SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF LOS ANGELES
DEPARTMENT 308 HON. CHARLES W. MC COY, JUDGE

RICHARD BOEKEN,	)	
	)	
PLAINTIFF,	)	
	)	
VS.	)	SUPERIOR COURT
	)	CASE NO. BC 226593
PHILIP MORRIS, INCORPORATED, A CORPORATION; INTERNATIONAL HOUSE OF PANCAKES, INCORPORATED, A CORPORATION,	)	
	)	
DEFENDANTS.	)	
	)	

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OFFICIAL REPORTER

I N D E X

CASE NUMBER: BC 226593
CASE NAME: BOEKEN v. PHILIP MORRIS
LOS ANGELES, CALIFORNIA Wednesday, MAY 10, 2001
DEPARTMENT 308 HON. CHARLES W. MC COY, JUDGE
APPEARANCES: (AS NOTED ON TITLE PAGE.)
REPORTER: LINDA STALEY, CSR NO. 3359, RMR, CRR
TIME: A.M. session after a.m. recess

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THE COURT: Mr. Carlton.

Thank you for your patience, sir.

MR. CARLTON: Thank you, Your Honor.

Q. Dr. LUDMERER, when we left off, you were going to tell us about the period 1954 to '64.

What kind of research was going on during that period?

A. The next major step in the investigation was the publication of the first prospective epidemiological studies in 1954.

Q. Okay. What's the difference between a prospective and the retrospective studies we've already talked about?

A. "Prospective" means going forward versus "retrospective," which means looking backwards.

In the prospective studies, the various teams of investigators started with individuals who either chose to smoke or had chosen not to smoke and followed them forward

over a period of time to see what happened to both of those groups.

It is important to point out that prospective studies are not experiments. These are still observational studies that require statistical analysis. You still have the problem of controls. You don't know that those who used to smoke are completely the same as those who choose not to smoke. So they're not considered experiments.

On the other hand, they are much more powerful tools for investigation than the retrospective studies. The prospective studies were able to study tens of thousands or even hundreds of thousands of individuals compared with the retrospective studies that had either hundreds or a few thousand patients in those studies.

The fact that you could go forward in time meant that scientists didn't have to trust memories, how much do you smoke, you could monitor as you smoke, how good is the heating in your house, this sort of thing.

So they were, as I say, much more powerful tools. They had never been done before. This was the first time in the history of medicine that prospective studies of this sort had been undertaken for chronic disease. They were epidemiological studies that were experiments, but they were much more powerful and persuasive than the earlier retrospective studies had been.

Q. And did these retrospective studies continue throughout the period?

A. Yes, they did. And that's an important

historical point to remember. The first prospective studies were published in 1954. There was the DONALD AND hill study, which studied physicians in England. And there was the hammer and horn study in the United States, which used volunteers from the American cancer study that defined individuals to study.

But these studies were -- they didn't stop in 1954. They went FORWARD in time. And this was important. Because the longer you followed the populations of patients, the more apparent differences became. The strengths of association grew stronger. Things that were not statistically significant at an earlier point in the study possibly could become statistically significant later on. That's a very important point.

Animal studies were done as well. In 1964, the surgeon general cited seven prospective studies. Four of them were published after 1960. So this continued, and year by year, evidence grew stronger, if you would, and new tools to analyze the data were also invented.

Q. So this was a process of development through the period?

A. That's very correct. It was a process of development in two ways. Prospective studies had never been done before, people figuring out ways to control them and study them and how to design the study.

In addition, the studies themselves came up with information, but you still needed statistical tools to analyze the information, to analyze the data to show if

something is statistically significant or not.

So many of the mathematical methods that were used to analyze data were invented in the late 1950's or early 1960's. So it is very much a process of development in this ten-year period.

Q. Would it be fair to say, doctor, that the science of epidemiology as it relates to chronic disease was invented in the course of these studies of the relationship between smoking and lung cancer?

A. I believe, Mr. Carlton, that is a very accurate and important statement. The epidemiology -- again, historians have to look at things in context, not with the eyes of the present.

Today, in 2001, we're very accustomed to doing epidemiological studies with chronic diseases. There have been thousands, ten of thousands of studies. We hear about it in the paper all the time; caffeine or not, salt or cholesterol, or whatever it may happen to be.

Sometime in the history of medicine, this had to be done for the first time. That was in the smoking controversy. The science of the epidemiology of chronic diseases that we have today grew out of the smoking controversy. It was developed to study this problem, and then new mathematical techniques to analyze the data. It came out of the smoking controversy.

This culminated with the surgeon general's report of 1964 which made an important contribution in terms of how the data should be analyzed and evaluated. In my

opinion, this is actually the most important aspect of the smoking controversy.

It's very, very important to know that cigarette smoking causes lung cancer. But even more important, out of this controversy, a new tool was developed for science that in the subsequent four decades or so we have used successfully in all variety of chronic diseases. And in my opinion, as I say, that was perhaps the most important result; even more important than the findings that cigarette smoking caused lung cancer.

Q. All right. Mouse-skin painting studies.

Did those continue during this period after 1954?

A. Well, yes, they did. You have two lines of investigation after 1954. You have ongoing epidemiological study with the prospective studies and the development of new mathematical tools to analyze the information.

But then on the other hand, you have continuing biological studies. Because, keep in mind, the dominant view for five centuries of medicine is that if you what to show something causes disease, you have to be able to show it in a biological or experimental way.

So a host of experimental studies continue alongside the epidemiological studies, one of which was mouse-skin painting studies.

Q. Did they continue to be official, the earlier mouse-skin painting studies?

A. Most of them did.

As I indicated before, Mr. Carlton, when, during -- the wynder and graham 1953 paper was not the first skin-painting study was the first time such a study had positive results.

So this stimulated other investigators to see if they could confirm those findings. Maybe something funny happened. Maybe they did something wrong. Maybe those positive results were, in fact, erroneous. Phone confirmation is an important part of the scientific process.

So approximately, if my memory is correct, maybe 16 or so studies were done in the subsequent decade. By studies, I mean skin-painting studies. Four of them actually had negative results, but 12 of them had positive results. And it was generally accepted that the original observations of Wynder and graham were confirmed.

Q. Were they doing animal inhalation studies where animals actually breathed smoke?

A. Right. And this was very important. Because in -- with the dominant view that you need experimental proof to show a cause-and-effect relationship. If you could show that inhalation of smoke actually produced cancer in people or in animals, that would be very, very powerful. And a lot of studies were done with different animals to try to induce lung cancer through exposure to cigarette smoke. All of those studies were negative. Every one.

