COMMONWEALTH OF PENNSYLVANIA

PUBLIC UTILITY COMMISSION

Letter of Notification of Philadelphia Electric Company relative to reconstructing and rebuilding of the existing 138 kV line to operate as a Woodbourne-Heaton 230 kV line in Montgomery and Bucks Counties.	Docket No. A-110550F055
Further hearing.	

Pages 1136 through 1207 Hearing Room No. 1
State Office Building
Broad and Spring Garden Streets
Philadelphia, Pennsylvania

Friday, November 22, 1991

Met, pursuant to adjournment, at 10:00 a.m.

BEFORE:

HERBERT SMOLEN, Administrative Law Judge

APPEARANCES:

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C O N T E N T S

E X H I B I T S

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P R O C E E D I N G S

ADMINISTRATIVE LAW JUDGE HERBERT SMOLEN: This is a further hearing in the matter of the letter of notification in connection with the Philadelphia Electric Company's Woodbourne-Heaton line.

This morning's session has been reserved for the presentation of the rebuttal testimony of Dr. Edward Gelmann.

Are we ready to proceed?

MR. BONNEY: Yes, Your Honor. We have one preliminary. During the cross-examination of Dr. Bockman the other day, the Office of Consumer Advocate made an on the record data request for full citations to four scientific studies that were discussed in Dr. Bockman's testimony. We just wanted to indicate that we have provided the response to the on the record data request.

JUDGE SMOLEN: That is noted for the record.

Now, let's proceed.

MR. WATSON: Your Honor, we call Dr. Edward Gelmann.

Whereupon,

EDWARD PAUL GELMANN

having been duly sworn, testified as follows:

JUDGE SMOLEN: Please have a seat. Keep your voice up. State your full name and business address for the

record.

THE WITNESS: Edward Paul Gelmann, 3800 Reservoir Road, N.W., Washington, DC 20007.

JUDGE SMOLEN: Mr. Watson.

DIRECT EXAMINATION

BY MR. WATSON:

Q. Dr. Gelmann, do you have before you a copy of a document entitled Rebuttal Testimony of Dr. Edward Gelmann, Philadelphia Electric Company Rebuttal Statement No. 3?

A. I do.

(Whereupon, the document was marked as PECo Rebuttal Statement No. 3 for identification.)

BY MR. WATSON:

Q. Do you have any corrections or additions to that document?

A. On page 15, line 14, a transcription error, the second "that" should be a "to", t-o.

JUDGE SMOLEN: What page was that again?

THE WITNESS: Page 15, line 14. Indicate "that exposure to power".

JUDGE SMOLEN: Yes, I found that one myself.

Go ahead.

BY MR. WATSON:

Q. Let me ask you to take a look at page 16, line

27. Could you read that sentence and see if there is anything missing from that?

(Witness perusing document.)

JUDGE SMOLEN: Are you saying "have" to "has"?

MR. WATSON: Yes. I think that, or "the effects have", one or the other. It seems like there is something left out.

JUDGE SMOLEN: I think the verb modifies her work. Is that what it meant to be?

THE WITNESS: "Either the effects of the phenomenon" have not been shown to occur in humans.

JUDGE SMOLEN: Do you want to follow it up?

BY MR. WATSON:

Q. Which one would you like?

A. "The effect" is fine.

Q. "The effect"?

A. Yes.

Q. The effects have not been shown to occur in humans?

A. In humans.

Q. So after "and" add "the effects", is that correct, Dr. Gelmann?

A. Yes.

Q. Any other additions or corrections?

A. No, sir.

Q. Dr. Gelmann, if I were to ask you while you are on the stand under oath here today each of the questions set forth in this document entitled Rebuttal Testimony of Dr. Edward Gelmann, would your answers be as set forth therein?

A. They would.

MR. WATSON: Your Honor, I pass the witness.

JUDGE SMOLEN: Ms. Burket.

MS. BURKET: No questions, Your Honor.

JUDGE SMOLEN: Mr. Dillon.

MR. DILLON: No questions, Your Honor.

JUDGE SMOLEN: Ms. McCloskey.

MS. McCLOSKEY: Thank you, Your Honor.

CROSS-EXAMINATION

BY MS. McCLOSKEY:

Q. Good morning, Dr. Gelmann. My name is Tanya McCloskey and I represent the Office of Consumer Advocate.

Dr. Gelmann, am I correct that you are testifying here today as a specialist in medical oncology and molecular and cellular biology?

A. Yes.

Q. And you are not testifying as an expert in electromagnetic fields or toxicology or epidemiology, correct?

A. Well, my testimony pertains to the studies that had to do with electromagnetic fields and cells and organisms. But I am not a physicist, I am not a toxicologist or an epidemiologist.

Q. Thank you.

Would you agree that the purpose of your testimony was limited to a review of the literature as to molecular and cellular biology as it relates to the question of electromagnetic fields and cancer?

A. The literature I have read is much broader than that, but my opinions are restricted to oncology and molecular and cellular biology.

Q. Now, if you could refer to page 22 of your testimony, lines 24 through 27, you refer at the end of line 27 to other adverse health effects. Do you see that reference?

A. Yes.

Q. And what are you referring to when you state other adverse health effects?

A. Any health effects that I would know of as a medical oncologist, also being an internist, that is, having specialty boards in internal medicine.

Q. And can you give us some example of those that you are considering as other health effects within your specialty?

A. I'm not sure what you are asking.

Q. What I am looking for is a specific type of health effect that you're discussing there. For example, you discuss cancer as one health effect. Is there anything else you are referring to when you use the term other adverse health effects?

A. Potentially any health effects that would fall under the general topic of internal medicine. There is particular interest in the lay press about cancer causation and there have been some epidemiologic papers that have addressed cancer, so cancer is the main topic.

I am not referring specifically to any other diseases that I could state. However, my reading of the literature did not cause me to conclude about any other possible diseases associated with electromagnetic fields from power transmission or distribution.

Q. As limited, as you stated before, going to the question of internal medicine and your medical specialty?

A. Yes.

Q. Dr. Gelmann, would you agree that the question of the health effects of electromagnetic fields is one that is interdisciplinary in nature, involving such as areas as biology, epidemiology, physics and other specialty areas?

A. It depends on what health effects you are

talking about.

Q. What I am referring to there is the full range of health effects that may be researched.

A. Well, the research that is done depends on the discipline for which it is pursued.

Q. Perhaps we are talking by each other. Let me try rephrasing it this way: would you agree that the question of cancer and its relationship to electromagnetic fields is only one of the areas that is being explored?

A. Well, there have been research papers in other areas of cancer, yes.

Q. And I believe you stated earlier that when you are looking at electromagnetic fields you are also looking in the area of physics?

A. I'm not sure I said that. I'm not sure what you mean.

Q. Earlier you stated that when one researches an area of electromagnetic fields you are not just looking at, for example, a molecule or a cell but you are looking at an interaction with the electromagnetic field, which is in the area of physics?

A. We must be talking around the question. If one asks what the effect of an electromagnetic field on a cell is, then one uses or one may use the electromagnetic

field as a stimulus. But one does not have to be a physicist to do that. But one is certainly using some sort of a physical entity as opposed to a chemical entity.

Q. Looking at pages four and five of your testimony, you refer and list numerous articles that you have published in scientific journals. Have you ever published any articles about electromagnetic fields and cancer?

A. No.

Q. And have you conducted any research into the question of electromagnetic fields and cancer beyond the literature review you have conducted for this testimony?

A. No.

Q. Now, if you could refer back again to pages 21 through 23 of your testimony, and I believe starting on page 21 you refer to three terms, cause, promote or contribute to the development of cancer.

MR. WATSON: Could we have a line, Counsel?

MS. McCLOSKEY: I'm sorry. It was page 22, line 26.

