

In the Supreme Court of Nevada

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Elizabeth A. Brown
Clerk of Supreme Court

SIERRA HEALTH AND LIFE INSURANCE
COMPANY, INC.,

Appellant,

vs.

SANDRA L. ESKEW, as special administrator of
the Estate of William George Eskew,

Respondent.

Appeal from the Eighth Judicial District Court, Clark County
The Honorable Nadia Krall, District Judge
District Court No. A-19-788630-C

JOINT APPENDIX Volume 6 of 18

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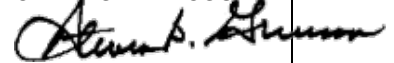
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DISTRICT COURT

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CLARK COUNTY, NEVADA

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SANDRA ESKEW, ET AL.,

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Plaintiff,

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vs.

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SIERRA HEALTH AND LIFE
INSURANCE COMPNAY, INC., ET
AL.,

11

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Defendants.

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14

BEFORE THE HONORABLE NADIA KRALL

15

DISTRICT COURT JUDGE

16

MONDAY, MARCH 21, 2022

17

RECORDER'S TRANSCRIPT OF JURY TRIAL - DAY 4

18

APPEARANCES

19

For the Plaintiffs:

20

MATTHEW L. SHARP, ESQ.

21

DOUGLAS A. TERRY, ESQ.

22

For the Defendants:

23

D LEE ROBERTS, JR., ESQ.

24

RYAN T. GORMLEY, ESQ.

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PHILLIP NELSON SMITH, JR., ESQ.

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RECORDED BY: MELISSA BURGNER, COURT RECORDER

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1 Las Vegas, Nevada, Monday, March 21, 2022

2

3 [Case called at 9:19 a.m.]

4 THE MARSHAL: -- Nadia Krall presiding.

5 THE COURT: Good morning everyone.

6 IN UNISON: Good morning.

7 THE COURT: Please be seated. Are the parties ready for the

8 jury?

9 MR. ROBERTS: Yes. We are, Your Honor.

10 MR. TERRY: Yes, Your Honor.

11 THE COURT: Thank you.

12 THE MARSHAL: All rise for the jury.

13 [Jury in at 9:19 a.m.]

14 THE MARSHAL: Jurors are all present.

15 THE COURT: Thank you. Do the parties stipulate to the

16 presence of the jury?

17 MR. TERRY: Yes, Your Honor.

18 MR. ROBERTS: Yes, Your Honor.

19 THE COURT: Thank you. Please proceed.

20 MR. ROBERTS: Thank you, Your Honor.

21 SHAMOON AHMAD, PLAINTIFFS' WITNESS, PREVIOUSLY SWORN

22 CROSS-EXAMINATION CONTINUED

23 BY MR. ROBERTS:

24 Q Good morning, Dr. Ahmad.

25 A Good morning.

1 MR. ROBERTS: Good morning, Jury.

2 IN UNISON: Good morning.

3 BY MR. ROBERTS:

4 Q So Dr. Ahmad, let's pick up where we left off on Wednesday
5 afternoon. We talked a little bit about your background in oncology and
6 your experience with radiation oncology, do you recall that?

7 A Yes.

8 Q So based on your personal background and experience, did
9 you feel comfortable reviewing requests for radiation treatment of
10 cancers?

11 A Yes.

12 Q What about lung cancers, did you treat patients with lung
13 cancer in your regular practice?

14 A Yes, I did.

15 Q And did some of your patients receive radiation therapy
16 together with any treatment you would provide?

17 A Yes.

18 Q The testimony in this case has been that Mr. Eskew was
19 receiving concurrent chemotherapy and radiation therapy. Did you have
20 experience with that in your practice?

21 A Yes, I did.

22 Q Could you explain to the jury why that might be used?

23 A The chemotherapy either in the form of tablets or
24 intravenously is sometimes used to potentiate the effects of radiation
25 and enhance the killing of the cancer cells.

1 Q Does providing concurrent radiation therapy with
2 chemotherapy have any added risk of side effects?

3 A Yes. Just as it helps increase killing of cancer cells it also
4 increases side effects from the treatment.

5 Q If you had felt uncomfortable reviewing these medical
6 records and understanding them, did you have any options or did you
7 have to do the review anyway?

8 A No. I had options. I could have declined to review, or I could
9 have asked them to send it to someone else.

10 Q And if you had not asked for assistance for external review,
11 would there have been any repercussions?

12 A No.

13 Q Are you discouraged from doing that if you don't understand
14 something?

15 A No. We are not.

16 Q We spoke briefly about the medical policies and the fact you
17 were familiar with them last week. Have you ever made a
18 recommendation that went against a medical policy?

19 A Yes. When necessary.

20 Q When necessary. Did you face any criticism or scrutiny when
21 you did that?

22 A No, I did not.

23 Q Did you have any repercussions from doing that?

24 A No.

25 Q Were you discouraged from doing that in any way?

1 A No.

2 Q We talked about the policy on Wednesday, and I'm not going
3 repeat that, but I would like to put something back up that we showed
4 you by Mr. Terry.

5 MR. ROBERTS: Audra, could you put up Exhibit 24, page 4
6 which is admitted into evidence? And go down to the next to last
7 paragraph.

8 BY MR. ROBERTS:

9 Q Okay. This is a description of proton beam therapy in the
10 medical policy that you used to deny the claim.

11 MR. ROBERTS: Your Honor, we seem to have a TV that's
12 turned away from the jury. Can the marshal fix that?

13 THE MARSHAL: Sorry about that.

14 MR. ROBERTS: May I proceed, Your Honor?

15 THE COURT: Yes, Mr. Roberts.

16 MR. ROBERTS: Thank you.

17 THE COURT: Thank you.

18 BY MR. ROBERTS:

19 Q Do you recall Mr. Terry reading this paragraph to you?

20 "The greatest energy release with conventional radiation photons
21 is at the surface of the tissue and decreases exponentially the farther it
22 travels. In contrast the energy of a proton beam is released at the end of
23 its path, a region called the Bragg peak. Since the energy release of the
24 proton beam is confined to the narrow Bragg peak collateral damage to
25 the surrounding tissue should be reduced."

1 Do you remember that being read to you?

2 A Yes.

3 Q So I'd like to focus in on this word right here, should. Should
4 be reduced. Could you explain to the jury what a theoretical benefit of a
5 medical procedure is? And lean up into that mic.

6 A Yes. So when we recommend any treatment, obviously
7 there are some anticipation or there's anticipation of certain things. The
8 response of the tumor as well the potential for side effects since all of
9 these things have side effects. The goal is always to try and reduce side
10 effects, however, that's not necessarily the case. And certainly it's rare
11 to eliminate them completely.

12 Q Okay. What I'd like you to do for me is to distinguish
13 between a theoretical benefit and a benefit that's been proven through
14 studies.

15 A Well, a theoretical benefit is exactly what that, you know,
16 implies, meaning it's something that one is considering perceived as
17 compared to things that are proven through clinical trials where we have
18 actual proof that the treatment or the combination will produce a certain
19 outcome in most patients.

20 Q And based on your review of the policy and your own
21 independent research, do you agree that proton beam theory has
22 theoretical benefits over photon therapy?

23 A Yes.

24 Q At the time you made this decision and relied upon this
25 policy, had that theoretical benefit been proven in actual clinical

1 randomized trials?

2 A No. Not for lung cancer.

3 Q One of the questions I wrote down that Mr. Terry asked you
4 was, do you agree that you can't argue with a piece of paper. A medical
5 policy is a piece of paper, and you can't argue with a piece of paper. Did
6 you have authority to overrule that piece of paper if you had felt that the
7 medical records in this case justified?

8 A Yes, I did.

9 Q Now during Mr. Terry's examination of you, you pointed out
10 that a reference to a ONC006 was a typo, do you recall that?

11 A Yes, I do.

12 Q And do you recall what the correct policy should have been?

13 A I don't remember the number, but it's several letters and
14 numbers.

15 Q And who fixed that, who corrected that typo? Was that you
16 or someone else at --

17 A Well, it was --

18 Q -- Sierra?

19 A -- concurrent with Sierra that saw that that was a typo and
20 they pointed it out to me.

21 Q And sent it back to you and asked you what the right policy
22 was?

23 A Yes.

24 Q And that incorrect policy citation, the typo, did that ever go
25 out in an official letter to Mr. Eskew or his provider?

1 A I don't think so.

2 Q Let's take a look at Exhibit 5, page 48. Do you recognize this
3 to be a copy of the denial letter -- and I think up at the top, who did this
4 particular copy go to?

5 A To Dr. Liao.

6 Q Okay. And let's look at the reason for denial, the block, the
7 details of our determination. Is there any reference here to an incorrect
8 medical policy?

9 A There's not.

10 Q Okay. So now that you've refreshed your recollection from
11 the letter, did -- was there any mistake in the denial letter which actually
12 went out from United?

13 A No. I don't see anything.

14 MR. ROBERTS: Let's look at the next page of that, Audra,
15 page, 49. Right in the middle beginning with, "if the treating physician".
16 It's just that one paragraph. Okay. So we can get it big.

17 BY MR. ROBERTS:

18 Q Okay. The letter that went to Dr. Liao stated, "If the treating
19 physician would like to discuss this case with a physician reviewer, he or
20 she may call the Health Plan", and gives a number. Did you ever receive
21 a phone call from Dr. Liao?

22 A I did not.

23 Q And you were asked whether you called Dr. Liao. Is that
24 standard practice to call the doctor?

25 A No. It's generally not. We get calls back from the requesting

1 doctor.

2 Q And I believe you mentioned about before you thought you
3 had everything needed to make this decision?

4 A Yes. That's correct.

5 MR. ROBERTS: Audra, could we go to 5-13?

6 BY MR. ROBERTS:

7 Q I want show you something which was focused on during
8 Mr. Terry's review.

9 MR. ROBERTS: And if you go to the bottom beginning with
10 the volume to the bottom of the page, Audra. Thank you.

11 BY MR. ROBERTS:

12 Q And he focused on this, which followed the discussion of the
13 pinnacle system, do you remember that?

14 A Yes.

15 Q What is the dose of radiation that is being proposed by MD
16 Anderson and Dr. Liao?

17 A So there are two different doses, one is for IMRT and the
18 other one is for IMPT, the proton therapy.

19 Q And am I looking up here at the 6,600 and the 6,000?

20 A Yes, correct.

21 Q And so the cGy, what does that stand for?

22 A Centigray.

23 Q And is there anything else here from the site to the dose all
24 the way across on the chart that would you tell you as a reviewing
25 physician how much radiation is going to go to adjacent structures in

1 IMRT versus proton beam therapy?

2 A No. There's not.

3 Q Is there anything in this data which would tell you that for
4 Mr. Eskew's particular type of cancer proton beam therapy would be
5 better for him?

6 A There's not.

7 Q Moving onto a different subject. Did you receive any training
8 before you started doing medical reviews for Sierra Health?

9 A Yes.

10 Q Tell the jury what type of training you got.

11 A It's part of the standard training where they tell you what the
12 rules and the regulations are, what is expected of the medical directors
13 and then these are periodically repeated or rechecked.

14 Q As part of that training were you encouraged to deny claims?

15 A No.

16 Q What is IRR testing?

17 A It's short for inter-rater reliability testing.

18 Q What was that again?

19 A Inter-rater reliability testing.

20 Q Okay.

21 A IRR.

22 Q And what is that?

23 A It's a matter to see what the decision is going to be between
24 two reviewers looking at the same set of clinical information.

25 Q And did you undergo any IRR testing?

1 A Yes.

2 Q How often?

3 A It was done at least once a year.

4 Q Did you receive any incentives, were you paid anymore if
5 you denied claims than if you approved claims?

6 A No, I was not.

7 Q Were you ever scrutinized or criticized for approving
8 services?

9 A No.

10 Q Now when you moved to a fulltime job as a medical director
11 reviewing claims, did that have anything to do with your denial rates or
12 anything like that?

13 A No. Not at all.

14 MR. ROBERTS: Your Honor, at this time I'd move to admit
15 Exhibit 76. There's no objection noted.

16 MR. TERRY: No objection.

17 THE COURT: Exhibit 76 will be admitted into evidence.

18 [Defendants' Exhibit 76 admitted into evidence]

19 MR. ROBERTS: Thank you.

20 BY MR. ROBERTS:

21 Q So this is titled up at the top.

22 MR. ROBERTS: Audra, if you could blow up the top block.

23 BY MR. ROBERTS:

24 Q This is distributed to a number of people including Health
25 Plan medical directors, affirmative statement about incentives. Is this

1 something that would receive as a medical director periodically?

2 A Yes.

3 Q And did you read it when you got it?

4 A Yes.

5 Q Let's look at the next section of the letter, 1 through 4. Is the
6 policy of the Health Plan that UM decision making is based only on
7 appropriateness of care and service and the existence of coverage. The
8 Health Plan does not specifically reward practitioners or other individuals
9 for issuing denials and coverage services or care. And financial
10 incentives for UM decision makers do not encourage decisions that
11 result in the underutilization. Was there anything about your own
12 personal experience with Sierra that differed from these policies?

13 A No. There was not.

14 MR. ROBERTS: Audra, can you put up Exhibit 7, page 1?

15 BY MR. ROBERTS:

16 Q And just briefly here, sir. I'd like to go back to this bill for
17 your services from MBO Partners. And I believe Mr. Terry did a
18 calculation showing that based on the number of claims you reviewed
19 during this period, they only averaged out to about 12 minutes a claim,
20 do you recall him asking?

21 A Yes.

22 Q Does that prove that you didn't spend 30 minutes on this
23 claim?

24 A No, it does not.

25 Q Why not?

1 A Because that's an average number based upon the total
2 number of cases reviewed. And as I mentioned before, most -- many of
3 these cases were approvals which take very little time. Therefore the -- a
4 lot of time was spent on reviewing denials.

5 Q And I think fair to say you won't remember which of these
6 claims you denied and which you approved and what your approval rate
7 was this one particular was back in -- six years ago, right?

8 A Right. No, I do not.

9 Q But you said that it was consistent. Explain to the jury what
10 about that rate was consistent, your approval rate over the period of time
11 that you served as a medical director?

12 A The majority of cases were approved and then there were the
13 denials. Is that what you're asking?

14 Q Yes. So when you say the majority, what do you mean, 51
15 percent?

16 A A lot higher than that. I don't recollect an exact number.

17 Q But it was much higher than 51?

18 A Yes.

19 Q And was there any particular reason why you believe Mr.
20 Eskew's review took longer than the average of 12 minutes?

21 A Yes. Because one it did not meet policy requirements,
22 therefore there was additional need to focus on all of the things that
23 were present.

24 Q And I'd like to close with one final exhibit. Exhibit 75 was
25 admitted during your initial testimony.

1 MR. ROBERTS: Audra, could you go up to the 75, page 4, the
2 bottom of the page, description services?

3 BY MR. ROBERTS:

4 Q And this is in the IMRT policy that you reviewed with Mr.
5 Terry, do you remember that?

6 A Yes.

7 Q So in this description of IMRT, are you familiar with the
8 description?

9 A Not precisely, but I'm familiar with how IMRT is delivered
10 and what happens.

11 Q And there's been a lot of discussion about the proton beam
12 therapy allows you to focus the energy in the tumor region and avoid it
13 radiating the adjacent structures, right?

14 A Yes.

15 Q Is the IMRT like that or not like that?

16 A IMRT is like that.

17 Q So IMRT is also designed to reduce the tumor -- the radiation
18 goes to adjacent structures while delivering higher radiation to the
19 tumor?

20 A Yes. That's correct.

21 MR. ROBERTS: Thank you, Doctor. That's all I have. I
22 appreciate you coming back.

23 REDIRECT EXAMINATION

24 BY MR. TERRY:

25 Q Hello, Dr. Ahmad.

1 MR. TERRY: May I proceed, Your Honor?

2 THE COURT: Yes.

3 MR. TERRY: Thank you.

4 BY MR. TERRY:

5 Q So you've had the -- sort of the rare opportunity, Dr. Ahmad,
6 to spend four days between the time you started procedure -- or your
7 testimony and today when you're finishing your testimony. Doesn't
8 happen often. So I want to ask you, how much time did you spend
9 preparing to come back and give this testimony you gave here today?