Q. They were not successful?

A. Correct. They were not successful. No one during that ten-year period was able to produce lung cancer

in experimental conditions through exposure of the animal to cigarette smoke.

Q. Were studies being done to try to determine what were the constituents or the ingredients of cigarette smoke and how that might relate?

A. Yes. That was another important part of the work that was done to try to find --

Q. Excuse me, Dr. Doctor. Could you just back off just a little bit. Thanks.

A. Thank you for that.

-- to see if you could find substances in cigarette smoke that caused -- that were known to be carcinogens. Carcinogens is the term we use in medicine to refer to a substance that can produce cancer.

So there was an attempt to analyze cigarette smoke and see if it contained known carcinogens. This had been done prior to 1954. This had been done in the '30's and '40's. Those studies were negative. But for the first time in 1954, an investigator -- I believe Cooper, Dr. Cooper and Lindsay -- were the first who succeeded using new techniques, new methods and showing that cigarette smoke contained a substance called Benzopyrene, which was a known, potent carcinogen, and that was important, and that was generally confirmed as well.

Q. And did that show, then, that cigarette smoking causes lung cancer?

A. No. It didn't. It was, again, disturbing evidence. But it was not considered proof for two reasons.

Number one, showing that a substance contains a carcinogen is not the same as saying that that substance produces cancer. For example, every time we barbecue a steak on the grill and you get a nice crust on the grill, there are carcinogens on the steak that we eat.

But they're there in very low amounts, and we don't think that barbecuing a steak is going to cause us to have cancer. So you have to show -- you need to show more than the presence of the substance.

And with Benzopyrene, there was an additional problem that hindered acceptance of the smoking hypothesis. And the surgeon general makes a very, very important point of this in his 1960 report. And what it means is that dose matters. Dose matters. You can have a chocolate cake in front of you and you can say you will get fat. How much do you eat?

If you eat the whole cake and eat that every day, you probably will. If you take a little bit and that's it and don't go back tomorrow and the next day, that one bite will not do it. Dose matters.

Quantities matter. And what happened with Benzopyrene is that investigators found that Benzopyrene was in cigarette smoke. But very low dosages. Not enough to account for the presumed ability of cigarette smoke to cause lung cancer. That was a mystery. It retarded acceptance of the smoking hypothesis, the fact that it was there, but very low levels, and this was, in the surgeon general's word, an anomaly.

Q. Now, was this research going on all over the world?

A. Yes. The topic of lung cancer and its relationship to cigarette smoking now is one of the hottest topics in the biomedical world. And you find there's a huge amount of attention being given to this; a huge amount of research being done all over the United States and all over the world.

Q. Did you see evidence that the tobacco industry contributed to this research?

A. Yes, I did.

Q. In what way?

A. When papers are published in the scientific literature, it is very customary for the researchers to identify their sources of funds, where they got grants to pursue the study. And it was a comment in the '50's and '60's to investigators publishing on this topic who either had been funded in their work by the tobacco industry in some fashion.

For example, a pathologist at UCLA might have gotten a grant to study this from the tobacco industry. And in some cases, papers were published by scientists who themselves were part of the research teams of the tobacco companies. Actually, tobacco companies employed scientists.

Q. In your opinion, what was the result of all this research?

A. At what time?

Q. Well, let's first focus on, say, 1960.

A. Well, you can look at it in two ways.

Certainly, attention has now focused to cigarette smoking, and some of the prospective studies that I mentioned earlier did much to eliminate air pollution, environmental exposure, things of that sort as major causes. So there is a lot of attention to cigarette smoke as the cause of lung cancer. And many scientists are now, by 1960, believing that cigarette smoke is the cause of lung cancer.

But it very much depended on what a scientist's world view was. Are you in the traditional world view that this is a biological problem that requires experimental evidence?

If you were, you tended to disagree And feel that the case had not been proved, because experimental evidence was essentially negative or ambiguous.

If you accepted the new world view that the use of statistics and epidemiology could give you an alternative view, an alternative way to show causation, in the absence of experimental proof, then those individuals by 1960 were likely to believe that the case had been shown.

So you have really two camps by 1960. More and more people are jumping onto the band wagon. But you have a significant resistance to the idea among many reputable scientists around the country and around the world, basically. And the issue is, basically, is this a statistical question or is it a biological question?

So it's very controversial. There was no consensus. And indeed, the term "controversy" is not mine.

The word "controversy" is one that I borrowed from the first surgeon general's report.

Q. Is it your opinion that this controversy persisted up until the '64 surgeon general's report?

A. Yes, it is.

Q. And I believe you've prepared a demonstrative to help discuss this.

Do you recognize this?

A. Yes, I do.

Q. And this refers to controversies regarding lung cancer and smoking, 1954 to 1964.

Why do you refer to it in the plural?

A. Because there were different -- this was a very confusing area, a very actively EVADED area, and there were different types of controversies. It was a complex subject.

Q. Okay. You've listed on this three controversies among different groups.

The first one you've listed is controversy among epidemiologists?

A. That's correct.

Q. Are you saying there was a controversy among epidemiologists themselves during this period, '54 to '64?

A. Yes, there was. Though, again, anchored in time. And that controversy was particularly important in the mid '50's and into the late '50's. There were some epidemiologists who thought that cigarette smoking was the main cause of lung cancer.

Environmental exposure, air pollution,

atmosphere, exhaust fumes, radiation, et cetera, were minor contributors. There were eminent epidemiologists, including epidemiologists at the national cancer institute, who thought it was the other way around, who thought that smoking was a factor, but a main factor or the major factors were pollution or environmental exposure.

Q. Controversy among statisticians.

What does that mean?

A. Well, there was significant skepticism that the prospective studies were valid from the statistical community, if we are looking at the late '50's and early 1960's. This was terribly important and retarded the general acceptance of the tobacco hypothesis in science, because the statistical methods that epidemiologists used came out of mathematical theory and statistics.

And the most eminent medical statisticians both in the United States and in the world thought that the prospective studies were not valid, that they had flaws that rendered their conclusions questionable, and also that as important as statistics were, this group of individuals thought that, ultimately, the question was biological and experimental, not statistical.

Q. So there were eminent statisticians who did not accept the epidemiological evidence?

A. That's correct.

Most notably in the United States, a man named Joseph Berkson from the Mayo clinic, who was considered the most eminent statistician in the United States. And even

more important was sir Ronald Fisher from England, who did not accept the prospective studies or their conclusions. He was considered the most eminent theoretical statistician in the world of all the notable medical scientists who contributed to our knowledge of smoking and lung cancer.

