

1 certain, but I believe it was in the order of 1983
2 or '82, relatively recently.

3 Q. All right, sir. Doctor, I'd like to move on to
4 another area and talk with you about target organ
5 toxicity, if I may.

6 Have you had occasion to review the
7 scientific literature on the effects of TCDD on the
8 various organs and systems of the body?

9 A. I'm afraid so.

10 Q. Do you have an opinion as to whether TCDD can
11 adversely affect the following systems or organs,
12 and I'm going to name these things for you, doctor,
13 and what I want to know, here, is if you have an
14 opinion. The skin?

15 A. Yes.

16 Q. The immune system?

17 A. Yes.

18 Q. The liver?

19 A. Yes.

20 Q. Porphyrin synthesis?

21 A. It can, yes.

22 Q. Cardiovascular system?

23 A. At perhaps very high doses.

24 Q. What I want to know is if you have an opinion,
25 doctor. I don't want your opinion at this point.

1 A. I see, yes, I have an opinion.

2 Q. Gastrointestinal system?

3 A. Yes.

4 Q. Neurological system?

5 A. I have an opinion, yes.

6 Q. Reproductive system?

7 A. Yes.

8 Q. And finally, the endocrine system?

9 A. Yes.

10 Q. All right, sir. Do you have an opinion as to
11 whether TCDD can cause mutagenic effects?

12 A. I do have an opinion, yes.

13 Q. Do you have an opinion as to whether TCDD can
14 cause carcinogenic effects?

15 A. Yes.

16 Q. All right, sir. Now --

17 THE COURT: Do I understand it that the
18 witness has been referring to an opinion which he
19 holds on all these matters with respect to humans?
20 Is that the question?

21 MR. LOVE: Based upon the literature.

22 THE COURT: Is that true, sir? You were
23 referring to humans?

24 THE WITNESS: I was really thinking both
25 in terms of animals and humans.

1 THE COURT: But at any rate, both.

2 THE WITNESS: At any rate, both, yes, sir.

3 THE COURT: Thank you.

4 BY MR. LOVE:

5 Q. All right, doctor, let's talk about the skin
6 first. What I intend to do now is go through each
7 one of these with you.

8 What is your opinion as to whether TCDD
9 can adversely affect the skin?

10 A. It can affect the skin.

11 Q. All right. Now, what is the basis for your
12 opinion?

13 A. The basis is primarily evidence that has been
14 developed in observations of humans who have
15 presumably been exposed to TCDD at various levels in
16 the development of chloracne. Also research that
17 has been done with experimental animals both attempting
18 to find an appropriate model, an experimental model
19 for chloracne, but also testing of some models and
20 using some models to evaluate the acnegenic
21 potential of TCDD.

22 Q. All right, doctor, based upon your knowledge as
23 a toxicologist and your knowledge of the literature,
24 do you have an opinion as to when we knew or when it
25 was known that TCDD was capable of inducing

1 chemicals.

2 The problem that they had was that they
3 didn't recognize the right area of the ear to use
4 and the model fell into considerable disfavor and
5 meanwhile there were attempts to use rats and other
6 typical experimental species. A monkey is subject
7 to a condition rather like chloracne but it isn't
8 entirely identical, and the nude mouse -- there is a
9 strain of mice that has a genetic defect in which it
10 does not have hair -- and the characteristic of the
11 skin of the nude mouse apparently allows it to
12 respond in a fashion somewhat similar but not the
13 same as the human skin to chloracne. The rabbit is
14 the best. The others are really not overly
15 satisfactory. They're useful for some things but
16 are not excellent.

17 Q. As a toxicologist, what is the significance, if
18 any, of these different results in the animal
19 studies?

20 A. Well, certainly it would indicate that the
21 human skin is somewhat unique. A toxicologist is a
22 little disappointed when there isn't a proper model,
23 of course, and I think that that's the part that
24 concerns me most.

25 Q. All right, sir. Dr. Dost, I want to turn now

1 to the immune system, if we may. Can you tell the
2 jury, just briefly, generally, what the immune
3 system involves?