10 A I did not.

11 Q None?

12 A No.

13 Q You didn't talk to the lawyers for UHC?

14 A Except to ask what the plan was for today.

15 Q That's it?

16 A Yes.

17 Q Okay. Zero, no minutes? Okay. So that -- I guess that leaves
18 us then with the 10 or 12 hours that you spent on your deposition and
19 preparing for your trial testimony that you told us about the other day,
20 right?

21 A That sounds about right.

22 Q Excuse me. Now Mr. Roberts asked you about the propriety
23 of your denial of proton therapy for Mr. Eskew. You'd agree with me
24 when you -- Dr. Ahmad that denials of claims like this one can result in a
25 policy holder being deprived of the care that their treating physician

1 wants to give them?

2 A I mean, I don't agree with that statement. It can be an
3 obstacle, but there are ways around that.

4 Q You'll admit it's an obstacle?

5 A It can be.

6 Q Okay. And there's ways around that obstacle?

7 A Yes.

8 Q Like what?

9 A If they disagree with the denial then it can be appealed at
10 several levels.

11 Q Appealed. One level of appeal in Mr. Eskew's policy, right?

12 A I don't recollect what policy numbers.

13 Q Okay. If the policy says you get one level appeal, you get
14 one level of appeal, right?

15 A Okay, yes.

16 Q Okay. What -- so appeal and what else?

17 A They can choose to go with the treatment that is supported
18 by the policy.

19 Q Okay.

20 A As in the [indiscernible] length and then there may be other
21 options --

22 Q Like?

23 A -- in clinical trials or getting it through other resources.

24 Q Like what other resources?

25 A There are organizations that support treatment that may or

1 may not be covered.

2 Q Okay. Anything else you can think of?

3 A I supposed they can pay for it.

4 Q Oh they can pay for it out of pocket?

5 A Yes.

6 Q But you wouldn't really expect somebody to pay for the
7 treatment that they're doctor recommends when they've got insurance,
8 would you?

9 A I can't speculate what, you know, they would expect.

10 Q Okay. So it's true to say isn't it, Dr. Ahmad, that we talked
11 when you were here on Wednesday that there's a system in place at
12 UnitedHealthcare that you didn't create that work in, right?

13 A Yes.

14 Q But we can agree that you at least in Bill Eskew's case you
15 were where the rubber met the road between that system and Mr.
16 Eskew, right?

17 A I'm sorry. Could you repeat that question again?

18 Q You as the medical director role, you were where the rubber
19 the road between the UnitedHealthcare system and Bill Eskew, right?

20 A I was reading the reviews, yes.

21 Q And that's the way the system was designed by people at
22 UHC that you've never met?

23 A I've met a few, but I'm not sure those that created this policy.

24 Q All right. So you told Mr. Roberts that -- we've talked about
25 your bill and you're charging 200 bucks an hour to do these reviews for

1 UnitedHealthcare. And you said to Mr. Roberts, oh I can make more
2 money than that being a doctor. And so I guess my questions for you is,
3 why would do that, why would make 200 bucks an hour doing this work
4 when you can make more money doing -- practicing medicine?

5 A I think I mentioned before that it was -- I was interested in
6 doing the work and being part of the process.

7 Q Well, one thing that could be true isn't it, is that you don't
8 spend hardly any time doing these 80 reviews every week and you send
9 a \$3500 bill every week for spending basically no time?

10 A That's not --

11 Q That's a better deal than practicing medicine, isn't it?

12 A That's not accurate.

13 MR. ROBERTS: Objection. Compound.

14 BY MR. TERRY:

15 Q I'm sorry?

16 A I said that's not accurate what you're saying.

17 THE COURT: When your attorney makes an objection, don't
18 respond. I need time to rule on the objection.

19 BY MR. TERRY:

20 Q Mr. Roberts asked you some questions about the appeal
21 process. And you mentioned just now, well they can appeal if they don't
22 agree with the outcome of the utilization review that you performed.
23 Isn't it true -- I think you've told us that you are an appeals medical
24 director now for this company, right?

25 A Yes.

1 Q And do you give the same care and careful consideration and
2 studied analysis to the appeals that you handle as you did to Bill Eskew's
3 claim?

4 A Yes.

5 Q And you're handling appeals of oncology claims, right?

6 A Yes, correct.

7 Q And you handle these -- well let me back up. Back in 2016
8 when you were reviewing Bill Eskew's claim, you were handling claims
9 all over the country, weren't you?

10 A I don't recollect. I know for sure Nevada I was.

11 Q But more states than just Nevada, right?

12 A Yes.

13 Q How many more states?

14 A I don't know.

15 Q Two or three, or is it 50? I mean, give us an idea.

16 A I couldn't say.

17 Q You don't know?

18 A I couldn't say. I don't --

19 Q Well, we know that you handled claims in Arizona, right?

20 A I'm sorry, say --

21 Q You handled claims in Arizona?

22 A Yes.

23 Q And you handled claims in California?

24 A I don't remember if I did California or not.

25 Q You do now, right?

1 A Yes.

2 Q So Mr. -- well, let me ask you this before I move away from
3 that. Mr. Roberts --

4 MR. TERRY: Can you pull up Exhibit 77 please, Jason? Has
5 that been admitted? Oh I'm sorry. Lee, you don't have any objections to
6 77, do you? Because you pulled it up. The statement regarding
7 incentives.

8 MR. GORMLEY: 76.

9 MR. TERRY: I'm sorry?

10 MR. GORMLEY: 76.

11 MR. TERRY: Oh 76.

12 MR. GORMLEY: For the incentive.

13 MR. ROBERTS: Yeah. 77 --

14 MR. TERRY: I'm sorry.

15 MR. ROBERTS: -- is not in. I did not --

16 MR. TERRY: Thank you, guys. I said the wrong number.
17 Exhibit 76, Jason, please.

18 BY MR. TERRY:

19 Q This is the document --

20 MR. TERRY: Blow up the top of it there, Jason, if you don't
21 mind. No. Up here at the very top, Jason.

22 BY MR. TERRY:

23 Q This is an affirmative statement about incentives, do you see
24 that?

25 A Yes.

1 Q And the company makes you say -- makes you sign one of
2 these every so often, right?

3 A Yes.

4 Q And it says you're not going to be corrupted -- effectively not
5 going to be corrupted by trying to make extra money by denying claims,
6 right?

7 A Correct.

8 Q And okay. But what we know is that as a medical -- appeals
9 medical director at UnitedHealthcare you earn bonuses every year, don't
10 you?

11 A There may be bonuses, yes.

12 Q Well, you do get bonuses every year, don't you?

13 A Yes.

14 Q Okay. And those bonuses go up and down from year to year,
15 don't they?

16 A Yes. That's correct.

17 Q And isn't it true that that's because your bonuses are based
18 on the profit of the company?

19 A I'm not quite sure how that process works.

20 Q So you get a bonus every year, but you don't know what it's
21 based on?

22 A Right, correct.

23 Q Can you testify for us here today the profit of the company
24 plays no role in your bonus?

25 MR. ROBERTS: Objection. Foundation.

1 THE COURT: Sustained.

2 BY MR. TERRY:

3 Q So you're telling us that you don't know what --

4 A Correct.

5 Q -- your bonus is based on?

6 A Yes.

7 Q Has anyone ever told you that profit plays a role?

8 A No. I don't recollect.

9 Q Is there a document somewhere that tells you what it's based
10 on, your bonus?

11 A I have not seen one. There may be one.

12 Q Okay. Well, isn't it true that this affirmative statement about
13 incentives is created so that you can have a bonus program in place, but
14 UHC lawyers can get up in court and do what Mr. Roberts just did and
15 act as though there's no profit bonus in place?

16 MR. ROBERTS: Objection. Foundation and calls for
17 speculation.

18 THE COURT: Sustained.

19 BY MR. TERRY:

20 Q And you're not here to tell us are you, Dr. Ahmad, that if the
21 Eskew's had appealed your denial that anything would have changed,
22 are you?

23 A It might have changed.

24 Q It might have, based on what?

25 A That would be speculating, I mean, as different reviewer

1 makes, you know, their own decision.

2 Q Okay. So Mr. Roberts asked you about how many of these
3 claims you approved, and you said, the majority. And he said, 51
4 percent, more than that. How many -- what's the percentage, right?
5 Remember that?

6 A Yes.

7 Q So where's the data, did you bring it with you today about
8 how often you approve versus how often you deny claims?

9 A No. I don't have it here.

10 Q Okay. This is just based on your memory from what you
11 think happens?

12 A Yes, correct.

13 MR. TERRY: Jason, if you could pull up Exhibit 5, page 5,
14 please.

15 BY MR. TERRY:

16 Q Dr. Ahmad, Mr. Roberts was asking you some questions
17 about what you did in the review of this claim, Mr. Eskew's claim.

18 MR. TERRY: I want to go to -- Jason, where's -- this right
19 here, please.

20 BY MR. TERRY:

21 Q Dr. Ahmad, this is your February 5th, 2016 email. See at the
22 top it says from you to Lou Ann, I think it's pronounced Amogawin, but I
23 may be wrong. Maybe it's Amogawin, I can't remember. From
24 Shamoon Ahmad to Lou Ann Amogawin. And this is the sum total of
25 your work product of this case, right?

1 A Correct. Before and after, but yes.

2 Q And everything that you documented with regards to Bill
3 Eskew's denial of proton therapy we can find right there, right?

4 A Yes.

5 Q Okay. What we know did not happen is you never spoke to
6 the Eskew's, right?

7 A Correct.

8 Q You never spoke to the agent who sold the Eskew's the
9 insurance policy?

10 A I did not.

11 Q You didn't know anything about the interaction between Mrs.
12 Eskew and the agent at the time when the policy was purchased, right?

13 A Correct.

14 Q You say here --

15 MR. TERRY: Jason, highlight this line right here where it
16 starts with NCCN.

17 BY MR. TERRY:

18 Q You say in your note that you reviewed the NCCN guidelines
19 for radiation therapy version 2016, but you've told us in your testimony
20 that's not right.

21 A Correct. It's used sometimes when it's applicable, but in this
22 case I did not.

23 Q So you did not review or rely upon it?

24 A Correct.

25 Q And yet here it is. It's the only piece of evidence besides the

1 medical policy that you documented in the file, right?

2 A Yes.

3 Q You've told us that you went out and did some research into
4 some medical literature related to proton therapy and lung cancer, right?

5 A I -- that would be my recollection, yes.

6 Q And you can recall that today six years later even though
7 you've done lord knows how many reviews since then up until now,
8 right?

9 A Correct.

10 Q I guess I'm wondering; how do you remember this one grain
11 of sand on this whole beach of reviews that you did?

12 A Generally for denials we took additional steps and research
13 much more than for approvals.

14 Q I appreciate that. I don't want to know about generally, I
15 want to know what you did on this claim. Do you remember that you did
16 that on this claim?

17 A To the best of my recollection, yes.

18 Q Okay. So -- but you cannot tell us as you sit here today what
19 other literature, medical literature that you went out and found and
20 reviewed before you made this claim decision, right?

21 A Correct.

22 Q And what we know is as we can see right here, it's not
23 written down anywhere, it's not documented?

24 A Yes, correct.

25 Q But we are to believe that you remember doing it even

1 though you didn't document it, right?

2 A Yes.

3 Q Can you see why someone might be a little skeptical about
4 that?

5 A I'm not sure.

6 Q Why would you not document the literature that you
7 reviewed if you did it?

8 A That depends from case to case. If there is a reason to
9 document something then it's documented. If it's fairly consistent, then
10 it's not.

11 Q Okay. So there was no reason to document what literature
12 you looked at or you would have?

13 A No, I didn't say that.

14 Q Oh. I thought you said you document when there's a
15 reason?

16 A When there's a reason, right. But that again, that's -- it's not
17 a rule to do that one way or the other.

18 Q Okay. Let's talk about because you've -- Mr. Roberts has
19 asked you about MD Anderson's information submitted to you in the
20 comparative study that they did. Do you know what comparative studies
21 of IMRT versus proton therapy are comprised of at MD Anderson? What
22 are the parts and pieces of it?

23 A I'm not sure what their process is, but generally speaking it
24 speaks to the different amounts of radiation delivered to different
25 tissues.

1 Q Okay.

2 A And compares different modalities it might need.

3 Q So there's a comparison done between the two, but I'm
4 wondering do you know how they do it and what the work product looks
5 like once they've done this comparison?

6 A I'm not -- again, I'm not sure what theirs looks like, but in
7 general it's the comparison and maybe tables or pictures.

8 Q Did you say tables or pictures? I'm sorry, I didn't --

9 A Yes.

10 Q Okay. Thank you.

11 MR. TERRY: Jason, let's pull up Exhibit 160. Don't put it up
12 yet. Your Honor, without objection we'd move for admission of Exhibits
13 160 and 161.

14 MR. ROBERTS: No objection, Your Honor.

15 THE COURT: Exhibits 160 and 161 will be admitted into
16 evidence.

17 [Plaintiffs' Exhibits 160 and 161 admitted into evidence]

18 MR. TERRY: Thank you, Your Honor. So let's pull up Exhibit
19 160, Jason, page 8. And then next to that, Jason, let's pull up Exhibit
20 161, page 70.

21 JASON: And what was the next page?

22 MR. TERRY: 161, page 70.

23 BY MR. TERRY:

24 Q Okay. Dr. Ahmad, on the left hand side of screen here,
25 Exhibit 160, page 8, can you tell us what that is?

1 A These appear to be scans of maybe some part of the chest.

2 Q Scans of some part of the chest. Okay. Can you see the
3 colored portions on the scans there?

4 A Yes.

5 Q All right. Do you know what those are?

6 A I'm not sure.

7 Q All right. On the right hand side of the screen, Exhibit 161,
8 page 70, do you know what those images represent?

9 A Not beyond the fact that these are images of again
10 somewhere in the chest.

11 Q Somewhere in the chest, okay. So can you tell us, Dr.
12 Ahmad, which one of those documents, 160 -- Exhibit 160 on the left or
13 Exhibit 161 on the right, which one is IMRT, and which one is proton?

14 A I cannot tell.

15 Q So if those images had been provided to you at the time that
16 the claim was submitted and ultimately denied by you, you wouldn't
17 have been able to even look at them and tell what they were, would you?

18 A I don't want to speculate what I might have done looking at
19 these at the time.

20 Q But you wouldn't have been able to look at them and see
21 what -- tell what they are because you can't do that now, right?

22 A Again, I don't know.

23 Q Okay.

24 MR. TERRY: Jason, let's go to Exhibit -- on the left hand side
25 can you pull up Exhibit 160, page 29?

1 JASON: 29?

2 MR. TERRY: Yes, sir. And then on the right hand side pull up

3 161, page 2 please.

4 BY MR. TERRY:

5 Q Can you see those, Dr. Ahmad?

6 A Yes.

7 Q Can you tell us what those are?

8 A Looks like -- says dose something on the left side and then

9 some organs are mentioned on the right side.

10 Q And then what on the right side? I'm sorry.

11 A Some organs are mentioned on the right side.

12 Q Okay. So you -- but you can't tell us what the tables show

13 there or the charts, what those represent?

14 A Correct.

15 Q Have you ever heard the term dose volume histogram?

16 A Yes.

17 Q DVH?

18 A Yes.

19 Q But you didn't know that these were dose volume

20 histograms?

21 A I mean, if I look at them closely I might know that.

22 Q Can you tell us which one of them is IMRT and which one is

23 protons?

24 A Not clear enough, but no.

25 Q I'm sorry, say that again.

1 A I said it's not clear to me.

2 Q Okay. So do you know how these documents here, these
3 dose volume histograms taken from Exhibit 160 and 161, how they relate
4 to the images that we looked at just before this?

5 A Correct.

6 Q Do you know how they relate to one another?

7 A Ask the question again, I'm sorry.

8 Q Do you know how these tables here, these dose volume
9 histograms --

10 A Yes.

11 Q -- how they relate to the images that we looked at just
12 before?

13 A I'm assuming these are numbers derived from some of those
14 images.

15 Q You're assuming that?

16 A I'm assuming that, but I don't know.

17 Q All right. Do you know -- excuse me. Do you know how a
18 dose volume histogram is used to measure the amount of radiation that
19 is going to be applied to organs at risk with a radiation plan?

