GLENN BROWN, et al. v. MONSANTO CO.

DEPOSITION OF DR. R. EMMET KELLY
TAKEN JUNE 1, 1990
VOL. I

IN THE CIRCUIT COURT OF THE CITY OF ST. LOUIS

STATE OF MISSOURI

GLENN BROWN, et al.,	)	
	)	
Plaintiffs,	)	
-vs-	)	
	)	# 862-00694
	)	
MONSANTO COMPANY,	)	
	)	
Defendant.	)	

VOLUME II
DEPOSITION OF DR. R. EMMET KELLY
On the part of the Defendant
June 1, 1990

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Defendant.) Div. # _____

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I N D E X

WITNESS: Page:

DR. R. EMMET KELLY

Continued Cross Examination by Mr. McCrea 4

E X H I B I T S

Plaintiff's Deposition Exhibit # 1 40

Plaintiff's Deposition Exhibit # 2 118

IN THE CIRCUIT COURT OF THE CITY OF ST. LOUIS

STATE OF MISSOURI

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MONSANTO COMPANY,)
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Defendant.)

DEPOSITION OF WITNESS, produced, sworn and examined on June 1, 1990, between 8:00 a.m. and 6:00 p.m. of that day, at the offices of Communitronics Corporation, 1907 South Kingshighway, St. Louis, Missouri, before Sheila C. Irvin, a Notary Public within and for the State of Missouri, in a certain cause now pending in the Circuit Court of the City of St. Louis, State of Missouri, wherein GLENN BROWN, et al. are the Plaintiffs, and MONSANTO COMPANY is the Defendant; on behalf of the Defendant.

A P P E A R A N C E S

The Plaintiffs were represented by Mr. David S. McCrea of the law firm of McCrea & McCrea, 119 South Walnut Street, Bloomington, Indiana 47402.

The Defendant was represented by Mr. Thomas M. Carney of the law firm of Husch, Donohue, Cornfeld & Jenkins, 100 North Broadway, St. Louis, Missouri 63102.

CONTINUED CROSS EXAMINATION

QUESTIONS BY MR. McCREA:

Q. Dr. Kelly, how are you this morning?

A. I'm fine, thanks. And yourself?

Q. Pretty good. Thank you. Dr. Kelly, in preparing for this deposition, did you review any documents?

A. Yes, I did.

Q. Did you review any documents other than the documents that have been identified as exhibits and which have been displayed to you during direct examination?

A. No, I have not.

Q. Were you asked to render an opinion in this case?

A. About what?

Q. About anything.

A. I was asked to --

MR. CARNEY: Let me object to the question. I think it's overbroad and I think he was, what he was asked is on the record and on the videotape.

Q. (By Mr. McCrea) Maybe I can be more precise. Did the attorneys for Monsanto ask you to provide them with an expert opinion on any subjects relating to PCBs?

MR. CARNEY: I'm going to object to that. I don't know what you mean. We asked for various opinions

that were given. I don't know if you're using the word asked for an expert opinion in some technical term or legal term. This person isn't an attorney.

Q. (By Mr. McCrea) You may answer.

A. Will you ask it again?

Q. Did the attorneys for Monsanto ask you to provide them with an expert opinion on the subject of PCBs?

A. Yes, they asked me to provide an expert opinion if PCBs could be used safely in the industrial workplace.

Q. Did they ask you to render any other opinions?

A. Yes, they asked me if we had any records, either personally or in the, if I had any information from the Medic Alert literature that's serving the presence or absence of any illness due to PCB outside of acute episodes and chloracne.

Q. Did they ask you for any other opinions?

MR. CARNEY: I'm going to object. The opinions or the questions that we asked him were on the record, and I think what you're doing is asking him to summarize all the answers that he gave yesterday during a full day of testimony. I don't see any point in this and it's -- I think you can just refer to those answers that he gave yesterday. That's -- Those are the questions we asked.

Q. (By Mr. McCrea) You may answer.
A. If you will give me the question saying did they ask you for this opinion, I can't recall.
Q. Okay.
A. Any myriad of opinions I might have given during a couple hours of discussion I had with them. If you ask me did they give you, did they ask you for an opinion about this factor concerning PCB, I'll answer you yes or no.
Q. Were you asked to review the medical records of the plaintiffs in this case?
A. No.
Q. Have you seen the medical records of the plaintiffs in this case?
A. No.
Q. As a physician for Monsanto, have you reviewed medical records of workers exposed to PCBs?
A. Yes.
Q. In preparing for this deposition, did you get together with the attorneys and review questions that they would address to you?
A. They reviewed the general tenure of my deposition. They were asking what they wanted to acquire from me. They asked what particular facts and opinions I had about the, my experience with Monsanto, my experience

with PCBs.

Q. Was that the first time, Dr. Kelly, that you have met with the attorneys in this case?

MR. CARNEY: You talking about me or anybody in my office?

MR. McCREA: Yes, the attorneys of record in this particular case.

A. I certainly have not met with Miss Rutter before, and I honestly don't remember if I saw Mr. Carney in any other cases.

Q. (By Mr. McCrea) Were there any videotapes of a question and answer session in preparing for this deposition which you reviewed?

A. No.

Q. Dr. Kelly, yesterday I asked you about testing which Monsanto did regarding the presence of furans in PCBs. Can you tell us what a furan is?

A. Yes. I can draw it for you if you want.

Q. All right, sir. Do we have an extra pad that we can provide the doctor?

A. It's two benzenes that are connected by one oxygen.

Q. What are the chemical elements in a furan?

A. Carbon. It depends on which furan, which one you're talking about.

Q. I don't know. Do they differ?
A. Yes, certainly.
Q. All right.
A. It all depends on how much chlorine is in there.
Q. What are the different elements, the different chemicals in a furan?
A. Hydrogen, carbon, oxygen.
Q. Does it have chlorine?
A. You asked furans now.
Q. Right.
A. If it's a chlorinated furan it certainly has chlorine, but you asked about furans.
Q. All right. A chlorinated furan would have carbon, hydrogen, oxygen and chlorine?
A. That's correct.
Q. Then there are also furans which are not chlorinated?
A. That's correct.
Q. Which would only have carbon, hydrogen and oxygen?
A. If it's a pure furan you're talking about. There are other -- There's a brominated furan, if you want to get into that.
Q. And that would have --

A. Bromine instead of chlorine.

Q. All right. Are there other halogenated chemicals associated with furans?

A. Well, there's only one other halogen. That's iodine, and I don't know if there are any iodine furans.

Q. So there are essentially three variables of a furan, and you've described those?

A. No, that's not true.

Q. I mean, three different sets of chemicals in a furan. One would be carbon, hydrogen and oxygen. A chlorinated furan would have those chemicals plus chlorine, and a bromated -- Is that the word?

A. That's certainly a word, yes.

Q. Would have carbon, hydrogen, oxygen and bromine?

A. That's right.

Q. Instead of chlorine?

A. That's right.

Q. Are there any other combination of chemicals that make up a furan?

A. Now, furans have oxygen, chlorine, hydrogen. There are no changes in a furan. Now, you want to talk about chlorinated furans?

Q. Well, we have a pure furan. Then we have a chlorinated. Then we have a bromated.

A. That's correct.
Q. Are there any others?
A. There may be laboratory curiosities. I don't know of any.
Q. Who requested that Monsanto do the testing for furans in the early '70s which you described yesterday?
A. I don't know.
Q. Did you know that this testing was going to take place?
A. I knew after it was done.
Q. Okay. From whom did you receive the information that the testing had been done?
A. Somebody in the analytical laboratory. This was 18 years ago, 20 years ago. I don't recall the name.
Q. What was the purpose of the testing for furans as you understood it by Monsanto Company in the early '70s?
A. To see if they were there.
Q. Where was the testing done?
A. I would -- To the best of my knowledge, it would have been done at the research laboratory in St. Louis.
Q. Is that part of your main office?
A. That's correct.
Q. In downtown St. Louis or where is it?
A. No, it's out on Lindbergh Boulevard.

Q. And who was in charge of that laboratory at that time?

A. A Dr. Keller, K-e-l-l-e-r.

Q. Was he the one who did the testing?

A. I wouldn't know.

Q. Were those results discussed with you?

A. I don't have any particular recollection of it. Somebody gave me the results. I don't know who gave it to me, but there was no great discussion.

Q. You stated that there was a varying amount of furans in the batches of PCBs. Is that a correct statement?

A. To the best of my knowledge, there was some variation, yes.

Q. Was there any explanation as to why they would have more furans in one batch of PCBs as opposed to another batch of PCBs?

A. No. Whether it was sensitivity to laboratory methods or not, I don't know. There was no great discussion because there was no large variation, no large amounts of the furans, and they were talking about single digit parts per million.

Q. Was this testing reduced to writing? Were the results reduced to writing?

A. I've seen a memorandum about it on one

occasion.

Q. What do you recall about that memorandum?

A. Just that it had a couple of figures about the amount of furan, of chlorinated furans in the material. That's all I remember, and that the figures were under ten parts per million. I don't know how far under.

Q. Were they testing pure PCB?

A. They were testing manufactured run PCB.

Q. Did they test PCBs from Japan?

A. I don't know.

Q. You have never heard anyone from Monsanto discuss the relative level of furan contamination of PCBs comparing Monsanto's PCBs to the Japanese PCBs?

A. I may have heard it. I mean, I have some vague recollection that they said we had less than the Japanese, but I don't have the figures. You must realize the Japanese manufacture their PCBs in a different manner than we do.

Q. Do you know of any documents in the possession of Monsanto which discuss the relative levels of furans in Monsanto's PCBs compared to Japanese PCBs?

A. I don't know if any exist or ever did exist. I don't know.

Q. But you do recall a discussion about the very--

A. Well, there was --

Q. Just a second, please.

A. Pardon me.

Q. You do recall a discussion from people in Monsanto about the relative levels?

A. Well, I do -- I'm telling you that I do recall, I have some vague recollection of people talking over the relative amounts, but I don't recall the people and I don't have any written data on it.

Q. Was this data about the furan level in the PCBs given to the government?

A. I don't know.

Q. Was it given to your board of directors?

A. I don't know that, but I would doubt it.

Q. Was it given to Westinghouse?

A. I don't know.

Q. Was it given to any public utilities?

A. I don't know.

Q. Was it given to anyone?

A. I don't know.

Q. Were any tests conducted by Monsanto to test the furan level of PCBs after the PCBs had been heated?

A. How do you mean heated?

Q. Heated as the PCBs were heated in Japan when they were used as a heat transfer fluid and escaped into

the rice oil, a similar type elevation of temperature.

A. I don't know.

Q. How are furans formed in PCBs?

A. I don't know the chemistry of the formation of furans in PCBs.

Q. What is the difference between a chlorinated furan and a chlorinated PCB as far as the chemical elements in the two compounds are concerned?

A. Well, if you are just talking about chemical elements, there are large varieties in the way these chemical elements are mixed up. Here we have two benzene rings that are connected by oxygen. That's an entirely different compound. The two benzene rings are connected just by themselves. So you cannot rationalize saying, "Well, we've got one oxygen and that's furan and we don't have an oxygen in the PCB, so they're practically the same." Well, that is nonsense.

Q. Is a furan more toxic?

A. Yes, enormously more.

Q. When did you know --

A. Chlorinated furan, sir.

Q. When did you know that a chlorinated furan was enormously more toxic than a PCB?

A. Late '70s, I suppose, sometime in the '70s.

Q. How did you learn that?

A. Various publications.
Q. Can you cite any of them?
A. Well, I can cite you one in '84.
Q. Can you cite any in the late '70s when you gained your knowledge?
A. No, but this review in 1984 referred to some work done previously.
Q. Did you communicate the information about the furans being enormously more toxic than PCBs to your board of directors?
MR. CARNEY: Let me object. Since he said he learned in the late '70s, that would mean he was retired from Monsanto. So when you say your board, it doesn't make much sense.
Q. (By Mr. McCrea) I stand corrected. Dr. Kelly, based on the number of times that you've served as an expert fact witness for Monsanto, do you have any knowledge of personnel in Monsanto communicating to the board of directors that furans were enormously more toxic than PCBs?
MR. CARNEY: I'm going to object to that. I don't think since Dr. Kelly's retirement there's been any foundation laid that he has any contact with the board of directors. I'm not sure he had any contact with the board before he was retired, but I'm quite confident he didn't

have any contact with the board, so there's no foundation for him having any potential for knowledge about that question.

Q. (By Mr. McCrea) You may answer.

A. I don't know of anybody who has talked to the board of directors about anything since I retired from Monsanto.

Q. Do you know of any information which was given by Monsanto to the United States Government that reflects your knowledge that furans are enormously more toxic than PCBs?

MR. CARNEY: I'm going to object to that question because it would call for this witness to answer, try to answer a question after he was retired from the company, so there's no foundation that he would know what Monsanto did or didn't do.

Q. (By Mr. McCrea) You may answer.

A. No, I don't know, but I certainly know that the government read the same articles that Monsanto scientists did. They read the same ones I did, so it really is, it's an overkill as it were.

Q. How do you know that?

A. Because I know the caliber of the scientists in the government. I know the people that have been writing on it. You see lots of articles coming out from

various divisions of the United States Government.

Q. Can you name one individual?

A. Sure. I'll give you Kimbrough as a starter.

Q. Okay. And --

A. She wrote a book on PCBs and halogenated hydrocarbons. She wrote several articles, review articles that included information about dibenzofurans and dibenzodioxins.

Q. Did the government ever ask Monsanto for test data as to the amount of furans in its PCBs?

A. I have no knowledge of any such request up to 1974. Whether they did after '74 or not, I don't know.

Q. And you have no knowledge up to '74 of that data being given to the government?

A. Never been asked. I said I have no knowledge of being asked for it by the governemnt.

Q. And also you have no knowledge that Monsanto gave that data to the government?

A. No, I have no knowledge of that.

Q. Can you explain why furans are enormously more toxic than PCBs from a toxicological standpoint?

A. No, I cannot, except they are. That's all.

Q. To this date, Dr. Kelly, do you know if Monsanto has conducted any tests to determine the amount of furans in PCBs after they are heated?

A. I do not know if they have or not. They may have. I may have had some recollection in the past. I do not have any recollection at the present time.

Q. Was there any effort by Monsanto to eliminate furans in its PCBs after the testing was done in the early '70s and the furans were detected by analytical methods?

A. Well, I don't know that, but you must remember, by the time that analytical expertise was present to look for furans, we were phasing out of the business. This was -- As I said, this was in the late '70s or the mid '70s that we're in a position to examine for furans, and we were getting out of the business.

Q. You retired in '74?

A. That's correct.

Q. This testing took place before your retirement?

A. Yes, it did. Well, in the mid '70s, I think.

Q. Well, it took place while you were there?

A. Yes.

Q. Monsanto didn't stop manufacturing PCBs until after the Toxic Substances Control Act in 1976; correct?

A. I said they were phasing them out. I didn't say they stopped manufacturing them.

Q. All right. I understand. What was the month and year that Monsanto stopped all production of PCBs?

A. I can't answer that. I wasn't connected with Monsanto at that time.

Q. But the testing for furans was before your retirement and you've described that?

A. That's correct.

Q. And Monsanto continued production until some three years after your retirement, 1977?

A. I don't know if it was '77. I can't tell you that.

Q. Was there any effort to reduce the amount of furans in PCBs after the testing was done by Monsanto and before they stopped production?

A. I don't know if there was or not.

MR. CARNEY: I'm going to object to that question. Again there's no foundation that this witness would be in a position to know that since he retired in '74, and anything after that time he wouldn't have been involved.

Q. (By Mr. McCrea) Was there any effort, Dr. Kelly, to reduce the level of furans at Monsanto Company before your retirement in 1974?

A. There may or there may have been not. I do not know. I do not know of any, but at that particular time it was not critical to us because we knew the toxicity of our PCBs and that toxicity included the presence of

these furans, and we knew those furans were in that. We were manufacturing it the same way for 30 years, so if we had furans in 1972, we had the same furans in 1974 and we knew what the toxicity was, so we were not concerned about it as an industrial chemical. There was no problem from the toxicity point of view in our minds.

Q. But you also knew that the episode in Japan involved heating of PCBs; correct?

A. Heating and eating, yes.

Q. Right. And eating is a means by which PCBs are absorbed into the body; correct?

A. Well, it's one of the ways.

Q. And they also are absorbed into the body by going directly through the skin; correct?

A. That's correct.

Q. And they also absorb into the body by being breed?

A. That's correct.

Q. So they get into the body three ways?

A. That's correct.

Q. And you knew that in Japan the PCBs had been heated; correct?

A. Yes.

Q. And did you ever attempt to duplicate the toxicity of your PCBs by heating them and then presenting

animal species for absorption of the heated PCBs?

MR. CARNEY: Let me object. I don't think there's any foundation that Dr. Kelly knew these details at the time of his retirement. There's some question, as you recall yesterday, as to when the Yusho incident was published in the English language, and so I think your question is, there's no foundation for it since if he retired and didn't have that information, he wouldn't know what Monsanto did after his retirement.

Q. (By Mr. McCrea) Dr. Kelly, did you know that the Yusho incident involved PCBs which were heated before your retirement?