4 A. Well, the immune system is collectively all of
5 the mechanisms that are employed by an organism to
6 fight off infection, to control any foreign protein
7 that may come into the organism. That sometimes
8 creates more problems than it solves. If anyone has
9 ever had a very severe reaction to a bee sting, the
10 reaction itself probably is going to cause far more
11 damage than the bee sting, if you happen to be
12 particularly sensitive to bee venom, because of that
13 immune response to the bee venom.

14 The other important component that the
15 immune system protects against are cells of one's
16 own body that have become deranged, either because
17 they've been infected by the virus or because they
18 have become, they have reached the initial stages of
19 development of tumors. Tumor cells early on cause
20 an immune response.

21 Q. All right, sir. Doctor, what is your opinion
22 as to whether dioxin can adversely affect the immune
23 system?

24 A. It appears that it can.

25 Q. All right, sir. Would you explain that to us

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1 A. What you're saying is that I select the
2 evidence that I'm going to assign weight to, is that
3 correct?

4 Q. Yes.

5 A. I select it on the basis of its strength, yes.

6 Q. And that's a personal judgment that you make,
7 isn't it?

8 A. It's a personal judgment that's tempered by a
9 great deal of experience and a great deal of
10 conversation with other scientists, yes.

11 Q. And throughout the course of this time period,
12 from 1970 until the present when you've become more
13 and more and more involved in the dioxin issue, in
14 addition to doing your governmental research and
15 work for EPA and the state governments out west, you
16 also have agreed to testify for chemical companies
17 in the Agent Orange litigation, isn't that true?

18 A. Correct.

19 Q. And you came down on the side of industry in
20 that particular case, didn't you?

21 A. I came down on the side of the available
22 information.

23 Q. Well, Doctor, you were hired and paid by
24 industry in that case to testify against the
25 veterans, isn't that true?

1 MR. LOVE: Your Honor, I object.

2 A. I think not.

3 THE COURT: Just a moment.

4 MR. LOVE: I object to the manner in
5 which counsel was asking that question. We can come
6 to the bench to discuss it if you like.

7 THE COURT: If there's more to it than
8 what I hear in the question that was asked and the
9 objection that was made, then I'll have you come to
10 the bench. Doesn't seem to me that it's a very
11 complex matter. Is there something that you haven't
12 related that you feel we ought to discuss at the
13 bench?

14 MR. LOVE: It's along the lines that I
15 had mentioned, Your Honor. That's all.

16 THE COURT: At this moment?

17 MR. LOVE: That's correct.

18 THE COURT: If that be the case, the
19 witness may answer that question.

20 A. Would you repeat the question?

21 Q. You decided to testify on behalf of industry in
22 that case against the plaintiffs in that case who
23 were, in fact, veterans of the Vietnam war?

24 THE COURT: The question is whether or
25 not he had been hired to do so.

1 MR. CALWELL: Yes.

2 THE COURT: That is the question, Doctor.

3 Were you hired to do so?

4 THE WITNESS: I was retained by counsel
5 for the industry, yes.

6 Q. And aside from testifying in that case by way
7 of deposition, you also testified in Australia, did
8 you not?

9 A. That's correct.

10 Q. Before a Royal Commission that was
11 investigating what effects, if any, Agent Orange had
12 had on Australian veterans; isn't that right?

13 A. That's correct.

14 Q. And you took the same position there that you
15 took in the Agent Orange case; isn't that true?

16 A. I have no control over the position that I take.
17 I can only go by the evidence.

18 Q. But you selected the evidence, did you not,
19 that you decided to assign weight to? That's true,
20 isn't it?

21 A. No, sir. No one has been able to challenge my
22 selection of the evidence.

23 Q. But, Doctor, the fact is you did select the
24 evidence that you chose to rely on; isn't that right?

25 A. The evidence that I selected was every bit of

1 evidence that I could find.

2 Q. But you don't rely on all the evidence, do you?
3 You haven't in this courtroom.

4 A. I have to rely on every bit of evidence that I
5 can find in developing my opinion. If I were to
6 rely, in this courtroom, on every bit of evidence, I
7 would have had to come here by train instead of by
8 plane because I couldn't bring it with me.

9 Q. Doctor, what I'm saying to you is that in
10 selecting the evidence that forms the basis for your
11 opinions, you select certain studies and certain
12 scientists as having more credibility than other
13 scientists or studies; isn't that true?