By far, the most important was Ronald Fisher. He is one of the great figures in the history of 20th century biology. He is to biology what einstein was to 20th century physics. A giant figure. Many of the mathematical formulas that the statisticians use as the basis to analyze the data from their studies came from Fisher's work.

So for fisher to say that he was skeptical was a very, very important criticism of the work that had to be taken seriously by all responsible scientists, and in the late '50's and early '60's, both Berkson and Fisher repeatedly expressed their doubts about the tobacco hypothesis.

Q. What was Fisher's problem with it?

A. Fisher's problem with the studies were several-fold. Number one, he felt that the prospective studies did not have proper controls and there was too much uncertainty in terms of how the studies were structured.

Number two, he felt that there were competing theories and competing ideas that the epidemiologists had not eliminated or ruled out or anyone had not ruled out. Fisher was essentially a biologist and Geneticist. He was a strong believer of the genetic theory, and he felt that at that time, no one had disproved the genetic theory, hey, we better

do this.

Most important, fisher was of the view -- and this actually relates to the third item -- what type of standards or proof are needed in medicine?

You need experimental standards, or in the absence of experimental proof, will statistical analysis be sufficient?

This had never been -- statistics had never been used in this way in the history of medicine before. Ultimately, Fisher, the statistician, believed that this was a biological problem, not a statistical problem.

And indeed, there was an international Congress of medical statisticians in 1961 that came up with the same conclusion that, ultimately, the proof must be experimental and biological, not statistical.

Mr. Carlton: Just for the record, this demonstrative is 11095.

(I.D. 11095 - ludmerer demonstrative)

Q. By mr. Carlton: All right. Let's talk about the third controversy that you illustrate here, epidemiologists versus experimentalists.

Is that pretty much what you've just been telling us about?

A. Right. I was referring to that in my comments about the controversies among statisticians.

Not only did they think that the studies

themselves had structural faults, but they also had a different philosophical view that if you wanted to show that something causes a disease, you need experimental evidence, because you can control all uncertainty in a well-designed experiment. And actually, this was the nature of the controversy for the late 1950's and early 1960's.

By this time, the tide had changed. Make no mistake about that. You have large numbers of medical scientists who now believe that cigarette smoking causes lung cancer. These individuals felt that statistics were enough.

But for those parts of medical science that said that this is not a statistical issue, this is a biological issue, that group did not accept the cigarette hypothesis, and that was the most important controversy of all, if you're looking at the period of the late 1950's and early 1960's.

Q. You mentioned Dr. Fisher.

Who were some of the other people who relied on experimental or biological evidence rather than statistical evidence at this time?

A. If we're looking at the late '50's and early 1960's, this was -- well, very frankly, by now, it is a minority view, but it is still a very prominent view advocated by very important scientists. You have the medical statisticians themselves who felt that the problem ultimately must be demonstrated experimentally.

You have various bodies of scientists, experimental pathologists, experimental toxicologists,

pharmacologists, who say that we need experimental evidence. In the absence of experimental evidence, we cannot draw any conclusions from the statistics.

You find that this view was widespread among physicians who actually took care of patients. The American college of chest physicians, for example, was on record as not accepting the statistics but pleading for biological work.

Most important of all, you find this view at the country's most important private cancer research institute, the memorial Sloan-Kettering research institute in New York City. The leaders at memorial Sloan-kettering did not accept the statistics.

And similarly, you find this attitude at the most important public cancer research institute; namely, the national cancer institute, which is part of the national institutes of health. There, Dr. Stuart and other leaders of the national cancer institute said this is a biological problem, not a statistical problem, the evidence is not in.

Q. So would it be fair to say, doctor, that during this period, there were prominent scientists, physicians and others who just had trouble accepting statistical proof as opposed to experimental proof?

A. That's a very good way to put it. Ultimately, it was a question of world view, of what philosophy, what types of standards you require to be able to show cause and effect. And this was the essence of the debate at this time. Statistical evidence and statistical argument versus

experimental proof.

Q. And did you encounter any scientific articles reflecting this continuing controversy during the period '54 to '64?

A. Yes. This was a very conspicuous thing in the medical literature through 1964. There were editorials in the New England journal of medicine in 1961 and in 1963 that expressed the view that the issue had not been resolved.

There was -- there were papers and important publications such as cancer research in 1962 and 1963 that said that it was still an open controversy, an open question.

There was one paper published by a Dr. Hyde from Long Beach who was on the faculty of UCLA, appeared in California medicine in 1963, who said exactly the same thing.

There were editorials and letters to the editor and to that effect in the journal of the American Medical Association in the late 50's and early '60's.

So you do see this theme commonly in the medical literature at that time.

Q. Now, I'm not going to put a bunch of articles up on the screen. But I would like to put one of them up that you've noted.

Do you recognize this article?

A. Yes, I do. That's an editorial in "the New England journal of medicine" from the middle summer, I think, of 1961.

Mr. Carlton: All right. This is exhibit 7478.

(I.D. 7478 - 1961 editorial)

Q. By mr. Carlton: And this is called, "the great debate," isn't it?

A. Yes, it is.

Q. What was the great debate?

A. The great debate was over whether cigarette smoking had been shown to be the cause of lung cancer. In that issue of the new England journal, the editors chose to publish two articles. One by an advocate of the smoking hypothesis, Dr. Wynder himself, wrote an article. And then it published -- it published a pro and con and point and counterpoint. So the pro side was written by Dr. Wynder. The con side was written by a well-known biologist, Dr. Little, who now is president of the tobacco institute, or something of that sort. But he had been a university president and a very prominent biologist.

And then the editorial commented on these saying, essentially, both sides had reasonable arguments, we don't know at this point in time.

Q. I'll just read this highlighted portion (reading):

"Many conscientious observers believe that there are strong indications in favor of a causal relation in the vast majority of cases, and no acceptable evidence that disproves it; others remain unconvinced

or have taken a determined stand behind Dr. Little. Certain facts stand out -- that the stakes are high in terms of life and death, that smoking has been indicted as a sometimes lethal agent and that nonsmoking is almost certainly harmless. Each individual must choose his own course, whether to woo the lady Nicotine or abjure the filthy weed, while the search for truth continues."

In your opinion, is this evidence that a controversy remained as late as 1961?

A. Yes, it is.

Q. And there were other articles, were there not?

A. Right. That's a sampling of many.

Q. Is controversy a bad thing for science?

A. No, it's not. Actually, it can be very healthy in terms of promoting discussion and debate and one side challenging another to do a new experiment or a new study or to analyze data in a new innovative way. It can actually accelerate progress.