A. Yes, yes, I did.

Q. Did you know that the Yusho incident involved furans as a contaminant before your retirement?

A. That is hard for me to recall because it was at least one or two years, several years afterwards that the analytical work done by the Japanese was done. There was also then some time after the Japanese work was translated into English or appeared in the English literature and -- Let me finish, please.

So I have seen numerous documents in these various PCB depositions, and I am unable at this time to recall if these documents which reflected the presence of dibenzofurans in heated PCBs were shown to me after I

retired in 1974 or whether they were memoranda that I saw prior to 1974. I would believe it's the former because I'm not so, I do not believe that I saw data concerning the development of furans in the heated Japanese heated Kanaclor. I just -- I can very well be confused with memoranda that I had before 1974 or documents that were shown to me during these numerous PCB depositions that I've undertaken.

Q. Dr. Kelly, do you know of any other reason why the Monsanto people in the analytical laboratory were testing for furans in the Monsanto's PCBs other than the concern of its toxicity as was demonstrated in Japan?

A. I don't know, and I don't know whether they did it because of the concern over toxicity.

Q. You know that people were poisoned in Japan?

A. Yes.

Q. You know that those people consumed PCBs?

A. They consumed PCBs. They consumed chlorinated benzofurans. They consumed quaterphenyls. They drank quite a lot of it. You asked me yesterday about the ballpark figures. They drank from a half a pint to three quarts of the rice oil over the course of the months. Yes, we knew that.

Q. Where did you get that information between yesterday and today?

A. I got that from Masuda, M-a-s-u-d-a, "American Journal of Industrial Medicine", November 1984. He stated that persons consumed between 195 and 3,375 milliliters of rice oil. That translates down to a half a pint to three quarts roughly.

Q. How many ounces, grams or milligrams of PCB were consumed?

A. During that period of time if you took -- Well, to take a round figure, if you divide 3,375 that's, and there was less than a thousand parts of the PCB in the rice oil, a thousand parts per million, a thousand parts per million, so there would be 1,000. It would be three milliliters. That was a half a teaspoon. It was a teaspoonful.

Q. How many milligrams would that be?

A. According to my figures, 3.3.

Q. 3.3 milligrams?

A. Milliliters. I have to --

Q. Why don't you calculate for us the amount of PCB which was ingested by the Japanese at the low range, 195 milliliters, and the high range?

A. You have a calculator here, by the way?

Q. What?

A. You have a calculator?

Q. I'm sorry. They might have one in the

building. At the low range, 195 milliliters and the high range, 3,375 milliliters?

A. Well, if you consumed 195 -- let's make it 200 -- and if they had 200,000 parts of PP per million, they would probably take -- unless I've lost a few zeros in here -- 200, .02 milliliters of PCB the low level, and it's about 16 times that much for the high level.

Q. All right. How many -- How much is that in milligrams?

A. Well, it's roughly the same. I mean, give or take ten percent. I don't know the specific gravity of PCBs, but it's pretty close.

Q. All right. So approximately how many milligrams were ingested at the level of 200 milliliters of rice oil?

A. 200ths. That would be .02.

MR. CARNEY: Would it help you, Doctor, to have a calculator?

A. Well, it would be easier.

MR. McCREA: Could we take a break and then see if there's a calculator in the building?

MR. CARNEY: Why don't we do it at the break rather than, you know, we'll have a break and --

MR. McCREA: Well, I'd like to stay so that there's continuity for the jury.

A. Well, if we have, if the person at the low level consumed 200 milliliters of rice oil, and let's assume also with an error of ten percent, that's 200 milligrams of rice soil, and if that 200 milligrams of rice oil had 1,000, 1,000 parts per million so that we get 1,000 of it, that's .2 milligrams of rice oil. That's correct, .2 milligrams of rice oil at the low level and at the high level 16 times that. That's 3.2 milligrams at the high level of PCB in the rice oil, of PCB that they consumed.

Q. So the total amount of PCB that the Japanese consumed which poisoned them was how much in milliliters?

A. Well, we're not saying that the PCBs poisoned them.

Q. Well --

A. It was the dibenzofurans that caused that.

Q. We'll get to that, but first I want to know PCBs. How many milliliters -- how many -- Excuse me. How many milligrams?

A. Between 2/10 of a milligram and 3.2 milligrams.

Q. And that's based on the information from?

A. Well, the "Annals of Industrial Medicine", November 1984, and if you want to continue in that same journal, Dr. Kabuto stated it was clear that the PCDFs, the dibenzofurans chlorinated were the main causative agent in

the case of Yusho disease because he gave comparative amounts of the dibenzofurans to monkeys and he got the skin problems, the thymus atrophy in rats. He got skin problems in the monkeys, thymus atrophy in rats, and he gave the PCBs to them and he didn't get anything. So he was the one that concluded -- That was the basis for his conclusion as written in the "American Journal of Industrial Medicine" that it was clear that the PCDFs or the chlorinated dibenzofurans were the main causative agent in the Yusho poisoning.

Q. What was the quantity of furans ingested?

A. Much smaller, much, much smaller.

Q. Can you calculate that for us?

A. I don't think I can. It was much, much smaller by a couple of magnitudes. It would be ten hundred, something like that.

Q. Now, you're working through these calculations on June 1, 1990 for the first time. Is that correct, Doctor?

A. That's correct.

Q. And --

A. Well, not through the calculations. I looked at the figures. I didn't go down to check out the exact --

Q. But until this date, you have never known the amount of PCBs ingested by the Japanese which poisoned them

and their offspring?

MR. CARNEY: I'm going to object to that. He didn't do it in milligrams, but he gave you the information in quarts and pints which I think the average person understands a lot more than milliliters or milligrams, and I think he indicated he read that letter back in '84.

A. Your answer is completely wrong. Your question's completely wrong. I did know it.

Q. (By Mr. McCrea) All right. What was the amount of PCB consumed by the Japanese which poisoned the people who ingested it and caused birth defects in their children?

A. Now, just a moment. It was not the PCBs.

Q. Just a second. All right. Let's have three calculations; all right? Do you know, Dr. Kelly, from your knowledge as the former medical director of Monsanto and based upon your testimony in numerous cases involving Monsanto and PCBs what the quantity of PCBs was that was ingested, what the quantity of furans was that was ingested and what the quantity of quaterphenyls was that was ingested by the Japanese which poisoned them and caused birth defects in their children? If so, would you tell us?

MR. CARNEY: I'm going to object to it as a compound question. You've asked three questions. If you break it down, what was PCBs and then go on to the rest.

MR. McCREA: Tom, that would be fine, but every time I ask him about PCBs he says it's not the PCBs, it's the furans.

MR. CARNEY: Well, you can ask him what the quantity was in PCBs and I think he can tell you that.

A. Do you have this article, this series of articles with you with all those exhibits you have? I'll read them out of there.

Q. (By Mr. McCrea) I'm asking you if you know.

A. Well, I know where to get the information.

Q. No, Doctor. Unfortunately in this situation I ask the questions; all right? Now, if you don't know, we'll get the articles. I don't have any trouble with that. I'm just asking you if you know.

A. Yes. To the best of my knowledge, persons consumed 195 to 300, 3,375 milliliters of rice oil which contained 920 parts per million of PCB.

Q. 920?

A. 920.

Q. Parts per million PCB?

A. That's correct.

Q. All right. And what -- Okay. Thank you. Now, how many parts furan?

A. Someplace between five and 18 parts per million of furans.

Q. Five and 18 parts per million furans?
A. That's correct.
Q. All right. And how many for quaterphenyls?
A. I don't have those figures.
Q. All right. Now, Doctor, without calculating, can you give the injury the amount of PCBs ingested? Do you know that figure?
A. Something between .2 milligrams and 3.2 milligrams.
Q. And how many milliliters is that?
A. Well, roughly the same depending on the specific gravity of PCBs. I don't know what that is.
Q. .2 milliliters?
A. Huh?
Q. .2 milliliters?
A. Yes, to 3.2 milliliters.
MR. CARNEY: It might be helpful to the jury to give it in quarts or pints because at least I don't, I'm not adapted to milliliters or milligrams. I'm one of these old fogies that doesn't understand that. That's kind of gibberish.
Q. (By Mr. McCrea) All right. I think that's a good suggestion from Counsel. Can you express the amount of PCBs in quarts or pints that were ingested by the Japanese which caused their health problems? Then the same

question for furans, first as to quarts.

A. No, there's an extremely low fraction of a quart.

Q. I'm just taking the suggestion of Counsel.

A. Well, I'd have a decimal point with a bunch of zeros in back of it. I don't think that's helping anybody.

Q. So it would be less than an ounce?

A. Oh, yes, less than an ounce.

Q. Less than half an ounce?

A. Yes, less than half an ounce.

Q. Less than a quarter of an ounce?

A. Yes.

Q. Less than a tenth of an ounce?

A. Yes, it would be a fraction of an ounce.

Q. Less than a hundredth of an ounce?

A. Around that.

Q. Around one-hundredth of an ounce? And can you tell the jury in quarts or pints what quantity of furans was consumed which poisoned the people who ingested it and caused birth defects in their children?

A. About one-hundredth of that.

Q. So that would be a hundred times a hundred, 1/10,000 of an ounce?

A. Something of that order.

Q. Did you know that information before today?

A. Yes, I've read it, yes. Remember, you also have to take this into consideration what is the lethal LD50 of PCBs. That's 4,000 milligrams.

Q. But it only took 1/100 of an ounce and 1/10,000 of an ounce of this compound to poison these people?

MR. CARNEY: Well, I'm going to object. You're mixing apples and oranges. The testimony -- Are you talking about PCBs? Are you talking about furans?

Q. (By Mr. McCrea) Tom, if you listen to the question. Doctor, it took 1/100 of an ounce of PCBs and 1/10,000 of an ounce of furans in the PCBs in Japan to poison those people?

MR. CARNEY: Let me object to it. You've asked two questions, and if you want to ask him one at a time, that's fine, but I'm going to object. It's a compound question. You're asking two questions in one, and which one do you want him to answer?

MR. McCREA: Well --

MR. CARNEY: If you'd ask them one at a time, I'll withdraw my objection. Otherwise, I object as compound.

MR. McCREA: I have this problem because when I ask him about PCBs, he blames it on furans.

MR. CARNEY: That's because that's what the authors in Japan blamed it on. The experts have blamed it on furans. I know you don't like that. You would like to blame PCBs, but the experts disagree with you, Mr. McCrea.

MR. McCREA: No, we're satisfied with the furans in your PCBs.

MR. CARNEY: Well, they were about one one-hundredth of the number in the Monsanto PCBs as in the Japanese PCBs which you don't like to hear, either.

MR. McCREA: Where did you get that data?

MR. CARNEY: I can supply that data for you later on if you want it.

MR. McCREA: Is that after it was heated? It was in Japan?

MR. CARNEY: Do you have a question?

MR. McCREA: I'm just asking you. You're volunteering this information.

MR. CARNEY: I'll be glad to give you the information, but I think -- I'm not under oath. I think Dr. Kelly is the one you should be directing your questions to.

MR. McCREA: You're supplying information, and we'll be happy to review it, so if -- I assume that -- Do you have that with you today?

MR. CARNEY: Why don't you ask another

question.

MR. McCREA: Do you have it with you today?

MR. CARNEY: I don't have that information with me. I don't carry all the information with me.

MR. McCREA: But you are volunteering it; correct? And you will provide it? Thank you.

Q. (By Mr. McCrea) Dr. Kelly, there's no dispute in medical science that the Japanese people were poisoned and their offspring suffered birth defects after the women consumed one ten-thousandth of an ounce of furans. Is that a fair statement?

A. I think it is because the lethal dose, the lethal dose 50 for furans is in the neighborhood of 1/1,000 of a milligram. Now, that is pretty small. Now, that's, I have that figured for dioxin, chlorinated dioxin, and furan is somewhat less toxic. I don't have the exact figure, but 1/10,000 of a milligram per kilo is the lethal dose for rats, and if you compare that to the PCB dose is 2,000 to 4,000 milligrams or something like 40 -- well, it's something over -- you take the dose of 2,000 milligrams per kilo and the furan is 0001 milligram. This is ten hundred, thousand. That's 1/2,000 roughly. It's less than -- It's more than that. 1/20,000 of the lethal dose of PCBs.

Q. Okay.

A. So we're dealing with two compounds you're

talking about. One has a relatively low toxicity. The other has one of the most extreme toxicities of any compound since the beginning of chemistry.

Q. One ounce of furans would be enough to poison 10,000 people?

A. Yes, I think so.

Q. And cause birth defects in their children?

A. It could be. I do not know what the toxicity of the material is as far as humans are concerned. If we're talking about rats, that's one thing.

Q. No, I'm talking about Japan. Let's get this clear because you may not be at trial. One ounce of furans based upon the data that you have given us today in this deposition would be sufficient to poison 10,000 people and cause birth defects in their children based upon the data from Japan which you have given us?

A. If I have -- If I have translated these figures correctly, that is correct.

MR. CARNEY: I'm going to object to that. You're saying -- are you saying -- I think you're mischaracterizing Yusho, that those, all those mothers have birth defects in their children. I don't think that's the, what the literature says and that's kind of a trick question that you've asked, but I don't think there's any support in the literature for that.

A. There are 1,000 people had various symptoms in Yusho. I do not have the figures for what those 1,000 people, what the amount of dibenzofurans, the total amount that those 1,000 people took. That may be someplace. I do not have that.

Q. (By Mr. McCrea) Well, Doctor, isn't it a fact that based on the testimony you've given us here this morning, based on the article that you have read, based on your calculations, that one ounce of furans is sufficient to poison 10,000 people? Isn't that a fact?

A. No. I think, Mr. McCrea, that may very well be a fact, but I would certainly have to have a more elaborate set of calculations and have my calculations gone over by a mathematician. So I cannot answer that question. It is very easy to drop a couple of zeros when you're talking about translating from ounces to milligrams to parts per million, so that I can not be certain of my calculations.

Q. Is it probable -- Do you have an opinion based upon medical probability as to whether or not one ounce of furans is sufficient to poison 10,000 people?

A. I can't be sure. I do not have that opinion at present, no.

Q. Your calculations would indicate that is true?

A. Yes, but I mean, I'm doing a hurry-up set of

calculations and I could very easily have misplaced some of the figures. I accept the fact that this is an extremely toxic compound, but. . .

MR. CARNEY: By it, would you --

A. It, dibenzofurans. It is an extremely toxic compound, but to make that jump from there to one ounce of the material poisoning 10,000 people, I think I'd have to be more sure of my calculations and I'd have to know the time these people took this ounce, what part of the ounce or else divide among 10,000 people a tenth of an ounce, 10,000 of an ounce in each person over what period of time. I would have to do quite a lot more calculations where I can't at the present time.

Q. (By Mr. McCrea) How many milligrams are there in a gram?

A. 1,000.

Q. How many grams are there in an ounce?

A. 30.

Q. How many milligrams are there in an ounce then, 30,000?

A. Yes.

Q. Thank you. Again, Doctor, you have known that furans are extremely toxic for what period of time?

MR. CARNEY: Now we're getting very repetitive. I'm going to object to the repetitive nature

of these questions, and also we're talking about furans and--

MR. McCREA: Presumably the same furans that were found in your PCBs.

MR. CARNEY: Well, you're trying --

MR. McCREA: Just a second, please. By Monsanto when they tested in the early '70s.

MR. CARNEY: In under ten parts per million. That would be a drop in the, a drop of it in a swimming pool. You're talking about an infinitesimal amount and you're trying to act like --

MR. McCREA: How much is 1/10,000 of an ounce?

MR. CARNEY: It's a lot more than a couple of parts per million if that's --

MR. McCREA: It's ten parts per million?

MR. CARNEY: That's the maximum he said it was. Ten parts per million was the maximum. He said it was under ten parts per million. We're talking about one or two or three parts per million, Mr. McCrea, and we've tested and you've just heard the testimony that the very, very infinitesimal amount of furans in the PCBs that Monsanto made did not cause any illnesses and was very, was not very toxic at all. So you're confusing furans, or I think you're attempting to try to confuse the jury with furans which are toxic with PCBs which aren't.

MR. McCREA: You would acknowledge that furans are enormously toxic, Mr. Carney?

MR. CARNEY: I think that's been the testimony. I think that --

MR. McCREA: Would that be stipulated by Monsanto?

MR. CARNEY: I'm not stipulating to anything. I think it's not up to us. The witness here is a knowledgeable person and he's testifying and that's what he said, and I'll stipulate that that's what he's testified to.

Q. (By Mr. McCrea) Thank you. Doctor --

A. I will say something, too.

Q. Dr. Kelly, just a second. If I may ask a question, please.

A. Yes, you sure may.

Q. Dr. Kelly, you have been asked, have you not, to testify in cases involving furans on behalf of Monsanto?

A. Not involving furans, no, sir.

Q. Is it your testimony today that you have not testified in any cases involving furan toxicity?

A. Well, that's -- I have been asked to testify towards the toxicity of PCBs, and the question of furans came up during the course of those depositions, yes, sir.

Q. Okay. And which deposition -- Thank you.

Which depositions did the subject of furans get raised?

A. I don't recall, and I might add to some --

Q. Just a second. Would you restrict yourself to the question?

A. Okay. Can I --

MR. CARNEY: I think you have to allow him to clarify.