14 A. I really don't think so. I present what I find.
15 I may speak to the credibility when I present it but
16 I have an obligation to use all of the evidence and
17 proceed as far as the evidence permits me to proceed.

18 Q. And you simply haven't been convinced yet,
19 personally, as a scientist, you haven't been
20 convinced yet of certain things about dioxin and its
21 toxicity; isn't that true?

22 A. I would presume that's true.

23 Q. You have found that it is a most toxic
24 substance, haven't you?

25 A. Yes.

Q. And you have found that it is probably the most toxic synthetic substance; isn't that right?

A. That's probably true, yes.

Q. Of all the things that man, through the wonders of science, have come up with, this may be the most toxic thing you've ever encountered; isn't that right?

A. It could very well be.

Q. And you have found that it affects the skin; isn't that true?

A. Yes.

Q. And you have concluded that it affects the immune system; isn't that true?

A. Correct.

Q. And you have found that it affects the liver, that's true, isn't it?

A. Yes.

Q. That it has some cardiovascular effect; that's true; isn't it?

A. Yes.

Q. That it affects the gastrointestinal system, that's true, isn't it?

A. Yes.

Q. And it affects the nervous system, you found that to be true, haven't you?

1 A. Yes.

2 Q. And it affects the reproductive system and the
3 endocrins; you found that to be true, haven't you?

4 A. Yes.

5 Q. And you found that to be mutagenic, you found
6 that to be true?

7 A. To a limited extent.

8 Q. And you also found it to be carcinogenic,
9 haven't you?

10 A. That's correct.

11 Q. But you just, as a scientist, are not yet
12 convinced as to how far this goes, are you?

13 A. Well, we've talked about the toxicity.

14 Q. Well, I want you to answer my question first.

15 A. How far it goes, what do you mean by that?
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Q. Well, you're just not convinced about certain things. You're not convinced about how carcinogenic it is, are you?

A. The evidence is reasonably clear how carcinogenic it is, what dosage is required to produce carcinogenicity.

Q. You're not convinced as to how carcinogenic it is in humans, are you?

A. No.

Q. And you're not convinced exactly as to how it may poison a human, are you?

A. Its mechanism, I presume you're speaking of?

Q. Yes.

A. No, I don't know.

Q. You're just not convinced about that yet, are you?

A. No one else is.

Q. Well, you've read studies where people have hypothesized about how it poisons humans, haven't you?

A. I've read studies where people have hypothesized how it affects biological systems.

Q. You've read those, haven't you?

A. Yes.

Q. And you just don't accept some of those, is

1 that right?

2 A. Most of the people who are investigating these
3 questions are unable to convince themselves.

4 Q. Doctor, I want you to answer my question. You
5 have seen explanations of the toxicity and the
6 mechanism of dioxin that you simply just don't
7 accept, isn't that true?

8 A. Yes.

9 Q. And you simply don't accept -- you haven't seen
10 a study, yet, that convinces you that dioxin may, in
11 fact, cause long-term irreversible effects on the
12 peripheral nervous system, for example, you just
13 haven't been convinced of that yet, isn't that true?

14 A. That's true.

15 Q. You know, and you are convinced that it does
16 have the ability to exert a toxic effect on the
17 peripheral nervous system in humans, isn't that true?

18 A. Apparently.

19 Q. But you're just not convinced as to how bad it
20 is or as to how long it lasts, isn't that right?

21 A. How bad it is, I presume you mean by dosage it
22 requires to do that.

23 Q. How much injury it causes, you're just not that
24 convinced about it --

25 A. At a given dose.

Q. -- are you?

THE COURT: Just a moment. What did you state, doctor, you said something about the given dose? I'm not sure --

THE WITNESS: Yes, sir, I did.

THE COURT: I'm not sure that was heard.

A. The destruction depends on the dosage.

Q. But the fact remains you simply aren't convinced yet as a scientist as to how much injury may result, dependent on whatever dose was received, and as to whether or not it's going to be permanent or not, isn't that right?