BY MS. McCLOSKEY:

Q. And first, could you please explain what you mean by cause?

A. What I mean by cause?

Q. Yes.

A. Cause means cause. That magnetic fields give -- can give an animal or human cancer.

Q. And would that be the same as initiation of cancer?

A. It could mean the same as initiation and it could also be broader.

Q. And in this sentence, though, you are referring to it in the broader sense, is that correct?

A. Yes.

Q. When you refer to promote, could you please tell us what you mean by promote?

A. Cancer promotion.

Q. What does cancer promotion mean? I am just trying to get a little background.

A. A cancer promoter is an agent that stimulates cell proliferation.

Q. And when you use the term contribute to the development of cancer, what do you mean by contribute to the development of cancer?

A. Aid in cancer formation in any other way that you may imagine.

Q. Are you familiar with the term progression of cancer?

A. Yes.

Q. Is progression different than cause, promote or contribute, or does it fit into one of those areas?

A. It would fit into contribute.

Q. Now, turning back to page 21 of your testimony, line 17, you refer to a substantial body of well done research. About how many studies are you referring to when you make that statement?

A. Predominantly the ones cited in the testimony.

Q. Do you think that more research should be done in the area of electromagnetic fields and the question of cancer in your area of cellular and molecular biology?

A. That depends what questions you want to ask by doing the research.

Q. What if we wanted to look into the question of causation of cancer? Do you believe that additional research should be done in your area concerning the causation of cancer and E/MF?

A. No.

Q. What if we want to look at the question of promotion of cancer and its relationship to E/MFs? In your area do you think that additional research would be necessary?

A. No.

Q. And what if we wanted to look into the area of contributing to the development of cancer? In your area

of specialty do you believe that additional research is necessary into that question?

A. No.

Q. Dr. Gelmann, I believe you have answered no to all three areas. How does the research community in science determine that enough studies have been conducted so that additional studies would not be necessary?

MR. WATSON: Objection, Your Honor. It's beyond the scope of his testimony. He is not here as an expert on the research community of science or the philosophy of science as it is sometimes called. He is testifying as an expert in the fields he has indicated.

MS. McCLOSKEY: I believe he is testifying as an expert in the area of cancer research and with that should have some familiarity with the research community. I am trying to get behind his --

JUDGE SMOLEN: Overruled. You may answer.

A. Well, I can't speak for the research community. I can give you my opinion, and my opinion is that sometimes research is instigated by important scientific issues, sometimes by political concerns and sometimes in response to public concerns that may or may not have any basis in scientific fact.

A good example of that, of the latter, is the research that was done with the anti-cancer agent

Laetrile, which had a tremendous amount of interest among cancer patients. There were books written about it. There was a huge amount of hope and money on the part of the suffering public expended in seeking this agent, in many cases in an illegal way. And finally the National Cancer Institute was basically forced by the situation to sponsor a very rigorous trial which after a lot of public funds were expended and a lot of cancer patients were enrolled showed that the stuff was absolutely worthless. But at least it put the question to rest.

BY MS. McCLOSKEY:

Q. You have given us one example. Let me ask you how you have determined as to these areas, what analysis have you pursued in these three areas to reach your conclusion that no additional research is necessary?

A. The analysis is based on my reading of the experiments described in the literature.

Q. And let's say you read one study that said that there was some effect shown and you read one study that said there was no effect shown. How, then, do you distinguish between those two studies to reach your conclusion?

MR. WATSON: Objection, Your Honor. It assumes facts not in evidence here. There is obviously more than one study on each side and there is no way for him to

wash out his mind and pretend that there is only one on each side.

MS. McCLOSKEY: Your Honor, it was a hypothetical.

JUDGE SMOLEN: It was a hypothetical.

MR. WATSON: I don't think it is a hypothetical that is relevant to the circumstances presented here.

JUDGE SMOLEN: My problem with the question, and I am not ruling on your objection, is that when you say effects, do you mean adverse effects or do you mean any effect as part of the question?

MS. McCLOSKEY: I can change it to mean adverse effects. What I am trying to do is get behind what analysis he is performing.

JUDGE SMOLEN: You are withdrawing the former question. Let's hear the next question.

BY MS. McCLOSKEY:

Q. Let's assume a hypothetical, Dr. Gelmann, and state that you have read one study that shows an adverse effect and you have read another study that shows no effect. How do you determine between those two studies or how do you make a distinction between those two studies and reach a conclusion?

MR. WATSON: The same objection.

JUDGE SMOLEN: I will overrule it. You can answer.

A. It depends on what you mean by effects. You

read the scientific data and based on my education, training and experience I am available to evaluate the scientific data and I come to conclusions. That is why we have scientific publications, so that the actual data is presented before scientific peers and can be assessed.

BY MS. McCLOSKEY:

Q. Let me ask it a different way, Dr. Gelmann. When you are evaluating the scientific literature do you look to see if studies have been replicated?

A. Yes.

Q. And do you look to see if studies have resulted in consistent results, or do you look for consistency?

A. Yes.

Q. And in the area of electromagnetic fields and cellular and molecular research, how many of these studies have been replicated?

A. I can't answer that sitting here, and I'm not sure what you mean exactly by replicated. If you want to discuss specific studies then I am glad to look at them with you.

Q. I'm not trying to get into specific studies. I am trying to get into you have reviewed many studies that are presented in your selected references and when you reviewed those studies did you look to see if there had been some replication or some consistency in the results

that were produced by those studies?

A. As part of my reading of the literature, having read many papers to this point, I am always registering as I read the next paper what is consistent or in some way replicative of previous work. But I can't possibly tell you sitting here, give you a number of how many. That is beyond what I have in front of me.

Q. Now, Dr. Gelmann, again back on page 21, line 17, you refer to the substantial body of well done research. And in that substantial body of research do you know how many of those studies were designed to test whether or not exposure to E/MFs is carcinogenic?

A. I cannot tell you which of the studies actually uses the word carcinogenicity in the body of the text, and I can't go into the mind of the researchers. But the studies that I cite as far as I am concerned are relevant to the question of cancer. And I will assume somewhat that that crossed the minds of the people who wrote those papers.

Q. Now, I believe I understand from your testimony that cancer causation is always related to a direct interaction with DNA. Is that accurate?

A. Cancer causation involves a permanent change in DNA.

Q. And do cancer promotion and contribution to the

development of cancer always involve a direct interaction with the DNA?

A. No, that is not what I said.

Q. Right. I am asking you about the next two areas.

A. I understand that, but that is not what I said. Cancer promotion is usually caused by an agent which facilitates cell proliferation.

Q. And what about contribution to the development of cancer?

A. That's not a rigorous scientific term. Can you be more specific.

Q. How about the progression of cancer?

A. The progression of cancer is something which can happen all by itself.

Q. Now, looking at page ten of your testimony at line 32, and on to the top of page 11, where you refer to the Whitson's study on the relationship between DNA repair and E/MF exposure, do you see that reference?

A. Yes.

Q. Just to get a starting point, could you attempt to put in as layman's terms as possible the importance of the DNA repair mechanism and its relationship to cancer?

A. Changes in DNA are necessary for the cause of cancer. The cell -- a normal cell has the capacity

through a number of different enzymatic mechanisms to repair DNA. There are in-born genetic diseases involving errors of DNA repair that show the severe impact of having an abnormal DNA repair on a person. And the study by Whitson looked at one kind of DNA repair, that is, to damage caused by ultraviolet radiation and whether power frequency fields could alter the cell's ability to repair that damage.

Q. And just to be sure we have come full circle, would it be correct to state that if the damage to the DNA is not repaired that is when the problem begins, the change then becomes more permanent? And I don't want to put words in your word, but I just want to come full circle.

A. Not repairing the DNA results in a mutation. Whether the mutation is important or not is the next question.

Q. But one of the mutations, then, for example, could be important in the causation of cancer? Is that the link?

A. Yes.

Q. Now, I believe you stated that the Whitson study looked at one DNA repair process. How many DNA repair processes do we now know about?