A. Can I clarify one of my previous answers or not?

Q. (By Mr. McCrea) Yes, sir.

A. You are using the word chlorinated dibenzofurans as a basket term. There are probably 70 different types of chlorinated dibenzofurans that exist and the toxicity varies greatly with how to make chlorine atoms, where these chlorine atoms are arranged, and to the best of my knowledge, that information concerning Yusho and furans in either Monsanto or Japanese PCBs has, I don't have that information as far as my knowledge is concerned.

So that if you make a blanket statement of toxicity of a dibenzofuran, chlorinated dibenzofuran, I think you would have to limit yourself to is it 3-4-7-8 or any of the other various configurations for the chlorine, of atoms hooked on to the molecule.

Q. Which of the molecules of furan are most toxic?

A. I think 2-3-7-8.

Q. Has Monsanto done toxicity testing on the various molecules of furans to determine their relative toxicity?

A. They did not until 1974. I do not know what's been done afterwards.

MR. McCREA: Okay. Can we take a break now? Thank you, Dr. Kelly.

(Thereupon, a short recess was taken. The reporter marked Plaintiff's Deposition Exhibit One, for identification.)

Q. (By Mr. McCrea) Dr. Kelly, the court reporter has marked an exhibit as Plaintiff's Exhibit One dated 6-1-90, and I will hand you the exhibit and ask you, sir, if you would first look at the exhibit and see if you can identify that as having been read by you before today's date?

MR. CARNEY: Let me object to the question. Mr. McCrea, you just tore out a page out of a booklet.

MR. McCREA: Mr. Carney, if I may.

MR. CARNEY: Can you -- It seems to me it's unfair to tear out a page in a one inch booklet, and I don't know that I've ever seen the booklet before. Have I?

MR. McCREA: Well, what this booklet has in it is a series of 27 documents. The only page referring to

this particular document has been taken from the booklet. I do not have the remainder of the document. If I did, I would be happy to provide it to Dr. Kelly.

MR. CARNEY: Let me just -- Could I take a look at what the document you gave --

MR. McCREA: Certainly. It's page 13, and at the upper right is the information as to the subject matter, and if he can't identify it, that's fine.

MR. CARNEY: All I want to point out for the record is that you've handed him one page, a page 13 that you just tore out of this notebook and it doesn't have the -- I don't know how many pages were in the document. We know there are at least 12 pages before this page. It starts in the middle of a subject that you don't even have the entire subject that would be on the prior page. Then it breaks off in the middle of a sentence at the last page, so we know there must have been at least one other page. At the bottom it talks about page 291. I don't know if this is out of a something that has 291 pages or not, but I just think it's -- I would object to handing out one page of a document that isn't titled or there's no indication of who the author is and there's no indication of what pages came before and after it. So that's my objection for the record.

MR. McCREA: And I think that's a valid

objection, but I'm just asking the witness if he's seen this data. If he hasn't, he hasn't. If he has, he has.

MR. CARNEY: Are you asking if he's seen that particular document?

MR. McCREA: Correct.

MR. CARNEY: Okay.

MR. McCREA: And I think your objection is totally valid, and if he can't identify it, I'm not going to continue with the questioning.

A. I may have seen it, but I certainly don't recognize it in this fashion. Could I see what -- Is this booklet, this book of yours have anything to do with this?

Q. (By Mr. McCrea) No, sir, it does not.

A. I mean, let me get this clear. This is something that was taken out of some publication or conceivably a publication and put in this booklet of yours or this --

Q. That's correct, that's correct. This is one page from a document consisting of many more pages. Unfortunately, Dr. Kelly, I do not have the remainder of that document. If I did, believe me, I would bring it because it would be much easier to identify. I just do not have it now.

A. I would have some doubts about that because where it stops it says, "Clinical Studies of Capacitor

Workers," and I would like to have seen what these same people found in the capacitor workers, but I don't have that. I can see where you didn't.

Q. I move to strike the comment of Dr. Kelly. He knows that that's an improper statement. We'll be discussing the capacitor workers later on.

A. All right.

Q. All right. Dr. Alexander, Blair Smith and others; all right, sir?

A. Uh-huh.

Q. Now, Dr. Kelly, if you would please restrict your answers to my questions and not volunteer information, we'll be out of here much earlier and the jury will get --

A. Fine.

Q. -- through this much quicker.

A. I'm ready for your question.

Q. All right. Would you read the first two paragraphs on this document and the footnote?

MR. CARNEY: To himself?

Q. (By Mr. McCrea) To himself, and I'll ask you if that data in those paragraphs is consistent with your knowledge on the subject discussed therein.

MR. CARNEY: Well, I'm going to object to this format. Again I think you asked him originally if he's ever, if he can identify that document and if he can't say

that he ever saw that document, you weren't going to go any further. Again I object as showing one page of a multi-page document that is totally incomplete and very difficult to identify. I think the initial question ought to be has he ever seen that particular document before and if he -- I don't think you can cross examine him on something or ask him to read something that can't be identified.

Q. (By Mr. McCrea) I think your objection is well taken. Dr. Kelly, have you ever seen that page before to your knowledge?

A. This particular page? I do not recall having seen it.

Q. Thank you. See how easy it is? Dr. Kelly, have you ever read any information which indicates that the toxicity threshold dose for furans which caused the health problems in the Japanese and the birth defects in children was .6 milligrams?

MR. CARNEY: I'm going to object. You're talking about birth defects in children. I think that's inflammatory, and we're talking about furans. Again you're trying to mix up furans with PCBs which is confusing and inflammatory.

Q. (By Mr. McCrea) Doctor, did you not state earlier in your testimony that the children born to the

mothers who ate the contaminated rice oil had birth defects such as in their teeth, their skin and other problems? Did you not state that?

A. I didn't say the other problems. I do not know if I used the word birth defects, and if I did, I think it ought to be clarified because birth defects means a lot different to a lot of different people. So we are talking the Japanese children had pigmentation of their skin. They had premature eruption of the teeth and they may have had chloracne. They had skin problems. I do not recall any other conditions which could be termed birth defects.

Q. Dr. Kelly, have you read medical literature which has discussed the health problems of the children born to the mothers who ate the contaminated rice oil?

A. Yes, I have.

Q. And can you give us the titles of those articles and the authors and the dates as best you recall? I don't expect you to remember every single word.

A. Yes. I think one is a review by Dr. Kimbrough in 1987 or '88. The other is in the "Journal of Industrial Medicine" in 1984. That authors, Dr. Kimbrough obviously is the United States national, and the authors of the others are Japanese nationals.

Q. What did Dr. Kimbrough state about the health

problems of the children?

A. It was in one of the exhibits, and I would rather read it rather than trying to commit it from memory.

Q. You do not recall?

A. Yes, I recall, but I want to be precise, Mr. McCrea.

Q. Well, I think the document -- Just a second. I think the document will speak for itself. The fact is you don't recall what was in the article?

A. Yes, I can recall the gist of it, certainly, I can recall.

Q. What was the gist of it?

A. The gist of it was we had 39 or so babies with pigmentation, some early eruption of the teeth, and after examining or on reexamination, a large percentage of them had cleared up.

Q. Okay. Thank you. Now, what was the other article?

A. Well, that was an article in the "American Journal of Industrial Medicine" by some Japanese author.

Q. And what was the gist of that article, sir?

A. Well, he described the skin problems with the children.

Q. Anything else?

A. There may be more. I cannot recall it at the

present time.

Q. Do you know Walter J. Rogan, National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina?

A. No, I don't.

Q. So you haven't read his article?

A. You didn't ask that. You said --

Q. Have you read an article?

A. I don't know which is the article. You show me. I'll tell you whether I read it or not.

Q. Fair question. Have you read an article published by Walter J. Rogan concerning "Congenital Poisoning by Polychlorinated Biphenyls and Their Contaminants in Taiwan"?

A. I may have. If you show me the article, I can tell you if I read it. I do not recall whether I read it or not.

Q. Okay. We'll get to that later.

A. That's all right with me.

Q. Now, my question is, Doctor: How would you describe the Yusho health problems?

A. I think it was a severe episode of accidental poisoning by eating contaminated industrial fluids.

Q. What was the toxicity threshold dose which caused this severe poisoning from the standpoint of furans?

A. Would you tell me what you mean by toxicity threshold dose?

Q. Does that not --

A. It's not a common term.

Q. That would be the dose necessary to cause health problems as I would understand it. Toxicity threshold dose. What minimum amount of furans would cause the health problems? That's how I understand it. Not the maximum, but the minimum, the threshold.

MR. CARNEY: What do you mean by health problems? Are you talking about any particular type or -- There are all kinds of health problems.

MR. McCREA: Well, the health problems which are documented in the literature that were experienced by the Japanese when they ate the contaminated rice oil which had PCBs and furans. That's what I'm talking about. Is that clear?

MR. CARNEY: Well, I'm not clear on it, but if the witness is, he can answer.

A. I'm not too clear on it either because there were various problems. Some --

Q. (By Mr. McCrea) All right, Doctor.

A. May I finish?

Q. The question is: What was the minimum -- What was the toxicity threshold dose for furans which caused

this variety of problems, if you know?

A. Well, you would have a different dose for a different problems. In other words, you would have a very minor problem which would have one threshold limit, as you phrase it, and you would have another dose for a much more serious symptoms.

Q. Okay.

A. So I do not -- To answer your question, I do not know what was the dose, the minimum dose necessary to cause the most minor of the symptoms and what was the dose necessary to cause the most serious complication in these people. It is certainly documented someplace. I do not have it at the present time.

Q. Have you read articles published by the United States Environmental Protection Agency with respect to Yusho poisoning?

A. Yes.

Q. Have you read articles which indicate that the toxicity threshold dose for the induction of disease in the Yusho incident was .6 milligrams of furans?

A. I would have to see that to assure myself if that's what I read.

Q. But you can't state that today?

A. I cannot state that today.

Q. Would you calculate how many, how many times

.6 milligrams goes into an ounce?

A. Well, let's see. Again we're having the zeros problem. There are 30 milligrams in an ounce, 30 grams in an ounce. That means there are 30 times 1,000 milligrams, so that's 30,000 milligrams and 6/10 goes into that 50,000 times.

Q. If there is data that indicates the furan toxicity threshold dose which induced the diseases in Yusho was .6 milligrams for furans, would that then indicate that one ounce of furans would be sufficient to induce the disease in 50,000 people?

MR. CARNEY: Well, I'm going to object to that. It's a hypothetical question. You're asking him to try to do some very complex mathematical equations and I think, you know, that's something you can calculate. To have him do that in a matter of minutes here, I think it's a waste of time. If you want to make those calculations and do those calculations, I just don't think that's the proper place for it.

MR. McCREA: Tom, I'm just taking your lead because you asked, and I think appropriately so, that the doctor express this in quarts and pints, and I think most of the people on the jury understand how many ounces there are in a pint, how many ounces there are in a quart. So I just quite frankly think that your suggestion was a good

one, and I'm following up on that so that the doctor can put this in terms that the jury will understand.

(By Mr. McCrea) Now, Doctor, if there are 50,000 milligrams in an ounce or if there -- Your calculation is that .6 milligrams goes into an ounce 50,000 times. Is that correct?

A. That's correct.

Q. So if .6 milligrams is the toxicity threshold dose to induce disease in the Yusho victims that means, does it not, that one ounce of furans would be sufficient to induce disease in 50,000 people?

MR. CARNEY: Well, let me object.

A. No.

MR. CARNEY: Let me just make an objection. You're asking him to assume something that he's already indicated he can't assume. You're reading from an article obviously. You won't show him what you're reading from and--

MR. McCREA: He already read it.

MR. CARNEY: Well, you haven't been able to identify it as to where did it come from, who's the author, how many pages there are in it.

MR. McCREA: It came from the U.S. EPA. The title is "Health Effects of PCB and PCDF Mixtures", Section IV, page 13. There's no secret.

MR. CARNEY: Well, there's a secret as to what is on the pages before that and what are the pages, what's on the pages after that, who the author is, what the date of the article is. You've ripped out one page of an article or a document that we can't identify, the witness can't, and now you're asking him to assume something in this unidentified piece of paper. I think it's improper. I object.

Q. (By Mr. McCrea) All right. You may answer the question.

A. Well, I said no because you have not included the chlorinated terphenyls in this. You have not told me which type of chlorinated dibenzofurans there are. You haven't talked to me about where, what percentage of chlorination these furans have, where these chlorine molecules are. The chlorine substitution in various places can account for a toxicity range of a thousand parts, a thousand to one.

Q. Now, of course all that information is interesting to you as the former medical director of Monsanto; correct?

A. Well, it's interesting.

Q. Terphenyls, where the chlorine atoms attach to the molecule, the different types of furan molecules. That's of interest to you; correct?

A. It was interest to me when you were quoting dibenzofurans and you are not saying which one it is because unless I would know which one it is and be able to look up the toxicity of the individual isomer, I wouldn't be able to answer your question.

Q. Have you done any work to determine that very information which you find of interest?

MR. CARNEY: In answering your question just a few minutes ago?

MR. McCREA: No, before he came to this deposition.

MR. CARNEY: Well, you asked a specific question and he was trying to answer your question, said he needed to know some additional facts in order to answer your question.

MR. McCREA: Yeah. I'm just wondering as the former medical director and as the individual testifying on your behalf if this information which he has said he would like to know before he can answer the question has been studied by him before coming to this deposition and if it hasn't, it hasn't. If it has, it has.

A. When you state -- Was that a question? Have you asked me a question?

MR. McCREA: Not really, not really.

A. I'm waiting for the question.

Q. (By Mr. McCrea) All right. So Doctor, furans are toxic; correct?

A. Let's be precise. Chlorinated furans are toxic.

Q. Are enormously toxic?

A. Depends again on the substitution, where the chlorines are added to the benzene molecule, atom molecule.

Q. They were toxic in Japan?

A. The ones that were there, yes. Now, there are other chlorinated dibenzofurans that can be much less toxic by a factor of a thousand.

Q. What studies did you read that established that?

A. I can't quote them to you right now, but they're certainly established in the literature.

Q. Now, are dioxins more toxic than furans?

A. Yes, somewhat more.

Q. By a magnitude of what?

A. I don't think it's ten times as much. They're somewhat more toxic, but not all that much more toxic.

Q. Approximately what, three to ten times more toxic?

A. I can't answer that because those absolute figures have really not been established particularly.

Q. Is it your opinion that dioxins are more toxic

than furans?

A. Yes.

MR. CARNEY: Which type of furans are you talking about? Again he said there were seven different types.

Q. (By Mr. McCrea) Golly, this gets confusing, doesn't it? How many different types of dioxins are there, 109?

A. 125, I think.

Q. 125. Now, you're not specifying which congener of dioxin in giving us the answer that dioxins are more toxic than furans. You're stating that dioxins are more toxic than furans; correct?

A. It's a general rule that dioxins are more toxic than furans, but when you asked me about, talking about figures as far as the toxicity of a furan of the chlorinated furans, I'm afraid you'll have to specify the ones because I cannot answer a blanket question as far as individual ones.

If you compare dioxins with dibenzofurans, that's fine, but if you're asking me a question about the toxicity of a general class of chlorinated dibenzofurans, it will be impossible for me to give you the answer unless you give me which one you're talking about.

Q. There are certain dioxin molecules that are

more toxic than other dioxin molecules?

A. That is correct.

Q. There are certain furan molecules that are more toxic than other furan molecules?

A. That's correct.

Q. There are certain polychlorinated biphenyls that are more toxic than other PCB molecules?

A. Yes. Now, remember you're bringing in PCBs in the same ballpark as dioxins and dibenzofurans, so. . .

Q. PC furans are more toxic than PCBs as a category?

A. Yes, much more.

Q. Much more?

A. Yes.

Q. How much more as a category?

A. 10,000 to pick a figure.

Q. Okay. And dioxins are more toxic than furans as a category?

A. As a what?

Q. As a category.

A. Yes.

Q. How much more toxic?

A. I can't answer that. I'd have to assume, but it's not 10,000 times or anything like that.

Q. How many more?

A. I'd have to assume. If you want an assumption, I'll give you an assumption.

Q. Fair enough.

A. Ten to a hundred.

Q. Thank you. Has this relative toxicity ever been expressed in writing by Monsanto?

A. I haven't seen it if it has.

Q. Have you had conversations with Monsanto personnel in which you informed them of the relative toxicity of furans to PCBs and dioxins to furans?

MR. CARNEY: You talking about prior to his retirement?

MR. McCREA: No, up to this date.

A. I've had times when they informed me about it.

Q. (By Mr. McCrea) So they know that?

A. Some people know it, yes.

Q. In Monsanto?

A. In Monsanto, yes.

Q. What are the by-products of the combustion of PCBs?

A. Chlorine, soot. It depends again. Now, what temperature are we talking about?

Q. Let's have three categories of temperature. Let's have 240 degrees Fahrenheit, 800 degrees Fahrenheit and 2,000 degrees Fahrenheit.

A. Okay. At 2,000 degrees it's all, the material is burned up.

Q. It turns into carbon dioxide?

A. Carbon dioxide, carbon, soot, carbon monoxide.

Q. Carbon monoxide?

A. Could be.

Q. That wouldn't be good for you, would it?

A. In a fire, I don't think anything is good for you at 2,000 degrees.

Q. All right.

A. There is a window at which dibenzofurans are formed, and that window is something around six or 700 degrees Fahrenheit. 200 degrees higher than that it is, the furans are destroyed. So there's a two or 300 degree window at which furans are formed. Getting down to the lower ones, you said a lower temperature?