A. That's correct.

Q. You're convinced and there's no doubt in your mind that it causes some injury, that's true, isn't it?

A. Yes, that's very true.

Q. You're convinced and there's no doubt in your mind that dioxin does, in fact, cause a skin disease, isn't that true?

A. With appropriate exposure, yes.

Q. And you're convinced and there's no doubt in your mind that dioxin does, in fact, adversely affect the immune system, that's true, isn't it?

A. With a sufficient exposure, yes, sir.

1 Q. Right. It's just that you -- you're not
2 willing, just yet, to say how long those things may
3 last, that's true, isn't it?

4 A. I don't see the evidence that tells me.

5 Q. All right. And you're not convinced as yet as
6 to how serious these injuries may, in fact, be, is
7 that true?

8 A. That's correct.

9 Q. Now, all of those or that attitude that you
10 have, your scientific attitude toward dioxin, is
11 something that you've arrived at simply from your
12 reading, isn't that right?

13 A. That's correct.

14 Q. This is not something that you have determined
15 on your own in terms of sweating through an original
16 piece of research, is it?

17 A. Not on dioxin.

18 Q. It's just something -- it's kind of editorial
19 that you've -- it's an editorial position of the
20 things you've read, isn't that right?

21 A. No, that is not correct. An editorial has an
22 entirely different meaning than the development of a
23 defensible scientific opinion.

24 Q. And is that what you've in fact done, doctor,
25 you've tried to develop a defensible scientific

1 opinion to come to Court with?

2 A. Yes, sir.

3 Q. How long, Doctor, would you have to have
4 peripheral neuropathy for it to be a condition that
5 you would consider permanent?

6 A. I am not entirely sure how long. I would have
7 to rely on the advice of neurophysicians who
8 specialize in neurology to make that kind of a
9 judgment.

10 Q. So really, you're not in a position to tell the
11 jury, really -- to really give them an opinion as to
12 how long it takes for any of these conditions that
13 you're convinced dioxin causes, has to persist
14 before it's permanent, are you?

15 A. No.

16 Q. Now, Doctor, I want to shift the focus here
17 just for a minute and we'll come back to this a
18 little later.

19 I want to ask you about chlorine free
20 radicals. There's a difference between a free
21 chlorine and a chlorine-free radical, isn't there?

22 A. Yes.

23 Q. In fact, if this is 2,3,7,8-TCDD, for that to
24 be a chlorine-free radical, you'd have to get rid of
25 all these chlorines, is that right?

1 A. No, sir.

2 Q. Can you tell me what that would be?

3 A. That would just be dibenzodioxin.

4 Q. With no chlorines?

5 A. No chlorines.

6 Q. What would be an example of a chlorine-free
7 radical?

8 A. A free radical is an entity that exists by
9 itself in a highly unstable state. A chlorine-free
10 radical would be chlorine, itself, separated from
11 the rest of the molecule.

12 Q. That would be a chlorine-free radical?

13 A. Chlorine-free does not mean -- we're talking
14 about a free radical --

15 Q. Yes, sir.

16 A. -- that is comprised of chlorine.

17 Q. Right. Let's say one of these --

18 A. Not talking about substance that is free of
19 chlorine.

20 Q. Let's say if this chlorine, here, came off,
21 that would be a free chlorine?

22 A. It would probably be negative charged and it
23 would probably be lacking in electrons or carrying
24 an extra electron.

25 Q. But it would be a negatively charged free

chlorine ion, is that right?

A. No, it wouldn't be an ion.

Q. What would it be?

A. It would be a free radical. An ion is a -- is part of a -- if we had sodium chloride or hydrogen chloride in that solution, it would ionize and it would exist as a chloride ion on the one hand and the hydrogen ion on the other that could be combined, let's say, if you put sodium in there, we would end up perhaps with sodium ions and chlorine ions.

This -- a chlorine-free radical has a very powerful, or any free radical has a powerful capability for combining with almost any kind of a molecule, because it's carrying a great deal of energy and it can literally jam its way into a reaction.

Q. Now, and if one of these chlorine free radicals, as you have defined it, and I want to make sure I understand your definition of it, now you tell me if I'm wrong, I believe your testimony was that sometimes in the body, this dioxin -- I'm talking about an animal, this dioxin molecule will begin to be metabolized and you'll lose a chlorine off one corner, is that right?

A. That's correct.