A. Many. I can't be more accurate than that.

Q. And you note at the top of page 11 the Frazier study and you use the term another DNA repair process. Did they look at a different process than in the Whitson study?

A. Yes.

Q. Do you know how many repair processes the Frazier study looked at?

A. I don't know how many and I'm not sure that Frazier knew how many. However, he looked at damage caused by X-rays, by gamma radiation, which another term would be ionizing radiation, and looked at the ability of cells to repair that damage and recover from exposure to ionizing radiation and found no effect of power frequency E/MF on the ability of a cell to recover from exposure to ionizing radiation. Ionizing radiation can cause several different kinds of breakage in DNA and the experiments basically encompassed all of those kinds of repairs just by virtue of the way the experiments were set up.

Q. Now, on page 19 of your testimony, at lines 26 and 27, you state that there is no data connecting melatonin levels to breast cancer in humans. First of all, what type of research would one rely upon to connect melatonin levels to breast cancer in humans?

A. I don't know. It depends on what research is done.

Q. Let me try and focus the question a little more. Would that be something along the lines of an epidemiologic study or something in the area of cellular and molecular biology?

A. Well, studies in a number of scientific disciplines could be done to ask the question.

Q. Now, are you aware of data or research that connects melatonin levels to breast cancer in animals?

A. Which studies are you talking about specifically?

Q. Specifically, are you familiar with a study by Tamarkin that is entitled Melatonin Inhibition and Pinealectomy Enhancement of 7,12-Dimethylbenz(a)anthracene-induced Mammary Tumors in Rats?

A. Yes.

Q. And would you agree with me that this study showed that the removal of the pineal glands in the rats leads to an increase in chemically induced breast cancer in rats?

A. I have read that paper. There were some effects shown. To discuss specifics I would need you to give me a copy. I have not read it, reviewed it, recently. But there were some effects after pinealectomy and also as a result of administering the melatonin to

the rats, as I recall.

Q. I unfortunately have not been able to obtain a copy of that. I have another article that discusses that. Maybe I can show you that and you can tell me whether you are comfortable after reviewing that and if that refreshes your memory.

A. No, if we are going to discuss Larry Tamarkin's paper I would prefer to have his paper in front of me.

Q. Why don't I show you the article that I have and after reviewing it you can let me know.

A. Okay.

Q. I don't want to discuss it in depth.

(Document handed to witness.)

MR. WATSON: This is a Stevens paper published in the American Journal of Epidemiology?

MS. McCLOSKEY: Yes.

MR. WATSON: This is Steves' discussion of Tamarkin's paper.

MS. McCLOSKEY: Tamarkin's paper. And I am asking after reviewing that discussion whether that refreshes his memory sufficiently on the Tamarkin study.

MR. WATSON: I thought he said if he was going to discuss Tamarkin's paper he would want to see Tamarkin's paper.

JUDGE SMOLEN: That is what he said.

MS. McCLOSKEY: I'm just asking him if this gives sufficient detail other than the Tamarkin study.

THE WITNESS: I am familiar with this review and it does not give me sufficient information on the Tamarkin study.

MS. McCLOSKEY: Fine.

BY MS. McCLOSKEY:

Q. Dr. Gelmann, do you know what the function of melatonin is in the human body?

A. I do not.

Q. Now, on page 20 of your testimony you refer to a study by Ross concerning cell proliferation, and you state that Ross reported a decreased proliferation of cells in vitro, is that correct?

A. Yes.

Q. I have the Ross study with me. Why don't I just hand that to you.

(Witness perusing document.)

Q. Is this the Ross study that you were referring to?

A. Yes.

Q. Now, when you state that Ross reported decreased proliferation of cells in vitro, were you referring to a specific table of data when you reached that conclusion?

A. For example, some of his data is shown in Figure 1.

Q. If we could stay with Figure 1, isn't it also true that Ross reported increased proliferation of cells when the signal amplitude began to exceed 0.6 millitesla?

A. Yes.

Q. And I'm not sure if you could make this conversion. We have been discussing about milligauss and gauss in this proceeding. Can you make the conversion between a millitesla and a milligauss?

A. Yes. One millitesla is ten gauss. So you are talking about 10,000 milligauss. Or 0.6 millitesla would be 6,000 milligauss.

Q. And at page 20, line 12 through line 15 --

A. I'm sorry. We are back --

Q. I'm sorry. We are back on your testimony.

A. Okay.

Q. As it relates to the Ross study.

A. Page 20 -- could you say it again?

Q. Yes. Lines 12 through 15.

A. Yes.

Q. And you are stating that the Ross study consistently reports that no such effect occurs as a result of exposure to power frequency fields. First of all, could you define what you mean by the power

frequency fields?

A. Fields that come from 60 hertz transmission lines.

Q. You were not limiting that to a specific gauss level or milligauss level in this review, is that correct?

A. Correct.

Q. And after reviewing Figure 1 does that change your conclusion that the studies consistently report no such effect occurs as a result of exposure to power frequency fields?

A. No.

Q. And why not?

A. The proliferation effects as described in the Ross paper are nearly insignificant. In terms of amplitudes, magnetic field intensities, et cetera, different authors report effects that change at different levels. There has never been any consistent dose response with respect to the level of the fields. And therefore, putting this in context with the other research that I have reviewed, I think it has no bearing at all on the cancer question.

Q. Now, if we could go back to pages nine and ten of your testimony where you discuss the work of Dr. Liboff?

A. Yes.

Q. And just for summary purposes, would you agree that Dr. Liboff's work measured the uptake of tritiated thymidime?

A. The assay he used in the paper that I discuss in the testimony was tritiated thymidime uptake in cell, yes.

Q. I'm sorry. I was referring to the study you discussed.

A. Yes.

Q. And it was your conclusion in your testimony that this had no relationship to DNA synthesis, is that correct?

A. Yes.

Q. Is an increase in thymidime uptake by the cell consistent with an increase in DNA synthesis?

A. If there was an increase in DNA synthesis there would be an increase in tritiated thymidime labeling. But an increase in tritiated thymidime uptake does not mean there was an increase in DNA synthesis.

Q. You have used the terms labeling and uptake as obviously two different things. Could you explain the difference?

A. For the last answer it would be synonymous.

Q. If the word uptake and labelling is synonymous

in your last answer, would it be possible that Liboff's observations may be related to DNA synthesis?

A. Well, a lot of things are possible. But the experiments as performed and reported unfortunately don't tell us anything about DNA synthesis.

Q. And could this issue be resolved by repeating the experiment using a more direct assay for DNA synthesis than what was used in the Liboff study?

A. You are asking me could the experiment having done better or could a better designed experiment address the answer more specifically?

Q. Yes.

A. Yes.

Q. And do you think it is important to do so, to use a better designed experiment to address that question of DNA synthesis?

A. I think it has been done.

Q. And where has that been done?

A. I think other papers have looked at the effect of fields on cell growth and it has been included in other work and there have not been any clear demonstration that you can increase cell growth with power frequency fields.

MS. McCLOSKEY: I have no further questions, Your Honor.

JUDGE SMOLEN: Mr. Sugarman.

CROSS-EXAMINATION

BY MR. SUGARMAN:

Q. Do you agree with the U.S. Environmental Protection Agency, Air and Waste Management Division, report of August 9, 1991, that a wide variety of studies indicate an influence of E/MF on pathways that regulate cell growth and proliferation?

A. You are talking about the EPA draft report?

Q. No. I am talking about a technical paper entitled Status Report of the Research in Electromagnetic Fields prepared by the U.S. EPA, August 9, 1991.

MR. WATSON: Your Honor, I object to the question unless he shows him the document.

JUDGE SMOLEN: Why don't you show the witness the document.

MR. SUGARMAN: Sure.

BY MR. SUGARMAN:

Q. Directing your attention to the first full paragraph on page five --

MR. WATSON: Why don't you let me see it first.

(Document handed to Mr. Watson.)

MR. WATSON: This is a document prepared by a Michael Buccigrossi?