Q. In fact, isn't controversy proposal -- making proposals, putting forth conclusions, criticizing them, debating them?

Isn't that at the heart of scientific development?

A. Yes, it very much is part of the process of normal science, yes.

Q. In your opinion, was the controversy about whether smoking caused lung cancer during the 1950's and up to 1964 good for the development of science?

A. In my judgment, Mr. Carlton, it certainly was. You have in a 15-year period the creation of a new science, the epidemiology of chronic disease. One that later could be generalized and used in many other conditions. You have a revolution in science.

In 1950, scientists were beholden to the dominant view of the five centuries of medicine that the only way to show cause and effect is experimentally, through the right experiment.

Now, we have a revolution in ideas. We have the emergence of an alternative way that, in the absence of experimental proof, that if you meet certain conditions, you can draw -- you can make conclusions about cause and effect from epidemiological studies and statistical data.

That's huge. As a historian in medicine, I find it remarkable that it only took 15 years for these huge -- for new science to be created and a huge, huge change in world view today to take place.

We're accustomed to epidemiology today. We've done it thousands of times in the last 30 or 40 years. This was the first time it was done and done successfully for chronic diseases. It was invented at that time. And I'm really quite impressed all and all that it went pretty quickly.

Q. Where does the 1964 surgeon general's report

fit into this?

A. The 1964 surgeon general's report fits into the story in two ways.

First, it's very important to recognize that it proves that this was a controversial subject in medical science at this time.

Sometimes, in history, you have to use some commonsense. The surgeon general wouldn't have had to conduct that study if everything had been wrapped up and if this was a scientific consensus.

The reason the study was done was because there was a lot of controversy among scientists, and he wanted to see if they could sort things out. It proved the existence of a controversy. It proved that there was not yet a consensus. And in fact, in the introduction to the report, the surgeon general report, the surgeon general himself described -- uses the word "controversy" to describe the smoking health controversy.

In addition -- and this is the second point -- the surgeon general's report made a major intellectual contribution to how epidemiology should be done. It defined five criteria of causation. And in the judgment of the commission, if each of these criteria were present, it was legitimate to draw conclusions about cause and effect from epidemiological data, even in the absence of experimental proof.

It was the final step in the invention of epidemiology and the maturation of the science. So it was a

very important intellectual contribution that the surgeon general's report made. And in the aftermath of this report, I think it is fair to look at the epidemiology of chronic diseases as a mature discipline.

Q. Now, I'd like to put up a page from the 1964 surgeon general's report. This is page 20.

And this is exhibit 5634.

Now, this portion says -- and I'll just read the first part -- (reading):

> "Statistical methods cannot establish proof of a causal relationship in an association. The causal significance of an association is a matter of judgment which goes beyond any statement of statistical probability."

So is it correct that the surgeon general in 1964 said that the causal significance of a statistical association is a matter of judgment?

A. That is correct.

Q. (Reading:)

> "To judge or evaluate the causal significance of the association between the attribute or event and the disease, or effect upon health, a number of criteria must be" -- and that's -- I can't

read that word -- "And no one of which is an all-sufficient basis for judgment. These criteria include". . .

And then it goes -- proceeds to list, as you said, five different criteria?

A. Right. Consistency, strength, specificity, temporary relationship, COHERENCE. Those were the five criteria.

Q. Is what the surgeon general was doing here was creating a method -- a means of arriving at a conclusion of causality from epidemiological evidence?

A. Yes. That is what the surgeon general's commission did. Not the surgeon general himself, the commission.

Q. The surgeon general's commission.

How important was that?

A. It was crucially important. It was huge. And as I believe I said before, there are two things. It assembled all the evidence, came out with new criteria for analyzing the evidence. And the scientific controversy quite essentially resolved in the aftermath of the report.

The medical community acknowledged the report by admitting or acknowledging that the surgeon general's commission was correct and, indeed, that if those criteria are met, you can draw conclusions about cause and effect from epidemiological and statistical data. That consensus emerged in response to the report.

And in addition, as you indicated before, that type of phraseology was very important in the maturation of epidemiology. Epidemiology really matured as a discipline from this report.

Q. Was this mode of analysis a sea change in the way that this kind of evidence was evaluated?

A. Yes. This mode of analysis and the whole development of clinical epidemiology of chronic diseases was a sea change in the way medical scientists viewed the biological world.

Q. Did everybody jump on the bandwagon right away?

A. Not necessarily. I think it is accurate to say that a consensus emerged in the scientific and medical community, but consensus does not mean 100 percent.

As I said earlier in my testimony, the consensus is often wrong. Scientists are strong-minded, independent people. If you were an experimental toxicologist or an experimental cancer researcher who had always obeyed the particular dictates of experimental medicine, always thought that you needed experimental proof, you may not have been persuaded by the surgeon general's report.

There's always room for responsible disagreement. So there was room for responsible disagreement. But the type of scientific controversy that we observed in the early 60's and 1950's, that subsided.

Q. After 1964?

A. Correct.

MR. CARLTON: I have nothing further.

THE COURT: Thank you, Mr. Carlton.

Mr. Piuze.

The witness: Your Honor, would it be acceptable for the witness to take a very quick 90-second run to the restroom?

THE COURT: It would be very acceptable for the witness to do that. Thank you for not being embarrassed to ask. If you would go out that door right there. It's down at the end of the hall.

MR. PIUZE: Equal treatment for jurors?

THE COURT: Is there anyone?

Yes, ma'am.

(Short pause.)

THE COURT: All right. We're back together, and we're on the record.

CROSS-EXAMINATION

BY MR. PIUZE:

Q. Doctor, I told the judge that if I could start questioning you around 11:30, I'd be done by 12:30. And I didn't quite get 11:30, so if I ask you really direct questions and if you give really direct answers, I can still try for 12:30.

A. I'll certainly do the best I can.

Q. I'm going to ask you to initial something in a minute, okay. I want you to be able to see what I'm doing

here.

Can you see that so far?

A. Sort of.

Q. Okay. So the start is 1950, right?

A. I'm not sure I understand what you mean by, "the start." You mean the start of the graph?

Q. No. Didn't you just finish giving about an hour-and-a-half, two hours' worth of testimony from the period 1950 to 1964?

A. You mean the watershed period in terms of opening up this as an area of study. 1950 was a watershed year, that's correct.

Q. All right. So I'm going to make it start 1950, and I'm going to make the end 1964.

Now, in about three sentences, if you could, what happened between 1950 and 1964 as far as the cigarette-tobacco-lung-cancer controversy?