Q. 240 degrees Fahrenheit is what I picked.

A. Huh?

Q. Yes, 200 -- All right. Furans are formed from the combustion of PCBs at 600 to 700 degrees Fahrenheit?

A. Well, I'm not sure of the exact -- It's around that area, and it might be a larger window. It might be 700 to 900, 600 to 850. I can't tell you, but there's a certain time in the combustion that furans are formed and a certain time in the combustion that it gets hot enough that

the furans are destroyed.

Q. Okay.

A. All fires are not alike obviously. If we're talking about laboratory combustion, we've got one thing. If we're talking about fire in a building, we've got something else.

Q. Why is that?

A. Because everything changes. There are various temperatures at various areas of the fire.

Q. I'm sorry. I didn't understand that.

A. Well, there are various temperatures in various areas of the fire.

Q. So in a laboratory it would be -- What would the difference be between a laboratory fire and a building fire?

A. You can control what temperature range that you want in a laboratory. You cannot control it in a building.

Q. Okay. Are there any other by-products from the combustion of PCBs other than furans at this window range of 600 to 900 degrees Fahrenheit?

A. Oh, yes. As I said, there's carbon dioxide. There may very well be carbon monoxide. There's carbon. There's chlorine that's knocked off. Whether thereare hydrochloric fumes or not, I don't know. I'm not sure.

Q. What about biphenyls?
A. They may be. I don't know.
Q. What about quaterphenyls?
A. I don't know about that.
Q. Okay. How long have you known that furans are produced in the window range of 600 to 900 degrees Fahrenheit by the combustion of PCBs?
A. Six to eight years, I suppose.
Q. How did you learn that?
A. I was told by chemists at Monsanto.
Q. Who was the chemist who told you?
A. It may have been Dr. Robert Kaley, K-a-l-e-y.
Q. What did he tell you?
A. Told me just that. He told me that there is a window that furans are formed, and after you exceed that window, a higher temperature, the furans are destroyed.
Q. So you learned that information about 1982 to '84?
A. Well, I can't be that precise. I've seen Dr. Kaley off and on the last ten years, so I don't know what he told me.
Q. Did he prepare a paper on that?
A. I don't know.
Q. Where does he work now?
A. At Monsanto, St. Louis, Missouri.

Q. Are you pretty sure it was him?

A. No, I'm not sure it was him, but it might very well have been him.

Q. Did he show you a document or did he just verbally communicate?

A. It was verbally communicated.

Q. And what did he tell you?

A. I don't have the precise words, but he told me that -- I had asked him about combustion products of the PCBs, and he told me.

Q. Did Monsanto communicate this information to people to whom they had sold PCBs?

MR. CARNEY: I'm going to object here. I think we've established that Dr. Kelly learned this after, long after he's retired from Monsanto, and I don't think there's any foundation that he would know that.

Q. (By Mr. McCrea) There may not be. Do you know if Monsanto communicated the information which you think was given to you by Dr. Robert Kaley that furans are produced by the combustion of PCBs at the window of 600 to 900 degrees Fahrenheit, did they give that information to the customers?

A. I don't know.

Q. Would you have given it to the customers if you'd have been with Monsanto?

A. I think that would depend on the customer. That would depend on the knowledge the customer had. That would depend on the amount of material that was in the literature. That would depend upon whether any fires had occurred because --

Q. What if fires might occur?

A. Well, fires really hadn't occurred until sometime around the mid '70s.

Q. Would there be any reason not to give that to your customers?

A. No, that I can think of, unless I knew the customers knew it themselves.

Q. Do you know of any customers that have conducted tests determining the production of furans from the combustion of PCBs?

A. No, but there have been government publications relative to that.

Q. Okay. How long did Dr. Robert Kaley work on this experiment or scientific test where he determined that furans were the by-product of the burning of PCBs at 600 and 900 degrees Fahrenheit or whatever?

A. I never said he worked on it. I never said he did any experiments. I do not know the basis for his knowledge. I never said he worked on it. I never said he did experiments.

Q. Well, that was not something that was tested in a laboratory?

A. I don't know.

Q. At Monsanto?

A. I don't know, but you asked me how long he worked on it.

Q. Did he tell you what the source of this information was?

A. No, he didn't.

Q. Do you know if there was an experiment done by Monsanto?

A. I don't know.

Q. So he would be the best one to ask?

A. You mean ask about --

Q. Dr. Kaley?

A. I don't know who else. There may be other people more knowledgeable than he is. You asked me who told me, and I said to the best of my recollection it was Dr. Kaley.

Q. Now, Dr. Kelly, do you know of any other by-products from the burning of PCBs other than furans which are toxic?

A. Well, chlorine is toxic.

Q. All right. Any others?

A. There may be others. I mean, I don't know at

the present time. Hydrochloric acid, I believe, is liberated.

Q. Have you ever done any studies on the content of by-products in failed capacitors?

A. What do you mean by a study?

Q. Laboratory, analytical work measuring the chemicals formed as a result of the failure of the capacitor?

A. No, sir, I have not.

Q. Do you know of any studies at Monsanto?

A. I do not know.

Q. Do you know of any studies at Monsanto which have tested the content of transformer fluid in a failed PCB transformer?

A. I do not know of any studies. There may be some I do not know of.

Q. When Dr. Kaley had this conversation with you as you recall, did you communicate that information that he gave you to anyone?

A. I don't know if I did or not. You mean did I communicate this with anybody at Monsanto? No. I think he gave it to me for my own information or I asked him for it for my own information. I don't know how the topic arose.

Q. Did you use it in any cases in which you were testifying as a fact, as an expert fact witness on behalf

of Monsanto?

A. I don't think so. I did not, have not testified in any cases where there were fires.

Q. Did you have PCB fires in the plant at Sauget?

A. If they had it, they certainly were not major fires.

Q. Did you have PCB fires in the plant at Anniston?

A. I never heard of any.

Q. Did you know of any customers who had PCB fires within their plants?

A. No, I did not.

Q. Do you know of any customers who had fires resulting from the heat transfer fluid being under pressure and heated and then burning within a plant?

A. You mean the heat transfer --

Q. Therminol.

A. -- fluid being a PCB?

Q. Therminol.

A. I do not know of any. There may have. I don't know of any.

Q. Can you describe for us the manufacturing process at Bloomington, Indiana in the Westinghouse capacitor plant?

A. I can't at all. I have never been in

Bloomington, in the Westinghouse plant at Bloomington, so I cannot.

Q. Do you know of any Monsanto personnel who were in that plant?

A. I do not know.

Q. And observed the plant operation?

A. I do not know of any.

Q. Dr. Kelly, if you received information today at Monsanto that only Monsanto had and that information indicated that PCBs caused a particular health problem and nobody else in the world had that information, would you give it to the government?

A. Yes, I would.

Q. Would you give it to the workers?

A. Yes.

Q. Would you give it to your former customers who bought PCBs?

A. Yes.

Q. Why would you do that?

A. Because if your assumption were true -- we're assuming that this is a fact -- I would not want the condition to be repeated. I would want to be sure that the people were following the safe handling procedures that we had outlined, and we'd want to correct it, correct their method of handling the product.

Q. Dr. Kelly, if you learned that a toxicological study paid for by Monsanto was false and fraudulent and you were the only person who knew that the toxicological study paid for by Monsanto was false and fraudulent, would you communicate that information to the United States Government and former customers who've purchased your PCBs?

MR. CARNEY: Let me object to the question. I think it's fraudulent if you don't give a time frame. You're making this witness speculate about what he might do under some circumstances where there's no foundation.

A. Well, in the first place I never learned that.

Q. (By Mr. McCrea) That wasn't the question.

A. Wasn't it?

Q. The question was -- It didn't have anything to do with what you learned. Do you now know there was false and fraudulent --

A. No.

Q. I'm just asking you the question.

A. Would you repeat the question?

MR. McCREA: Could the court reporter read the question back, please?

(Thereupon, the reporter propounded the previous question.)

A. Are you talking now?

MR. CARNEY: Before you clarify it, let me

make a further objection to the question. I think you haven't given enough facts here or hypothetical facts to have anybody give a reasonable answer. If there was a -- You haven't said what in this fraudulent study was fraudulent, whether it would impact anything about the study or would it make any difference in the study.

It seems to me if there was some mistake in a study but it made no difference in the conclusion of the study, that might be one thing. If it would impact the toxicity of the substance that was being tested and would change the substance, that might be another. I think you've got to give more facts than just there's some study and there's something fraudulent in a study without identifying more facts so that somebody could answer.

And also, I object that the question is compound. You asked about would he give this information to the government, would he give it to customers, and that would make a difference as to which you're talking about.

Q. (By Mr. McCrea) You may answer.

A. Well, would you clarify your last phrase in that when you brought in PCBs? Up to that whole question you never mentioned PCBs until right at the end, and I'd like to know are you referring to a toxicological study on PCBs and if that were false? Well, you --

Q. Any study.

A. Well, you mentioned PCBs in it.

Q. Well, let's restrict it to PCBs.

A. All right. Now --

MR. CARNEY: But you haven't -- Would you tell him whether the, in the hypothetical you're giving him whether the mistake or the fraud had any impact on the state of the knowledge about the toxicity? If it was irrelevant, then why would you want to tell anybody? If it was material and changed the, materially the information about the toxicity of the PCB, if you're using that in this instance, that would be another thing.

Q. (By Mr. McCrea) Okay. First of all, Dr. Kelly, if the study was false and fraudulent and it had absolutely no impact on the toxicity of the chemical and its impact on the environment or humans, would you give that information to the United States Government that it was false and fraudulent?

A. Well, that is an impossible question for me to answer. Here is a study that we are running that is false and fraudulent and has no impact on anything?

Q. Right.

A. How do we know it's false and fraudulent then? Why are we running it? If we would be trying to get some information, well, if we couldn't depend on the information and even if the information were wrong, it would have no

impact on the toxicity. I can't answer a question like that.

Q. Now, if the study was false and fraudulent and it did impact on the results, in other words, the falsity and the fraud indicated that it was not toxic and the true test results would show it was highly toxic, would you communicate that information to the government and your former customers who bought the product?

MR. CARNEY: Again we're talking about something hypothetical that has no relationship to facts as they occurred, but you can try to answer.

A. Well, certainly if it impacted on material that we had given people before, we would certainly correct that.

Q. (By Mr. McCrea) Okay. Dr. Kelly, yesterday you mentioned that you did not recall the names of the cases in which you had given testimony.

A. All the cases, yes, sir.

Q. I understand that. But you also mentioned that that information would be on your tax returns. Is that correct?

A. No, it wouldn't be.

Q. Well, I thought that was your testimony.

A. I guess that was a bit of humor. I would write down I received X thousand dollars from this lawyer

or X thousand dollars from this insurance company, X thousand dollars. The name of Brown versus Monsanto or Jones versus Monsanto or Smith versus Monsanto would not be on my tax return.

MR. McCREA: To save time, Counsel, can we have a stipulation that you will provide us the names by cause number, plaintiff, defendant, court, city in which doctor, in which the doctor has testified so that we don't have to pursue this matter and take any more time in this deposition?

MR. CARNEY: Well, you know, all I'm saying is I don't have a list and --

MR. McCREA: Well, Monsanto surely does.

MR. CARNEY: And as far as I know Monsanto doesn't. I'll ask them if they have a list, but Dr. Kelly said yesterday that he didn't have a list. He's given you in search of his memory yesterday as to all the cases he can think of, so I don't know that I can add anything because I don't have any independent knowledge of any cases other than the ones he's mentioned. I didn't know most of those until he mentioned them.

MR. McCREA: Will you contact Monsanto and ask them for the names of the cases, cause number, court, city in which Dr. Kelly has testified and provide that to us so we can move on with this deposition?

MR. CARNEY: I'll contact Monsanto. I don't know that they have the information.

Q. (By Mr. McCrea) Thank you. Dr. Kelly, yesterday you reviewed a number of animal studies in which the toxicological properties of PCBs and other chemicals were investigated. Is that correct?

A. That's correct.

MR. McCREA: Counsel, do you have those studies with you today?

MR. CARNEY: I'm sorry. Which studies?

MR. McCREA: The exhibits.

MR. CARNEY: Yeah, I've got all the exhibits that were used yesterday.

Q. (By Mr. McCrea) All right. Now, what I would like to ask you, Dr. Kelly, is this: Would you go through those studies and identify all of the studies by exhibit number only in which Monsanto paid for the entire study? Just a second.

Then would you go through the studies and identify by exhibit number only those studies that Monsanto paid partially for, and then thirdly, the studies in which Monsanto paid no money. And I see no reason to continue with the video camera while you do that, but what I would like to know, are all of those studies which were paid for by Monsanto in whole or in part. Fair enough?

A. I will tell you and save you a lot of time, all the studies of Industrial Bio-Test that I saw were paid for wholly by Monsanto. All the studies at Younger Laboratory were paid for by Monsanto. All the studies of Scientific Associates were paid for by Monsanto.

Q. All right, sir.

MR. CARNEY: I think the testimony was that Monsanto requested all those studies, as I recall, at least of all those names, and that was the bulk of the studies.

Q. (By Mr. McCrea) All right. Then maybe it would be easier to identify the studies that were not paid for by Monsanto. Now, do you know, for instance, if the study that was carried out on the workers who had chloracne at Anniston, Alabama by Dr. Jones in Atlanta was paid for by Monsanto?

A. Certainly whether it was paid for -- The treatment of the workers was paid for by either the insurance, not by Monsanto. It was the insurance company that insured Swann or the insurance company that, of Swann Chemical themselves. Writing a paper, the scientific paper is never paid for by outside people. The man writes it himself, a scientific medical paper.

Q. All right. That answers my question.

A. Okay.

Q. So in that situation, as I understand it,

these workers who worked for Swann -- Am I correct?

A. Correct.

Q. Developed chloracne?

A. Correct.

Q. They then would have been sent to the doctor at the expense of Swann?

A. Yes.

Q. The doctor then treats them medically. He's paid for by Swann?

A. That's correct.

Q. And then ultimately he writes a paper which is on his own time?

A. That's correct.

Q. All right, sir. Now, in that particular situation, was the examination that was carried out by the two doctors in Atlanta done at a point in time before ownership by Monsanto or was the examination after ownership by Monsanto?

A. It was before.

Q. All right. Thank you. Now, are there -- What I would like to have at this point since you've saved us a lot of time by stating that Industrial Bio-Test, Younger and Scientific Associates were paid for 100 percent by Monsanto.

A. That's correct.

Q. Would you identify any other articles in the stack that were not Industrial Bio-Test, Younger or Scientific Associates?

A. Yes, the von Oettingen article which was in the Westinghouse file. I don't know who paid for that. Monsanto didn't pay it.

Q. He was contracted with Westinghouse?

A. I can't answer that.

Q. All right. So you don't know?

A. I don't know.

Q. All right, sir. Now, what I need, just because it may be six months before we review this material, I need the exhibit numbers if we could.

MR. CARNEY: You want to -- I'll have somebody find that if you want to go on, and we'll just read it into the record withnin the next five minutes.

MR. McCREA: That's fine.

MR. CARNEY: So we can save some time.

Q. (By Mr. McCrea) That's agreeable. Doctor, you made reference yesterday to the term systemic poison. What do you mean?

A. Systemic poison is something that affects the body metabolism. It is something apart from local action. In other words, if you spill an acid on your arm, you will get an acid burn. That's a local reaction. If you take a

poison internally, you will get a systemic action. If you swallow the acid, you could get a local death of tissue. That would be local, on the stomach or the esophagus which is the gullet.

Q. Are PCBs which get on your skin categorized as something involving local action or something involving the body metabolism?

A. It depends on how much you get on, how often you get on, how long you leave it on. It does have a local action on the skin similar to mild paint remover or something like that. If you get enough of it on your skin for a long enough period of time and repeat it enough times, you will get systemic action.

Q. How do you get systemic action from a PCB which makes contact with the outer portion of your skin?

A. It penetrates the skin. It's absorbed.

Q. How does it penetrate the skin? How does it get through the skin barrier?

A. It's oil soluble.

Q. If you had ten milligrams of PCB on your skin and you left it there for 24 hours, how much of that would go through your skin?

A. I don't know, but it wouldn't hurt you, not enough to go through to hurt you.

Q. Okay. You don't know the percentage that goes

through?

A. No, I don't.

Q. How long have you known that PCBs which come in contact with the skin can penetrate the skin and if in sufficient quantity, can work as a systemic poison?

A. Now, again we have to define systemic poisoning because systemic poisoning means all different things to various people. I know that I have known for 30 years that if you get PCBs on your skin in a sufficient amount and leave it on there you will get chloracne. I have known that. Now, if by --

Q. And excuse me, Doctor. Is that the result of a systemic action?

A. Yes, chloracne is. It's a skin manifestation of a systemic action.

Q. It's not a local contact dermatitis?

A. No, it's --

Q. It means that the chloracne problem is caused by something happening within the body?

A. That's correct.

Q. Excuse me for interrupting you. If you would continue.

A. Where was I?

Q. Well, we, you were talking about you have known for 30 years that if PCBs got on the skin in

sufficient quantity, it could cause chloracne, and that's when I asked you if chloracne was a systemic manifestation. We have two minutes left.