MR. SUGARMAN: Prepared by the agency. It is

issued by the agency. I object to your characterization.

MR. WATSON: I think it says at the bottom of page 12 prepared by Michael Buccigrossi.

MR. SUGARMAN: It is issued by the agency.

MR. WATSON: I think it is actually issued by Region II.

MR. SUGARMAN: That is the agency.

MR. WATSON: That is one of the regions of the agency.

JUDGE SMOLEN: What is the question, now?

BY MR. SUGARMAN:

Q. Do you agree or disagree with the statement in this published report, "A wide variety of studies on the other hand, indicate an influence of E/MF on pathways that regulate cell growth and proliferation"?

A. I have never seen this document. I don't know specifically what studies it is referring to. I would be glad to take time to read it and then talk to you about it. But to take a sentence out of it and to ask me whether it is true or not is just something that I can't --

Q. You don't have an opinion about -- you don't have to read the report to have an opinion on the subject. The statement is, "A wide variety of studies on the other hand, indicate an influence of E/MF on pathways

that regulate cell growth and proliferation." Do you have any opinion on that subject?

MR. WATSON: Objection. Asked and answered.

MR. SUGARMAN: He didn't answer it.

JUDGE SMOLEN: Well, it's answered in his direct testimony but it is cross-examination. So I will let him answer the question.

A. What pathways are you discussing?

BY MR. SUGARMAN:

Q. Any pathways.

A. The statement that you are reading to me is hopelessly broad and I can't answer it in any effective way.

Q. Are you familiar with the work on protein kinase activity in response to E/MF by Byus, et al. in 1984?

A. Yes.

Q. And the statement is made in here that "protein kinase activity has been altered in response to E/MF." Do you agree with that?

A. I am familiar with the paper by Byus. I don't necessarily agree with that conclusion about it but I am familiar with the paper.

Q. The statement is made, "magnetic fields have also been demonstrated to react a membrane bound

receptors in bone tissue of mice which stimulated collagen synthesis," citing Luben, 1982. Are you familiar with Luben's work?

A. I may have read it but I don't recall it right now.

Q. A statement is made, "another indication of cell proliferative activity, RNA transcription, was shown to increase with exposure to E/MF," citing Goodman and Henderson. Do you agree with that statement?

A. I am familiar with the work of Goodman and Henderson. Many of the papers that you're rapidly citing do not use just -- first of all, don't use just power frequency fields but some of them use pulse fields.

Secondly, the work of Goodman and Henderson about RNA transcription in some papers uses sinusoidal fields and in some cases uses pulse field.

So if we are going to talk about the data and what it means we will have to get more specific.

Q. The statement is made, "further supporting evidence shows human cancer sells were found to produce more colonies after exposure to magnetic fields or electric and magnetic fields combined but not electric fields alone," citing Philips and Winters, 1987, and stating, "this increased proliferative response was correlated with increased numbers of transferant

receptors, also indicative of growth potential." Are you familiar with Philips and Winters?

A. Yes.

Q. Do you agree with that characterization of their work?

A. No, for several reasons.

Q. The next statement is made, "E/MF is also suspected of having the potential to enhances the effect of other promoters. TPA, a known cancer promoter, was more effective in causing tumors when mice were also exposed to a magnetic field," citing Stuchly, et al., in 1989. Are you familiar with Stuchly?

A. Yes.

Q. Do you agree with that characterization of his work?

A. It is Maria. It's her work, Stuchly. And, no, as a matter of fact that is an absolutely incorrect reading of the data. There were no statistical significant differences in that work.

Q. So you, then, disagree -- well, do you disagree with the conclusion on page six, "individually and collectively the results of these studies support the hypothesis that E/MF influences cell growth patterns and as such may have the potential to promotion cancer cells"?

A. I have not read that document. Using the statement that you just read and the studies that you have just reeled off, I completely disagree. It is an erroneous conclusion and it reflects a complete misunderstanding of the biology of cancer and of cell biology.

Q. Now, you were asked by Ms. McCloskey about whether you considered any of the epidemiological studies in formulating your opinion as expressed in your direct testimony. Is it true that you have not considered any of the epidemiological studies?

A. I don't know what you mean by considered. I have read them.

Q. Well, do you agree that the epidemiological studies by Wortheimer, Savitz, and -- well, I will withdraw the question and ask a couple of preparatory questions.

Are you familiar with Matanoski's report or study?

MR. WATSON: Your Honor, I am going to object to this right now so that there is no question of waiver beyond this. This witness has testified in a specific field. He has identified that field, he said he is not an epidemiologist. He didn't testify on it. And it is totally inappropriate cross-examination to begin to attempt to cross-examine him on the field that Dr. Cole

testified in just the other day. It is beyond the scope of his direct examination.

JUDGE SMOLEN: Mr. Sugarman.

MR. SUGARMAN: Well, he has testified that he read the epidemiological studies. I am asking if he considered them. By consider I mean did they have any bearing on your opinion one way or the other.

JUDGE SMOLEN: I will allow that question.

MR. SUGARMAN: I am withdrawing that question. I want to know, because it is obvious if he didn't consider them --

JUDGE SMOLEN: Just ask the question.

MR. SUGARMAN: Fine.

BY MR. SUGARMAN:

Q. Did they have any bearing on your opinion one way or the other?

A. In terms of what I have written in my report?

Q. And what you have answered Ms. McCloskey's questions.

A. No.

Q. Do you consider it scientifically appropriate to exclude epidemiology?

MR. WATSON: Objection, Your Honor. Argumentative.

JUDGE SMOLEN: I am going to sustain that. He is offered as an expert in a particular field and that is

what he has testified to.

BY MR. SUGARMAN:

Q. Do you consider it be accepted procedure in your field, oncology, to exclude consideration of epidemiology in forming conclusions about your work?

MR. WATSON: Objection, Your Honor. The same objection. It's argumentative. He has testified to a particular field.

MR. SUGARMAN: It's not argumentative.

JUDGE SMOLEN: Sustained. Next question.

MR. SUGARMAN: It's not argumentative.

JUDGE SMOLEN: He has testified -- the objection was sustained.

MR. SUGARMAN: But I have a right to find out whether he considers it appropriate to -- whether it is his understanding of his field that epidemiology should or should not be considered.

JUDGE SMOLEN: That's a different question.

MR. SUGARMAN: Okay.

BY MR. SUGARMAN:

Q. Do you consider it appropriate -- do you have an opinion about whether your field considers it appropriate to exclude epidemiology in forming opinions in your field?

A. Yes, I have an opinion.

Q. What is your opinion?

A. My opinion is that in scientific knowledge one must take all information and assess it for its worth.

Q. Well, did you assess the epidemiology for its worth?

A. I was not asked to assess the epidemiology, and it's beyond the scope of my expertise.

Q. So, then, if in all scientific fields you must assess the related information, as you have just said, and yet you can't do it, how could you fulfill your scientific or how did you fulfill your scientific obligation?

MR. WATSON: Objection, Your Honor. Argumentative.

JUDGE SMOLEN: Sustained.

BY MR. SUGARMAN:

Q. You said it has to be done. You said you couldn't do it. How do you square those two?

MR. WATSON: Objection, Your Honor. Argumentative. It's the same question.

MR. SUGARMAN: This is cross-examination.

BY MR. SUGARMAN:

Q. How could you reach a conclusion -- I am trying to be non-argumentative. This is not a rhetorical question. How do you go about reaching a conclusion if you can't do something that is necessary to do?

MR. WATSON: Objection, Your Honor. Argumentative. Counsel knows well that this expert has testified in a particular field. If you want an opinion in the field of epidemiology you go to an expert in epidemiology and get it.

MR. SUGARMAN: I don't want an opinion in the field of epidemiology. I don't want that. What I want is I want a response --

JUDGE SMOLEN: Temperance, Mr. Sugarman. Temperance, please. Go ahead.

MR. SUGARMAN: I'm sorry.

JUDGE SMOLEN: What was your response to the objection?