20 A Generally speaking there is radiation delivered to the target
21 as well as the surrounding tissues. It may be different, but it's always
22 there.

23 Q What I'm asking you is, do you know how a radiation
24 oncologist could look at these dose volume histograms that we're
25 showing you now and determine how much radiation will be delivered

1 to a specific organ in a radiation plan?

2 A I don't know what the radiation oncologist would see.

3 Q Do you know how a radiation oncologist can use these dose
4 volume histograms and the images we looked at earlier to predict the
5 risk of negative side effects to specific organs at risk?

6 A I mean, they would take into consideration I'm assuming the
7 results of the data from here.

8 Q Okay. But you don't know how a radiation oncologist can
9 take this data that you're looking at now and predict the prevalence or
10 the risk of negative side effects to an organ at risk near the tumor, right?

11 A Correct.

12 Q Okay. So if I were to ask you, Shamoan Ahmad, medical
13 oncologist, tell us, based on the comparative studies, which of these two
14 plans, protons or IMRT best maximizes the therapeutic ratio and
15 comports with the principal of ALARA, as low as reasonably achievable,
16 you wouldn't be able to do it, would you?

17 A I mean, I -- perceivably, I could.

18 Q Well --

19 A I would have to sit down and spend time on it and perhaps I
20 would, or I may not.

21 Q Maybe, maybe not?

22 A Yes.

23 Q Okay.

24 MR. TERRY: Jason, pull up Exhibit 5, page 13, please. Okay.

25 BY MR. TERRY:

1 Q Let's pull up this part here that Mr. Roberts was showing you
2 earlier, Dr. Ahmad. And specifically, in the highlighted portion of this
3 document, there's 6,600/6,000 centigray, correct?

4 A Yes, correct.

5 Q Centigray, if you take off the zeros equals gray, right?

6 A Yes.

7 Q So 6,600 centigray is 66 gray?

8 A Right.

9 Q 6,000 centigray is 60 gray?

10 A Yes.

11 Q Okay. So what your read of document is, that there are two
12 different doses of radiation, 6,600 dose and a 6,000 dose. One of those is
13 IMRT and the other is proton therapy?

14 A Yes.

15 Q Which one's which?

16 A The IMRT is the 66 and the proton would be the 60, assuming
17 they are going by the way it's mentioned.

18 Q Okay. So you're saying that your -- the way you read this is
19 the 6,600 or 66 gray is the IMRT and the 6,000 or 60 gray is proton
20 therapy?

21 A I'm assuming that.

22 Q What significance does that have to you?

23 A Just that these are different doses for different types of
24 radiation.

25 Q Okay. What -- does that mean anything to you at all?

1 A No, not necessarily.

2 Q So when you look -- when you looked at this claim, did you
3 assign any significance to that fact?

4 A I looked at it, but it didn't require any additional
5 investigation.

6 Q Okay. But what I'm saying is did the fact that you concluded,
7 the way you read this, IMRT is 6,600 and proton therapy is 6,000. Did
8 that have any part of your decision to deny Mr. Eskew's claim?

9 A No.

10 Q Isn't it true, Dr. Ahmad, that you don't possess the medical
11 expertise to tell us what the benefits are of proton therapy, whether they
12 be theoretical or actual?

13 A I'm aware of the literature that's out on both of those two
14 modalities.

15 Q Uh-huh. And does that -- is that -- are you saying that you
16 have the expertise, you Shamoon Ahmad, to tell us what the theoretical
17 and actual benefits of proton therapy are?

18 A I do not have the expertise.

19 Q Okay. Thank you.

20 MR. TERRY: By the way, Jason, will you pull up 160 again
21 real quick? And go down to page -- actually, go to page 8. Well, just
22 right there is fine. That's fine.

23 BY MR. TERRY:

24 Q So this is part of the comparative plan at MD Anderson.
25 There's a whole bunch of these images.

1 MR. TERRY: Can you scroll through some pages, Jason, just
2 to show that there's a number of pages like this? Keep going.

3 BY MR. TERRY:

4 Q Whole bunch of pages. I think this exhibit has like 100 pages
5 of images like this and data that relate to the -- one of the treatment
6 plans. This happens to be the IMRT plan. How was MD Anderson
7 supposed to get this to you?

8 A I cannot answer that.

9 Q Fax?

10 A Possibly.

11 Q Isn't it true that UHC or Sierra requires fax?

12 A I'm not -- I don't know how they get information.

13 Q Did you put your email address in the denial letter? I didn't
14 see it.

15 A No, I don't --

16 Q So if you were to fax the images -- scroll back up some,
17 Jason. If they were faxing these images to you, do you think they would
18 be meaningful at all, coming through a fax machine?

19 A I cannot speak to that.

20 Q And if MD Anderson was to print them all off and put them
21 into snail mail, delay is being built in for the treatment, right?

22 A Mail takes longer, yes.

23 Q Now, you approved IMRT in this case.

24 MR. TERRY: Jason, go to the first page of 160, please. And
25 isn't it true that the only document you have related to IMRT, a

1 planning -- excuse me -- the planning document for IMRT was this one
2 page?

3 A I cannot --

4 Q You don't know?

5 A No. I cannot read it.

6 Q Oh.

7 MR. TERRY: Can you blow that up a little bit, Jason?

8 BY MR. TERRY:

9 Q Sorry about that, Dr. Ahmad.

10 A And what was your question again? I'm sorry.

11 Q The only thing you had in your possession at the time you
12 approved IMRT was this one piece of paper, right?

13 A I don't recollect. If it was there, yes.

14 Q All right.

15 MR. TERRY: So Jason, pull up Exhibit 75, which is I believe
16 is the IMRT medical policy. Yeah.

17 BY MR. TERRY:

18 Q So this is a medical policy from Sierra. It says at the top,
19 Sierra, a United Health Company. It has to do with IMRT. So I'd like for
20 you to take a look at this IMRT medical policy and point out to us where
21 there's an analysis done by the company of IMRT for lung cancer.

22 A Generally, it would be in the reference section.

23 Q Okay. Well, let's go down to the reference section.

24 MR. TERRY: And in fact, Your Honor, may I approach and
25 hand a copy of that to --

1 THE COURT: Yes.

2 MR. TERRY: Thank you.

3 BY MR. TERRY:

4 Q So tell us what page you want us to start looking at. And
5 again, the question is where does it say in there that IMRT is safe,
6 effective and proven for lung cancer?

7 THE COURT: Mr. Terry, Melissa is saying they said they can't
8 see it very well.

9 MR. TERRY: Oh, I'm sorry.

10 UNIDENTIFIED SPEAKER: [Indiscernible] can't see that.
11 Sorry.

12 MR. TERRY: Yeah. When Dr. Ahmad gets to a place where
13 he wants to take a look, we'll find that spot and blow it up.

14 UNIDENTIFIED SPEAKER: Okay.

15 MR. TERRY: Thanks for letting me know.

16 THE WITNESS: I think what I'm seeing here is the clinical
17 evidence described under main topics or headings for different types of
18 cancers.

19 BY MR. TERRY:

20 Q Okay. So I'm sorry. I didn't understand what you're trying to
21 tell me.

22 A I said the reference section is describing and listing what I'm
23 assuming are trials or day from -- for individual cancers.

24 Q Is there one there for lung cancer?

25 [Witness reviews document]

1 A I don't see that under a specific topic, except there are many
2 references towards the end. I'm not sure if there's something in there.

3 Q Okay. So under the section entitled, clinical evidence --

4 MR. TERRY: Jason, pull up page -- 75, page 5. Under the
5 section titled clinical evidence [indiscernible] little bit, please.

6 BY MR. TERRY:

7 Q This is the second under which you'll find references to
8 literature related to specific kinds of cancer, right?

9 A Yes.

10 Q Okay. And then if you look under that --

11 MR. TERRY: Jason, pull up -- yeah.

12 BY MR. TERRY:

13 Q So right there, it says anal cancer. That's the first one. Anal
14 cancer. See that?

15 A Yes.

16 Q So there's some literature cited to with regard to anal cancer
17 and IMRT, right?

18 A Correct.

19 Q But then if you scroll on down through there, you'll see bone
20 tumors, breast cancer, central nervous system tumors, cervical cancer, et
21 cetera. But isn't it true that if you scroll all the way through this
22 document, there's not any literature in there related to lung cancer?

23 A In this section, correct.

24 Q Well, there's not any anywhere in the whole document, is
25 there?

1 A Well, there were trials listed towards the end, several page.
2 I'm not sure if there's anything in there or not.

3 Q Okay. But the bottom line is you approved IMRT without
4 referring to any medical literature that supports its safe and effective and
5 proven use for lung cancer, right?

6 A That was kind of the general -- yeah, frequent
7 recommendation.

8 Q So if there's -- if someone -- let's -- let me pose a situation to
9 you. Someone needs to have surgery to remove a tumor and there's
10 two surgical procedures that can be used, procedure A and procedure B.
11 Procedure A is more expensive, and Procedure B is less expensive.
12 Procedure A will pose less risk of side effects. Procedure B will pose
13 more risk of side effects, even though it is cheaper. Are you with me?

14 A Yes. So wouldn't you agree in that scenario that Procedure A
15 is the most appropriate treatment?

16 MR. ROBERTS: Objection. Improper hypothetical.

17 THE COURT: Sustained.

18 BY MR. TERRY:

19 Q You'd agree with me, wouldn't you, Dr. Ahmad, that cost
20 doesn't determine what medical treatment is the most appropriate?

21 A In regards to clinical decisions or a coverage decision?

22 Q Either one.

23 A Unless it's listed as a stipulation in the policy or somewhere,
24 should not.

25 Q So even if it's more dangerous, if it's cheaper, that's the

1 route Sierra Healthcare taught you to go, right?

2 A No, that's not correct.

3 Q Well, does cost factor in or not?

4 A As a medical director, we were not looking into that. We
5 were looking at the medical necessity.

6 Q You told us that on Wednesday. You told me that on
7 Wednesday. And then when Mr. Roberts was asking you questions, he
8 was showing you a part of the insurance policy that referenced managed
9 care. Do you remember that?

10 A Yes.

11 Q And he said well, look under here. It says cost is a factor.
12 And then he said something to the effect of you're supposed to take cost
13 into account. Do you remember that?

14 A I don't remember if he said that or not.

15 Q Well, do you or don't you?

16 A I don't remember if he said that or not.

17 Q Do you or don't you take costs into account?

18 A Generally not.

19 Q Sometimes?

20 A Actually not, no.

21 Q Not generally. Never?

22 A No, correct.

23 Q And you're telling us that you never took the cost of proton
24 therapy versus IMRT into account, right?

25 A In making a coverage decision?

1 Q Yes.

2 A I did not.

3 Q Okay. So if UHC's or Sierra's lawyers get up and argue that
4 hey, we got a right to consider cost and we're supposed to consider cost,
5 that's different than what you did at the time you denied the claim, right?

6 A I was reviewing for clinical appropriateness.

7 Q Last thing. Mr. Roberts, I think misremembered something
8 that I asked you on Wednesday I don't remember, much, but I do
9 remember what he was saying. He said that I asked you -- you can't
10 argue with a piece of paper. That's not what I recall asking. What I
11 asked you is, you know, as a physician, you don't treat a piece of paper.
12 You treated a person, right?

13 A For a clinical decision, yes.

14 Q So for a clinical decision, things like therapeutic ratio and the
15 risk of side effects are very important, aren't there?

16 A If supported by --

17 Q For a clinical decision.

18 A -- if supported by the clinical literature, yes.

19 Q Whereas, in a coverage decision, those things don't matter at
20 all, do they?

21 A I'm assuming the policy is based on all of those comparables
22 of comparative literature.

23 Q And if it turns out that the medical policy is not based on
24 science on medicine but is instead based on money and business
25 decisions, then that's a problem in your mind, isn't it?

1 A I can't speak for, you know, for them.

2 Q Well, I thought you told me on Wednesday that you wouldn't
3 want to be a part of the system whereby the insurance company was
4 taking into account costs and business decisions when they're drafting
5 up these medical policies and not taking into account the medicine. Do
6 you remember that?

7 A I said I would not want to be part of that, but --

8 Q All right.

9 MR. TERRY: I think that's all I have, Your Honor, thank you.

10 THE COURT: Thank you. Any recross?

11 MR. ROBERTS: Yes. Thank you, Your Honor. Audra, could
12 you put up 161 page 1?

13 RECROSS-EXAMINATION

14 BY MR. ROBERTS:

15 Q Mr. Terry started out by showing you a couple random
16 images from Exhibit 160 and 161. Remember that?

17 A Yes.

18 Q And there wasn't anything on that that identified which of
19 those images were proton and which were IMRT, was there?

20 A I don't recollect.

21 MR. ROBERTS: Let's blow up the top third. Now, this is 161
22 page 1. The whole top third, Audra. Start with proton plan all the way
23 up there, if you can get all of it there. There you go. Thank you.

24 BY MR. ROBERTS:

25 Q Now, if instead of just showing you a random image from

1 the middle of one of those exhibits, if you had gotten the whole thing,
2 including page 1, would you have known whether that image was in the
3 proton plan or the IMRT plan?

4 A Yes, I would.

5 Q And how would you have known that?

6 A Because it would state so.

7 Q But you didn't get that, right? Not even of the first page.

8 A Correct.

9 Q Now, I know you didn't get this whole thing. Did you even
10 get a summary from the doctor as to what these comparative findings
11 were?

12 A I did not.

13 Q They weren't included in the records that you were shown,
14 were they?

15 A They were not, right.

16 Q And you were asked a hypothetical. If you'd gotten this,
17 would you have been able to understand and you said well, I don't know
18 if I've studied it. Let's assume that you got it and you studied it and you
19 didn't understand it. Did you have an opportunity?

20 A Yes. I could have asked someone else to review it.

21 MR. ROBERTS: So let's go to 160, page 1, Audra.

22 BY MR. ROBERTS:

23 Q And just like the first one. If you had gotten --

24 MR. ROBERTS: The top third of the page again.

25 BY MR. ROBERTS:

1 Q If you'd gotten the entire document, would you have been
2 able to tell if that image was from the IMRT plan or the proton plan?

3 A If it stated which plan -- which modality it was for, yes, but
4 other than that, no.

5 Q And does this say which modality this plan is for?

6 A It says radiation oncology IMRT planning note.

7 Q So this is for IMRT?

8 A Yes.

9 Q Okay.

10 MR. ROBERTS: Audra, could you go to the first green
11 checkmark?

12 BY MR. ROBERTS:

13 Q Why is MD Anderson saying they require IMRT treatment?

14 A They're saying that IMRT should be used to protect those
15 organs, but that's what I understand.

16 Q Because they're limiting structures outside of the primary
17 tumor volume so close they require an IMRT to assume safety and
18 morbidity reduction, right?

19 A Yes.

20 Q Okay.

21 MR. ROBERTS: Audra, next checkmark.

22 BY MR. ROBERTS:

23 Q And is there anything in this second request that says the
24 proton would have been better or does it just say IMRT is necessary?

25 A No, it does not.

1 MR. ROBERTS: And if we could go back to the IMRT policy.

2 BY MR. ROBERTS:

3 Q And you were looking for a lung cancer reference there with
4 Mr. Terry, right?

5 A That's what I was asked.

6 Q Let's look at the bottom of page 15, Exhibit 75 page 15,
7 beginning with ASTRO. Are you familiar with the ASTRO acronym?

8 A Yes.

9 Q And what does that stand for?

10 A I think it's -- I'm into quite sure, but American Society of
11 something Radiation Oncology.

12 Q Okay.

13 MR. ROBERTS: Audra, could we go to the heading just real
14 quick?

15 BY MR. ROBERTS:

16 Q American Society for Radiation Oncology. Does that sound
17 right?

18 A Yes.

19 Q Okay.

20 MR. ROBERTS: And then go back to that paragraph.

21 BY MR. ROBERTS:

22 Q And this is in the IMRT policy. And one of the citations here
23 is ASTRO considers IMRT reasonable in instances where sparing the
24 surrounding normal tissue is of added clinical benefit to the patient.
25 Examples of when IMRT might be advantageous include bullet one, the

1 target volume is in close proximity to one or more critical structures.