A. Okay. And I know also, I've known for quite some time that in rabbits, in rats, if you put a sufficient amount on and repeated it, you can get systemic poisoning in other parts of the body. You could get liver problems. That I haven't known as long.

Q. How long have you known that?

A. Well, we did that repeated work at Bio-Test in 1972.

Q. Okay.

A. In rabbits.

Q. All right, sir. And that showed what?

A. That showed in rabbits that you could get a sufficient amount through. That's not human skin, though.

Q. To do what?

A. To cause liver problems.

Q. What kind of liver problems?

A. A swelling of the liver and in sufficient doses, eventual death of the animal.

Q. One minute. Anything else that you'd like to add to the discussion of systemic poisons?

A. No, no.

Q. When you have a systemic poison, is there any

part of your body that is immune from the effects?

A. Well, certainly. I mean, I think you have to tell me by, what you mean by immune. Do you mean does it affect your eyes and ears, brain, brain?

Q. Yeah, not subject to injury.

A. Well, a systemic toxic agent has --

MR. CARNEY: We're out of tape, so we'll have to come back to that.

MR. McCREA: We'll come back to that. I'm sorry.

(Thereupon, a short recess was taken.)

Q. (By Mr. McCrea) Dr. Kelly, I would like to discuss Exhibit K-6 with you.

A. Yes, sir.

Q. Do you have a copy of that?

A. I have a copy.

Q. All right, sir. And that also has on the bottom of the page the identifying letters and numbers GBRN001998; correct?

A. Yes, sir.

Q. Did you author this document?

A. Yes, I dictated it.

Q. And this is a copy from the files of Monsanto, a carbon copy?

A. Yes.

Q. It does not have a signature?
A. Beg your pardon?
Q. It does not have a signature?
A. No, it's a carbon copy. I only sign the letter that's going out.
Q. Did you know Dr. J. Clarence Davies, III, Senior --
A. No, I didn't. I did not.
Q. This letter was written May 10, 1972; correct?
A. Yes, sir.
Q. Did Dr. Davies make inquiry of you before May 10, 1972?
A. I don't know if he did, but somebody must have wanted this information. I don't know why, the particular reason I sent it to Davies. Conceivably he talked to me or somebody talked to me and said, "Send this to Davies," or I may have decided on my own and Davies may have had some contact with us. I don't know.
Q. Did you have any follow-up communication with Dr. Davies other than the May 10, '72 letter?
A. Not that I can recollect.
Q. At the top it says, "cc: Dr. Richard Osland." Who is that gentleman?
A. The plant physician at East St. Louis.
Q. East St. Louis is the same as Sauget?

A. Yes. I used East St. Louis because very few people know where Sauget is. We had always called it East St. Louis, but Sauget is the technical geographical name.

Q. In the first paragraph you refer to it as Sauget or Sauget, Illinois plant?

A. That's correct.

Q. And whenever you refer to East St. Louis in your testimony, that would be the same as Sauget?

A. That is correct.

Q. One and the same?

A. One and the same.

Q. Who were the people on your medical staff who examined the hourly and salaried workers?

A. Myself and the technician I took along to draw the blood.

Q. Just two of you?

A. Yes.

Q. Can you give me the technician's name?

A. Oh, no, I can't. 18 years ago? I don't remember.

Q. Can you describe for me the protocol which you use for the examinations?

A. Yes. I call these 27 people in one at a time over a period of -- I don't know how many different days I was there, and sat them down in the examining room and

talked to them, got a medical history from them, got an industrial history, industrial history being what they did, what exposures they had.

Then I ran through the usual systemic list of symptoms, cardiovascular system, the pulmonary symptom, the neurological system, asked them whether they had been hospitalized, whether they had any recent or not so recent visits to the doctor, whether they had lost any time.

Then I proceeded to examine them. I carried out a complete examination. The usual clinical examination starts with observing a person when he walks in. Then you have him take off his clothes to the waist. You look at his eyes, ears, nose, throat, ears. You look at his skin, especially the face and ears and neck because that's where chloracne starts.

You examine the heart and the lungs. You have them lie down on a table and feel his abdomen to see if there are any enlargement of any of the organs or any tumors or any masses. Then you, along the way you've checked his blood pressure someplace, listened to his heart, listened to his lungs.

Then you do a neurological examination on him and run a battery of laboratory tests. I don't see I've written down anything about the EKG or chest x-ray. I thought I did them. I may very well have, but I didn't

write it down here.

Q. Where are the forms which you used when you conducted these examinations in 1972?

A. There are the forms we used for the people in the Sauget plant, and they were placed in the Sauget plant file at the end of the examination.

Q. Where --

A. I mean, after I received all the blood work back.

Q. Where are they today?

A. I haven't the slightest idea.

Q. When was the last time you saw the forms in the files relating to these examinations?

A. I don't know if I saw them in the files. I sent them back to East St. Louis after I received the laboratory data and the PCB analysis. I wrote that on there and sent it back, so it must have been the last time I saw the forms was sometime in May of '72 or April. It all depends how fast -- Well, I had them, yes. I mean, it must have been sometime in May of '72.

Q. In preparing for this deposition, did you ask Monsanto if they still had those forms on file?

A. No, I did not.

Q. How many of the 27 were salaried workers?

A. I don't know. I don't know for certain, but I

would probably say no more than three or four.

Q. Did 27 -- Were 27 people the total number of people involved in the manufacture of PCBs?

A. At the Sauget plant, yes. I believe I got all of them. I mean, I can't say that there may not have been, I missed one or two, but I thought I got all the people that were working at that time.

Q. 16 had no detectable PCBs; correct?

A. That's correct.

Q. And two -- Let's see -- Six had levels of 200 parts per billion to 500 parts per billion; correct?

A. That's correct.

Q. So you had six people in the range of 200 to 500 parts per billion?

A. That's correct.

Q. What was the background level at that point in time in the United States?

A. I don't know. I don't know if it was established.

Q. Did you consider 200 to 500 parts per billion as high?

A. No.

Q. Do you consider it as high today?

A. Yes. You recognize that I had said in my testimony yesterday that laboratory sensitivities have

changed a great deal from 1972 for the next ten years. They were much more precise and much more confident of their results.

Q. But that wouldn't change the information as to 200 to 500 parts per billion being high or low. It would simply affect the accuracy of the numbers?

A. Well, if the numbers weren't accurate, it would sure change whether it was high or low. I mean --

Q. But --

A. I'm not as confident in the numbers today as I was in 1972. We were doing the best we could at that time, but since then we have found out that we are much more precise, much more sensitive and we're much more confident about the results, but it was the best we had in 1972 and I found out that 16 didn't have any and two of them had four parts -- 400 parts per billion and one had 500 parts per billion.

Q. Six people between two and 500 parts per billion?

A. That is right.

Q. But you had no idea as to whether or not that was a high number, the 200 to 500 parts per billion?

A. No, sir, I can't say that. I may have -- There may have been some background that I knew about. I don't know. I don't know that.

Q. Did you have any idea, Dr. Kelly, as to the relative amount of PCBs in fat at that point in time if you found 500 parts per billion in the blood?

A. Yes.

Q. How much more would you expect to have found in the fat? You didn't test the fat?

A. I think in an industrial environment, Mr. McCrea, you do not tell the worker that we are going to make a two inch incision in your skin and take out a couple of grams of fat to analyze it. They don't look upon that very enthusiastically.

Q. Well, your company's done that to our clients.

MR. CARNEY: I object to that. That's incorrect.

MR. McCREA: Well, sorry. It's absolutely correct.

A. Well, I am saying --

MR. CARNEY: What he just described is incorrect. We didn't do that to --

A. -- was my, at present time the analytical methods are such that you can use a needle puncture and bring out fat. In those days you had to take out at least one or two teaspoonfuls of fat, so that necessitated a two or two and a half inch incision in the abdomen and I didn't see any reason to do that.

Q. (By Mr. McCrea) All right. Putting that aside, based on your experience, your reading about PCBs, your knowledge of PCBs, can you tell the jury how, what quantity of PCBs you would expect to find in the individual who had 500 parts per billion in his blood, what quantity you would expect to find in his fat?

A. I wouldn't be able to tell because it depends whether he had a recent exposure to PCB that gave him in his blood and had not gone into his fat.

Q. Okay. Now, obviously you had some people here who had PCB exposure.

A. Yes, 27.

Q. Well, by being PCB exposure by indicating the levels in their blood?

A. Well, they worked around PCBs. They were exposed to them when they were working.

Q. Did it concern you as the director of medicine at Monsanto that PCBs were contaminating these individuals at this level?

A. I don't think I would have used the word contaminated the people. I was not concerned. I was concerned, too, because I checked over the individuals. That's the reason I examined them, and I examined them and found no clinical evidence of any illness, no evidence of any PC poisoning, and I found these workers were as healthy

as the people I examined every day when I examined people.

Q. So it didn't concern you that you found these levels in their blood?

A. I did not think this was at all an alarming statistic, no, sir.

Q. There were no changes in the plant operation to eliminate exposure after you found these levels?

A. Remember we were not this sure of our results on the PCB in blood. You are taking these as gospel, and I have said all along that we were not certain about -- This was the best we had, but we didn't know if it was good, good enough, but I was much more interested in the state of their health, their clinical health, their laboratory findings which were all nothing unusual in there. So that's what concerned me rather than these samples I took of the blood, of their blood.

Q. Dr. Kelly, after you found these levels in their blood did, was there any effort by Monsanto to eliminate the leaks of PCBs which obviously were getting into these people?

A. We always try to tighten up all operations. I do not -- Remember you are just -- The answer is I do, I think we looked over the housekeeping procedures, but you are picking on the blood levels which I have repeatedly said we are not confident that these represent actually

what was in the people's blood.

Q. It could have been much higher?

A. It could have been much lower, too.

Q. Right. The question is this, and would you answer the question, please, and we'll get out of here much earlier: Did you take any measures following this collection of data to eliminate leaks of PCBs in the Sauget, Illinois plant?

A. We always -- The answer is we always tried to eliminate leaks. Once we saw a leak, we eliminated it.

Q. Did you have a number of leaks from time to time?

A. Well, in the chemical plant you do have leaks, certainly.

Q. Doctor, when you examined these people in 1972, you knew about Yusho; correct?

A. Yes, sir.

Q. What health symptoms did you suspicion could be caused by PCBs when you examined these people on May 10, 1972? And I'll ask you just to list them.

A. Will you repeat that sentence?

Q. What health problems did you suspicion could be caused by PCBs when you examined these 27 workers on May 10, in the two months preceding your report on May 10, 1972? What I would like for you to do is simply to list

all of those symptoms which you suspicioned might be caused by PCBs.

MR. CARNEY: Well, I'm going to object to having, using the word suspicion. Object to the form of the question, and you changed the question now when you talk about symptoms. I'm not sure what question you're asking.

Q. (By Mr. McCrea) Do you understand the question?

A. Well, I understand it, I believe. I will answer it and see if I understand it. I recognize that if individuals were exposed to PCBs that contained high levels of nitrofurans or benzofurans and ate the material, certain things would occur to them. I had no suspicion that we would have any illnesses occur in our workers because we had had none for 25 years or my experience was 38, 30 years. So I asked all the questions that you would ask an individual who walked in. You asked him whether he had lost weight, whether he had --

Q. Just a second. Can you go slower?

A. Yes.

Q. Lost weight?

A. Yes.

Q. All right. Is that -- Now, do we understand each other? This is a symptom that you suspicioned might

be caused by exposure to PCBs. Is that correct?

A. No, it isn't. It's a symptom that can occur, and then after you find out -- After you examine the man, you find out what is the cause of it.

Q. Doctor --

A. Well, now just a moment. There are things that have occurred in massive exposure to PCBs containing dibenzofurans. I am suspicious of what that, those things, what symptoms those might be, what symptoms and signs a person might have. I have no preformed ideas of anybody, what symptoms an industrial worker in our plant was liable to have because I have known for 25 years that they didn't have any symptoms. So I didn't know what to look for except that I looked for all the symptoms that you would look for if you were trying to pick up any illness.

Q. Then, Doctor, it's important that you understand my question.

A. Well, yes, please.

Q. If you don't understand my question and you answer it not understanding it, then it's of no value.

A. All right.

Q. All right? On the date of May 10, 1972, you have testified about your knowledge of furans.

A. Yes, sir.

Q. Did you have knowledge of furans on that date?

A. I'm not sure. I'm really not sure of '72. I may or not have. I'm not sure.

Q. All right. I believe your testimony was that you did.

MR. CARNEY: Well, I think you're mischaracterizing.

Q. (By Mr. McCrea) Just a second. And you're stating now that you may or may not have?

MR. CARNEY: Well, I don't think you're -- I don't think he's been inconsistent on that point.

Q. (By Mr. McCrea) No, I'm not saying he has, but it's important for me to know what your testimony is and I was a little confused; all right?

A. Well, I might very well have. I believe I did, but I'm not certain.

Q. All right, sir. Now, my question is this: Did you formulate as part of your medical protocol a list of symptoms and/or health problems which you felt based upon the literature, Yusho, whatever, might be caused by PCBs?

MR. CARNEY: I'll object to the form of the question. I think it's ambigious.

A. Well, I'm trying to understand it, Mr. McCrea. When you examine an individual -- Well, I have to do that because I cannot answer your question yes or no. When you're carrying out a medical examination, you ask the man

for all symptoms he has, all symptoms you think he might have. During the course of that you say, "Do you have upset stomachs? Have you lost weight? Have you had any skin problems?" I did not go in there with a list saying, "Okay, we'll run down these nine things because they were reported in Yusho."

Q. That's exactly my question.

A. But I was knowledgeable about Yusho. I was knowledgeable about how to carry out a medical examination and take a medical history, and that's what I did.

Q. So I think you've answered my question. I'm not sure, and as I understand your answer, it is this: You did not prepare a list of symptoms which you then asked these workers if they had, based upon your suspicion that those symptoms might be caused by PCBs?

MR. CARNEY: I'm going to object to that question. It's compound and contains --

MR. McCREA: It's a little bit long. I'll agree. Let me rephrase it, Tom.

MR. CARNEY: Okay.

Q. (By Mr. McCrea) Did you prepare a list of symptoms which you addressed to the workers?

MR. CARNEY: Are you talking about did he have it in his head or did he have a list in his --

MR. McCREA: No, written down.

A. No, I didn't go in there with a written down list. I had a list of symptoms in my head that when I go over a generalized physical examination, you will take a history by symptoms, by systems. You ask all the circulatory questions. You ask all the gastroenterology questions. You ask all the neurological questions, and I covered all the symptoms that they may have had and that may have been present at Yusho.

Q. (By Mr. McCrea) Based on information in your head, not based upon a list?

MR. CARNEY: Well, I've never seen a doctor that's ever done a physical for me have a list, that since they do hundreds of physicals a week, I'm sure they're smart enough to have these things in their head, but I guess you're --

A. No, I did not.

MR. CARNEY: Well, your point is did he have them all written done on a piece of paper, and I think he said no.

A. No, but I've taken medical histories for 50 years and I have not had a list, but I know what to ask people.

Q. (By Mr. McCrea) All right. Fine.

A. Yeah.

Q. Now, the next question is: Recognizing you

didn't have a list, what symptoms --

A. A written list, please.

Q. Exactly, written list. What symptoms did you suspicion that could be caused by PCBs?

MR. CARNEY: Again I'll object to the form, the use of the word suspicion.

Q. (By Mr. McCrea) You may answer.

A. Well, there it can be caused by PCBs in what exposure and in what amount? Here I am going over examining workers and I am examining them to see if they have any problems, any symptoms that are untoward, but that would encompass any of the problems that had occurred in the eating episode over in Yusho.

MR. McCREA: Will the court reporter read the question back, and if I don't get an answer, I'm going to take it to the Court. Now, I want an answer, Dr. Kelly.

A. All right. Fine.

MR. CARNEY: Let me just object here. You're insulting this witness totally without cause. He has sat here for almost, well, a day and a half now asking questions, answering questions very patiently and he's answered, I think, every question to the best of his ability including that particular question which is a very vague and ambiguous question. He did a lot better job of answering it than I think I could have done or anybody

else. He answered the question, and to tell him that you're going to take it to the Court, go ahead. I welcome you to take it to the Court because I think the Court will say that this witness has done an exemplary job of answering that question, and to insinuate that he's somehow not answered that question is outrageous to me. Sorry to lose my temper a little bit, but I --

MR. McCREA: That's all right.

MR. CARNEY: I really feel strongly that that's accusing this witness of something that is not true.

MR. McCREA: I would like the question read and the answer read so that I can be sure that I know the question which was addressed and the answer. Then I will have comments as to whether or not I feel the question was answered. So could the court reporter --

A. Well --

MR. McCREA: Just a second, please, Doctor. Could the court reporter please read the question and his answer?

(Thereupon, the reporter propounded the previous question and answer.)

MR. McCREA: He didn't answer the question. I asked him what symptoms did he suspicion were caused by PCBs. His answer is -- I would expect the answer to be, "I didn't suspect any, I didn't suspect any or I suspected the

following." Now, if he didn't suspect any, that's fine. If he did suspect some, I would like to know those symptoms. He has not answered the question.