MR. SUGARMAN: My response to the objection is that the witness has said that it is necessary to consider all relevant information. I asked him if he assessed the relevancy of the epidemiology. He said he couldn't do it. So my question is how can he form an opinion without doing it. If it's necessary to do it -- it seems to me it's a syllogism. So I am asking him to explain.

JUDGE SMOLEN: You can respond.

MR. WATSON: Your Honor, I think this started with the same series of questions. It's an argumentative question. It is based upon a fundamental misunderstanding or position that Mr. Sugarman has that

somehow this expert must go into the field of epidemiology necessarily to reach a conclusion, even if he has enough in the field of molecular genetics alone to reach an answer.

MR. SUGARMAN: Well, if that is his answer let him give that answer. But that is Mr. Watson's testimony.

JUDGE SMOLEN: One voice at a time.

MR. WATSON: And this expert has said that as to offering an expert opinion in the field of epidemiology, he has left that to somebody with expertise in that field.

MR. SUGARMAN: That is not what he said.

MR. WATSON: He has made that, I think, clear, and all of this is basically argument.

MR. SUGARMAN: That's not what he said --

JUDGE SMOLEN: Let's ask the question again. Please, let's keep composure here. Ask the question again.

MR. SUGARMAN: I mean, I would just like to response -- I will ask the question, Your Honor, but I would like to respond to what I would consider the epithet that something is argumentative whenever Mr. Watson doesn't like it. I don't understand the term if it means everything that is cross-examination. I mean, I don't believe Mr. Watson either believes what he

says or knows what he is saying when he characterizes questions as argumentative simply because they take previous testimony and ask the witness if he can reconcile it.

JUDGE SMOLEN: Ask your question.

BY MR. SUGARMAN:

Q. You testified that it is necessary to consider all relevant data.

JUDGE SMOLEN: Wait. Was that your testimony? Finish that piece of the question.

MR. SUGARMAN: Can we read it back?

JUDGE SMOLEN: Yes.

MR. SUGARMAN: Well, it was before the last question. First I asked is it necessary to consider epidemiolcgy and he said yes, it's necessary --

JUDGE SMOLEN: To do what? Necessary to consider epidemiology in what.

MR. SUGARMAN: In forming a scientific opinion.

JUDGE SMOLEN: About what?

MR. SUGARMAN: In his field.

JUDGE SMOLEN: And what was your answer? Put that on the record again. What was your answer to that?

THE WITNESS: Can I get the question one more time? I'm sorry.

JUDGE SMOLEN: Just repeat that question.

BY MR. SUGARMAN:

Q. I asked in your field of oncology is it necessary to consider epidemiological evidence in forming opinions --

A. Yes.

Q. -- as a matter of scientific practice.

JUDGE SMOLEN: He answered yes. Go ahead.

BY MR. SUGARMAN:

Q. And I asked you, then, did you consider the epidemiology, and you said no, it was outside the scope of your assignment and outside the scope of your expertise, isn't that right?

MR. WATSON: Your Honor, I object to that. That is a misstatement of the record. He did not say -- he said he did not consider it with respect to the issues presented in --

JUDGE SMOLEN: Well, let's ask the question and get the witness to answer. If it's repetitive, it's repetitive. Ask the second half of your question again.

MR. SUGARMAN: The only trouble is if I get a different answer I want to go back to the earlier one because Counsel is trying to coach the witness through his arguments.

BY MR. SUGARMAN:

Q. I will ask it fresh as if I didn't ask it

before. Did you consider the epidemiology and did it affect your conclusion one way or the other? I think you answered no, right?

A. I read the epidemiology; it did not affect my conclusion.

Q. Right. Then I asked you did you consider it. I will ask you that again. Did you consider it?

A. I considered it as I would any epidemiologic study that I would read as a medical oncologist.

Q. Do you remember answering me five minutes ago that it was outside the scope of your assignment and you don't have the expertise? Do you remember giving me that answer five minutes ago?

A. Yes.

Q. Okay. Now, if it was outside of your assignment and outside of your expertise, how did you consider it?

A. It is not abnormal or unreasonable to read something and be informed about it. For the purposes of the area that I was asked to review and comment on based on my expertise I focused on molecular and cellular biology and the tumor cell genetics of the question. There is nothing about the epidemiology that is considered in the report. I am aware of the epidemiology.

For example, if I were reading a paper about the epidemiology of some other cancer, I would read it and weigh it as I could. If I were very concerned about it and if I wanted to know more I would go to an epidemiologist and say what do you think about the data in this study and I would utilize that expertise.

Q. Did you ask Counsel whether you could consult with an epidemiologist as part of your scope of work?

A. The epidemiology was outside the scope of the work. I wasn't asked to consider it as part of the studies that I have cited. I am focusing here on the cell biology and the genetics of the question.

Q. Didn't you just say a little while ago that it is necessary to consider the science -- I'm sorry -- that it is necessary to consider the epidemiology in doing the science?

MR. WATSON: Objection, Your Honor.

JUDGE SMOLEN: I am going to sustain it. It has been asked and answered. We are going over the same thing. Go to the next question.

BY MR. SUGARMAN:

Q. About the epidemiology, if it were true that the epidemiology showed a trend of association between childhood leukemia and exposure to E/MF, would that affect your conclusions?

MR. WATSON: Objection, Your Honor. It assumes facts not in evidence. There is no evidence to support a proposition that the epidemiology would at all support that view. In fact, the only evidence by a qualified epidemiologist is directly to the contrary.

MR. SUGARMAN: Rosenbaum testified on the basis of literature review. Liboff testified on the basis of his participation that the epidemiology shows that association. The witness Cole conceded there is an association. He challenged the epidemiology, but he agreed there are epidemiological studies that purport to show an association between E/MF and childhood leukemia. So there is plenty of evidence in the record.

MR. WATSON: Your Honor, just to respond to that, neither Rosenbaum nor Liboff have any qualifications in the field of epidemiology whatsoever, and Dr. Cole did not testify as Mr. Sugarman described it.

MR. SUGARMAN: He certainly did.

JUDGE SMOLEN: One says yea and the other says nay. Let's get the question again.

BY MR. SUGARMAN:

Q. If there were studies that showed --

JUDGE SMOLEN: Is this a hypothetical question?

MR. SUGARMAN: Yes. But it is based on evidence in the record. I don't expect the witness have read the

record --

JUDGE SMOLEN: Let's hear it.

MR. SUGARMAN: -- since part of it was made yesterday.

BY MR. SUGARMAN:

Q. If there were studies that showed an association or purported to show an association between exposure to E/MF and childhood leukemia would that change your opinion?

JUDGE SMOLEN: About what?

BY MR. SUGARMAN:

Q. About your conclusion that exposure to E/MF has no effect on cancer.

JUDGE SMOLEN: You may answer.

A. It would not change my opinion based on the studies I reviewed and my scientific expertise.

BY MR. SUGARMAN:

Q. Now, if there were epidemiological studies which purported to show an effect of exposure to E/MF on cancer incidence in occupational fields of adults, would that change your testimony?

A. No.

Q. Now, did you study potential effects of E/MF on the pineal gland?

A. Can you be more specific?

Q. Did you study whether E/MF affects the production of the pineal gland?

A. I have read some papers in that regard, but E/MF effects on pineal gland secretion is outside of my expertise.

Q. So when you gave your opinion in your direct testimony at page 22, lines 24 to 27, that, quote, the extensive research on molecular and cellular biology and cancer provides no scientific basis to conclude that power frequency electric and/or magnetic fields cause, promote or contribute to the development of cancer or other adverse health effects, end of quote, you did not include in that possible cancer impacts of effects on the pineal gland, is that right?

A. Yes, I did.

Q. Well, how could you do that if you didn't study -- please tell us, and this is a non-argumentative -- can you please tell you how you could consider them in forming that conclusion if you didn't have the expertise to consider whether E/MFs affect pineal gland production?