2 Does that sounds like the exact treatment rational that MD Anderson was
3 using to request IMRT treatment from you?

4 A Yes.

5 Q Okay.

6 MR. ROBERTS: Nothing further, Your Honor. Thank you.

7 THE COURT: Any redirect, Mr. Terry?

8 MR. TERRY: No, Your Honor.

9 THE COURT: You're excused, Doctor.

10 THE WITNESS: Thank you.

11 THE COURT: We'll take a brief recess at this time. You are
12 instructed not to talk with each other or with anyone else about any
13 subject or issue connected with this trial. You're not to reach, watch,
14 listen to any report of or commentary on the trial of any person
15 connected with the case or by any medium of information, including
16 without limitation, newspapers, television and/or radio. Do not conduct
17 any research on your own regarding this case, such as conducting --
18 consulting dictionaries, using the internet or using reference materials.

19 Do not conduct any investigation, test any theory of the case,
20 recreate any aspect of the case or in any other way, investigate about the
21 case on your own. You're not to talk with others, text others, tweet
22 others, Google issues or conduct any other kind of book or computer
23 research with regard to any issue, party, witness or attorney involved in
24 this case. You're not to form or express any opinion on any subject of
25 this trial until the case is finally submitted to you. o we'll take a brief

1 recess and come back at -- in 15 minutes. So at 10:40.

2 THE MARSHAL: All rise for the jury.

3 [Jury out at 10:26 a.m.]

4 MR. TERRY: Thank you, Your Honor. May Dr. Ahmad be
5 excused?

6 THE COURT: Yes, Doctor. Thank you.

7 MR. TERRY: Thank you.

8 THE COURT: So Mr. Terry, who's your next witness you plan
9 on calling?

10 MR. TERRY: Dr. Andrew Chang.

11 THE COURT: Dr. Andrew Chang. Is Dr. Chang here?

12 MR. TERRY: Yes, he's right here.

13 THE COURT: Okay. All right. So we'll come back in just over
14 ten minutes.

15 MR. TERRY: Thank you, Your Honor.

16 MR. ROBERTS: Thank you, Your Honor.

17 [Recess taken from 10:27 a.m. to 10:42 a.m.]

18 THE MARSHAL: Come to order. Back on record.

19 THE COURT: Thank you. Please be seated. Are the parties
20 ready for the jury?

21 MR. ROBERTS: Yes, Your Honor.

22 THE MARSHAL: All rise for the jury.

23 [Jury in at 10:43 a.m.]

24 THE MARSHAL: Jurors all present.

25 THE COURT: Okay. Do the parties stipulate to the presence

1 of the jury?

2 MR. TERRY: Yes, Your Honor.

3 THE COURT: And Mr. Roberts?

4 MR. ROBERTS: Yes, Your Honor. And Mr. Gormley will be
5 handling this witness, Your Honor.

6 THE COURT: Thank you.

7 MR. TERRY: Plaintiff calls Andrew Chang, Your Honor.

8 THE CLERK: Please raise your right hand.

9 ANDREW CHANG, PLAINTIFFS' WITNESS, SWORN

10 THE CLERK: Can you please state and spell your first and
11 last name for the record.

12 THE WITNESS: Andrew Chang, A-N-D-R-E-W. Last name
13 Chang, C-H-A-N-G.

14 THE CLERK: Thank you. You may be seated.

15 MR. TERRY: May I proceed, Your Honor?

16 THE COURT: Yes, Mr. Terry.

17 MR. TERRY: Thank you.

18 DIRECT EXAMINATION

19 BY MR. TERRY:

20 Q Dr. Chang, I'd like to start off asking you a few questions
21 about who you are, introduce you to the jury a little bit, so let's do that.
22 Can you tell us what your profession is?

23 A Yes. I am a radiation oncologist.

24 Q Okay. And where do you currently practice radiation
25 oncology?

1 A I have a medical group that covers several different centers.
2 Our headquarters is in San Diego, California.

3 Q Okay. And do you cover centers in other places beside in
4 California?

5 A Yes. Our group covers other places in Oklahoma as well as
6 in Tennessee and the southeast United States.

7 Q Dr. Chang, if you could speak up just maybe a little bit.
8 You're a soft spoken person and we want to make sure the jury hears
9 everything you have to say.

10 A All right. I'm sorry. I'll try.

11 Q That's okay. So when you say that your physician group
12 covers centers, tell us what that means.

13 A So we provide clinical services and seeing patients and
14 treating patients with radiation therapy at centers -- at these treatment
15 centers.

16 Q And do you yourself see patients still?

17 A I do.

18 Q And where do you see your patients mostly?

19 A Most of my patients are either in Oklahoma or in San Diego
20 as I am providing coverage for my partner whose out in Oklahoma.

21 Q Okay. And so let's talk about your work in California in San
22 Diego. Do you provide proton therapy in San Diego?

23 A Yes, I do.

24 Q And what is the name of the facility that you provide proton
25 therapy at?

1 A It is California Protons located in San Diego, California.

2 Q Okay. And how long have you been providing proton
3 therapy to folks, Dr. Chang?

4 A Just me personally?

5 Q Yes.

6 A I've been seeing patients for proton therapy since 2003.

7 Q Okay. So coming up on 20 years?

8 A That sounds like a long time, but yes.

9 Q Now in your current practice do you treat only with protons?

10 A No. I treat with protons as well as photons or x-rays as I call
11 them to differentiate between protons and photons and electron therapy
12 as well.

13 Q Okay. Well, something you said I think we should be clear
14 about, you said photons or x-rays. IMRT is a form of photons or x-rays,
15 right?

16 A Correct, IMRT is a form of x-ray therapy.

17 Q Do you prefer to use the term x-ray as compared to using the
18 term photon?

19 A I do, just because they're one letter difference and people can
20 get confused, so I tend to say protons or x-rays.

21 Q Okay. So photon and proton sound too much alike so you
22 like to use x-rays for photons?

23 A Correct.

24 Q Okay. But when you say x-rays we can take from that that
25 you're talking about x-rays, photons, IMRT all those are used the same?

1 A That's correct.

2 Q Okay. So tell us a little bit about your background, tell us
3 about your education if you would please. Where did you go to
4 undergraduate school?

5 A Sure. I went to undergrad at the University of California
6 Riverside. I studied biochemistry and classical Greek, a double major.

7 Q Biochemistry and classical Greek?

8 A Yeah.

9 Q Okay. I bet you were the only guy at the school that had
10 those two majors?

11 A Yes. There's only two Greek majors in my class.

12 Q Okay. So where did you grow up?

13 A I grew up in Riverside, California.

14 Q Okay. So you went to undergrad at Riverside, did you go
15 onto medical school right out of college?

16 A Yes. I went to medical school at Loma Linda University in
17 California.

18 Q Okay. And how many years did you stay in medical school at
19 Loma Linda?

20 A So it was a five year program there, so we did four years of
21 undergraduate and five years of medical school and then four years in --
22 or it was actually five years in residency training after that.

23 Q So after medical school you did another five years of
24 residency?

25 A That's correct. The first year is called an internship and then

1 the four years after that is specialty in radiation oncology training.

2 Q Okay. So four years in undergrad, five years of med school?

3 A Correct.

4 Q Then five more years of residency?

5 A That's correct.

6 Q That included an internship and what was the --

7 A Internship in pediatrics --

8 Q Okay.

9 A -- and four years in radiation oncology training. And then I
10 spent an additional four and a half months specializing in pediatric
11 radiation.

12 Q Okay. So one of your specialties is pediatric radiation
13 oncology?

14 A That's correct.

15 Q Meaning you treat children with cancer?

16 A That's correct.

17 Q Where did you do your training for pediatric radiation
18 oncology?

19 A St. Jude's in Memphis, Tennessee.

20 Q So how much time overall then did you spend training or
21 obtaining your education in training as a radiation oncologist before you
22 started practicing?

23 A Four and a half years in specifically radiation oncology.

24 Q Now you saw some of Dr. Ahmad's testimony here this
25 morning, right?

1 A I did, yes.

2 Q And Dr. Ahmad told us in this trial that he is a medical
3 oncologist not a radiation oncologist?

4 A That's correct.

5 Q Okay. I want to talk if we can about that. What is the
6 difference between a radiation oncologist and a medical oncologist?

7 A They are different specialties. In the treatment of cancer,
8 which is called oncology, we typically do one of three treatments:
9 surgery, radiation or medicine. There's different trainings for each of
10 those.

11 A surgical oncologist does residency in surgery for three to five
12 years and then another fellowship in surgical oncology for another one
13 or two years. A radiation oncologist like myself does four years just in
14 radiation. A medical oncologist does three years in internal medicine
15 and then three years in medical oncology.

16 Q Okay. So all of those subspecialties are referred to as
17 oncologists, but there's different subspecialties?

18 A That is correct. Depending upon how we treat that cancer,
19 we have different specialties doing that. Just like myself, I don't give
20 chemotherapy and I don't do surgery, so I'm only a radiation oncologist.

21 Q Okay. So let's talk about your experience providing radiation
22 treatment to cancer patients and you said you've been doing that now
23 for 20 years almost?

24 A Yes.

25 Q Okay. So where did you start practicing after you had

1 completed the training that you told us about?

2 A I should clarify that. The first start treating in 2003 was as
3 part of my residency.

4 Q I see.

5 A I started first as my first job after finishing training and my
6 fellowship was at Indiana University in Indianapolis, Indiana.

7 Q Okay. And there was a proton center there?

8 A There was a proton center there, yes.

9 Q Okay. And you treated folks with proton starting way back
10 then?

11 A I started patients with both x-rays -- or all three x-rays,
12 electrons and protons when I was at Indiana University. It was the third
13 center in the United States that had proton therapy and so they recruited
14 me there to start up their proton treatment program.

15 Q Okay. And what was the first place that had a commercial
16 treatment proton center in the US?

17 A The first proton center actually in the world was at Loma
18 Linda University where I went to medical school and did residency
19 training.

20 Q Okay. And how many proton centers are there in the United
21 States?

22 A As of this year it's about 35 now and most have those have
23 been in the last 10 years.

24 Q Most of them have been in the last 10 years?

25 A Yes.

1 Q And how many proton centers roughly are there worldwide?

2 A There's about 50 proton centers throughout the world now.

3 Q And so you worked at Indiana University at the proton -- or at
4 a facility that had a proton center?

5 A That is correct.

6 Q And then after you had done your time at Indiana University,
7 where did you go next?

8 A I went to Hampton University in Hampton, Virginia to help
9 them start a proton center as they were building one at that point.

10 Q Okay. So that brings up a point I want explore with you. You
11 said that you were recruited to Indiana to help them start their proton
12 center?

13 A That's correct.

14 Q What -- why would they recruit you to do that?

15 A Proton therapy is an even more specialized form of radiation
16 treatment and at that time there was only two proton centers in the U.S.
17 before, one at Loma Linda and the other one at Harvard in Boston,
18 Massachusetts. And so there was a physician from Boston that had
19 gone to Indiana to start that program and he needed help as growing the
20 program and so he recruited me from my residency to go to Indiana to
21 help them.

22 Q Okay. So you went there to Indiana, and you helped
23 implement a proton program?

24 A That's correct.

25 Q Okay. All right. And then you said after that you went to

1 Virginia to Hampton University?

2 A That's correct.

3 Q And what did you do there?

4 A Similarly they were just starting up a proton center and they
5 needed expertise in utilizing it and so asked me to go out and start
6 building up that proton therapy program.

7 Q Okay. About what years were you there?

8 A I was there from about 2011, the late -- latter half of 2011
9 through about 2015 or '16, I can't remember now.

10 Q Okay. And at that facility at Hampton University in Virginia
11 you regularly treated people with proton therapy?

12 A That is correct.

13 Q And also other modalities?

14 A At Hampton itself they only had protons, so in Virginia I only
15 did protons.

16 Q Okay. And then after you left Virginia Hampton University
17 where did you go?

18 A At that point there was a need for help starting up a center in
19 Oklahoma City, and so I went to start helping them start up -- actually I
20 was still based in Virginia but helping the program in Oklahoma be
21 developed because there's only a few of us that had worked at proton
22 centers before.

23 Q Okay. So they have the proton center in Oklahoma?

24 A Yes, they do.

25 Q And that's where you and I met is in Oklahoma, right?

1 A That's correct.

2 Q Okay. So from Virginia -- still based in Virginia and now
3 you're helping to develop a proton center in Oklahoma City. And then
4 what's the next sort of arch of your career?

5 A So at that time there was a lot of centers that were starting to
6 be developed, this is around 2012. At that point there was probably
7 about a dozen proton centers in the U.S., and another 20 or so being
8 developed. And as there were only a few of us that had been doing
9 proton therapy for any length of time I was asked to start help
10 developing different programs throughout the country. And specifically
11 one in San Diego was being opened up and it was an opportunity for me
12 to in essence go back home to southern California, I was getting tired of
13 the winters and so I rebased to San Diego.

14 Q Probably a good idea. Okay. So have you spent your time
15 mostly in the last handful of years in San Diego?

16 A Yes.

17 Q Okay. Practicing in San Diego?

18 A Well, practicing, but during these times as our interest in
19 proton therapies grew, my physician group also started growing larger
20 as we got busier and busier, and we started providing physician services
21 in other places. I had physicians in Oklahoma still also covering protons
22 as well as the x-ray centers that are there. And as we've grown the
23 majority of my time is at -- split between Oklahoma patients and San
24 Diego patients.

25 Q So you said -- you've mentioned a couple times your medical

1 group, tell us about that?

2 A Sure. So as I was asked to help develop these programs they
3 also realized there was not many physicians that had expertise in
4 treating with proton therapy and so they would ask me, and I in essence
5 hired physicians and helped train them up in the use of proton therapy
6 and we started staffing centers. And in doing so we've kind of just
7 added to our numbers as more places wanted our services because we
8 provided I think good care to our patients. And so we started having
9 physicians that were in our group that just grew organically helping to
10 treat patients at these various centers.

11 Q And tell us about the San Diego Proton Center, tell us about
12 your interest and your work there.

13 A Sure. So in San Diego we treat -- it's only the second center
14 -- one of two centers in California and we treat patients from around the
15 world that go there for the specialized care with proton therapy. About a
16 third of the patients are from San Diego and a third of the patients from
17 the rest of California and then a third from outside California. So
18 Arizona, we've got patients from New Mexico, Nevada, international
19 patients come to San Diego for proton therapy treatment because these
20 centers there's still not a lot of them.

21 Q Okay. So tell us if you would about some of your experience
22 treating cancer patients with proton. You've told us that you are -- one
23 of your specialties is as a pediatric radiation oncologist. What kinds of
24 cancers in children do you treat?

25 A So that was my specialty because it's even a more limited

1 subspecialty of radiation doctors, there's only about 30 of us in the
2 United States that treat children with radiation therapy and protons. And
3 so I treat a lot of things from brain tumors, to pelvic tumors, to lung
4 cancers, to sarcomas in extremities, to tumors in the abdomen. Most of
5 my research has been in brain tumors for pediatrics. We saw a lot of
6 that. I've gotten business enough that I unfortunately now about 50
7 percent of the time I'm doing administrative work, overseeing our group.
8 And so I've had other physicians now that work with me that see the
9 patients 100 percent of the time.

10 Q Okay. You said that -- you mentioned lung cancer in
11 children, that's a pretty rare thing?

12 A Cancer in children in general is pretty rare and once it occurs
13 it can occur anywhere in the body. About half the time it occurs in the
14 brain, the other half the time anywhere else in the rest of the body.

15 Q Okay. And you've treated adults over the years too, right?

16 A That's correct. I treat -- I still treat a lot of adults.

17 Q Okay. And what kinds of cancers have you treated in adults
18 with proton therapy?

19 A So with adults I treat with both again, x-rays as well as
20 protons and electrons. So I treat prostate cancer, skin cancers, breast
21 cancer, esophageal cancers, pancreatic cancers, lung cancers, head and
22 neck cancers. Anywhere in the body that requires radiotherapy I treat.

23 Q Okay. So -- now you've got some experience or some things
24 on your resume that are not specific to treatment. You've got some
25 leadership positions in the radiation oncology role that I'd like you to tell

1 us about. Like for instance I see that you were a cochair of the Children's
2 Oncology Group for a study, right?