A. This bursts into scientific consideration with prospective studies, and then the skin-painting studies, as I said. It was -- the epidemiological evidence grew stronger after 1954, but throughout that decade, with the prospective studies, as they were both continued, as new techniques were developed, analyzed the data. And as new studies were done, the period after 1954 was characterized by experimental studies that exceptionally were negative.

And you have great concern in the scientific community during that 14-year period that cigarette smoking is the cause of lung cancer. Year by year, more evidence

comes, particularly of an epidemiological sort.

Whenever you have revolutionary ideas replacing old ideas, you always have a bell-shaped curve. Someone's always going to be at the beginning of those who accept. Most people are in the broad middle. You have some people who are at the tail end.

So you find larger numbers of scientists accepting the new epidemiological standard. But the point -- but the most important point is that significant disagreement remained among responsible scientists through January into that year. As I said before, it was mainly one of interpretation.

Q. Thank you. Thank you. Okay.

And that's important. The surgeon general's report came out at the beginning of January 1964, correct?

A. That's correct.

Q. So 1964 -- the year '64 is not included in this controversy; it's not a 14-year run, it's a 13-year run, correct?

A. Well, certainly, the surgeon general's report was 1950 -- 1964. That is 14 years. Because I'm counting 1950 as a year. So it was the end of 14 years, the beginning of 15 years. And that is the period that I studied.

Q. See what I've drawn here. I've given you --

(juror sneezes.)

MR. PIUZE: Bless you.

Q. I'VE given you a hatched-in area here on this time line. The time line -- everyone will see in a minute -- goes from 1950 to 2000. The hatched-in area goes from 1950 to the beginning of 1964.

That's when the cigarette controversy began and ended, right?

A. I didn't say that it ended. I said that a consensus developed. I haven't followed it forward in time.

It is important to recognize that there was room for responsible disagreement. As i SAID, a controversy -- a consensus EMERGED, but I'm also saying, there was room for responsible disagreement. But I have not followed it forward past 1964, so I can't really comment in a specific way PAST that time.

Q. Okay. Here. Why don't you just take this for A minute. I'm going to ask you to sign that, if you would. Sign IT while I get rid of this.

A. Are my initials okay?

Q. Yeah.

(MR. PIUZE LIFTS UP EASEL OVER COURT REPORTER.)

Mr. Piuze: No Workers' Comp. Claim. I promise. No Workers' Comp. Claim.

Q. Okay. Thanks.

A. Okay.

Q. Now, why didn't you study beyond 1964?

MR. CARLTON: I would object to this. The doctor said

he didn't agree that the controversy ended, and he was asked to sign it. What does that signify?

MR. PIUZE: Okay. That's a point.

Q. The controversy did what?

A. A consensus emerged in the scientific community in 1964. As you know, there were political, legal consequences as well that report -- leading to the first surgeon general's report.

One thing that historians need to do in the process of doing history is having a firm idea of your dates. Why do you begin a study when you do; why do you end a study when you do?

In fact, 1950 was a very appropriate time to begin, because we started to see more lung cancer, and I considered January of 1964 to be an appropriate stopping point. The surgeon general's report appeared. This had major consequences in terms of legislation. This has been widely regarded as watershed in the medical historical literature. And in addition, there were plaintiffs' experts in other cases who also stopped at that point in their testimony. So it seemed reasonable to me to stop.

Q. Here's the thing. I need to put a word there on that end because Mr. Carlton's right. If your initials are going to be on there and you don't think it ended, give me a word or phrase. Give me your word or phrase for January of 1964.

A. I would say that a consensus emerged but that there was room for responsible disagreement.

Q. Okay.

And the consensus emerged that what?

A. Two things. On the specific issue; that cigarette smoking was the major cause of lung cancer. On the more general issue, that epidemiology and statistics were a legitimate alternative way to study disease causation in the absence of experimental evidence. Both of those points emerged.

Q. Thanks.

We're here for cigarette smoking and cancer And not for epidem -- for not how good epidemiology is just an a general concept.

So I'm only going to write the first one; the consensus, cigarette smoking was a major cause of lung cancer, right?

A. Correct. In the scientific community.

Q. Was a major cause, the major cause?

A. I think it would be fair to say by that time, the major cause.

Q. Thank you.

A. I forget exactly the words the surgeon general used, but I believe it was the major cause.

Q. The controversy has never ended, though, right?

A. I haven't studied things forward. Certainly, there's a lot of talk back and forth, but I cannot speak to our present day understanding to what degree we have accumulated experimental evidence to confirm the epidemiological evidence. So you're really asking questions

that go beyond what I studied -- what I'm prepared to testify on as an expert.

Q. Good enough. Thank you.

Mr. Clerk, what's the next exhibit number in this trial here, 10,000 --

THE CLERK: It is 10,027.

Mr. Piuze: Okay.

(I.d. 10027 - document)

MR. PIUZE: Here you go.

Q. You were approached by someone from the Washington, D.C. office of Mr. Carlton's and Mr. Leiter's law firm in what year?

A. 1988.

Q. You had several meetings with large groups of attorneys representing the tobacco industry, correct?

A. Are you talking about at that time?

Q. Yes.

A. In the course of doing -- yes. There were a handful of meetings, that's correct.

Q. Sometimes there were dozens of lawyers present talking to you?

A. Well, there may have been eight or ten so, to me, it was a large meeting. I don't think it was ever beyond that. But there were several meetings. And several lawyers, of course, would attend the meeting. Not always, but sometimes.

Q. Sometime ago, you testified in a case called the state of Mississippi versus the tobacco industry; is that correct?

A. That is not correct.

Q. What is not correct about that?

A. Perhaps I don't understand the word "testify." I did give a deposition for that case, but I did not appear as a witness at trial.

Q. Okay. You gave sworn testimony under oath?

A. That is correct.

Q. Mississippi versus the tobacco industry?

A. That is correct.

Q. Here, let -- just let me -- I'm going to refer him to page 50. This probably isn't a big deal. But could you just read that highlighted part there as to whether or not there were dozens of people present with you at these early meetings with tobacco company lawyers?

A. There is a question, and my response is (reading):

> "You have to understand, I'm not a professional witness" -- And that's true -- "and that in some of the early meetings, there would be a dozen people from different firms."

I think that's true. There very well could be up to a dozen people.

Q. That's fine. Thanks a lot.

For your first study that you did, you were compensated about $200,000, right?

A. That's correct. I was compensated for my time at $200 an hour. And the study that I described to you before with the review of all the secondary literature and then the comprehensive review of the primary literature was a thousand hours, and that's about 200,000.