MR. WATSON: Objection, Your Honor. It is argumentative. He asserts in there that the witness didn't have the expertise.

MR. SUGARMAN: All I did was quote his own testimony.

JUDGE SMOLEN: I am going to overrule the objection. You can answer that question.

A. You are talking about two different things. The effects on the pineal gland in animals is an endocrinologic question. The issue of whether the primary pineal hormone, which is melatonin, which has something to do with cancer in humans is an oncologic question, and the answer is that it has nothing to do with cancer in humans.

BY MR. SUGARMAN:

Q. So you are not testifying as to whether the effect on the pineal gland could have some other health effects other than cancer?

A. I didn't say that.

Q. So, well, if you don't have the --

JUDGE SMOLEN: I'm not sure the witness finished his answer.

THE WITNESS: I'm done.

JUDGE SMOLEN: Okay. Sorry.

BY MR. SUGARMAN:

Q. What is your basis or did you -- let me ask the question a different way. Do you wish to express an opinion about whether effects on melatonin production by the pineal gland have any health effects or may have any health effects?

A. No.

Q. Do you wish to express an opinion on whether they have any adverse health effects? That is, on whether reduction of production in the pineal gland has any adverse health effects. Do you wish to express an opinion on that?

A. Not outside my area of expertise or what I have written in my report.

Q. Well, you have written in your report, quote, other adverse health effects, which could cover everything or nothing. And it does not say any other. So it may say some other or whatever. So I am asking you specifically with respect to the potential adverse health effects of decreases in melatonin production by the pineal gland, are you wishing to express an opinion as to whether that might have any adverse health effects?

MR. WATSON: Objection, Your Honor. Asked and answered.

MR. SUGARMAN: Oh, no.

JUDGE SMOLEN: Wait. Give him a chance.

MR. WATSON: I would like to finish my objection before Mr. Sugarman reacts.

I think the witness clarified when Ms. McCloskey asked him the specific phrase "other adverse health effects" that he was referring to adverse health effects

within the field of molecular and cellular biology and cancer only. He made that clear. He has already answered this.

JUDGE SMOLEN: What I am going to do is I am going to overrule the objection. If the witnesses wants to answer it that way then he will answer. He is an sophisticated witness. He is an expert. He can answer that question, what he meant, really, by adverse health effects. If it's surplusage, it's surplusage.

THE WITNESS: Can I get the question read back, please?

(Whereupon, the reporter read from the record as requested.)

A. No.

BY MR. SUGARMAN:

Q. Thank you,

Now, are you familiar with the work of Grahm, et al., dealing with a slowing of human heart rate during exposure to magnetic fields?

MR. WATSON: Objection, Your Honor. Beyond the scope of his testimony. He didn't testify as a cardiologist.

BY MR. SUGARMAN:

Q. It says here the extensive research on molecular and cellular biology and cancer provides no

scientific basis to conclude that power frequency electric and/or magnetic fields cause, promote or contribute to the development of cancer or other adverse health effects. What does that phrase other adverse health effects mean? You talk cellular and molecular biology as if that limits the phrase other adverse health effects. Fine. Now I need to know is the slowing of the human heart a molecular or cellular biology question.

JUDGE SMOLEN: Well, that is okay.

MR. WATSON: If he asks that question that would be different.

BY MR. SUGARMAN:

Q. You indicated, and Mr. Watson --

JUDGE SMOLEN: Well, wait a minute. Let's get an answer to that.

BY MR. SUGARMAN:

Q. Is the slowing of the human heart a molecular or cellular biology question?

A. It may be and it may not be.

Q. And as you gave your testimony, other adverse health effects, were you intending to give an opinion and are you now intending to give an opinion as to whether E/MF slows human heart rates?

A. You are asking me if E/MFs slow human heart rates?

Q. I am asking you if you are intending to give an opinion on that subject.

A. No.

Q. Are you familiar with the work of Creim, et al., 1989, concluding that behavioral effects have also been investigated and that rats made more errors in performance in a radial arm maze when exposed to a DC magnetic field combined with a 60 hertz magnetic field?

A. No.

MR. WATSON: Your Honor --

JUDGE SMOLEN: Well, he answered. He's not familiar with the study.

BY MR. SUGARMAN:

Q. Now, did you include in your opinion anything having to do with effects of E/MF on reproduction?

MR. WATSON: Your Honor, objection. This is --

BY MR. SUGARMAN:

Q. What does the phrase other adverse health effects mean?

MR. WATSON: He has testified several times that by other adverse health effects, and he started with the cross-examination by the OCA, that it refers to, and he said it at least twice, molecular and cellular biology in cancer.

MR. SUGARMAN: Okay. Let me ask the other

question.

JUDGE SMOLEN: Sustained.

BY MR. SUGARMAN:

Q. Are reproduction effects within the term molecular and cellular biology?

MR. WATSON: Your Honor, that is not -- I object to that. That is not the same question.

MR. SUGARMAN: It's a different question.

JUDGE SMOLEN: I sustained your objection before. Now it's a new question.

MR. SUGARMAN: I am asking the question.

A. They could be.

BY MR. SUGARMAN:

Q. Were you intending and are you now intending to express an opinion as to the effect of E/MF on reproduction?

A. I have not done an exhaustive literature search on the issue of reproduction. Some of the papers that I have read included information about reproduction.

Q. My question is were you and are you now intending to express an opinion about reproduction as affected by E/MF?

A. You want to know if I am saying that E/MF has an effect on human reproduction?

JUDGE SMOLEN: No. That wasn't the question. Do

you intend to express an opinion on that?

THE WITNESS: No.

BY MR. SUGARMAN:

Q. Thank you.

Now, on the question of cyclotron resonance you expressed an opinion with respect to some of Dr. Liboff's work, specifically at pages nine and ten of your testimony and 19 and 20 of your testimony. My question is this: if I understand -- and this is a very complicated area for me at least so this question may seem too simplistic to you -- if I understand your testimony you are not challenging that Dr. Liboff might have demonstrated that the ion cyclotron resonance effect occurs. Your question is does it have any effect on human health. Is that what I -- and you believe that he has not demonstrated that it has any effect on human health. Am I correctly interpretting your testimony?

A. You lost me. I don't think I said anything about ion cyclotron resonance. I'm not sure I used the term in the report. Where are you referring to?

Q. I am referring to Liboff's work on DNA synthesis and on cell proliferation.

A. That is the paper referred to on page nine of my report, Liboff et al., in Science, 1984?

Q. Right. And Liboff's paper, 1991, cited at

pages 19 and 20 of your report. Liboff is referred to in lines 34 to 35 as Liboff's recent abstract using lymphoma cells.

JUDGE SMOLEN: What is the question again so that the witness knows what he is being asked?

BY MR. SUGARMAN:

Q. Is it your intention in either section of your testimony that I am referring to to challenge the statement or conclusion or to question the work as to whether electromagnetic fields cause ion movement across cell membranes?

MR. WATSON: Objection, Your Honor. That is a compound question, I believe.

JUDGE SMOLEN: Is a compound question. Break it up.

MR. SUGARMAN: All right. I'll break it down.

JUDGE SMOLEN: Sustained, then.

BY MR. SUGARMAN:

Q. Dr. Liboff -- you are familiar with Dr. Liboff's work as reflected in the references on pages nine and 19. Are you questioning whether there is a mechanism of action on E/MF by way of cyclotron resonance?

MR. WATSON: Objection, Your Honor. That is the same question, I believe. He has referred to page nine

and then page 19. They are two different sets of studies. On page nine it is an '84 study --

JUDGE SMOLEN: Sustained.

MR. SUGARMAN: Let's try it separately.

BY MR. SUGARMAN:

Q. In your critique or discussion of Liboff at pages 19 and 20, do you challenge his conclusions with respect to the mechanism of cyclotron resonance in causing movement of ions when exposed to E/MF?

MR. WATSON: Your Honor, I don't see a challenge to conclusions here or any reference to what he is talking about. I think the question is vague.