3 A Yes. That's correct.

4 Q Tell us about that?

5 A So the Children's Oncology Group is a large group
6 throughout that treats children throughout the United States. And the
7 idea is because pediatric cancers are very rare we want to collate all the
8 experiences of all the centers throughout the United States and say we
9 can treat children a certain way to see if we can find the best way to treat
10 children.

11 In the COG we run probably 50 or 60 studies at any one time trying
12 to say, for this tumor what can we do to improve the outcomes and
13 reduce the side effects for more treatments. One of those treatments
14 that has been doing very well is a brain tumor called ependymoma and
15 my mentor in pediatric radiation was the chair of the prior study from
16 that until about 2008. We finished that study, and we were opening the
17 next study for the next generation of treatments.

18 And so the next generation of studies was looking at question of
19 after surgery and after we do radiotherapy does chemotherapy also help
20 the control of this cancer. And so he brought me on board as the cochair
21 to write the study to develop in essence the protocol that is used
22 throughout the United States for how we treat this particular type of
23 cancer in children.

24 Q What is the National Association of Proton Therapy and
25 what's your role in that?

1 A The National Association is a group of consistent members
2 of all the proton therapy centers that are looking at developing
3 educational seminars as well as bringing awareness of proton therapy to
4 the community. And I am a physician adviser on the board of directors
5 for the National Association of Proton Therapy.

6 Q We saw earlier during Dr. Ahmad's testimony reference to
7 ASORO, the American Society of Radiation Oncologists.

8 A Yes.

9 Q You're a member of that group?

10 A Yes.

11 Q Tell us what the Particle Therapy Cooperative Group is and
12 what you do there?

13 A So the Particle Therapy Cooperative Group is the research
14 side to saying, what are the techniques we can use to improve outcomes
15 even further with proton therapy and to see if we can study the
16 incremental benefits of patients treated with protons. And so it runs a lot
17 of clinical trials to optimize that. The PCG I am the vice president and
18 treasurer of that group and as well I run the breast cancer study for that
19 group.

20 Q Okay. What about the Proton Center Development
21 Corporation --

22 A That --

23 Q -- that's something that you're involved with, right?

24 A Sure. Yes. Proton Center Development Corporation is a
25 company that I started in 2007, 2008 somewhere around there when

1 there was a lot of interest in building these proton centers. And it was
2 taking basically a lot of my time and I needed to bring on more people to
3 help me with that and so I started a company that helps consult and
4 guide places that want to develop proton centers on how to do so if they
5 are building one.

6 Q So there may be a group of people who are thinking about
7 building a proton center and they might hire your group -- your company
8 to come in and consult with them how to do it?

9 A Yes. Because the centers are big and they take a long time
10 and they're expensive and so they don't want to -- they want to make
11 sure do it correctly, so they bring us in to either build it or to give them a
12 feasibility study. So for instance a lot of times I'll tell places, you know,
13 you probably shouldn't build one because you can't support it.

14 I remember going to India before and they want to build a proton
15 center and I said, look you just need to get clean water. You know, don't
16 put the money on a proton center, do basic hygiene. In the Middle East
17 was one place in the UAE where they wanted to build a proton center
18 and I said that it could be done but they needed to invest in things like
19 just screening mammograms and basic diagnostics.

20 And so part of our group is to build feasibility studies and to make
21 sure that places who are wanting to build it know how to use a tool that
22 is -- takes a long time to develop.

23 Q Okay. Is there anything else about your background that you
24 think the jury might like to hear as to why you're an expert in this area?

25 A No. Not that I can think of.

1 Q Okay. Now it sounds to me like you're telling us that you've
2 traveled around the world consulting with groups about proton centers
3 and building them and designing them and that kind of thing, right?

4 A That is correct.

5 Q And do you have -- have you developed sort of a
6 presentation that you use to educate the folks who are interested in
7 proton therapy?

8 A Yes. I find that our field is a very technical field and when I
9 get asked to talk to people about proton therapy a lot of times they don't
10 quite understand what it is that we're speaking about. And so I have a
11 little primer that I use to show people, okay, well this is how I think about
12 radiation and cancer treatments and what role proton therapy plays
13 specifically in the use of a cancer.

14 Q Okay. And do you have it with you here today?

15 A I do.

16 Q And do you have it on your computer there on the stand?

17 A I do.

18 Q And can you display it to the jury and explain --

19 A Sure.

20 Q -- what you explain to folks about proton therapy in that
21 context? Do you need some help hooking into the system, Dr. Chang?
22 We've got an IT guy back here.

23 A Oh I see it now. Okay. It's ready.

24 Q Oh you got it?

25 A Yes.

1 Q Okay. Tell us what your -- what our first slide is going to
2 show us?

3 A So this I start with just an introduction of what cancer is
4 because that informs the way that we think about what is the best way to
5 treat patients with cancer. And so the field of radiation oncology is very
6 similar to surgery, we're very much focused on the anatomy and the
7 images because that's all we do all day long. Like a radiologist we look
8 at images of a patient.

9 So I start with the idea of the word cancer, and it's a very old word.
10 And we actually use in the English language outside of medicine when
11 people who are like looking at the horoscope, there's a sign called
12 cancer. And there's a constellation called cancer. And that's because
13 they both come from the same Latin word meaning crab.

14 And why that's important is because cancer's been around as long
15 as human history. When people were dying thousands of years ago, and
16 the early surgeons were doing what we now call autopsies they would
17 find these masses growing inside a patient that to them looked like a
18 crab. An example this top picture is a breast cancer specimen there.
19 The --

20 Q That photograph on the top right there, that image is a breast
21 cancer?

22 A That's correct. Breast cancer in a patient whose breast have
23 been removed, and they cut it open, and this white area is the cancer,
24 and the yellow is a normal breast tissue. And you can see why these
25 early physicians and scientist would call them cancers because they

1 looked like these little crabs that were growing inside patients. So they
2 said they're little crabs and so we kept the same word cancer that we use
3 even thousands of years later.

4 As I mentioned it's been around as long as human history. This is
5 the first written account of cancer from 5,000 years ago, it's a papyrus
6 script describing breast cancer. And Hippocrates was the -- you know,
7 from the Hippocratic Oath following modern medicine, he described the
8 cancers, and he used the Greek word which is Karakinos which is where
9 the word carcinoma. But it's the same idea, cancer.

10 The reason I start with that is because that is how I think about just
11 generally the treatment of cancer. The rule for hundreds of years that if
12 you can do surgery and remove the cancer that's very important to help
13 keep the cancer from growing. But the difficult part is that this cancer as
14 we saw like a crab, it's got those legs that go places. And sometimes
15 these legs are so close to big nerves or vessels that a surgeon can't cut it
16 all out, so a surgeon might be only able to take this much out. But what
17 happens is those little legs they start growing back into new cancers.

18 So what we learned is with the discovery of radiation afterwards or
19 instead of we can come back in and do radiation to an area and not have
20 as much damage to the normal tissues. We're not cutting the nerves or
21 blood vessels and we can treat those little fingers with radiation as well.

22 Q Okay. Let's talk about radiation for a second. I just want to
23 ask you a simple question and then you can continue explaining. But
24 radiation kills cancer cells?

25 A Yes, it can.

1 Q How does radiation kill cancer cells?

2 A It destroys the DNA of that cancer cell so that it can't
3 reproduce or grow any further without getting damaged.

4 Q Okay. Does radiation also kill healthy tissue?

5 A It can as well. And what we try to exploit is the difference in
6 the sensitivity of radiation to cancers versus the sensitivity of radiation to
7 the normal tissue. And every normal tissue has a different amount of
8 radiation it can take before it gets damaged. And the more radiation
9 increases the risk of both killing cancer as well as increasing the risk of
10 damaging that tissue.

11 Q So is it known these days now that the medical science has
12 advance beyond writing on papyrus or whatever, is it known how much
13 radiation, how many greys of energy it takes to kill certain kinds of
14 cancer cells?

15 A Yes. We know very well how much radiation you need to
16 give us a good chance at killing cancers as well as what is the tolerance
17 of the normal tissues before we start getting into increasing risks of side
18 effects to those tissues.

19 Q So you can -- it's also known in medical science how much
20 radiation normal tissue can handle before it starts to have negative
21 effects on it too?

22 A That's correct. We have percentages that tell us if it gets this
23 much radiation here's a percentage of injury. If it gets this much
24 radiation that percentage goes up. It gets this much more radiation the
25 percentage goes up again for the damage.

1 Q And you know that from different organs in the body like the
2 heart, or the lung, or the esophagus?

3 A That's correct.

4 Q So you know that about the esophagus for example, you can
5 tell based on how much additional radiation the radiation plan is going
6 to give the esophagus how much increased risk of side effects is caused
7 by that increased radiation?

8 A That is correct.

9 Q We'll come back to that in minute. Why don't you go ahead
10 with your explanation?

11 A Okay. The other thing that cancers like to do is they like to
12 get into the blood and spread to other places, like they can go to the liver
13 and grow little new cancers or the brain or the bones. And sometimes
14 these are so small we can't see them and so a surgeon can't pluck them
15 all out. It's very difficult to do radiation to the whole body and so that's
16 where the third arm of cancer treatment is, it's a medicine that either
17 taken by mouth or given into the vessels that goes throughout the body.
18 And that medicine is chemotherapy is the primary one, but there's also
19 immunotherapy and vaccine therapies.

20 And so one of my mentors use to say, when you think about
21 cancers he would say, think about Mrs. Crab. Crab of course referring to
22 the cancer itself, the Mrs. referring to the three treatments being
23 medicine, the R for radiation and the S for surgery. And each of those
24 types of treatments we have different oncologists. Again, oncologists
25 are people who are physicians who treat cancer. The medicine are the

1 medical oncologists that give the medicine. Those who treat with
2 radiation are the radiation oncologists like myself. And those who do the
3 surgery are the surgical oncologists.

4 And we work together and say for every specific type of cancer and
5 every stage or the aggressiveness of it we would say, this patient would
6 benefit from using all three. For instance a very aggressive breast
7 cancer we might say you need surgery for the breast and then we do
8 radiation and then chemo. On the other hand there might be a very
9 early stage cancer, all you need is radiation or all you need is surgery.
10 Or some cancers they say you just need two of the three. And it depends
11 on exactly where the cancer is and the approach we need to treat that
12 cancer.

13 Q Okay. So would it make any sense to you to have a medical
14 oncologist that's under the medicine part, the chemo part making
15 decisions about radiation treatment?

16 A No. It is a completely different specialty for the treatment.
17 Like I would never chemotherapy recommendations because I don't do
18 that. Likewise neither of us would do -- recommend a surgeon how to
19 treat. Neither a surgeon or medical oncologist will tell a radiation doctor
20 how to treat with radiation.

21 Q Would a radiation oncologist ever go into the surgical
22 operating room and tell a surgical oncologist what kind of scope or
23 scalpel to use?

24 A Never.

25 Q Would a surgical oncologist ever go into a medical

1 oncologist clinic and say, hey I think you might want to use a different
2 drug or a different dose?

3 A I can't imagine that ever happen -- well, knowing surgeons
4 they probably would, but no one would listen to them. Yes. No. It's not
5 something that's done.

6 Q And so neither a surgical oncologist nor a medical oncologist
7 would ever come to a radiation oncologist and say, don't use IMRT, use
8 protons, don't use protons, use electrons, or that kind of thing?

9 A No.

10 Q That just isn't how it works in the real world?

11 A Not only it's not how works, it's -- we don't have the
12 knowledge base. I wouldn't even know how to start to recommend
13 chemotherapy. If someone asked me to do surgery I'd be like, I don't
14 know a clue what to do there. Likewise a medical oncologist would not
15 be able to differentiate what a radiation plan is doing.

16 Q Okay. So you got to lay eyes on Shamoan Ahmad this
17 morning, right?

18 A I did.

19 Q Is -- have you heard his name beyond this case?

20 A I have.

21 Q Tell us about that.

22 A He is a reviewer for treatments that are sent for
23 authorization. And we are very familiar with him in San Diego because
24 he is on a lot of our denial letters that we get from requests for
25 authorization for treatment.

1 Q And while we're on the topic, when you get a denial for
2 proton therapy that you asked for, for one of your patients you have the
3 opportunity to appeal I guess; is that right?

4 A Often times we do, yes.

5 Q And with -- and you've appealed UnitedHealthcare denials of
6 proton therapy before?

7 A Yes, we have.

8 Q Including those from Dr. Ahmad?

9 A I don't know exactly if it's for United from him. I've seen his
10 name for a lot of different denials. I don't know which insurance
11 companies --

12 Q Okay.

13 A -- they were for.

14 Q And do you find that with United they ever change their mind
15 on appeal?

16 MR. GORMLEY: Objection. Foundation.

17 BY MR. TERRY:

18 Q First level?

19 THE COURT: Well, hold on. What was the objection?

20 MR. GORMLEY: Foundation.

21 THE COURT: Sustained. Can you just lay a foundation?

22 BY MR. TERRY:

23 Q So Dr. Chang, you -- at your facility in San Diego you often
24 times request proton therapy for patients of yours who are insured by
25 UnitedHealthcare?

1 A Yes.

2 Q And often times you will submit prior authorization requests
3 to UnitedHealthcare for proton therapy, right?

4 A Yes.

5 Q And often times they will deny proton therapy on the prior
6 authorization request?

7 A Yes.

8 MR. GORMLEY: Objection Your Honor, outside the scope of
9 his report. If we can approach?

10 THE COURT: Approach, counsel.

11 [Sidebar at 11:19 a.m., ending at 11:19 a.m., not recorded]

12 BY MR. TERRY:

13 Q So Dr. Chang, UnitedHealthcare in this case has pointed to
14 the fact that in denial letters that they send out they say in there that you
15 can appeal and that you can get an appeal turn -- a turnaround on an
16 appeal in 72 hours. Does that happen in real life?

17 MR. GORMLEY: Objection. Form, foundation and outside
18 the scope of his report.

19 THE COURT: Sustained.

20 BY MR. TERRY:

21 Q Okay. So let's talk about -- let's go back to your presentation.

22 A All right. So the next primer or the next set is just about how
23 radiation is used and what we look at from a radiation doctor standpoint.

24 Q Great.

25 A So the history of radiation is it's been around for a long time.

1 This is actually one of my favorite pictures, it's the first x-ray ever taken.
2 Discovered by Wilhelm Röntgen a German physicist. And he took a
3 picture of his wife's hand and published it and he won the first ever
4 Nobel prize of physics for it.

5 Q What's that thing on her finger?

6 A That's a ring. Yeah. It's not a tumor. People ask me that.
7 Yeah. That's her wedding ring. But that's the first time we saw inside a
8 patient without having to cut them open.

9 Shortly afterwards radioactivity was discovered by Becquerel in
10 uranium components -- compounds. And then Curies, Marie and Pierre
11 Curie discovered radium and polonium, that these metals actually could
12 be radioactive. And they won the Nobel prize in 1903 for physics for this.

13 It was actually Dr. Becquerel, this French physicist that found out
14 that these radioactive seeds actually could cause biologic damage. He
15 actually left a little piece of uranium in his shirt pocket and developed an
16 ulcer a few days later. And so he said well, we can use this for things
17 like tongue cancers that were growing and couldn't treat. And they put
18 these little seeds on the tongue and the cancer dissolved. And on skin
19 cancer, the skin cancer would go away. They started using them in
20 cervical cancers in women with cervical cancer because a surgery down
21 there is very, very difficult to do. And the cervical cancer started
22 disappearing.

23 So we started seeing very early that radiation could be used to
24 treat patients. Now of course, at that time we didn't know what DNA
25 was, we didn't know how it worked we just knew we could use radiation

1 to treat cancers.

2 So most radiation takes use of what we call electromagnetic
3 spectrum, that's why refer to as x-rays. Now we all have known about
4 the rainbow since we were little kids and that's part of the visible light.
5 But on the far side of red we have infrared rays, radar, radio waves, a TV
6 and so forth. But it's this stuff on the far left of the purple that has the
7 energy to damage, that's ultraviolet rays, x-rays, gamma rays. It's this
8 stuff on the left that we use to determine how we can treat cancers.

9 Q So let me ask you something about that. You've got written
10 there one gray, equals one jewel, equals 100 centigray, equals 100 rads?