Q. Between the time of the initial engagement and the time you started working on Mississippi versus the tobacco industry, you had done another $100,000 worth of work for the tobacco industry, correct?

A. I don't think it was that much. There was additional work that -- I'm sorry. What were those dates?

Q. Well, I didn't give you dates.

What I said was: After your initial engagement and up until the time -- let me do it better.

After your initial work that you've told us about, a thousand hours' worth --

A. That's correct.

Q. -- from that time up until when you started with Mississippi versus the tobacco industry here, you had been involved in a couple of other cases and your billings in those cases was another $100,000; right?

A. I had been involved in one other case and that billing was $40,000. That was the Cotler case in Boston.

Q. That was the Cotler case in Boston.

A. 1991.

Q. Okay. And I'll tell you what. I've actually highlighted your testimony about the cotler case in boston here.

Do you see that?

A. Uh-huh.

Q. How much?

A. Well, as I already said, that was approximately $40,000 for the cotler case.

Q. Why don't you flip that over to the next page, which is page 9, and tell us about the additional billings that had occurred up until the time of that deposition there, please.

Another 60,000?

A. That seems to be correct, yes.

Q. So 40- and 60- is 100-, plus the original 200- comes out to the 300- I mentioned, correct?

A. Correct.

Q. Thanks a lot.

How many hours have you spent getting ready to testify here now?

A. I haven't counted them up yet, but I'd say a few dozen.

Q. A couple of dozen.

And with inflation and all, your billing rate has gone up?

A. My current billing rate -- well, to be very precise, the last figure, the billing rate was $300 an hour. Now, this year, my billing rate is $350 an hour. Has gone up

with time and inflation.

Q. All right. Now, when you got engaged, who was it that decided the time period you were going to concentrate on; you or them dozen lawyers?

A. Ultimately, that was my responsibility.

Q. Okay. Is it your testimony here today, I guess, that until 1950, there was no real knowledge out there that smoking tobacco caused lung cancer?

A. That's essentially correct. That there was no credible scientific evidence at that time.

Q. Take a look at this, would you.

I mean, isn't the knowledge that tobacco causes bad diseases at least 400 years old because king James wrote about it in 1604?

A. Well, you're not accurately representing my testimony.

Q. Excuse me. I'm not trying to summarize your testimony.

A. Okay.

Q. This is cross-examination. I'm representing someone else's testimony who testified in this trial.

A. Well, I think it's important to understand in this cross-examination what my testimony is and what it is not.

Q. Could I interrupt for one second?

I apologize.

A. Yeah. What I mean --

Q. I'm aiming still for the time that I set out,

and if you could just try to answer my questions directly, we'll all have a better shot of getting there.

MR. CARLTON: I'll object. If the witness needs to explain --

THE COURT: I'll regulate it, then.

Ask your question.

MR. PIUZE: Appreciate it.

THE COURT: Thank you.

Q. BY MR. PIUZE: Here's your question: Isn't it true that at least -- at least 1604, when king James made some statements, most people should have known tobacco caused bad diseases?

A. It's very true that there are lots of attitudes and views of tobacco that go back for hundreds of years in popular perceptions and in popular literature.

And to try to answer your question, I'm making the point that I was studying scientific attitudes and not a popular wisdom or popular understanding. I was also studying specifically lung cancer and not other health hazards associated with cigarette smoking.

You're correct, very correct, that there's widespread popular opinion and popular anti-tobacco talk that goes back for hundreds of years, and that's very, very true.

Q. But I'm talking now -- I'm talking now, science with you, okay?

Isn't it true that before 1800 ever started, that science knew darn well that tobacco was causing cancer?

A. That is not true, if you're looking at that

period of time.

Q. All right. Well, do you remember a president of the United States named Andrew Jackson?

A. Yes. Andrew Jackson had some type of head and neck cancer. But what you have to understand is, number --

THE COURT: Sir, sir. The question he has asked was: Do you remember president --

The witness: Yes. I remember president Jackson.

THE COURT: Thank you.

Q. BY MR. PIUZE: Not personally?

A. No. But I've read about him.

Q. Isn't it true that he smoked cigars, he got some kind of cancer, and so everyone in the country knew darn well that tobacco caused cancer?

A. Number one, he did develop some type of head and neck cancer. But the history of oral cancer from pipe smoking and cigar smoking has a different scientific history than does lung cancer from cigarette smoking.

And in addition, I don't know what the public knew or didn't know. I didn't really answer that question. You're asking a different type of question from the one I'm able to answer.

Q. Okay. That's good. Thanks.

Here. I'm going to keep moving along as rapidly as you can. This is one of your charts that you showed today, right?

"Possible causes of lung cancer," right?

A. Correct.

Q. What it really should have said is: "Possible primary causes of lung cancer," correct?

A. I think that's a very fair comment, yes.

Q. Okay. So anyway, interestingly enough, the one thing that isn't on there is cigarettes.

How did that happen?

A. Well, I think, as I said in my testimony -- and if I didn't, I should have said it, but I believe I did -- was that those were possible primary causes in addition to cigarettes.

Q. Right.

A. You're quite right; that cigarettes belong on there.

Q. You did say that in your direct, but for sure, cigarettes belong in there?

A. I very much agree with that, yes, sir.

Q. Okay. So you're from Long Beach.

What year did you leave Long Beach?

A. Fall of 1964 to go off to college.

Q. Not that I'm keeping track or anything, but did we used to have smog here in southern California?

A. As far as I know, we did.

Q. Back there in St. Louis now, you probably figure we've still got smog here, huh?

A. We've got in smog in St. Louis, too.

Q. The smog we used to have in the 60's, late 50's, early 60's, up until the time you left was awful, awful, awful worse than it is now, was not it?

A. Quite frankly, I don't know. I haven't lived here, but my recollections of the smog from that point are a little vague. We lived in Long Beach, not Los Angeles. I'm not trying to avoid the question, but I really don't remember how bad it was or how it compares with today.

Q. I'll keep moving.

Air pollution -- not in Los Angeles.

You've certainly heard that Los Angeles has been called the smog capital of the world, haven't you?

A. Correct.

Q. Air pollution -- you've got up there -- wasn't for Los Angeles; that was just generally anyplace, air pollution anyplace, including places where it's cleaner than L.A., was considered to be a possible primary cause of lung cancer, right?

A. At that time, yes.

Q. Right?

A. We're talking at that time, yes.

Q. Yes. Of course.

And at that time, the fact that there were lots and lots of cars out there, that was also thought to be a possible primary cause of lung cancer?