JUDGE SMOLEN: It's a good question. It may not be -- it's not objectionable. So I will overrule the objection.

You may answer if you understand the question?

A. Are you asking my conclusions about cyclotron resonance?

BY MR. SUGARMAN:

Q. Right.

A. I think you are better off to ask a physicist.

Q. You testified that the melatonin research does not provide a pathway by which exposure to E/MF could cause cancer in humans. That's page 19, lines 23 and 24. You then testify there are no data connecting melatonin

levels to breast cancer causation in humans. Are you including in the term no data epidemiological data? Or do you mean experimental data?

A. To my knowledge as a medical oncologist there is no data connecting melatonin levels to breast cancer causation in humans.

Q. Have you made any inquiry as to whether there is any epidemiology on that?

A. I have read several papers in the field. I couldn't quote them to you at this time.

Q. Now, the question that you were answering asks whether there was a pathway, whether they provide a pathway. And your answer is no to that question. Have you found any pathway by which any agent causes cancer in humans?

A. You want to know if I know of some agent that causes cancer in humans and how?

Q. I am using the term pathway. Have you found any pathway by which any agent causes cancer?

A. We know of a number of agents that cause cancer.

Q. That is not the question, sir. The question relates to the term pathway. Have you found any pathway by which any agent causes cancer?

A. I personally know of several agents that

through biochemical pathways cause cancer.

Q. Through biochemical, but can you tell us what the biochemical pathway is and how it works?

A. Yes.

Q. Okay. Tell us one, please.

A. Breast cancer causation.

Q. Go ahead. Tell us the pathway and how it works.

A. Estrogen is required for breast cancer causation.

Q. Right.

A. Estrogen stimulates breast cell proliferation and is a tumor promoter in humans as well as in animal models.

Q. How does it work to do that? What is the pathway? How does estrogen do that?

A. Perhaps your definition of pathway is different from mine. What specifically do you mean by pathway?

Q. How does it work?

A. It works by being a tumor promoter.

Q. So when you say does the research provide a pathway by which exposure to E/MF, referring to Wilson's research and the others on melatonin, what is the difference between the answer you just gave about estrogen and the answer that they give about melatonin

levels in terms of being able to describe exactly how it happens? What is the difference?

A. Well, would you please tell me what you are talking about when you talk about Wilson and what is it that he said that you want me to comment on?

Q. They show that reduced levels of -- they show that E/MF reduces melatonin levels. Melatonin levels have been associated with cancer. What do you mean by saying that there is no pathway?

MR. WATSON: Objection, Your Honor. It assumes facts not in evidence. In fact, they haven't shown that. That is just Counsel's assertion.

BY MR. SUGARMAN:

Q. Do you agree that they purport to show that?

A. Do I agree that they purport to show what?

Q. That melatonin levels are lowered.

A. In a study done by Wilson? I would have to look at the study to tell you what they show.

Q. It says here, "Have you reviewed the research by Wilson and others on melatonin?"

"Yes, I have reviewed that research. For example, Lerchl, '91; Reiter, '90; Wilson, '81, '86 '88 and 99."

A. Yes.

Q. Do you agree that that shows that E/MF exposure lowers melatonin production?

A. No.

Q. Do you agree that it purports to show that?

A. Yes.

Q. Do you agree that melatonin reduction is a cancer promoter?

A. No.

Q. I understand now.

(Pause.)

Q. Are you familiar with the use of electromagnetic fields to promote bone healing?

MR. WATSON: Objection, Your Honor. Beyond the scope. He didn't testify in the area of --

JUDGE SMOLEN: Sustained. Go ahead.

BY MR. SUGARMAN:

Q. Are you testifying that E/MF does not affect -- and this is not a rhetorical question or an argumentative question -- are you intending to testify that E/MF does not affect cell formation and proliferation?

A. My testimony was that power frequency fields do not affect cell proliferation.

Q. Now, do you know whether they affect cell proliferation in connection with healing of bones?

A. No, I don't.

Q. Are you familiar with the use of E/MF in the medical community to affect bone healing?

A. I am vaguely aware that there are devices which are used to try to affect bone healing.

Q. And have you made any inquiry to determine whether they have any success?

A. Yes. Actually it is a very interesting area.

Q. And what is the nature of the inquiry that you made?

MR. WATSON: Your Honor, I assume that these questions are related to his testimony about the impact on cells as distinquished from the separate field of bone healing.

JUDGE SMOLEN: Cell proliferation, I think.

MR. WATSON: If that is the case I have no objection as long as they are within that arena.

MR. SUGARMAN: Cell proliferation, yes.

BY MR. SUGARMAN:

Q. Go ahead.

A. The question had to with what my inquiry was?

Q. Yes.

A. I have read several papers in the area.

Q. Do you have any reason to doubt that electromagnetic fields are successful in promoting cell proliferation as a means of healing bones?

A. I do.

Q. What is your reason for doubting it?

A. Well, the rigorous test of a medical or therapeutic modality often is a randomized trial. And I looked hard for randomized trials in this area and only one was started and it got to the point where 14 patients were randomized, 14 patients with fractures had not healed for more than a year, which is a long time, were randomized, 14 to receive the application of a device which was not turned on. So these patients were put to bed with this device strapped on but it was not working. And half of the patients were given the same treatment, only the device was turned on. And an equal number of fractures healed in both of those groups. So in the one study that was initiated and the one preliminary report that I read there was in fact no difference between those two groups.

And because I was particularly curious about it, because it is sort of intriguing, I couldn't find any evidence that when this was tested rigorously that at least one device did any good whatsoever.

Q. Is the device approved for use by the FDA?

A. I don't know. I don't use them. I am not an orthopedist.

Q. Have you talked to any clinicians who are using it?

A. No, I have not.

Q. Do you consider clinical evidence to be a valid basis for forming conclusions about the scientific processes?

A. Clinical experiments have to be evaluated for their rigor just as any other scientific study does.

Q. I didn't mean clinical studies, I meant clinical results, clinical effects?

A. Clinical anecdotes are virtually worthless.

Q. What was the study that you referred to that indicated equivalent or comparable healing for control and treated patients or individuals?

A. I believe Bassett was one of the authors but I would have to get it out of my files for you. I don't recall it.

Q. Do you agree that the Adey laboratory has interpreted their data as having a relevance between E/MF and cancer?

A. Which data are you --

MR. WATSON: Objection, Your Honor. I don't see how this witness could possibly be an expert on how someone who is not here in the courtroom today interprets his own data. There is no way he could know that.

MR. SUGARMAN: I don't mean in their heads. I mean in the reports.

MR. WATSON: If he shows him a report and asks him,

that would be a different question.

JUDGE SMOLEN: I sustain the objection.

BY MR. SUGARMAN:

Q. Have you previously testified, specifically in a New Jersey Public Utility Commission hearing, that in response to a question, "In reviewing the published work by the Adey laboratory isn't it true that in interpretting their data they suggest it has relevance to cancer?"

"Answer. In the discussion sections of the papers they do make those speculations."

Do you recall that question and answer?

A. Yes.

MR. WATSON: Could we have the page and line on that?

JUDGE SMOLEN: He has answered the question but, please, supply the page and line number of that.

MR. SUGARMAN: The page?

JUDGE SMOLEN: Yes.

MR. SUGARMAN: Here it is, page 52 and 53 of his cross-examination in New Jersey.

BY MR. SUGARMAN:

Q. And the next question was, "I take it from your direct testimony it is fair to say that to the extent that the OTA, Office of Technology Assessment, report

agrees that their research may have a relationship with cancer, you disagree with the OTA report, right?"

"Answer. With some of the assessments of the biological significance of the results from Adey's lab, yes. I think it is not critically assessed."

Do you still hold that opinion?

A. Yes.

Q. Now, the Adey studies were related to ODC levels, were they not?

A. There is one paper that I am familiar with on ornithine decarboxylase level. Let s just make sure we are talking about the same one. Wh ch one are we talking about?