11 A That's correct.

12 Q So I want to try to give an example, or have you give an
13 example of that, of what that means in real life terms. So when you go
14 to the dentist office --

15 A Uh-huh.

16 Q -- and you lay down in the chair and they're going to take a
17 dental x-ray.

18 A Yeah.

19 Q Does -- tell us how one gray of energy equates to a dental x-
20 ray?

21 A So that one gray is a lot of radiation compared to something
22 like a dental x-ray. A dental x-ray would be -- it would take like about
23 10,000 dental x-rays to equivalent one gray.

24 Q 10,000?

25 A 10,000 dental x-rays or like 1,000 chest x-rays to equivalent to

1 be one gray.

2 Q Okay. So we've talked the other day with Dr. Ahmad about
3 the concept called ALARA.

4 A Yes.

5 Q As low as reasonably achievable, A-L-A-R-A?

6 A Yes.

7 Q Are you familiar with that?

8 A Yes.

9 Q Is that one of the guiding principles of radiation oncology?

10 A That's correct. My whole specialty is focused on getting
11 enough radiation to kill a cancer and everything else you want to get as
12 low radiation or zero radiation if possible.

13 Q Is there such a thing as a safe dose of radiation?

14 A No.

15 Q So the goal is always to be at zero radiation to healthy
16 tissues if possible?

17 A Correct. If possible because every potential exposure
18 increases the risk of a side effect.

19 Q Well, when you have a dental x-ray you get exposed to some
20 radiation, right?

21 A Yes. But that's why they put the lead shields on you and
22 everybody else walks out the room. No one wants any exposure. If, you
23 know, if you can't avoid it you have to get it done, but if you can we try
24 to minimize it.

25 Q So one gray equals 10,000 dental x-rays and we can take that

1 fact in a moment and talk about the therapeutic ratio between IMRT and
2 proton therapy for Mr. Eskew, right?

3 A Yes.

4 Q So tell me about the concept of therapeutic ratio, what does
5 that mean?

6 A So that means what is the largest difference I can get
7 between giving a high dose of radiation to a cancer and as less radiation
8 as possible to any specific normal tissue around there. And the bigger I
9 can make that difference that ratio that I can do therapy to give good
10 treatment and to lower the risk of side effect.

11 Q So the perfect treatment, radiation treatment would deliver
12 exactly what you need to kill the cancer and zero to everything else,
13 right?

14 A That would be the perfect treatment, yes.

15 Q But unfortunately today in medical science does that exist?

16 A No. There's no way to get zero to normal tissues.

17 Q But the therapeutic ratio is to maximize the killing dose to the
18 tumor and minimize as best as possible the dose to healthy organs and
19 tissues?

20 A That is correct.

21 Q Okay. Keep going, Dr. Chang.

22 A So when we are determining this radiation the thing that I
23 mentioned is, as you were asking about therapeutic ratio is, how do I get
24 the radiation into a patient because there's no way I can get it for free,
25 right? With zero to normal tissues. Like the light spectrum when I use x-

1 ray radiation I have to think about it like light in terms of, say if you're
2 standing on a pier looking over a body of water like standing over Lake
3 Mead when there was a big lake there and you're looking down. As it
4 gets deeper and deeper it gets darker and darker because the light is
5 being absorbed by that water.

6 And so if I were to graph that out, saying this is the dose of
7 radiation or how much radiation gets in there and this is the -- oh, sorry.
8 This is the dose of radiation there and this is the depth of water, what
9 happens is as it gets deeper and deeper there's less and less radiation.

10 And so when I'm treating a patient I have to keep this in mind. And
11 so for instance the most common cancer we treat in United States in
12 men is prostate cancer, it's the most common cancer among men in the
13 United States. The prostate is a gland that sits kind of right in the middle
14 of the pelvis. And so I'm going to use that as an example to show what I
15 have to keep in mind when we're treating a patient with radiation.

16 So if this is a slice through the male pelvis and the middle of the
17 pelvis is the prostate gland, in front and on top is the bladder and behind
18 it is the rectum.

19 And I tell people I'm not an artist, so you kind of use your
20 imagination here. But the units that we're talking about is these grays,
21 right? If I'm trying to get 10,000 -- if I'm trying to get 8,000 centigray,
22 which is the dose that's needed to kill prostate cancer, if I'm doing one
23 beam that comes in from the front -- and keep in mind, this radiation falls
24 off. I might have to get 10,000 centigray at the front. The bladder would
25 get about 9,000. The prostate would get that 8,000 there and the rectum

1 would get say, 6,000 before it passes out.

2 Q Hang on a second. So you're talking about using x-ray right
3 now.

4 A Correct. This is x-ray radiation.

5 Q Well, let me ask you a question about that. You're talking
6 about how in your example that you've drawn for, from the top -- so this
7 would be the front of the body?

8 A That's correct.

9 Q You'd start with 10,000 centigray or 100 gray?

10 A Yes.

11 Q It would enter the body. It would hit the bladder. It would hit
12 the prostate, which you're trying to hit to kill the cancer. Then it would
13 hit the rectum and then it would pass on through, right?

14 A That's correct.

15 MR. GORMLEY: Objection. Leading.

16 BY MR. TERRY:

17 Q So --

18 THE COURT: Overruled.

19 BY MR. TERRY:

20 Q So by their very nature -- by its very nature, x-ray radiation,
21 does it just go all the way through the body?

22 A It goes all the way through. Yes, that's correct.

23 Q You can't make it stop?

24 A No. It's only absorbed -- the energy can only be absorbed.

25 Q Well, how come it won't stop? Is that just a physics thing?

1 A That's just the nature of radiation. You can only stop it with
2 things like lead, that's why radiation rooms have lead that surrounds it to
3 keep the radiation from going beyond that. But there's nothing like lead
4 in the human body.

5 Q Okay. Okay. Go ahead. I'm sorry. Go ahead. So this is one
6 way to get that 8,000 centigray there, 40,000 rads. But that's a lot of
7 dose and the early physician said let's use some geometry. So instead
8 of doing one beam with -- like that, let's do -- let's say one beam that
9 gives 6,000 from the front. The bladder will then get 5,000. The prostate
10 would get 4,000, the rectum would get 3,000 and then it passes out. And
11 then I can come in with a second beam from the side, like this, getting
12 6,000 of the -- 6,000 at the skin there, 5,000 at the hip, another 4,000 at
13 the prostate and then 3,000 before it passes out.

14 Now, by using two beams, I still get that 8,000 at the prostate that I
15 want, the target. But then by just using that, I reduce the bladder
16 radiation by half and the rectum radiation by half. People said great, that
17 works good. This was basically what we considered 3D conformal
18 radiation. With better computer powers and such now we start saying
19 now I can do different angles now.

20 So instead of doing 6,000, I can do, let's say, 3,000 from the front,
21 3,000 from the side and then maybe beam that comes in from the -- an
22 angle like this, do 3,000 there. So where all those beams meet, I still get
23 that 8,000 I want, but by using more beams, I start reducing the radiation
24 to any one structure in that area.

25 Q Well, let me ask you a question, though. You've got all these

1 beams coming in from different directions and they're crossing at the --
2 from -- at the prostate in this example, right?

3 A Correct.

4 Q But in doing so, are you delivering radiation everywhere else
5 throughout the body?

6 A That's correct. That's -- radiation goes to the other parts as
7 the beams are passing through. But the idea, again, is to minimize the
8 radiation in any one normal structure. And so that's the tradeoff we take.
9 Rather than one tissue taking a lot, we kind of spread it out throughout
10 the rest of the body.

11 Q Okay.

12 A So --

13 Q So if you could come up with a way to not do -- not radiate
14 anything but the tumor, but then you would have really found
15 something, right?

16 A Correct.

17 Q All right. So keep going.

18 A So this is some CT scans of exactly this type of prostate
19 cancer patient. This is a CT scan with the prostate drawn in red there,
20 the bladder drawn in yellow in front and the rectum, the front of the
21 rectum in green there. So you can see as the radiation passes out, it's
22 very high dose where it starts and then less and less radiation as it goes
23 through the body. If I split into two, it looks like that. Three fields will
24 look like that. Four fields. Or if I were to do like eight fields, it would
25 look like this. Or just radiate -- the high dose radiation is just focused on

1 the prostate and any one normal structure doesn't get that high dose of
2 radiation.

3 Q Why is all that blue?

4 A That is still radiation that's exposed. It's about 2,000
5 centigray or so. That's the area.

6 Q Okay. Keep going.

7 A So that's why this is a standard radiation treatment machine
8 that's found anywhere in the United States, the patient laying on a table
9 there. It goes up and down and left and right. It's also cut out for the
10 floor, so the table can stand. The radiation comes from the head of the
11 machine there. And this machine rotates around 360 degrees. And so
12 by moving the patient or moving the table, I can come in through any
13 angle that I want for a specific patient's cancer that I'm aiming the
14 treatment at. Again --

15 Q And that's an IMRT issue?

16 A This is an IMRT machine, and this machine can also do
17 standard 3D x-ray radiation, but this is an x-ray radiation machine.

18 Q Okay. A photon x-ray IMRT machine?

19 A Correct.

20 Q Okay. Keep going.

21 A So I use that as a base. That's where most radiation therapy
22 is. And so I say okay, well, what is proton therapy? What is it that makes
23 it different? Protons is not part of this electromagnetic spectrum. It's not
24 part of this energy spectrum. It's actually a particle that has weight.
25 Because of that, we can speed it up. We can slow it down and use some

1 unique characteristics of it.

2 Q Hang on. Let me ask you that. So a proton is a particle?

3 A That's right. It's a particle with mass.

4 Q And it's what you learn in high school physics class as well
5 as subatomic particles?

6 A That's right. It's the very first one with just one proton.

7 Q Okay. And so when we say proton beam, what is that?

8 A So it's thousands of these little protons that we're shooting
9 at very, very high speeds at a target. And when -- we found that if you
10 use these very high speeds, the protons interact with tissue by damaging
11 DNA like x-rays, but it's got these unique characteristics that make it
12 helpful for treatment of some cancers.

13 Q Okay. Let's talk about how you generate the proton beam
14 just for a second.

15 A Okay.

16 Q Where do these protons come from?

17 A It's just a bottle of hydrogen gas. We take the electrons of
18 and then what's left is the protons. You put in a magnet that speeds it
19 up to very, very fast, about two-thirds of speed of light that gives it the
20 energy it needs.

21 Q Two-thirds the speed of light?

22 A That's correct.

23 Q And where is it -- where is it traveling when it's traveling that
24 fast?

25 A So there's these vacuum tubes that we have and a big

1 magnet that spins, speeds it up. Actually, the -- probably the best pop
2 culture analysis is -- think about the hadron collider, like the big
3 accelerator they have in Switzerland or in --

4 Q Like the superconducting supercollider or --

5 A Yeah, the supercollider. Or in Iron Man 2, Tony Stark built
6 the proton accelerator. That -- they went to a proton center and said
7 this -- what does it look like? And that's what it is. Just a set of magnets
8 that spins and spins and gets these protons up to very high speed.

9 Q How big is this machine?

10 A They are very big. So they weigh 80, 90 tons of metal
11 magnets.

12 Q Okay. And so you use hydrogen and strip protons out and
13 put them into a machine, where a magnet accelerates them. And then
14 what?

15 A And then it spits it out and that's where it interacts with the
16 tissue. And so as we -- if we were put into a body of water, just like I
17 drew before, with the depth of the water here and the dose of the
18 radiation, like we said for x-rays, it looks something like this. Less and
19 less radiation on the way in, because it's just getting absorbed energy.
20 Protons, because they are a particle of mass, what happens is they go
21 very, very fast and as they start to slow down, they interact with the
22 tissue around there. And there's a peak of energy and deposits all its
23 energy in called what I heard referenced earlier, the Bragg peak and then
24 the radiation stops with no radiation beyond that.

25 Q So there's a point where the protons stop in the body?

1 A That's correct.

2 Q And it's called the Bragg, B-R-A-G-G?

3 A Bragg peak. That's correct.

4 Q And so can a radiation oncologist control how deep the

5 protons go into the human body?

6 A Yes. We can describe to within about a tenth of an inch, 2

7 millimeters.

8 Q Okay. So you can control the depth within a couple of

9 millimeters into the body and you can make it where the protons release

10 all their energy at that spot?

11 A That's correct.

12 Q So when you do that with a patient who has a tumor in their

13 body, does that mean you can control the depth of the proton beam and

14 make the protons stop at the depth of the tumor?

15 A That is correct.

16 Q Okay. And so --

17 A So for example --

18 Q Go ahead. I'm sorry.

19 A So for the example, then, you're asking about if I were to

20 have that same patient with prostate cancer, the prostate in the middle of

21 the body and the bladder in front on top and the rectum behind it, I

22 would come in with one beam from the side that gives maybe 2,500

23 centigray on the way in. Oops. 2,500 on the way, 4,000 at the prostate,

24 where I want and then it stops. And likewise, the opposite direction,

25 2,500 on the way in and then another 4,000 where I want to give the

1 radiation and then it stops.

2 So examples of that are like here. This is that same exact patient I
3 showed before. Low dose radiation on the way in. High doses where I
4 want it and then the radiation stops. Low dose on the way in. High dose
5 where I want it at the prostate and then the radiation stops. So for that
6 same patient, I can still get that total 8,000 rads there but reduce the
7 normal tissue radiation exposure.

8 Q So these areas then on what you're showing us on this
9 image, these areas that are gray in the front and in the back of this
10 person's body, those are not being radiated at all?

11 A That's correct. They get zero radiation.

12 Q Whereas with your earlier IMRT example, all of those tissues
13 would have had some level of radiation apply?

14 A That's correct. And that's why the next slide that compares
15 the two --

16 Q Ah. Very good.

17 A -- you can see the x-rays, in this particular case, an IMRT plan
18 versus the proton plan here. You can see what we're avoiding is the
19 radiation exposure to the normal tissues. And the reason that's
20 important to us is, again, the risk of the side effect developing is directly
21 proportional to how much radiation exposure is there. And so for a
22 patient like this with prostate cancer, what that leads us to see is there's
23 less risk of urinary side effect, less rectal toxicity, rectal bleeding, as a
24 result of not giving as much radiation to those normal tissues.

25 Q So on the image that you have pulled up now with your red

1 circles drawn, on the top read circle, what would be inside of there
2 anatomically? What part of that person's body?

3 A So this is the muscles, the abdominal muscles there. These
4 are some of the blood vessels that are there. The bladder, again, in
5 yellow there. In the back, the rest of the rectum that's in this back area.

6 Q Okay. All right. What's your next slide, Dr. Chang?

7 A So a little bit about the history of protons, because I get
8 asked a lot. Oh, is this a new technology? Well, it's in new in the sense
9 that there's not very many centers that do it, but the concept has been
10 around a long time. We -- I showed you that picture of that Bragg peak.

11 Q Yes.

12 A That's because it was discovered by William Bragg, an
13 Australian physicist in 1904 and he won a Nobel Prize for this discovery
14 of it. By 1930, the first actual machine that could accelerate these
15 protons was the -- called the cyclotron, was built in 1930 at U.C.
16 Berkeley, which he won the Nobel Prize for that development. And then
17 the first physicist, the director of Fermilab in 1946 said hey, you know,
18 we treat patients with radiation now. It would be really neat if we could
19 use protons to patients, because in fact, they stop. And can we
20 potentially consider doing that?

21 Well, the -- it took ten years, but we'd first be able to use in that
22 actual medical re -- that physics research one in 1954. It moved all the
23 physics equipment aside and the one -- the machine that developed the
24 periodic table, the berkelium californium that machine, they pushed all
25 the physics aside, brought patients in the room and then they treated it.

1 Back then, this was before we had computer access. And so being able
2 to plan protons meant -- this is before we had CT scans even. We only
3 could treat a couple of tumors, one in the eye, one in the middle of the
4 brain that you could see.

5 It wasn't until the 1970s and 80s that we started developing CT
6 scans and we could start seeing inside a patient. In the 1990s, we start
7 building the first center that actually said -- my old chairman said hey,
8 look, we're using these physics research labs where they can only treat
9 maybe one or two patients a day. Let's build one specifically for patient
10 treatment. And that was the one we built at Loma Linda, and we treated
11 about 150 patients a day there since 1990 and it's still operational.