MR. CARNEY: I disagree with you, Mr. McCrea. I think he did answer the question. I just don't think you liked the answer. You have some other answers that you would like to give to your questions, but this is the witness whose answers count, not your answers. So do you have another question?

MR. McCREA: No. I'm going to --

A. Repeat that question of yours then that we are discussing.

Q. (By Mr. McCrea) I'd be happy to. What symptoms did you suspicion were caused by PCBs when you examined these workers before you wrote the letter?

MR. CARNEY: Same objection.

A. My suspicions could vary from no symptoms depending on the exposure of the man to a number of symptoms that were developed after the Yusho incident.

Q. (By Mr. McCrea) Now, Doctor, describe if you would the number of symptoms developed after the Yusho experience?

A. Yes. Changes in the skin, lassitude, pains in the extremities, loss of weight.

MR. CARNEY: Is your question asking him for

symptoms that showed up in Yusho so I'm clear? I think that's what he's answering and I just want to --

Q. (By Mr. McCrea) That's exactly correct. Is that the way you understand it, Doctor?

A. Yes, I presume, I believe so.

Q. Yeah. Okay. Continue.

MR. CARNEY: Okay.

A. What have I said so far?

Q. (By Mr. McCrea) Doctor, you said changes in skin, lassitude, pains in extremities, loss of weight.

A. Changes in respiratory function such as shortness of breath, tiredness, frequent illnesses, irritability, headaches. That's all I can think of at the present time.

Q. All right, sir. Doctor, from the standpoint of your expertise -- just a second here -- can you explain the mechanisms which were implicated in the induction of those toxic effects that you have just cited?

MR. CARNEY: I would object to the form of the question. It's vague and ambiguous. I don't understand it.

A. You'll have to clarify toxic effects. Where?

Q. (By Mr. McCrea) The nine symptoms you described from Yusho, can you explain the mechanism which is implicated in the induction of changes in the skin?

MR. CARNEY: Same objection. It's got undefined terms. It's vague.

Q. (By Mr. McCrea) In other words, do you know how the PCBs and the contaminant furans caused the changes in the skin in Japan?

MR. CARNEY: Same objection. I don't know what you mean. I don't know what you mean by the question. It's vague.

A. Repeat the question.

Q. (By Mr. McCrea) Do you know how the exposure to PCBs in the rice oil in Japan induced or caused the changes in the skin in those people?

MR. CARNEY: Objection. I don't know what you mean by how. How, that's a vague term to me. How, in what way how? Chemically?

MR. McCREA: Yes, chemically.

A. Well, first of all, it was swallowed. It goes into the stomach and the intestine. It is then absorbed and it goes into the liver. There are changes in the oxidative enzymes of the liver, and somehow this disturbs the fat metabolism of the hair follicles and the sebaceous glands of the skin. I am not familiar with the details of those last two steps.

Q. (By Mr. McCrea) Can you explain how the absorption of PCBs into the body chemically caused the

lassitude?

MR. CARNEY: Objection. Same objection.

A. You mean that particular -- You were using the word PCBs generally all over. Are we still talking about Yusho?

Q. (By Mr. McCrea) Yes, we are.

A. Okay. So that's --

Q. PCBs and furans.

A. Huh?

Q. PCBs and furans.

A. Let's say, yes.

Q. Let's call it the Yusho PCBs.

A. The Yusho PCBs with its dibenzofurans and its quaterphenyls?

Q. Exactly.

A. Can I explain how it did what?

Q. Caused the lassitude.

A. No, sir.

Q. Can you explain how the PCB, the Yusho PCBs chemically caused the pains in extremities?

MR. CARNEY: Let me object. Can I have a standing objection to the form of the question?

MR. McCREA: Yes, you may.

MR. CARNEY: It's vague and contains undefined terms.

A. Yes, it caused demyelinization of the nerve fibers with peripheral neuritis.

Q. (By Mr. McCrea) What is meant by the term demyelinization?

A. Well, myelin is a covering of the material, and the nerve sheath covers the nerves, and you take away the myelin and you leave the nerves bare as it were.

Q. Sort of like taking insulation off a wire?

A. Something of that sort.

Q. Can you explain how the Yusho PCBs chemically caused the loss of weight?

A. No, except that furans have been -- dibenzofurans have been associated with a wasting illnesses. Whether that mechanism is in the liver or not, I don't know.

Q. Can you explain, Doctor, how the Yusho PCBs chemically caused the change in respiratory function and shortness of breath?

A. No. There's a very large amount of controversy over that, and whether or not those symptoms were real or not has not been established.

Q. Can you explain how the Yusho PCBs chemically caused the tiredness?

A. No, sir, I cannot.

Q. Can you explain how the Yusho PCBs chemically

caused frequent illnesses?

MR. CARNEY: Again you're talking about the furans in the PCBs?

MR. McCREA: Talking about the Yusho PCBs with furans and quaterphenyls.

MR. CARNEY: It would be better if you, since the literature seems to establish it was the furans, the high concentration of furans that caused these problems, use the word furans rather than PCBs. Otherwise, I think you're confusing the jury.

MR. McCREA: Would you like to cite me to an article?

MR. CARNEY: I would cite you to the same article that Dr. Kelly cited you to about an hour ago.

MR. McCREA: What's the name of that article?

A. Kumita, K-u-m-i-t-a, in the "American Journal of Industrial Medicine", November 1984 whose statement was, "It is clear that PCDFs" -- that's dibenzofurans -- "were the main causative agent in the case of Yusho disease."

Q. (By Mr. McCrea) Okay. All right, sir. Can you explain how the Yusho PCBs with furans as the main causative agent chemically caused frequent illnesses?

A. Well, first of all, I'm not sure they did. That's a symptom that has been reported around in various places, but if it is, it is a change in the immunological

system.

Q. What is the immunological system?

A. That's a very intricate part of a body that shows, that affects how people react to things. In other words, if you have an immune deficiency, you are liable for the sort of illnesses. If you have hyperimmunity, you are liable to other illnesses.

Q. You mentioned that it's been reported in various places. Can you elaborate on that or describe that for us, please?

A. Well, I don't know what you mean by elaborate. I don't have the journals right at present, but it has been reported at times and not reported, disputed at times.

Q. Okay. Can you explain how the Yusho PCBs with furans as the main causative agent chemically caused irritability?

A. No, I cannot.

Q. Would that relate to the brain?

A. Well, whether it related to the brain or whether it was because the people were sick, were irritable, whether there was any organic problem there, whether it was a psychic problem, I don't know.

Q. Can you explain how the Yusho PCBs chemically caused headaches?

MR. CARNEY: Again the Yusho PCBs with the

furans caused, principally causing the problem?

MR. McCREA: With furans as the main causative agent.

A. Caused headaches?

Q. (By Mr. McCrea) Right.

A. I don't think anybody can explain what causes headaches.

Q. Is that neurological?

A. Well, you can have headaches from brain tumors. That's neurological. You can have headaches from migraine which is vascular. You can have headaches from emotions which is certainly psychological.

Q. Okay.

MR. CARNEY: You can have headaches from a long deposition.

MR. McCREA: You can have headaches from working in PCBs in Bloomington, Indiana, Tom.

MR. CARNEY: Well, your experts disagree with you on that. They don't think headaches have anything to do with PCBs.

Q. (By Mr. McCrea) Well, you need to read the reports. Now, Doctor, you have discussed the symptoms from Yusho and you've listed nine which you had in mind when you surveyed these people. Is that a fair statement?

A. No, it isn't a fair statement because I have

these symptoms in mind when I examine anybody no matter what they have, what they come in to me for. These symptoms are not diagnostic of PCB or nitrofuran exposure or intoxication or poisoning. They could occur from a host of conditions.

Q. Doctor, we're kind of back where we started. Didn't I ask you for a list of symptoms based on the Yusho experience, and didn't you give me one through nine based on the Yusho experience?

A. Well, no, that is not correct because it's not only based on the Yusho experience. It's based on what other people may have from other illnesses. You can't say that a person comes into me and has a headache and I say, "Have you had headaches in the last year," am I asking them that because I think he's exposed to PCB or I think he may have eyestrain. So I cannot differentiate my medical history on the basis of PCB exposure, Yusho publications or the general health or the general medical history of a person.

Q. Okay. Doctor, during the time that you worked for Monsanto, did you ever make a tabulation of symptoms experienced by your workers? In other words, you have 27 workers. You have headaches and you have X number with headaches. Then you have irritability, X number with irritability, frequent illness, X number and so on. Did

you ever do that from 1936 to 1974?

MR. CARNEY: Objection to the question. It's vague and ambiguous. It doesn't define what group you're talking about.

MR. McCREA: PCB workers.

A. No, I never did that and you never do that with anybody because you are, there are all variations in a person's symptoms. When you say headaches and this tabulation we ought to make, do I say eight headaches, headaches four times a day, headaches three times a week. We cannot do that in medical examinations. You have to take the sum total of a person's history, his medical history and then make your diagnosis from that.

Q. (By Mr. McCrea) Doctor, I appreciate the fact that you didn't do that from 1936 to 1974.

A. I did not make a tabulation, that's correct.

Q. Right. So you don't know what percentage of workers had what problems?

MR. CARNEY: Well, I'm going to object to that. This question is totally irrelevant.

Q. (By Mr. McCrea) Well, strike it. Strike the question, Tom. Do you know and do you have any results as to what percentage of workers had what problems?

MR. CARNEY: Well, I'm going to object here. I don't know what you mean, what percentage of workers have

what problems, headaches, for example, or irritability. I would assume everybody has headaches from time to time or irritability from time to time or these symptoms. You have to be more specific and quantify what you mean by these symptoms to make any sense out of it. I don't think we're getting anywhere.

Q. (By Mr. McCrea) I'll try to be more specific, and I think that's a good suggestion. Have you read studies by epidemiologists where they determine percentages of people with certain symptoms and determine those to be significant at a scientifically acceptable standard?

A. I may have. Do you have the studies?

Q. Is that a recognized area of science?

A. I don't think symptoms are relative. I think that -- I think they are looking for objective findings rather than something you can see, something that is shown by physical examination, laboratory examination or x-rays. Symptoms vary all over the place and --

Q. Okay.

A. Symptoms also are, there are many causes for it.

Q. Did you see a list of symptoms in the studies of the people in Japan?

A. I may have. I don't know.

Q. And as I understand it, you would consider

objective evidence such as x-rays, EKG, EEG and that type of information as significant to prove epidemiologically if these workers have suffered a certain set of health problems. Is that a fair statement?

A. No, it isn't fair because x-rays -- It all depends on what you're looking for. I would say that there are certain physical conditions that you were looking for. If you were talking about PCBs, if I saw a group of people with chloracne, I would know this, and they worked with PCB, I would be certain that they got their problems from PCB. If I saw a bunch of people with headaches and they were working with PCBs and they didn't have chloracne, I would not believe that their headaches were coming from PCBs.

Q. Okay. So unless you see chloracne, it's your determination that there has been no injury by PCBs?

A. I think that's mine and I think that's the feeling of the majority of the writers.

Q. Can you name two or three writers who feel that way?

A. I'm sure you could start with Kimbrough again.

Q. She feels that if you don't have chloracne, there have been no injuries by PCBs?

A. That's correct.

Q. All right. Who else?

A. Oh, I don't know right off the top of my head, but that's, I'm sure they're around because I've seen them.

Q. But you don't remember them?

A. No, I don't remember them.

Q. Okay. Now, Doctor, did you see chloracne in any of these people?

A. Which people?

Q. The 27.

A. No, none.

Q. So that more or less ended your study?

A. No, it didn't.

MR. CARNEY: I object.

Q. (By Mr. McCrea) Well, if you didn't see chloracne and your opinion is that if you don't have chloracne, there are no health problems, was there any reason to go forward?

A. Oh, I was looking for any health problems, yes, and I wanted to reinforce my opinion that chloracne is the hallmark of PCB toxicity, and if I found no chloracne and I found a bunch of liver problems, I would have changed my mind.

Q. You wanted to reinforce your opinion?

A. That's correct.

Q. Okay. Did you approach that endeavor with an open mind?

A. Of course I did. I approached it by examining the people to see if there was anything wrong with them.

Q. Doctor, can you explain enzyme induction to us as it is caused -- Well, first of all, let me ask you this. Does PCB exposure cause enzyme induction?

MR. CARNEY: Object to the form. It's vague. I don't know what you mean by enzyme induction.

MR. McCREA: Well, that's why we have a doctor here to explain it, Tom.

MR. CARNEY: Well, I don't know what you mean by it. If the doctor understands the question, he can answer.

MR. McCREA: Okay.

A. PCB exposure does not cause enzyme induction. PCB absorption in sufficient amount does cause enzyme induction.

Q. (By Mr. McCrea) What is enzyme induction?

A. Enzyme induction means that you start the formation of enzymes in certain parts of the body, primarily the liver.

Q. That all?

A. Well, what else do you want? I mean, that's what enzyme induction is.

Q. What are the functions of enzymes?

A. They enter into every metabolic process in the

body.

Q. Can they alter metabolic processes?

A. Beg your pardon?

Q. Can they alter metabolic processes?

A. They may. They may not.

Q. And by metabolic process, you mean what?

A. The chemical reactions that go into the body, into the daily working of the body.

Q. So PCBs, if absorbed in sufficient quantities, can alter the metabolic function and the chemical reactions associated therewith?

A. In certain places of the body, yes. Not --

Q. Which places?

A. The liver.

Q. What, do they just stay in the liver, the enzymes?

A. Well, an enzyme, there is specific enzymes for all -- You don't have one enzyme that goes around working every place in the body. There are literally hundreds of thousands of enzymes in the body. Some have to do with protein metabolism, some fat metabolism, some sugar metabolism. There's a lot of -- some oxygen metabolism. There are all sorts of enzymes.

Q. Can PCBs affect more than one enzyme?

A. I can't answer that.

Q. Are the enzymes -- Is the enzyme induction caused by absorption of PCBs a factor in chloracne?

A. I don't believe that's been established.

Q. Can PCBs, if absorbed into the body in sufficient quantity, result in the inhibition of mitochondrial respiration?

A. Yes. Well, that's an enzyme function.

Q. And what is the effect of that enzyme function resulting in the inhibition of mitochondrial respiration on the individual?

A. It depends on how much and how many of the mitochondria are affected.

Q. All right. Now, the low level, at a low level, then a high level.

MR. CARNEY: Objection to the form of the question. It's vague.

A. Low level, it wouldn't make any difference at all. At a high level we would get some problem with the liver metabolism.

Q. (By Mr. McCrea) Can -- And is that related to -- When it says mitochondrial respiration, are we talking about the liver or are we talking about the lungs?

A. You have to have oxygen in all the cells in the body. Mitochondria are part of the cells, usually in the liver, and the respiration means a transfer of oxygen

past the cell membrane. The mitochondria are not puffing up and down like your lungs are.

Q. Okay, Doctor. How much time? Doctor, three minutes left on this tape. Can the absorption of PCBs into the body in sufficient amounts result in estrogenic effects in altered steroid metabolism?

A. In some species, yes. Some species, no.

Q. What is that?

A. What is what?

Q. Estrogenic effects in altered steroid metabolism.

A. Well, estrogens obviously are sex hormones. Steroids are also hormones, but have to do with building up the body. That's why weight lifters take them.

Q. And what is the effect of the estrogenic effects on altered steroid metabolism?

A. You have to tell me how much they have.

Q. Well, a lot.

MR. CARNEY: Well, I'm going to object to a lot.

A. I don't know what a lot means.

Q. (By Mr. McCrea) Well, you'll have to tell me what you mean by asking me what I mean because I don't know.

A. Let's run that by again. That's got me

confused.

MR. CARNEY: It's got me confused.

MR. McCREA: Well, it's a little bit --

MR. CARNEY: I don't know if he should speculate as to what you mean.

Q. (By Mr. McCrea) Well, sufficient quantities, sufficient amounts.

A. To do what now?

Q. You're getting me off track, Doctor.

A. I'm sorry. You want her to read it back?

Q. Doctor, can absorption of PCBs into the body in sufficient amounts result in estrogenic effects on altered steroid metabolism, and if so, what is the effect?

MR. CARNEY: Objection, compound and vague and ambiguous as to what you mean by sufficient.

A. The answer is yes to the first part of your question, and the second is the effect would determine, be determined by how much they're altered.

Q. (By Mr. McCrea) And if they're altered a lot, what is the effect?

MR. CARNEY: Objection to form.

A. That again varies with the species. If you're a mink, you have one problem. If you're a guinea pig, something else, and if you're a dog or a human, you'll have something else. So I cannot answer that question

specifically.

MR. McCREA: Thank you. Time for a break.

(Thereupon, a lunch recess was taken.)

Q. (By Mr. McCrea) Dr. Kelly, I think we left off after your discussion of estrogenic effects on altered steroid metabolism. You have an opinion if sufficient absorption of PCBs can result in the mobilization and redistribution of stored PCBs?

A. It may and it may not.

Q. What is the effect of mobilization and redistribution of stored PCBs?

A. What may be excreted. In other words, the PCBs absorbed in the fat and if it's mobilized, it could be excreted.

Q. Are there other --

A. It could be metabolized.

Q. Are there other consequences?

A. Depends on how much.

Q. Well, assuming there is a sufficient amount.

MR. CARNEY: Objection again to the form of the question.