Q. That one. I am not going to try to pronounce it. Are you familiar with that, right?

A. I am familiar with the paper in Cancer Research which addresses ornithine decarboxylase levels, yes.

Q. And that is the research in which Adey and his group purported to associate the impacts of E/MF with cancer, is that not correct?

A. I'm not sure about that.

Q. I thought you said that -- "Isn't it true that in interpreting their data they suggest that it has a relevance to cancer?"

"Answer. In the discussion sections of the paper

they do make those speculations."

A. That particular paper in their discussion section says that the data presented in the paper -- that any connection between cancer causation and that data is entirely speculative. I believe it is phrased something like that.

Q. Now, is it true that in the New Jersey proceeding you were not asked to get into the initiation and promotion process?

A. I don't remember.

Q. I show you Mr. Watson's statement at pages 33 and 34 of the record, where it says, "Here we have a medical oncologist testifying on the medical oncology and the cellular biology," referring to you. "Dr. Boutwell was testifying solely limited to the question of cancer initiation and promotion processes, which is a separate area. And he was not a medical oncologist. He was a regular oncologist. So while they may use the same study, we have the same situation here."

And he goes on to say, "We are not asking him" -- he says, "You've have heard the same study mentioned by several different people and you will probably hear a number of studies mentioned by several different people, but we are confining them to the area of expertise that they are in and what that study tells them only within

that area. We are not asking him," that is referring to you, "to get into the initiation and promotion process. I think you can tell already we have not asked him that."

MR. WATSON: Your Honor, I object to this. He is entitled to cross-examination the witness about a prior inconsistent statement, but nothing more. There is no statement by the witness here.

JUDGE SMOLEN: I don't have a question yet.

BY MR. SUGARMAN:

Q. Do you remember in the New Jersey proceeding that you did not get into initiation and promotion?

MR. WATSON: Objection, Your Honor. Irrelevant. He is only entitled to ask him about a prior inconsistent statement from an another case.

JUDGE SMOLEN: I'm going to sustain that.

BY MR. SUGARMAN:

Q. Is it true that you are not an expert in initiation and promotion?

A. No.

Q. Are you an expert in initiation and promotion? Or should I break it down separately?

A. I have an expert understanding of the molecular events of the initiation and promotion of cancer.

Q. Did you indicate an unwillingness to testify in that area previously?

A. No.

MR. WATSON: Objection, Your Honor. Irrelevant.

JUDGE SMOLEN: He answered.

You mean in this proceeding?

MR. SUGARMAN: No. Previously in response to Mr. Watson's request.

JUDGE SMOLEN: In the other case?

MR. SUGARMAN: Yes.

JUDGE SMOLEN: Sustained.

BY MR. SUGARMAN:

Q. You answered Ms. McCloskey that you didn't see any indication of any need for more research in the field, is that correct? Of E/MFs and cancer.

A. My answer sounded something like that but it wasn't exactly that.

Q. Could you tell us how I misstated it and correct me?

A. I would have to rehear her questions.

MR. WATSON: Objection, Your Honor. This is repetitious.

JUDGE SMOLEN: It may be repetitious of what Ms. McCloskey asked, but we have a different attorney representing a different client and I think he is allowed some latitude. So I will overrule.

BY MR. SUGARMAN:

Q. Is it your opinion that there is no need for additional research relating to E/MF exposure in cancer within your field?

A. Yes.

Q. That's what I thought. Okay.

And do you recognize Reiss, R-e-i-s-s? I think you cite him in your direct.

A. Isn't it R-e-e-s-e?

Q. Okay.

A. Are we talking about the same Reese?

Q. Yes, possibly so. His work of 1988. Yes, Reese, Jostes and Frazier, Exposure of Mammalian Cells to 60 hertz Magnetic or Electric Fields, cited at page 32 of your testimony.

A. Yes.

Q. Do you agree that he recommends additional research be done?

A. I don't recall what was said in that regard in that paper.

Q. In the New Jersey proceeding you were quoted a page of that report. Page 12 of your testimony, "The research represents part of a systematic study by his laboratory to determine mechanisms by which electrical or magnetic fields interacted with cells and cellular constituents." You agreed that that was a correct

statement.

MR. WATSON: Your Honor, I think he ought to show him the statement if he is going to read from another transcript. And there does not seem to be any prior inconsistent statement anyway.

JUDGE SMOLEN: It may be the groundwork for a prior inconsistent statement.

BY MR. SUGARMAN:

Q. Did you agree in New Jersey that Reese recommended additional research on the possibility that a low rate of DNA damage if linked to cell cycle would not have been detected after a one hour exposure?

MR. WATSON: Objection, Your Honor. There is prior inconsistent statement.

JUDGE SMOLEN: Of this witness?

MR. WATSON: Of this witness.

JUDGE SMOLEN: Sustained.

MR. SUGARMAN: I will withdraw the question. I don't have the Reese report. I think it is easier just to withdraw the question.

BY MR. SUGARMAN:

Q. You testified that not all genetic change results in cancer at page seven of your testimony, lines 15 to 25. How would you go about determining whether any particular genetic change causes cancer?

A. There are numerous experimental techniques to ask those questions depending on what genetic change you are specifically referring to.

Q. What studies have been done to determine whether genetic changes lead to -- caused by E/MFs -- lead to cancer?

A. Well, as I have outlined in my report, the first questions that have been asked, or questions that have been asked focus on whether E/MF can cause genetic change, and the answer to that is conclusively no. The second questions that have been asked are whether exposing small animals with short lifespans to E/MF results in the formation of cancers, and the answer to that question has also been no. So those are two kinds of experiments that can be done.

Q. That's it?

A. Those are the main E/MF studies that I have relied on, and that is a very short summary of what is referred to in here.

Q. Now, is a genetic change the only way that an agent can cause cancer?

A. The only way that cancer can be caused is by genetic change.

Q. Are changes in melatonin production genetic changes?

A. No.

Q. Are changes in cell proliferation genetic changes?

A. No.

Q. So your conclusion is that changes in melatonin and genetic changes -- changes in melatonin and cell proliferation couldn't cause cancer?

MR. WATSON: Asked and answered, Your Honor.

MR. SUGARMAN: Okay.

BY MR. SUGARMAN:

Q. How do you explain the positive findings of the epidemiological studies?

MR. WATSON: Objection, Your Honor. Beyond the scope.

JUDGE SMOLEN: Sustained.

MR. SUGARMAN: No further questions.

MR. WATSON: No questions, Your Honor.

JUDGE SMOLEN: The witness is excused. Thank you very much for appearing and testifying today.

(Witness excused.)

JUDGE SMOLEN: I didn't bring my calendar in, but there is a date for the exchange of the testimony of your other witnesses.

MR. WATSON: Yes, Your Honor. And I believe we also owe everybody here a report on Dr. Rosenburg. And I

think we will need some calendars in order to talk about that, the scheduling.

JUDGE SMOLEN: Let's take a break. We will go off the record now and discuss the scheduling.

(Recess.)

JUDGE SMOLEN: Back on record.

Our scheduling still stands, then. Rebuttal testimony is due from the electric company on December 5 on its remaining rebuttal witnesses. If there is any problem with any one of the witnesses then we will have a telephone conference and iron that out at that time.

And the next set of hearings will be on December 16 and 17 here commencing at 10:00 a.m.

Anything further?

(No audible response.)

JUDGE SMOLEN: There is no response. The hearing is adjourned. Thank you all very much for appearing today.

(Whereupon, at 11:58 a.m., the hearing was adjourned, to be reconvened at 10:00 a.m., on Monday, December 16, 1991, in Philadelphia, Pennsylvania.)

C E R T I F I C A T E

I hereby certify, as the stenographic reporter, that the foregoing proceedings were taken stenographically by me and thereafter reduced to typewriting by me or under my direction; and that this transcript is a true and accurate record to the best of my ability.

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