12 So again, the -- 1990 was the first medical one, but it has been
13 used since 1954. I went to Indiana. That was the third one in the country
14 in 2006. 2010, there was about a dozen in the U.S. and in the last ten
15 years that technology now is no longer projects that were individual
16 machines that were built. These were custom made machines. In the
17 last ten years now, there are big vendors that say okay, let's start
18 producing these in factories. And so the cost has become cheaper,
19 because it's no longer just building one. They're building many, many of
20 them.

21 Q Okay. So let me ask you this. Has the FDA approved the
22 machines that deliver proton therapy?

23 A Yes. Our first one in Loma Linda in 1989, the FDA approved
24 the use for the treatment of cancer.

25 Q Does Medicare pay for proton therapy?

1 A Yes, Medicare pays for proton therapy. Again, for the
2 treatment of cancer -- now, I'll say -- I put that definition, because there
3 are things that we're looking at proton therapy now that are
4 experimental. Looking at it for using -- treating seizure activity, a type of
5 heart attack. You can treat a very specific blood vessel in the heart and
6 reduce the risk of heart attacks. Those things are experimental and so
7 FDA and Medicare does not approve that. But for the treatment of
8 cancer, protons has been approved by both Medicare and FDA.

9 Q So your proton center that you work at is in San Diego.
10 There's a large military contingent of folks who live there? Navy base?

11 A That's correct.

12 Q Do you treat veterans?

13 A Yeah. We treat many veterans and active military members
14 in San Diego.

15 Q Does TRICARE pay for proton therapy?

16 A Yes, TRICARE pays for proton therapy for all the patients.

17 Q TRICARE being the medical insurance for the military?

18 A For the career military, so those retired from the military.

19 Q Let me ask you this. There's been a little bit of reference to
20 3D conformal radiation and there's been some reference to IMRT and
21 proton therapy. So those are three different forms of radiation
22 treatment, 3D conformal, IMRT and proton therapy, right?

23 A That's correct. I'd say 3D and IMRT are forms of x-rays. One
24 just uses more advanced computer modeling. The IMRT has more
25 advanced computer modeling than the 3D, but they're still both x-ray

1 therapy.

2 Q Okay.

3 A Protons has similar. There's 3D protons and then there's
4 IMPT, which is like the IMRT for protons. More sophisticated proton
5 modeling.

6 Q Okay. So there was three conformal and then there was
7 IMRT was the next iteration of photons.

8 A Correct.

9 Q Or x-rays. And then -- now there's -- and there's also
10 protons, which is sort of in a different category?

11 A That's correct.

12 Q Okay. But is the radiation energy that's delivered by protons
13 any different than the radiation energy delivered by x-rays?

14 A They're very little [sic] different. And we calculate for that
15 and there's a -- something called an RBE, radiobiological effect. Proton's
16 a little bit more effective. And so we account for that dose. But the
17 example I give to patients is the majority of the differences are simply
18 physical. Where is the radiation dose going, more than anything to do
19 with the biology. An example I give to many of my patients -- again,
20 large military area is I explain that if one things about x-ray or photon
21 radiation, x-ray radiation, kind of like a shotgun that hits everything in
22 the area.

23 Proton radiation is like a target rifle. Allows us to pinpoint where
24 we're giving that radiation. So if you imagine a piece of paper with a
25 circle drawn on it. Use a shotgun. You got some bullets inside that

1 circle, some bullets outside that circle. With a target rifle, you can get all
2 the bullets better inside that circle. That piece of paper doesn't care how
3 the bullets are getting there. It's simply where are they placed. And
4 similarly, the human body doesn't care how the radiation's getting there,
5 protons or x-rays or electron even, It's simply where is that radiation
6 going into relation to the normal tissues that are in that area.

7 Q So in your example, IMRT would be the shotgun and protons
8 would be the target rifle?

9 A Like a target rifle, yes.

10 Q Okay. And so other areas that this has been very helpful for
11 is -- the next set of slides is just some images that I used to show where
12 we treat with these types of treatments.

13 A Okay. This is something called that ependymoma you had
14 asked me about. It's a brain tumor in a pediatric patient. And you can
15 see the radiation stopping in the brain, the back of the brain. So what
16 this means is I can avoid all the upper part of the brain that -- the high
17 cognitive area. And so we spare these patients the memory and their
18 executive function, their thinking, their critical thinking skills.

19 This is an example of a patient with something called a
20 medulloblastoma. It's a tumor that goes in the brain and spreads by
21 fluid to the rest of the spine. And because of that, they get a lot of
22 chemotherapy. They have surgery. And then we have to do radiation to
23 sterilize. Those little [indiscernible] that are anywhere in the spinal fluid.
24 And on the left, you can see the x-ray plan and on the right, the proton
25 plan. The x-rays -- it goes throughout the rest of the body. And with

1 protons, I am able to avoid all the stuff in front her spine.

2 And what that means is these patients when they got treatment
3 before, they would -- if we cured them of their cancer, most common
4 cause of death was heart attach 10 to 20 years later. So I can avoid her
5 heart, so that gits rid of that risk. I avoid her intestines, so she doesn't
6 get nausea and sickness. I avoid her ovaries, so that means that she
7 could have kids in the future, whereas previously, that was not
8 something we were able to do.

9 And even though I talk about these numbers as kind of a small, like
10 400 centigray or 2,000, that 400 centigray is equivalent to about 40,00
11 chest x-rays. I mean, it's not something we just say oh, you know, it's
12 okay. I mean, we do it because we had no other choice as compared to a
13 tumor, but if we can avoid it now that we've got the tool, that's what we
14 aim to do.

15 Some real case examples. This is a pair of patients that was
16 treated by a colleague of mine. On the left is the x-ray plan. He had a
17 tumor in his abdomen next to his kidneys in the back. And actually,
18 about nine months later, there was another patient that had the same
19 tumor, but he -- the one on the left, the patient was -- while he was
20 building a proton center, they were two 16 year-old kids and they were
21 not able to get protons, and so he was treated with IMRT. You can see
22 the radiation going to the other parts of the body.

23 And the one with the protons, we were able to stop it before it got
24 to the rest of his body. And the reason I like is he actually got CT scans
25 of both of them 12 months later and at the diagnosis, you can see the

1 kidneys were about the same on both patients. But 12 months after the
2 IMRT, his kidney there is shrunken versus his other kidney. Whereas the
3 patient that got protons, you see only the back part has shrunk, but the
4 front part is still good and healthy.

5 And what that meant is the kid on the left is now actually on
6 medicines for complications of that kidney for the rest of his life. And so
7 these are real examples of that low dose radiation causing an effect on a
8 tissue. This is a patient with a sarcoma of the sacrum. The protons you
9 can see going in and stopping. This is a 28 year-old lady.

10 Q Is that a tailbone?

11 A That's a tailbone right there, yeah, on this bottom right
12 picture. That's kind of a slice right to the middle of the body. By
13 stopping the radiation, she actually went on and had a -- got pregnant
14 and had a kid normally, after getting 7,000 centigray. In the x-ray, she
15 would have been infertile and never has a possibility of doing that. And
16 so these are the benefits were seeing of protons. And when I think about
17 protons, people ask me, is it more effective? I say generally, no. But
18 we're not trying to be more effective with protons.

19 As cancer cure has gotten better and better, we are looking now at
20 can we get the same cure but reduce the side effects? So it's no longer
21 just cure at all costs. It's cuing with a qualify of life associated with it.
22 And to this case, you had asked me about lung cancer. Here's some
23 examples of a proton lung cancer versus and x-ray on the left. And you
24 can see we're trying to avoid all that normal tissue. And this particular
25 patient is a female patient, so avoiding breast radiation at risk of breast

1 cancer in the future.

2 And again, x-ray, just x-ray radiation versus a proton radiation
3 plan. And looking at this, it's easy to see why for some patients, proton
4 therapy is a -- just a more precise tool for us to be able to utilize radiation
5 treatments.

6 Q Was that your last slide, doctor?

7 A That is. And I think it helps explain like what --

8 Q Thank you.

9 A -- how we as doctors, all we focus on is very much the
10 patient, where I need to get the radiation and what are the normal
11 structures I need to avoid in not giving radiation.

12 Q Okay. Thank you. Dr. Chang, roughly, if you can give us
13 your best estimate, how many patients have been treated with proton
14 therapy in the world over the years?

15 A So there is a large group called the photon therapy
16 organization. It tracks surveys every year or few years for the centers.
17 An as of last count from 2020 before the -- or right around the beginning
18 of the pandemic, it was about 200,000 patients so far as of that year.

19 Q Okay. How many studies are there published in the world
20 that support the use of proton therapy for treating cancer in a human
21 being?

22 A Lots of studies. Hundreds of studies that show that proton
23 therapy is an effective and valuable tool that we have available to us for
24 the treatment of patients with cancer. Is there any doubt in your mind
25 that it is established as a proven treatment to treat cancer?

1 A Yes. There's no one in the medical community that doesn't
2 think it's proven. It's another tool that we use for treatment of cancer.

3 Q So no doubt in your mind?

4 A No.

5 Q Is there any doubt in your mind that proton therapy, over the
6 history of it up to now has been established as a safe and effective
7 method for treating cancer in human beings?

8 A Yes. That is definitely correct.

9 Q And would you say that would be true of lung cancer as
10 well?

11 A Yes, that's correct.

12 Q Let's talk about -- well, let me ask you this. You've reviewed
13 medical records of Mr. Eskew, Bill Eskew, right?

14 A Yes, I have.

15 Q You've also reviewed the deposition of Dr. Zhongxing Liao?

16 A Yes, I have.

17 Q And you know that Dr. Liao is from MD Anderson Cancer
18 Center, the University of Texas MD Anderson Cancer Center in Huston?

19 A Yes, I do.

20 Q So tell us about MD Anderson.

21 A MD Anderson is a well-known oncology hospital. It is
22 probably the most reputable cancer treatment center in the world, with
23 high quality care and expertise at -- of Huston.

24 Q Okay. And let's talk about Dr. Liao. Do you know of her?

25 A I do know of her.

1 Q Tell us how you know of her.

2 A She is an expert in the field of treatment of lung cancer with
3 radiation, is widely published and well-known. I've been to many of her
4 speaking -- at ASTRO and other conferences where she speaks at. So
5 I've never met her in person, no.

6 Q In your estimation, would Dr. Liao be considered a world-
7 renowned lung cancer radiation oncologist?

8 A Yes, if not the top in the world.

9 Q Have you ever heard, before this case, of a doctor named
10 Parvesh Kumar?

11 A I have not.

12 Q Have you ever been at ASTRO or anywhere else where he's
13 spoken?

14 A I might have. At ASTRO, there's hundreds of talks literally,
15 so he might have spoken at one, but I have not been aware of it.

16 Q So you're familiar with the way in which Mr. Eskew was
17 diagnosed with cancer?

18 A Yes, I am.

19 Q Can you tell us just briefly what you know about that?

20 A Yes. I understand that he broke his arm and was found to
21 have a what's called a pathologic fracture. It's a cancer that got into the
22 arm bone and weakened it, so it broke when he was, I believe playing
23 golf. And they looked at why it had broken and found that he had lung
24 cancer that was in his thorax.

25 Q Okay. And we've seen some images of -- well, I don't know if

1 we've seen -- I don't want to say that yet, but we know he had a lung
2 tumor, right?

3 A That is correct.

4 Q Did he have another tumor in his chest?

5 A Yes. There was a primary lung tumor that I saw in the
6 records and then one of the lymph nodes that we next to it in the middle
7 of his chest, that lymph node is kind of like a guardian that catches
8 cancer cells to keep it contained in one location.

9 Q And that second tumor that you just described was in an area
10 of his body called what?

11 A It's called the mediastinum. That's the kind of middle portion
12 of our chest there.

13 Q So between his lungs?

14 A Between his lungs. That's correct.

15 Q And was that mediastinal -- I'm going to say that wrong --
16 mediastinal tumor, was it adjacent to any critical structures in his chest?

17 A Yes. In the middle of the body, as you can imagine, is a lot of
18 critical structures that are there. Some include the trachea, which is the
19 large breathing tube that's down there. The esophagus, which carries
20 food and liquids from the mouth down into the stomach as well as
21 various blood vessels that are quite large in that area.

22 Q So Dr. Chang, in your opinion, is proton therapy a standard
23 of care in the radiation oncology world for the treatment of lung cancer?

24 A I find the word being standard of care not a great word,
25 because it's not well-defined, but it is a tool that's widely accepted and if

1 a center has access to it, it can be a standard of care for that center.

2 Again, because it's limited numbers of centers in the country, not very
3 many radiation oncologists have access to that tool.

4 Q So we heard here in this courtroom that there's not a proton
5 machine in Las Vegas or in the State of Nevada.

6 A That's correct.

7 Q So -- but we know that Bill Eskew was treated with radiation
8 for his lung cancer at MD Anderson in Huston?

9 A That's correct.

10 Q So based on your review of Dr. Liao's deposition and your
11 knowledge of that sequence of facts I just referenced to you, is it your
12 belief that proton therapy for lung cancer is a standard of care at MD
13 Anderson at Huston?

14 A Yes. MD Anderson appears to use it regularly and routinely
15 for the treatment of Lung cancers.

16 Q Okay. So is it true to say that proton therapy is not necessary
17 in every case for ever cancer patient?

18 A That is correct. There are many cases that proton therapy,
19 when we look at these computerized planning, where it does not seem to
20 be beneficial. And again, that's what I do as a radiation oncologist every
21 day. We look at patients. We get computerized plans and then I review
22 hundreds of plans. And we choose the ones that look best. And
23 sometimes I would use protons. Other times, I say this is a better patient
24 for IMRT. Others I would say this is a better patient for 3D conformal. Or
25 sometimes I would say, you know what, this is a very superficial, very

1 close to the surface lesion. I should use electrons for it. It's another tool
2 for it.

3 Q Well, you know that Bill Eskew had his arm radiated before
4 he went to MD Anderson --

5 A I do.

6 Q -- here in Las Vegas? And they didn't use proton therapy for
7 that, right?

8 A That's correct.

9 Q Why?

10 A That's because in that area, there's not very many other
11 critical tissues that are at risk of being damaged. So you can pass the
12 photons or the x-ray through the arm without hitting any other critical
13 structures?

14 Q That's correct and that how we would set up the patient to --
15 with the arm off to the side. And it's likely they didn't use IMRT, either.
16 It was likely just a 3D conformal, because that was all that was necessary
17 to treat that lesion.

18 THE COURT: Counsel, we're going to take our lunch recess.

19 MR. ROBERTS: Yes, Your Honor.

20 THE COURT: Ladies and gentlemen, you are instructed not
21 to talk with each other or with anyone else about any subject or issue
22 connected with this trial. You're not to reach, watch, listen to any report
23 of or commentary on the trial by any person connected with the case or
24 by any medium of information, including without limitation, newspapers,
25 television and/or radio. Do not conduct any research on your own

1 regarding this case, such as conducting -- consulting dictionaries, using
2 the internet or using reference materials.

3 Do not conduct any investigation, test any theory of the case,
4 recreate any aspect of the case or in any other way, investigate about the
5 case on your own. You're not to talk with others, text others, tweet
6 others, Google issues or conduct any other kind of book or computer
7 research with regard to any issue, party, witness or attorney involved in
8 this case. You're not to form or express any opinion on any subject of
9 this trial until the case is finally submitted to you. And if you find out a
10 fellow juror has done so, you need to report it to the Marshal
11 immediately. Is that understood?

12 All right. We'll be back at 1:00.

13 THE MARSHAL: Okay. All rise for the jury.

14 [Jury out at 11:59 a.m.]

15 THE COURT: Any issues outside the presence of the jury,
16 counsel? Mr. Gormley?

17 MR. GORMLEY: No, Your Honor.

18 THE COURT: All right. We'll see you back at 1:00 then.

19 UNIDENTIFIED SPEAKER: Thank you.

20 THE COURT: Thank you.

21 [Recess taken from 12:00 p.m. to 1:02 p.m.]

22 THE MARSHAL: Department 4 is back in session. Come to
23 order.

24 THE COURT: Okay. Thank you. Please be the seated. Are
25 the parties ready for the jury?

1 MR. TERRY: Yes, Your Honor.

2 THE COURT: Thank you.

3 THE MARSHAL: All rise for the jury.

4 [Jury in at 1:03 p.m.]