A. Some people did think that, that's correct.

Q. And in addition to L.A. being called the smog capital of the world by a lot of people, it's also called the car capital of the world by a lot of people, isn't it?

A. I really don't know. It could be. I don't know for certain.

Q. Okay. Here. Here's another chart you used this morning.

See where it says, "avoidance of hindsight"?

A. Yes.

Q. Does that concept apply only to cigarette companies or should that rule apply to human beings, too?

A. I was actually not applying it to either. I was applying it to historians and ways to responsibly do historical studies.

Q. All right. That's fine. I'll take that.

If we're going to do a responsible historical study, regardless of whether it's on this medicine here or whether it's on something else, should we try to avoid hindsight?

A. I believe that's very important, as I said. Putting events in the context of the time, judging events by the standard of their time, and that of our own standard, remembering that people at the time knew only what happened before but not what came later. I believe that those are very important principles to remember if you're doing any type of historical study.

Q. Thank you very much.

Now, obviously, you know who Dr. Ogner is, right?

A. Ogner, or are you referring to Ochner?

Q. Ochner. Sorry.

A. I don't know a Dr. Ogner.

But in context, I suspect you're referring to

Dr. Ochner.

Q. I think Ogner is an automobile dealer in the San Fernando valley.

Ochner, who is he -- who was he?

A. Dr. Ochner was a prominent surgeon from the middle third of the century. He founded a clinic in his name, which continues to exist to this day, the Ochner clinic. It is in the south. I believe it's in new Orleans --

Q. New Orleans.

A. Thank you for that.

He was a very prominent surgeons of his time.

Q. He was maybe one of the people, maybe in the 30's, who was saying, you know what, I'm seeing too many smokers and lung cancer, I think there's a relationship here between smoking and lung cancer, right?

A. That's correct. In 1939 and 1941, Dr. Ochner published two papers. They were accounts of his own individual patients. They did not have controls.

But he advanced speculation in those periods to say, hey, 80 or 90 percent of my patients that I've treated on for lung cancer, maybe cigarette smoking is the cause. So he was one of those voices from that early period, that is correct.

Q. Do you know offhand when modern cigarettes, meaning machine-rolled cigarettes, started to be manufactured?

A. I'm not a historian of the cigarette industry,

the tobacco industry, the production of cigarettes. So I'm guessing. And that's not my area of expertise.

Q. Don't guess.

A. But I think it's late 19th century, early 20th century. Somewhere in there.

Q. All right. Guess. Okay.

So by, let's say, 1915 or so, do you have any idea how many cases of lung cancer were reported in any given year in the world or in the U.S. or any other place?

A. Thank you for that question.

I don't know the exact number. It had been described. It was none. But it was still considered a rare disease at that time. I cannot give you exact numbers, but it was considered a rare disease at that time.

Q. Lots of doctors practicing back in, let's say, 1910 or 1912 might not ever, ever, ever, ever see a case of lung cancer, right?

A. That's very correct. At that point in time -- in fact, it was commonly said that physicians, particularly at teaching hospitals, were very careful, if they had a patient with lung cancer, to make that patient known to students and others because this might be the only opportunity in your lifetime to see someone with lung cancer.

So it was a very rare disease in 1912, 1915, that period, yes.

Q. Do you remember what year the Titanic sank by any chance?

A. Not precisely. 1918, 1919.

Q. I think we're testing your moviegoing skills here.

A. I did not see that movie.

Q. I think it was a little earlier than that.

What if I told you -- or asked you -- I'm not going to tell you anything.

What if I asked you, in the year the Titanic went down -- which I have a feeling was before world war I -- more people died on the Titanic than died in the whole United States the whole year of lung cancer?

Do you think that sounds about right?

A. I don't know precisely, but it would not surprise me at all if that were correct.

Q. So the exact numbers, I don't think, are important. But as recently as between 1910 and 1920, one shipwreck could equal the entire toll for lung cancer from all causes, everyplace, in round numbers in the whole United States of America?

A. At that time, that's a very correct observation. And I like the way you put it graphically with the metaphor of the ship. That's very true.

Q. All right. Well, thank you.

I'll keep going.

Obviously, you know sir Richard Doll, right?

A. I'm sorry. Who?

Q. Sir Richard doll?

A. Do I know him?

No.

Q. You know of him?

A. I know of him, yes. He was one of the major contributors to the epidemiology.

Q. Right. And you discussed Dr. Doll to some extent in the deposition that you gave in the Mississippi case, right?

A. It is very possible.

I haven't seen that recently, but it's very possible. Certainly, he was an important figure, both in the retrospective and prospective studies, so I would be surprised if I didn't.

Q. Let me show you.

Mr. Clerk, what's that next number now, please?

The clerk: You used 10,027, so it would be 10,028.

(I.D. 10028 - dr. Doll chart)

Q. By mr. Piuze: Let me show you something that's never been marked before now, which is a chart that Dr. Doll talked about when he was here.

Have you seen this chart at all?

A. No, I have not.

Q. Okay. How about this, please.

That between 19 -- one other thing.

You were shown -- for this Mississippi deposition, you were shown a report that Dr. Doll had written in anticipation of giving a videotape deposition for that case, right?

A. I was not shown such a report. I have not seen that.

Q. Well --

A. If I have, I don't remember it.

Q. Okay. Tell me what you think of this, please.

(Reading:)

"During the 1950's, the epidemiological evidence of carcinogen of tobacco smoke was complemented by the experimental demonstration in Denmark, France, Japan and the USA that relevant tobacco tars were carcinogenic when applied regularly for a long time to the skin of laboratory animals."

Sound right to you?

A. Yes. And that was part of my testimony. The positive skin-painting experiments and accumulation of some of this indirect biological evidence in addition to the epidemiologic evidence. That's a correct statement.

Q. (Reading:)

"All the expert committees appointed to review the evidence consequently reached positive conclusions about causality between '57 and '59. The Netherlands ministry of social affairs and Public Health

in '57; the British medical research counsel in '57; a study group appointed jointly by the U.S. national cancer and national heart institutes and the American Cancer Society, '57; the Swedish medical research council, '58; the national cancer institute of Canada, '58; and the U.S. Public Health service, '59, all reported that cigarette smoking was a cause of lung cancer."

Sound right?

A. It does sound right.

And I would like to reiterate. That's part of my testimony. The bandwagon is changing, and people are jumping on board. Evidence is becoming stronger. Lots of scientists are starting to accept this alternative view of the epidemiological view, and you do see the appearance beginning in the mid '50's, late '50's, as you point out, of a number of Public Health warnings by important organizations. That does happen.