Q. (By Mr. McCrea) How much would it take to cause other effects?

A. I don't know. What species are we talking about?

Q. Humans.

A. I don't know.

Q. Can absorption of PCBs into the body result in covalent binding to cellular macromolecules?

A. I'm not an enzymatic enzymology chemist. I can't answer that.

Q. Can absorption of PCBs into the human body result in altered calcium metabolism?

A. I don't know if it does in the humans. It occurs in avian species. That's birds.

Q. Did Monsanto rely on animal testing to determine potential health effects to humans?

A. They relied on animal testing. They relied on experience with their workers. They relied on the public, published information concerning PCB.

Q. What is altered calcium metabolism?

A. Just what it says. Calcium is an important ingredient of the body. It takes -- It's used at the cellular level, and altered means you either get too much or too little.

Q. Have bone and joint deformities been reported as a result of the ingestion of Yusho PCBs in human beings?

MR. CARNEY: These again are the PCBs where the furans were the principal cause of the problem?

MR. McCREA: The literature speaks for itself.

A. Beg your pardon? You talking to me or him?

MR. McCREA: Well, I'm talking to him.

A. The question is?

MR. McCREA: Could you repeat the question?

(Thereupon, the reporter propounded the pending question.)

A. I don't recall. I do not think it was a very prominent effect.

Q. (By Mr. McCrea) Have joint pains been recorded in the children born to the mothers who ingested the Yusho PCBs?

A. We're talking now about children? Previously you talked about joint deformity.

Q. I'm now talking about joint pains.

A. I think they may have. I'm not certain.

Q. Doctor, can you explain the mechanism by which the Yusho PCBs caused joint pain in children born to the mothers who ingested the rice oil contaminated with the PCBs, furans and quaterphenyls?

A. No, I can't.

Q. You do acknowledge that's documented?

MR. CARNEY: Are you talking about with the furans or PCBs?

A. I said it may be. I haven't seen the documentation lately. I'd be happy to look at it and give

you a definite opinion.

Q. (By Mr. McCrea) Talking about the joint pain in children.

A. That's what you're -- Yeah, show me the documentation. I'll be happy to talk about it.

MR. McCREA: All right, sir. Can you -- Can we staple this and mark it as our next exhibit?

(Thereupon, the reporter marked Plaintiff's Deposition Exhibit Two, for identification.)

Q. (By Mr. McCrea) Doctor, I --

MR. CARNEY: May I take a look at it?

Q. (By Mr. McCrea) Doctor, I hand you what the court reporter has marked as Plaintiff's Exhibit Two dated 6-1-90, and I'll ask if you will take a look at that article. My first question is: Have you read that before today?

A. I do not recall whether I read this before or not.

Q. Are you familiar with the poisoning in Taiwan?

A. Yes, I am.

Q. Was it similar to the poisoning in Japan?

MR. CARNEY: Objection to the form.

A. It was similar to the -- yes, it was, to the Yusho incident.

Q. (By Mr. McCrea) In what year was the Yusho

incident?

A. '68 or '69.

Q. In what year was the incident in Taiwan?

A. '79.

Q. Are you familiar with any of the authors of this article titled "Congenital Poisoning by Polychlorinated Biphenyls and Their Contaminants in Taiwan" by reputation or by direct knowledge, and if so, just explain to us what you know about the authors?

A. Well, I don't know anything about the authors. I never heard of them.

Q. Are you familiar with the Triangle Park Research Laboratory?

A. Yes, I am.

Q. Does it enjoy a good reputation?

A. Well, there -- You were talking about the research laboratories in the Research Park. There are any number of laboratories in that.

Q. Okay.

A. Some government, some private. So if you're asking about do I know whether the National Institute of Environmental Health Sciences Research, if that's what you're asking about, I do not believe this is a government agency, and I don't know anything about its reputation.

Q. All right. Now, as the expert witness and a

fact witness for Monsanto, you are constantly updating yourself on the literature, are you not?

A. As well as I could, yes.

Q. All right. What is the title of this particular article?

A. "Congenital Poisoning by Polychlorinated Biphenyls and their Contaminants in Taiwan."

Q. Explain to the jury what the word congenital means.

A. Something that exists from birth.

Q. All right. Now, Doctor, can you, or let me direct your attention if I might to the second page of the article.

A. I'm going to read it from the beginning if I'm going to go to the second page.

Q. All right, sir. I agree.

A. In the first place, I see none of the qualifications or degrees of the authors. There is W. J. Rogan. It doesn't say what he is or who he is. R. C. Gladen, it doesn't say who he is or what he is. N. B. Ragan, those three. Then we have some other individuals, but the three people in the lead, I do not have their degrees. They do not say with what establishment they are attached.

MR. McCREA: Can we shut off the tape while he

reads that?

MR. CARNEY: Yeah.

(Thereupon, a short recess was taken.)

Q. (By Mr. McCrea) Dr. Kelly, have you had time to read the article?

A. Yes, I have.

Q. And does the article compare the condition of health of children born to mothers who ingested the rice oil contaminated with PCBs and its by-products to a control group?

A. Yes.

MR. CARNEY: Let me object here for the record. This is a document that was torn out of a larger document just before it was handed to the doctor. There's no testimony whether it's a complete, self-contained document or a complete document. The -- Dr. Kelly hasn't been able to authenticate it as to its being a reliable document. There's no foundation that these people are qualified to write such an article, so I just object for the record to asking questions about an article that hasn't been authenticated in any way.

Q. (By Mr. McCrea) Dr. Kelly, I will represent to you that that is the entire article. Can you determine by looking at the exhibit if it includes all the pages of the article?

MR. CARNEY: I'm going to object to that. It would be pretty hard for the doctor since he doesn't know if he ever read the article to determine whether there are more pages to the article or not, but if he can answer it, fine.

A. I think it appears to be a complete article.

Q. (By Mr. McCrea) And then are there blow-ups of the charts?

A. Well, table one is blown up. Table two and table three, yes, sir.

Q. All right, sir. Dr. Kelly, can you recite for the jury the findings of the authors of this article with respect to the health symptoms of the children born to mothers who consumed the contaminated rice oil compared to the control group of children whose mothers had no exposure?

MR. CARNEY: Can I have a standing objection to this, any questions about this document with regard to its authenticity, its establishment as a scientific document and as to whether it's a complete document?

Q. (By Mr. McCrea) Yes. Doctor?

A. What do you want?

Q. The blow-ups. Can you read those charts without the blow-ups? Is that fair enough to you?

A. Yes.

Q. All right. Would you refer to table one?

A. Yes.

MR. CARNEY: Just a minute. I'm going to object to -- here you have a document that hasn't been, there's been no foundation laid as to where it came from, who the authors are, and now you're blowing it up, and before you show it to anybody, I just want to make my objection and that is that it hasn't been authenticated to be introduced into evidence, so it's improper to show it to the jury. Can I have a standing objection to that during this line of questioning about this article?

Q. (By Mr. McCrea) Doctor, are you familiar with the publication?

MR. CARNEY: Well --

Q. (By Mr. McCrea) In which this article was written?

A. Yes, I am.

Q. And is that authoritative and relied upon by doctors and scientists?

A. I would say that there's a double question there. It's an excellent article. It's an excellent magazine, an excellent journal. They always usually put in preliminary reports which at some later date may be disputed or changed.

Q. Yes, sir. Now --

MR. CARNEY: Can I have a standing objection or should I object on each question about this article?

MR. McCREA: No, I agree that you may have a standing objection as to all of those objections that you have noted during the entire course of the doctor's testimony.

MR. CARNEY: Okay.

Q. (By Mr. McCrea) Doctor, would you refer to table one? And if the camera could focus on that.

A. Yes, sir.

Q. Will you read the introduction to the table?

A. "Physical signs present at birth and selected medical history items as reported by mothers. Frequencies are those reporting 'yes' or those reporting 'yes' or 'no'. 'Don't know' and missing values are not included."

Q. On the upper left column it has physical sign and then exposed and control. Can you explain that to the jury?

MR. CARNEY: Well, I'm going to object to this. Dr. Kelly didn't write this article. He doesn't even know the authors, and I'm going to object to your asking him to speculate what somebody else meant by using words since he hasn't talked to them. In fact, he doesn't know them. He'd have to speculate inside their minds.

Q. (By Mr. McCrea) Can you explain that to the

jury, Dr. Kelly?

A. Physical sign is something you see. Exposed is presumably the individuals who were exposed in the Taiwan episode, and control is some group. I don't know where he got this control group. Let's see where he found this control group.

Q. All right, sir.

A. I'm trying to find out where his controls came from. I'm sorry I'm so slow, but. . .

Q. No, that's all right.

A. He stated in his summary at the top there were 108 unexposed controls were examined and evaluated, but I'm going through the body of the report and I don't see where he mentions where these nonexposed children came from.

Q. What does --

A. You've had this much longer than I do. Do you want to point it out to me?

Q. Well, I assume that by control he means those who were not born to the mothers who ingested the rice oil which was contaminated.

MR. CARNEY: Well, I'm going to object to --

A. Oh, yes.

MR. CARNEY: -- any assumptions here. We're talking about an article that the writers of the article are unknown to the witness.

A. I think the big point is -- Marie said just a moment.

Q. (By Mr. McCrea) Doctor, you're unable to determine what is meant by the word control. Is that right?

A. Well, I know what is meant by the word controls, but I do not know where he got his 108 exposed controls, and I have no way of knowing whether they're really truly controls, whether they came from the same economic stratum or not. I don't see in the body of this report any mention of where he got his controls. I don't even know if they're the same age. It doesn't mention that, I don't think. This -- It doesn't say anything about a control group. He says, "I've got 108 controls," period. I don't know what the controls were.

Q. All right. The chart on table one states that the exposed group of children, there were 32 of 108 with white eye discharge, and in the control group there were 5 of 113. Is that a symptom of which you have seen reported in Yusho?

A. Yes.

Q. Can you explain the method by which the PCBs with the furans and quaterphenyls cause white eye discharge?

A. There are -- There are glands in the eyelids

that secrete, that are fat secreting type of glands, and we know that PCBs with nitrofuran, with benzofurans cause acne which is a disturbance of the fat metabolism in the sweat glands, in the hair follicles, and it is no surprise to me at all that there would be some eye discharge when you have a serious condition serious enough to cause chloracne.

Q. The next category is eyelid swelling. Can you explain the method by which the PCBs with furans and quaterphenyls produce this condition?

A. Well --

MR. CARNEY: Well, let me object. You're assuming that -- First of all you're saying PCBs cause this condition, and I think you're misstating the facts again. You're mixing up the PCBs and the furans.

MR. McCREA: I said PCBs with furans and quaterphenyls.

MR. CARNEY: I don't think you said it in that last question.

MR. McCREA: Yes, I did.

A. The same things I said for the discharge. The glands that cause the discharge also cause the eyelids to swell. That's where the glands are in the eyelids.

Q. (By Mr. McCrea) Teeth present, can you explain the mechanism by which that comes about?

MR. CARNEY: Well, I'm going to object to

that. I don't know what is meant by teeth present.

MR. McCREA: Teeth present at birth. When the children are born, they're born with teeth.

MR. CARNEY: I don't see that in the, in the chart, but at any rate, I think the question is vague and I think you're implying that this is the Yusho incident or I think you mentioned it.

MR. McCREA: No, it's Taiwan.

MR. CARNEY: This is Taiwan, not Yusho.

Q. (By Mr. McCrea) That's correct. Can you explain the mechanism by which that comes about, Doctor?

A. No, sir, I do not know that, but that has been reported in the Taiwan episode.

Q. And Yusho, too?

A. I believe so.

Q. All right. Irritated or swollen gums, can you explain the mechanism for that?

A. Same as teething in babies. The teeth come out, the gums are irritated or swollen or maybe an added mechanism, but that is certainly a major one.

Q. All right. Hyperpigmentation. What is that, hyperpigmentation?

A. Pigmentation is coloring. Hyper means more coloring, excess coloring.

Q. And can you explain the mechanism by which

PCBs, furans and quaterphenyls produce that condition?

A. There is some deformity of the skin metabolism. There's some derangement of the skin metabolism, and some of the melanin in the skin is overdeposited. It's oversecreted or overformed.

Q. And does that give it a darker coloration?

A. Yes. I don't know what happens in an Oriental, but I think it's darker.

Q. All right, sir. Deformed or small nails, can you explain the mechanism by which that symptom is produced?

A. Well, the question of nails, eyelids, teeth, skin all come from the same embryonic layer in the fetus, and so presumably -- I'm now assuming things which I shouldn't -- there is the same mechanism that causes the deformity, the deformed, early eruption of the teeth is also involved in the deformity of the nails.

Q. All right, sir. Acne?

A. Well, that's chloracne. That's a disturbance of the fat metabolism in the skin.

Q. Now we go down to the second category. The first category was at birth. The second category is subsequent history. Is that the way you read the chart?

A. Yes, it is.

Q. Has bronchitis or pneumonia in first six

months. Can you explain the relationship of PCBs, furans and quaterphenyls to that condition?

MR. CARNEY: Again you're lumping PCBs and furans and quaterphenyls all in the same category, and I think that's an attempt to mislead the jury into thinking that they're all the same thing.

Q. (By Mr. McCrea) What's the title of the article, Doctor?

A. The title of the article is "Congenital Poisoning by Polychlorinated Biphenyls and their Contaminants in Taiwan."

Q. Thank you. Can you explain the method by which the relationship of polychlorinated biphenyls and its contaminants as noted by the title of the article to that condition?

MR. CARNEY: Well, the title of the article doesn't spell out what the contaminants are.

MR. McCREA: Furans and quaterphenyls.

MR. CARNEY: Well, that wasn't in the title. You just read the title.

Q. (By Mr. McCrea) You may proceed.

A. Say the question over.

Q. All right, sir.

A. I get lost in this.

Q. All right. Can you explain the mechanism by

which bronchitis or pneumonia in the first six months is produced by the absorption of PCBs, furans and quaterphenyls?

A. Well, first I'm not sure that that's the cause.

Q. Because?

A. Because with the absence of what appears to be an adequate control group, I just don't know. Certainly babies get bronchitis in their first six months, so I cannot say whether this is due to PCBs or not, PCBs with their contaminants.

Q. There's 30 out of 124 compared to five out of 115?

A. As I said before, I'm not sure what this control is, if these people --

Q. All right, sir.

A. -- who had the 30 had more children or they were in a poor economic group, then the controls, obviously they'll have more bronchitis and pneumonia.

Q. All right, sir. Bronchitis bad enough for two days in bed, 21 out of 126 to three out of 111. Do you find those numbers significant in the exposed group?

A. Not unless I know more about the relationship of the exposed group to the control group.

Q. Seizure with fever, 15/127, 5/115. Can you

explain the relationship of PCBs to seizure with fever?

A. I can relate the relationship of bronchitis or pneumonia to seizure with fever. Whenever you get an elevated temperature in a child, you are very likely to have a seizure, but as I said before, I cannot relate the seizures with fever to PCBs without knowing more about the control group.

Q. Seizure without fever, would you agree that there is no relative difference in those figures?

A. That's correct.

Q. Chipped or broken teeth, 38 of 107 to 25 of 106. Would you consider that a significant elevation and something that would concern you as the former doctor of Monsanto or not?

A. Well, I'd have to have an epidemiologist to tell me whether this is statistically valid or not, but anyway, if their teeth came out earlier, they would probably got a better chance of getting them chipped or broken.

Q. I see. Hair loss, 14 of 115 compared to two of 105. Do those figures look significant to you, and if so, can you explain the mechanism by which PCBs are related to hair loss?

A. No, I can't, but again hair is in the same grouping as teeth, skin, nails. It's all part of the

ectoderm of the body.

Q. Acne scars, 11 and 115, 0/106. Do you feel that you've discussed that adequately in the previous testimony in this deposition?

A. Well, yes, except I do not know what they are calling acne scars because other reports, especially one by Kimbrough, did not show any acne scars and anything like this, this percentage. In other words, 16 people with acne and subsequently they had 11 of those had scars. Kimbrough had 39 people with acne and she had very, very few scars. So I don't know what that means.

Q. What's the date of this article?

A. '88, but I don't know what she was, what parts she referred to.

Q. Loss of muscle strength. Do you have an opinion, Dr. Kelly, if exposure to PCBs, furans and quaterphenyls can result in loss of muscle strength?

MR. CARNEY: Are you saying based on this data?

MR. McCREA: No, does he have an opinion.

A. I don't know, but I don't know how -- Oh, sorry.

MR. CARNEY: I'm sorry. Again you're talking about the Japanese or the Taiwanese PCBs with the heavy concentrations of furans, or are you talking about the

Monsanto PCBs with very few furans?

MR. McCREA: I'm talking about if he has --

MR. CARNEY: Which type of furans?

MR. McCREA: I'm talking about the PCBs contaminated with furans and quaterphenyls, if he has an opinion if that can result in a loss of muscle strength.

MR. CARNEY: Well, I'm going to object. I don't think you've given him enough information as to what kind of furans, as to the dose. Obviously you can feed any species including a human enough of almost any product and you can get adverse health effects as you well know, so you haven't given him enough information.

