUP HAS CONDUCTED ON THE METABOLISM OF VINYL CHLORIDE, WAS THAT IN ANY WAY FUNDED THE MCA GRANT? YOU MAY HAVE ANSWERED THIS. I'M NOT SURE.

A. IN THE PAST, IT HAS. PRESENTLY, IT'S NOT.

Q. AND THAT -- THAT WAS THE MCA GRANT THAT YOU TALKED ABOUT YESTERDAY THAT WAS $250,000 PER YEAR FOR THREE YEARS?

A. THE MAJOR RESEARCH THAT WAS DONE WITH THAT GRANT WAS RELATED TO THE H L A GENETIC TISSUE TYPING AND A SMALLER PROPORTION WAS STARTED FOR THE METABOLISM WHICH WE'VE SUBSEQUENTLY CONTINUED WITH PRIVATE RESEARCH FUNDS.

Q. DOCTOR, THE SLIDES THAT -- SOME OF