Q. Thank you.

(Reading:)

"A year later, an expert committee of the world health organization in 1960 agreed with this."

Sound right?

A. It sounds right there. As I said before, there were a number of organizations that began taking positions in the late '50's and early '60's, that is correct.

Q. Thank you.

(Reading:)

"Reports by the royal college of physicians of London in 1962 and the advisory committee to the U.S. surgeon general in 1964 were widely publicized to the effect that cigarette smoking caused lung cancer."

A. That's very correct. That was typically -- the surgeon general's report received, in my understanding, a huge amount of public as well as scientific attention. So I believe that's a correct statement.

Q. Okay.

(Reading:)

"As to the surgeon general's report, it was long and detailed and was particularly newsworthy because the members of the advisory committee had been individually vetoed by the tobacco industry which had been privileged to veto anyone who had publicly expressed any views about the subject on that issue."

Do you agree with that?

A. I don't know for certain, and I'm not trying to quibble with that wording. I don't know all the inner history of how the committee was assembled and so forth.

I do know that it was important to the surgeon general to have ten individuals who had not taken public stands on the issue who were considered neutral at that time as opposed to someone who was, you know, strongly of one position or the other. But I don't know all the internal details of how that committee was put together.

Q. Although you don't know all the internal details --

A. I really don't know much about the internal details at all. I didn't study its founding or review its records.

Q. So you don't want to confirm or deny that the tobacco industry had a veto over who could sit on the committee that did the study for the surgeon general?

A. I just don't know. They very well could have. It wouldn't surprise me if they did. There was close cooperation with the tobacco industry with the surgeon general's report, including providing the surgeon general with some of their own data and unpublished studies. So there was a lot of communication. It wouldn't surprise me if that's true. By I just don't know myself.

Q. All right. Thank you.

I'd like you to tell me whether you agree or disagree with the following. I'm not going to tell you what

this is yet or exactly when this is yet, other than to tell you that it's after 1964. Okay.

MR. CARLTON: Object. Beyond the scope.

THE COURT: I don't know what it is yet.

Q. By mr. Piuze: (Reading:)

"It is not known whether smoking has a role in the development of various diseases."

Now, I'm telling you that this is a statement made after 1964. Do you agree or disagree?

MR. CARLTON: Well, object. Beyond the scope.

THE COURT: Overruled.

THE WITNESS: Can you give me a little bit of the context of that document?

It's always important to historians to have a little more sense of what the document is and where it came from and a bit more about it.

Q. BY MR. PIUZE: Yes. 1984 to the United States Congress by the tobacco institute.

Agree or disagree?

A. So you are citing testimony that a tobacco company or executive in 1984 made to Congress?

Is that where the statement comes from?

Q. No. It comes from a paper that was presented by the tobacco institute to the United States of America Congress, Washington, D.C.

A. So this is a report of a paper given to the Congress by the tobacco company?

Q. That's right.

MR. CARLTON: Objection.

The witness: What is the statement?

Could you please read that again?

THE COURT: I'll explain it to you later.

Q. BY MR. PIUZE: (Reading:)

"It is not known whether smoking has a role in the development of various diseases."

A. And what is your question for me?

Q. Agree or disagree?

A. I'm not sure that question as you phrase it really allows a yes-or-no answer.

The point is that we had epidemiological evidence, but not good experimental evidence in 1964. I haven't followed the controversy forward. I'm not an expert on that, but it's my understanding that in 1984, it was pretty much the same sort of thing. That the case was mainly an epidemiological one, not a scientific, experimental one. And that if one wanted to say that experimental proof was absent, it seems to me that is a responsible statement to make.

Q. Okay. How about this: The surgeon general's reports have the characteristics of briefs for the

prosecution only; the defense having been largely omitted.

Even these reports, meaning, the surgeon general report, '64, should have been unbiased; agree or disagree?

MR. CARLTON: Objection. Objection. This doesn't relate to the '64 surgeon general's report necessarily. Vague and ambiguous.

THE COURT: Which surgeon general's report?

MR. PIUZE: Plural, Your Honor. Surgeons generals' reports.

THE COURT: Ask it in context of the '64 report, then.

MR. PIUZE: You know what?

I'm going to withdraw the question.

THE COURT: Fine.

MR. PIUZE: I'm on the clock still. I'll withdraw the question.

Q. So you haven't studied that part?

A. That's correct. As I said, my study ended with the first surgeon general's report of 1964.

Q. Okay. The Frank statement was put up on the board there, and you were asked a couple of sentences -- whether you agreed or not with a couple of sentences there.

Do you recall that?

A. Yes, I do.

Q. How about this: Do you happen -- by any chance --

A. I can't see it.

Q. It's okay. I'll let you see it, or I'll read it.

By any chance, do you happen to remember the date in January 1964 of the surgeon general's report?

We know it's January '64.

By any chance, do you happen to remember what day it was?

A. I'm sorry. But I cannot remember the exact date.

Q. Okay. Here's something from January 4, '54, ten years earlier (reading):

"We accept an interest in People's health as a basic responsibility paramount to every other consideration in our" -- that's tobacco -- "business."

Do you think that's a good idea?

MR. CARLTON: Objection. Relevance.

THE COURT: Sustained.

Q. BY MR. PIUZE: Will we always have -- no, I won't ask that either.

THE COURT: I didn't sustain it on relevance grounds. I sustained it for a different reason.

MR. CARLTON: Foundation.

THE COURT: Sustained.

MR. PIUZE: Right. That's why I was going to put it down.

Q. Did you say that in 1954, there was disturbing evidence that smoking caused lung cancer and that had to do with Benzopyrene?

A. Well, I don't remember if I used the word "disturbing" or not. But certainly, I think that's a fair word to use.

Later in 1954, Benzopyrene for the first time was discovered in cigarette smoke. It was a known carcinogen, as I said before. It was hard to interpret the results because the levels were exceedingly low, less expected. But yes, it was found in cigarette smoke. And that, along with the skin-painting experiments, represented the two most powerful pieces of evidence from the biological side.

Q. Thank you for answering my questions.

I've got no further questions.

THE COURT: All right.

MR. CARLTON: Nothing further, Your Honor.

THE COURT: All right.

Sir, you may step down, and you are excused.

The witness: Thank you, sir.

THE COURT: All right.

Ladies and gentlemen of the jury, that completes our testimony for today.

Don't discuss the case with anyone.

We'll see you back here tomorrow at 8:45 A.M.

Thank you very much.

(AT 12:18 P.M., AN ADJOURNMENT WAS TAKEN UNTIL friday, may 11, 2001 AT 9:00 A.M.)