MR. McCREA: Well, at a dose of .6 milligrams to the mother of furans which would be, if you had one ounce, that would be sufficient to cause toxic effects in 50,000 people, with that dose.

MR. CARNEY: I'm going to object to the form. It's very ambiguous now as to what the question is, but if you understand it, you can answer.

A. Well, I'd like to have it repeated so we'll be sure I can understand it. We were talking about loss of muscle strength, I believe.

Q. (By Mr. McCrea) Yes, sir. Do you have an opinion if exposure to PCBs, furans and quaterphenyls with a dose of furans at .6 milligrams to the mother can result

in loss of muscle strength, and if so, the mechanism by which that --

A. First of all, I would have to see more --

MR. CARNEY: Objection to the form.

A. I would have to see more data than this is here. Secondly, they don't say how much muscle strength it is, what their perimeters of testing for muscle strength. So I would not be in a position to answer that question.

Q. (By Mr. McCrea) Joint pain. Do you have an opinion, Dr. Kelly, if exposure to PCBs, just the PCBs can result in joint pain?

A. No, I do not think I can.

Q. Do you have an opinion if exposure to PCBs with furans and quaterphenyls with furans at a level of .6 milligrams can result in joint pain?

A. I would have to reference this some more. I'm not sure whether that was true or not.

Q. Have you ever heard of children being born with joint pain?

A. I'm not a pediatrician. I don't know much about children and joint pains. I don't know.

MR. CARNEY: I'm not sure --

A. As I understand, none of these were born with joint pains. They were not at birth. We've seen at the top grouping it says at birth. I don't see joint pains up

there. It was all in subsequent history.

Q. (By Mr. McCrea) I stand corrected. Have you ever heard of children having joint pain?

A. Lots of them. I've had it myself when I was a child.

Q. All right, sir. Generalized itching. Do you have an opinion if PCBs contaminated with furans and quaterphenyls can result in generalized itching?

MR. CARNEY: Same objection.

A. I have no opinion. On the basis of this, I would say I do not accept this as a valid authority on that.

Q. (By Mr. McCrea) All right. Skin abscesses or boils.

A. Yes, I think that -- Whether 11 out of 103 or 26 out of 116 is statistically valid, I don't, I'd have to refer to an epidemiologist, but certainly if they have acne, if they have acne scars, obviously they have a history of skin abscesses.

Q. Warts?

A. I have not seen that as a prominent feature in any of the articles that I've seen about contaminated PCBs with benzofurans.

Q. All right, sir. Can you go to the table two?

A. Yes, sir.

Q. Do you have an opinion, Doctor, if any of the physical signs listed in the column on table two can be caused by exposure to PCBs contaminated with .6 milligrams furans and quaterphenyls? And just go down the list and give us your opinion. First, gum hypertrophy.

A. Yes, that could be caused.

Q. Tooth chipping?

MR. CARNEY: Are you asking him whether based on this data he comes to the conclusion that that can be caused because I think he's already said that this data, there's no control group information to really make this data significant unless he knows what the control group was, where, what population was used. Are you just asking for his opinion?

MR. McCREA: No, I'm just asking for his opinion.

MR. CARNEY: Okay.

Q. (By Mr. McCrea) Gum hypertrophy you've answered. Tooth chipping?

A. I don't know about that.

Q. Intraoral hyperpigmentation?

A. Yes, I think that could be associated.

Q. Caries?

A. I would certainly doubt that.

Q. Acne?

MR. CARNEY: Just so -- Why don't you, to help the jury understand what caries is, you might ask what it is.

Q. (By Mr. McCrea) What are caries?

A. Holes in your teeth.

MR. CARNEY: Cavity, I think.

A. Cavities in your teeth.

Q. (By Mr. McCrea) Okay. Acne or acne scars?

A. Here again, this is very confusing because subsequent history showed no acne scars in this supposably control group, and then a selected finding shows ten out of 106. I wonder where those ten came from or when they showed up. As I said, no acne scars in the first table and ten of them in the second table, so I don't know.

Q. All right, sir. Fair enough. Hyperpigmentation?

A. Hyperpigmentation of the face or head has occurred in chloracne.

Q. Okay. What about perineal genital? What is that?

A. I have not seen it. What did you say? Did you ask a question?

Q. Yeah. Right here.

A. What is what?

Q. What is that?

A. Well, the genital area is obvious. The perineal area is the area between the genitals and the rectum.

Q. All right, sir.

A. In the skin.

Q. All right. Pigmented or deformed nails?

A. Yes, that has occurred in the Yusho incident, also.

Q. Fingers?

A. Yes, sir.

Q. Toes?

A. Yes, sir.

MR. CARNEY: I think we're not just talking about fingers and toes, but the nails. Isn't that right? We don't want to confuse the jury.

Q. (By Mr. McCrea) It says nails on fingers and the nails on the toes; correct? Right? Not the skin. Conjunctivitis or cysts?

A. Well, this -- According to this, there is no difference.

Q. All right. Those numbers are just about the same, aren't they?

A. I would say so.

Q. All right. Can you pronounce the next one for us and tell us what that is?

A. Lymphadenopathy. That means swollen lymph glands.

Q. Do you have an opinion if that can be caused by exposure to PCBs contaminated with furans at .6 parts per milligram?

A. It depends on where the lymph glands are that are swollen. In other words, if you have infected cysts from chloracne in your face, you will have swollen lymph glands in your neck. So I'd have to know -- Those would be connected. If only chloracne was on the face and you had swollen lymph glands in your perineal region or in your groin or under your arm, that would not be connected.

Q. Eyebrow flare?

A. That's a physical condition that I don't know much about. I'll have to read what he means by eyebrow flare. I don't know what he's talking about on eyebrow flare, so I can't comment.

Q. Lungs not clear to auscultation?

A. Auscultation. Well, here again if you have bronchitis and you have repeated or pneumonia, your lungs would not be clear.

Q. Do you have an opinion if PCBs contaminated with furans and quaterphenyls can produce that condition?

A. I'm not sure that they can.

Q. Can you pronounce the next one for us?

A. Hirsutism. That means excess hair.
Q. Do you have an opinion if PCBs contaminated with furans and quaterphenyls can produce that condition?
A. Yes, it can.
Q. Hyper -- Can you pronounce that?
A. Telorism. I'm sorry. I just can't define that for you.
Q. All right. And the last one, Doctor?
A. Clinodactyly. I think that is joining together of the fingers of some type, but I don't see what he is talking about there.
Q. All right. Doctor, the last chart is table three which deals with developmental testing and behavioral assessment. Have you ever performed any similar type tests on workers at Monsanto?
A. No, sir.
Q. Have you ever read any reports out of Yusho or any other area that discussed these particular testing and behavioral assessments when individuals were exposed to PCBs, furans, quaterphenyls?
A. If I've read them I don't, I don't recall them.
Q. Can you interpret for the jury this information?
A. Well, I can only interpret the center, the

second one which is the WISC. Let's see which one that is.

MR. CARNEY: Wechsler.

A. Wechsler Intelligance Scale for Children.

Q. (By Mr. McCrea) All right, sir. Can you interpret --

A. They're all the same. There's no change.

Q. All right. No change in what?

A. Between the exposed as the control group.

Q. Okay. And the exposed for verbal IQ, that's the same; correct? 82 to 82?

A. 82/82.

Q. The performance IQ, exposed is 90, control is 97, seven points higher?

A. Plus or minus 2.7, plus or minus 2.9.

Q. Correct. Full IQ, the exposed, 84; control, 88, plus or minus 2.9, plus or minus 2.4?

A. That could be explained. I don't know how long after they did this, whether the children had the same education, whether the children had the same household motivation. I just don't know.

Q. And on the Bayley test, the exposed, 100; control, 106. Controls tested higher?

MR. CARNEY: Let me object.

Q. (By Mr. McCrea) Is that --

MR. CARNEY: What are the Bayley tests? I

think we ought to know what these things are. Otherwise, I don't think it helps the jury to know that somebody's slightly higher or slightly lower.

Q. (By Mr. McCrea) Do you know what those are, Doctor?

A. I have -- No, I don't.

Q. All right, sir. But at any rate, the scores were higher for the control group than the exposed group?

MR. CARNEY: I'm going to object. There's no evidence as to whether it's better to have higher or lower. We again have the problem, we don't know what the control group, where they came from, which population, what their educational levels were, what their environment was. So it really -- Just to read off some scores that are very close to the same anyway doesn't really give any relevance to anybody.

Q. (By Mr. McCrea) Doctor, have PCBs been implicated in the reduction of IQ?

A. Not to my knowledge, and by the way, if I could explain that, the difference here, these exposed and controls wasn't very marked, the difference between 100, plus or minus two and a half. That means you could have 102.5, 106 plus or minus 2.4. That could mean you could have 103.6, so they're the same, same thing in all three of them. So I don't think it shows any difference.

Q. Does that -- Go ahead.

A. But I think you would want a psychologist who these people are presumably -- I mean, I don't know who they are, but it doesn't look like very much difference to me.

Q. Okay. All right. And the IQ, 85 to 89; correct? You're familiar with the Stanford IQ test?

A. Yes.

Q. In all instances the exposed group had lower scores except for verbal IQ which was identical. Is that correct?

MR. CARNEY: I'm going to object to that.

A. No, it isn't correct. It isn't correct because if you have just the fact that you have a lower score does not mean that's statistically valid. I can't imagine anybody putting this down without having a probability factor on these things.

Q. (By Mr. McCrea) Well, isn't that discussed in the article?

A. I don't know. Let's go back to the article.

Q. All right. Before we do that, can you also then go down to the last category which is Rutter? Are you familiar with that, Doctor?

A. No, I am not.

Q. In this instance the control group, the

exposed group had higher scores, more health problems, habits, behavior than the control group. Is that -- Just a second, Tom. Is that a fair analysis of the data?

MR. CARNEY: No. I'm going to object here because first of all, the witness doesn't know what the, isn't familiar with that test, and second of all, he's already testified that the control groups, he doesn't know what was involved with the control group, where they came from. So you're asking him to draw a conclusion that's impossible to draw a conclusion on.

A. And he's got a different control group down at this bottom one. I mean, he's got 109 of 120, and he was talking about 113 all the way along or 106, and now he's up to 120. It's got me completely confused, and I'm surprised "Science" published it.

MR. McCREA: All right, sir.

MR. CARNEY: Let me just ask you, Mr. McCrea, were those last three pages that you've been putting up there, were they a part of that article?

MR. McCREA: He already explained that, Tom, if you were listening.

MR. CARNEY: Well, I thought you said all those pages were a part of the article.

MR. McCREA: They were blow-ups of the chart.

MR. CARNEY: Okay. Well, when you first

showed it to the doctor you said all those pages were a part of the article, and now it turns out three of them weren't.

MR. McCREA: Well, if you would listen to the testimony, I asked him if the blow-ups at the back were reflected the charts on page two and he said yes, they did. Now, if you'd like to look at them, you may.

MR. CARNEY: No. All I'm saying is that I thought this was a six page article. It turns out it was a three page.

MR. McCREA: Well, take your time and look at them.

MR. CARNEY: No, I already pointed it out to you. You said they were all a part of the article, and it turns out it was just the three pages. You've added three additional blow-up pages.

Q. (By Mr. McCrea) Doctor, did you understand when you were looking at the charts that the charts up here were blow-ups of the charts on page two?

MR. CARNEY: I'm not disputing that.

A. Yes, I did understand.

Q. (By Mr. McCrea) Thank you. Doctor, can absorption of significant amounts of PCBs result in immune suppression?

MR. CARNEY: I'm going to object to the

question. You haven't defined your term. It's vague and ambigous as to what you mean by significant. What type of PCBs?

A. I suppose if you did absorb -- Are we talking about humans now?

MR. McCREA: Yes.

MR. CARNEY: I'm going to object. If it calls for speculation, I would object to asking the witness a question that would cause him to have to speculate. If there's no data on it, I would not speculate about something.

Q. (By Mr. McCrea) You may answer.

A. Can significant?

Q. Yes.

A. It may, but I don't know whether it would or not.

Q. Doctor, can significant absorption of PCBs result in decreased -- and you'll have to help me out a little bit with these words -- thyroglobulin proteolysis?

A. That is -- Those are enzymes, and I don't know. I am not an enzymologist. I cannot answer that question.

Q. Can significant absorption of PCBs result in metabolism?

A. Can they result in metabolism?

Q. Altered metabolism.

A. Altered metabolism? They could result in altered metabolism of the skin. They could result in altered metabolism of some liver enzymes. Whether that's any particular harm or not to the individual is certainly not definite.

Q. All right. Doctor, can you refer to Exhibit K-2?

A. If you point it, give it to me.

Q. Yes, sir, I will.

A. I have K-6.

Q. I've got this, a copy of K-2.

A. Yes, sir, I'm referring to K-2.

Q. Doctor, you discussed this on direct examination at some length, did you not?

A. Yes, I did.

Q. And I believe these workers, to recap the testimony and we're referring to Exhibit K-2, an article titled "An Acneform Dermatergosis"?

A. Gosis.

Q. By Jack W. Jones, M.D. and Herbert S. Alden, M.D., Atlanta, Georgia?

A. Yes, sir.

Q. Involving workers at the Swann Chemical Plant which was purchased in 1933 or '4 by Monsanto?

A. I think it's later than '34. I think it's '34 or '35. I'm not sure.

Q. All right. And Dr. Jones and Dr. Alden examined these workers and then wrote this article?

A. Yes.

Q. You later examined the same workers?

A. I didn't say I examined them. I said I saw some of them. I observed some of them. I did not examine them.

Q. I stand corrected. You observed them and the skin conditions had resolved?

A. That's correct.

Q. So you, you actually talked to the, some of these workers who Dr. Jones and Dr. Alden wrote about?

A. Yes, that's correct.

Q. And in this article on page one which I guess doesn't have a number, but would be, well, for page one?

A. 1920, yes, is my number on it.

Q. Okay. It -- In the second paragraph, the second sentence states, "This term chloracne was first used by" -- Is that --

A. Herxheimer.

Q. "Herxheimer in 1899 to describe an eruption composed of comedones." What is that, comedones?

A. Comedones is a plugged up sebaceous gland.

Q. And --
A. Sebaceous gland is a fatty skin gland.
Q. Can PCBs cause that?
A. Yes.
Q. "And small sebaceous pustules."
A. That's when the gland gets affected.
Q. Can PCBs cause that?
A. Yes.
Q. What does a comedone like like?
A. It looks like a white head instead of a black head.
Q. And what does a small sebaceous pustule look like?
A. A small hickey.
Q. Like a little red mark?
A. Well, a tiny boil.
Q. All right, sir.
A. A tiny pimple or it could be larger pimple, but it looks like a pimple.
Q. "That occurred on the arms and faces."
A. Yes.
Q. And can PCBs cause those comedones and pustules on the arms and faces?
A. Yes.
Q. Going on down in that same paragraph said,

"Two patients whose skins were diffusely pigmented." Can PCBs cause skin to be diffusely pigmented?

A. Then again I don't know what you mean by diffusely. If you -- It can be pigmented in an area of one or two square inches. The ones that I have seen have been, have not been pigmented, but it can. I would imagine it can because chloracne has other things that cause chloracne and have caused pigmentation.

Q. What do we mean, pigmentation? If you look at--

A. It's darker. The skin looks like it's a collection of blackheads.

Q. Okay. And it says dark, rough and dry, "Whose skins were diffusely pigmented, dark, rough and dry." Can PCBs cause those symptoms?

A. Well, pigmentation is dark. I mean, that's the same thing. Well, rough and dry, I --

Q. All right.

A. I don't know what the, what he's describing there because if you put paint remover on your skin, you'll get rough and dry. I guess you could get it. By the way, we are talking now about chlorine compounds that were being used 30 years before PCBs were invented.

Q. Right.

A. Okay.

Q. And my question is not directed to anything other than PCBs.

A. Okay.

Q. Fair enough. I understand that. That's a good observation. All right. This paragraph is not talking about PCBs.

A. No, but I wanted the jury to be clear.

Q. And I agree. Now, we've just got one minute. Can PCBs cause small tenacious comedones?

A. I don't know what he means by tenacious. That's -- If he means by that it stays around a long time, that could be true, if that's what he means by tenacious.

Q. All right. Can PCBs do that?

A. Yes, sometimes.

Q. Can PCBs cause small follicular abscesses?

A. Well, if any skin lesion gets infected, one gets an abscess. Follicular abscess is a hair follicle on the skin.

Q. All right. Can PCBs produce that?

A. Well, if comedone becomes affected, infected, yes, it can become a pustular. We're just repeating themselves down the way.

MR. McCREA: All right. Doctor, we're out of time here.

(Thereupon, a short colloquy was had between counsel

and the witness, off the record.)

MR. CARNEY: We've been talking off the record about rescheduling, and Mr. McCrea is not available tomorrow although everyone else would be tomorrow, but we agreed, I think, that we would stop at this point because the studio needs this room and would like this room for the majority leader of the House of Representatives to give a videotape, and so we've agreed to stop now, and the 12th which is a Tuesday, the 12th of June at 9:00 the same place we will finish up the deposition. Is that all right?

MR. McCREA: That's correct.

MR. CARNEY: Okay.

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