5 THE MARSHAL: All jurors present.

6 THE COURT: Thank you. Parties stipulate to the presence of
7 the jury?

8 MR. ROBERTS: Yes, Your Honor.

9 MR. TERRY: Yes, Your Honor.

10 THE COURT: Thank you. Please be seated.

11 Please proceed, Mr. Terry.

12 MR. TERRY: Thank you, Your Honor.

13 DIRECT EXAMINATION CONTINUED

14 BY MR. TERRY:

15 Q Okay, Dr. Chang, we're ready to continue. You ready?

16 A Yes, I am.

17 Q Okay. There's been a lot of talk in this trial about these
18 comparative treatment plans -- comparative treatment planning at MD
19 Anderson with regard to studies done to compare IMRT treatment on the
20 one hand versus proton treatment on the other, and I want to talk to you
21 a little bit about how those plans are generated, how they're come up
22 with.

23 A Okay.

24 Q All right. So let's kind of start from the top, and just -- and
25 sort of from a higher up level looking down at it. Let's talk about the big

1 moving pieces and parts of a comparative plan, okay. So I want to ask
2 you first about something called a simulation. Can you tell us what that
3 has to do with treatment planning?

4 A Yes. So the first step after we determine a patient is going to
5 be recommended to get radiotherapy is to create the computerized
6 model of where we're going to be giving our radiation. And so that first
7 part is called the simulation. Now --

8 Q How is one done?

9 A I'm sorry?

10 Q How is a simulation performed?

11 A So simulation is a broad term, but most simulations done
12 now involve the use of a CT scan to do the volume-based treatment plan.
13 So I'd start say when you had asked me before about the different types
14 of radiation, we don't do this much anymore but we used to do 2D
15 radiation, which was where in essence I would examine a patient with
16 my hands and feel where the tumor is and then literally draw on the
17 patient with a Sharpie, treat the radiation here, and then do some
18 calculations and just point the radiation there.

19 That worked, of course, but with the development of CT scanners
20 in the 1970s and 80s we started getting more sophisticated. Instead of
21 just using x-rays, we would create a CT scan of the patient with the
22 patient held in a very specific pattern. For instance, if I am treating
23 someone with prostate cancer, I would create a bag that helps hold the
24 legs in the same position every day and they would lay in -- in the
25 essence of being bagged, we suck all the air out, so it holds the patient in

1 a similar area because once we do the simulation that goes to the CT
2 scan, it goes in my computer, I'm going to do the computerized
3 planning. And once we start the radiation, it will be a daily treatment for
4 several weeks. And so every day during that treatment, I want them to
5 be as closely aligned as that very first day where I do that computerized
6 planning.

7 Q Okay. So is it fair to say just as a -- as a sort of a summary
8 statement that the simulation is designed to locate the tumor precisely?

9 A That's exactly correct. We want to set the patient up so that
10 it's reproduceable every day. And then once it gets -- CT scan gets in my
11 computer, I would take any other CT scans they might have had before,
12 PET scans they might have had before, MRIs, put them all in the
13 computer, overlay them and then create a three-dimensional volume. I'll
14 locate this is where the tumor would be. This might be other areas that
15 are close to the tumor that I'm concerned that cancer may have spread
16 to, and then likewise draw all the normal structures. This is the brain
17 stem, this is the spinal cord, this is the kidneys. The normal structures
18 that I have to be concerned about giving too much radiation for one.

19 And from that, we work with our physics team to plan which
20 angles the beam comes into, how much radiation go. And they will run
21 iterations of hundreds of plans in the computer until we find ones that
22 say this gives me my target amount of radiation, the number of
23 centigray, the number of radiation bullets, in essence, that I want to give
24 to the cancer. And that the normal tissues around it are not getting more
25 than that would be considered tolerance, that a -- that low risk of

1 developing a side effect.

2 Q Okay. So if I'm understanding you right, correct me if I'm
3 wrong, first thing you do is the CT scan to locate exactly where the
4 tumor is?

5 A That's correct.

6 Q Because you got to know exactly where you need to shoot
7 the radiation into a person's body to make it work?

8 A Correct.

9 Q You don't want to miss the tumor, you want to hit the tumor?

10 A That's correct.

11 Q And if you want to hit it, you got to know right where it is?

12 A That's correct.

13 Q Okay. And then once you know where the tumor is, then you
14 develop a plan with your computer to model what the radiation is going
15 to do when you shoot it into the body?

16 A That's correct.

17 Q And you could do that before you ever do radiation?

18 A And that's what we do before we start the radiation because
19 we want to be able to get the most accurate radiation plan that likewise
20 also the normal tissues that are at risk to minimize the radiation to those
21 tissues.

22 Q Okay. So part of the -- part of the CT scan can you also see
23 the organs that are healthy around the tumor?

24 A Yes. We see the anatomy of the normal tissues that's
25 around.

1 Q Okay. So then you've got this computer system. What's it
2 called?

3 A So there are a couple of different programs that can be
4 utilized, and every institution will have whatever software version that
5 they use.

6 Q One of them is called pinnacle?

7 A Yes, one's called pinnacle.

8 Q Okay. So once you have precisely located the tumor and
9 then you run your computer simulation, you can run a -- well, let me ask
10 you this. You can run a computer simulation for IMRT?

11 A We can run for anything.

12 Q Okay.

13 A X-rays, including 3-D or IMRT. Some will allow to do
14 electrons. Some will also allow to do protons. It depends on the specific
15 version of the software; but yes, we run any treatments beforehand on
16 the computer to determine what would be the best radiation plan.

17 Q Okay. So using these computer programs, you can predict
18 electronically where the radiation is going to go once it enters the body?

19 A That's correct.

20 Q Can you also predict what levels or what dose of radiation is
21 going to hit what parts of the body?

22 A Yes. And we can create then graphs that determine how
23 much radiation goes to the tumor or the lymph nodes that we're
24 concerned about or to any specific normal structure that we draw on our
25 computer. It renders the three-dimensional dose that we are giving to

1 that area.

2 Q Okay. So you also have to know what kind of tumor it is,
3 right?

4 A That is correct. Different --

5 Q Because different -- different tumors have different kind of
6 cells in them. Is that true?

7 A That's correct. Some tumors are much more sensitive and
8 so we can use 2,000 centigray. Some are much more resistant, require
9 maybe 8,000 centigray. Some are 6,000 centigray. So it depends on
10 exactly the tumor type that we are trying to treat.

11 Q Okay. So some cancerous tumors require more radiation to
12 kill them than others?

13 A Yes, that's correct.

14 Q All right. So you got to know what kind of tumor you're
15 trying to kill so that you can know how much radiation you got to deliver
16 to the tumor, right?

17 A That's correct.

18 Q And then is it the goal to minimize radiation to everything
19 else?

20 A That is correct. We have to know what are the normal
21 tissues and what their tolerances are. And in some cancers, we say well,
22 if I give 6,000 centigray to this tumor, that might mean the spinal cord is
23 getting too much and I'm going to lead to the paralysis of this patient.
24 And so unfortunately, I'm going to have to reduce the amount of
25 radiation I'm giving to the tumor in order to avoid that side effect.

1 Q Okay. So how -- all right. So you're trying to predict with the
2 computer where this radiation is going to go when it goes in the body,
3 right?

4 A Yes.

5 Q So it needs to be accurate?

6 A Yes.

7 Q Is it?

8 A It's fairly accurate. We can't be 100 percent because, again,
9 every day during the treatment the patients come in there's going to be
10 differences in set up a little bit. There'll be differences in simply
11 breathing for a lung cancer, the tumor is moving a little bit. When I treat
12 something in the pelvis, the bladder filling is going to be different every
13 day, the amount of stool in the rectum may be different every day. The
14 heart beating -- if I'm treating a tumor that's next to the heart, the heart
15 beating is going to be different every day.

16 And so depending upon the area of the tumor, we have to consider
17 okay, how do we -- how do we account for the uncertainties that are in
18 any one day's treatment for any specific tumor. A tumor for instance in
19 the brain not very much moves up there. So I have much more tighter
20 tolerances of I know where the radiation is going versus something that
21 is in -- right next to the diaphragm that might be moving up and down
22 every -- with every breath.

23 Q So in other words, while the patient is on the table, they're
24 breathing?

25 A Hopefully so, yes.

1 Q Yeah, that's the idea. And that may make some parts of their
2 body move a little bit, so you have to account for that in the way that you
3 plan for the radiation?

4 A Yes. And there are things we can do to minimize that a little
5 bit for some tumors that are very sensitive to motion. We have a device,
6 for instance, that helps patients regulate their breathing. In essence, it's
7 a scuba mask that they breathe into with video goggles, and they can see
8 where the breathing is. And we say okay, take a deep breath in, and it
9 goes between the two lines, so it can hold your breath there for 30
10 seconds. We'll do the radiation, and then relax and breathe. So we can
11 help aim for the same reproducibility as on the first day.

12 Q I guess is it true to say that once you have taken into account
13 those variables about the way the patient's body may move during the
14 treatment, you get pretty accurate?

15 A Yes. And we have -- before starting radiation as well, from
16 the computer planning, there's a next -- another step in that radiation
17 planning it's called the QA or the quality assurance where our physicists
18 will take that radiation plan, will, in essence, shoot the radiation into a
19 tank of water, and we measure it or some films, and say does -- does
20 what come out of the machine mirror what we set in the computer and
21 make sure that there is no specific issues with the way the radiation
22 comes out.

23 Q So you build into your process accountability for the -- for
24 the variables that might exist on a different patient?

25 A That is correct.

1 Q Okay. So once you have established let's say a proton plan,
2 you've done your work and drew up the proton plan, can you feel
3 confident that the protons are going to go where you think they're going
4 to go?

5 A Yes.

6 Q How?

7 A Because again, we run the plan on a water tank first and to
8 measure exactly what it's doing. In addition to that, every machine, not
9 just protons but x-ray machines as well, there are monthly, daily, and
10 yearly calibrations that are done to make sure that what is on the
11 computer matches what the machine output is.

12 Now again, it's not perfect. It's usually anywhere from 2 to 3
13 percent of uncertainty in day-to-day variation because things like the
14 temperature and the humidity in the room will also change the output a
15 percent or half a percent. So they are measured every day for things like
16 temperature, pressure, to calibrate the machine to get within an
17 acceptable range of variation.

18 Q And that would be true of photons, as well?

19 A Correct. True of x-rays, electrons, and protons. They all
20 have inherent variability.

21 Q So you mentioned physicists. Some participate in this
22 process. Tell us about that. What is their role, a physicist?

23 A Sure. So in delivering the radiation as it's becoming more
24 and more complex, and there's a lot of interfacing between the
25 computers and the machines, all radiation oncologists we have a physics

1 team that supports our treatment to make sure that what we are giving is
2 accurate to what is being displayed on the computer. I've heard my
3 friends explain it that a physicist is to a radiation oncologist very similar
4 to what an anesthesiologist is to a surgeon. You can't do surgery
5 without anesthesia for the most part. We don't do radiation without our
6 physics that are calculating and doing those types of measurements in
7 the background. And that's a separate training program where a
8 physicist has to go through a residency, and they all get separately
9 board certified from someone who studied physics.

10 Q And those people are participating in the development of
11 these radiation plans, right?

12 A That is correct.

13 Q What about dosimetrist? I have heard that a person is a
14 dosimetrist referenced before. What's that?

15 A A dosimetrist is in essence the one that runs these radiation
16 plans. So for instance, when you asked me about developing a plan,
17 once we get into our computer, we have to put on some angles that we
18 predict and then see if it meets the right criteria. And then if it doesn't,
19 we run it again. And then modify the beam angles to determine what
20 the best radiation angles are.

21 And in any one particular plan, we could be running tens, dozens,
22 hundreds of these plans, the dosimetrist is the one that uses the
23 computer and tweaks the plans so that they are good. And then they
24 would present it to the physician for me to say well, I -- maybe in this
25 particular patient I know that he has had heart attacks before and so I'm

1 more particularly concerned about his heart so let me use some other
2 angles that avoid the heart. My dosimetrist would go back and run the
3 plan a few more times. And so they do, in essence, a lot of the heavy
4 lifting with the computers for the physics group to present to the
5 physician.

6 Q So the physicists and the dosimetrists develop the actual
7 predictive plans and then they run them by the doctor?

8 A That's correct.

9 Q Okay. And they don't just develop one? They may develop
10 dozens or hundreds?

11 A Yes. It's usually again, the iterative process. Before they
12 would have to do it by hand, hand calculations. Again, with computers,
13 we started being able to run it out of computers. Now the new frontier is
14 with using AI having -- now the newest programs I could tell the AI look,
15 I want to give 95 percent of my dose to 100 percent of my tumor and
16 then this structure, this structure, this structure I'm going to put limits of
17 2,000 here, 3,000 there, and 4,000 there, and then let the computer just
18 run with those constraints. And it might run through a thousand plans,
19 and then it will pick the top five to present to the dosimetrist and myself.
20 And I would look at it and evaluate.

21 Q So like if you're trying to create a proton plan on a patient
22 and you're doing this comparative planning study like we're talking
23 about, you could have hundreds of different models for how to deliver
24 protons to that patient's tumor?

25 A Yes. They generally will run through many, many sets of

1 them. And then they will take the top three or four to show to me that
2 we would see and say okay, these are acceptable, or I'm concerned
3 about this particular patient maybe I'm more concerned about their skin
4 reaction because they have a history of eczema and they're going to get
5 more sunburn, so let me reduce the skin dose here. And so then it's
6 iterative process of focusing it on that specific patient's needs.

7 Q So is it true to say that this comparative planning process is
8 sort of the manifestation of the therapeutic ratio and [indiscernible] in
9 action?

10 A That's exactly what it is. We use those principles to again get
11 as much radiation to the cancer and the areas of concern and as little
12 radiation to any other normal structure. It's a trade-off, though, you
13 know, again the perfect would be zero. We cannot get zero. So we say
14 what are willing to accept as a risk of toxicity to the structures around.

15 Q Okay. So you've looked at Bill Eskew's records from MD
16 Anderson?

17 A I have.

18 Q I'm going to show you one.

19 MR. TERRY: Let's pull up -- Jason, let's pull up Exhibit 5. I
20 think it's page 13, I think. Yeah, that's the page. Yeah, let's blow this
21 part up that Mr. Roberts was talking to Mr. -- Dr. Ahmad about today.

22 BY MR. TERRY:

23 Q So you see here in the highlighted portion RUL tumor, that
24 means right upper lobe tumor?

25 A That's correct. Right upper lobe, the top portion of his lung.

1 Q And MD node. What does MD node stand for?

2 A That stands for the mediastinal lymph node. That lymph
3 node that's in the middle of the chest.

4 Q Okay. And then it says "IMRT versus IMPT."

5 A That -- yes.

6 Q And did you hear Dr. Ahmad's testimony about the 6,600 and
7 6,000 centigray?

8 A Yes, I did.

9 Q And he testified that the 66,000 -- or 6,600 relates to IMRT
10 and this 6,000 relates to proton therapy or IMPT. Remember that?

11 A Yes, I do.

12 Q Is that right?

13 A That's incorrect.

14 Q Why do you say so so confidently, Dr. Chang?

15 A The rest of the line defines what was actually being done. It
16 says, "Modality XO6."

17 Q Over here?

18 A Yes. And then next to it, "Fractions 30 FX."

19 Q Yes.

20 A That means it's 30 treatments that were being given to this
21 patient's plan. And then D over FX that's the dose per fraction. That's
22 the how much radiation is given every day as part of that treatment. And
23 then the last one is dose which is the total dose that's given. So that
24 6,600/6,000 centigray is actually for that last portion of the dose. And
25 what it refers to is dose per fraction 2 -- 220.00 GTV/200PTV centigray.

1 What it is saying there is that there are two volumes, the GTV and the
2 PTV. The GTV is the gross tumor volume. That's what it stands for. The
3 actual tumor. The PTV is the little rind around that that has those little
4 fingers that we are concerned about. That's the PTV, planning treatment
5 volume.

6 What this plan indicates is that it's giving 6,000 to the larger rind
7 because it's the fingers, and the gross tumor, the GTV, gross tumor
8 volume, has more cancer so they're giving more radiation each day to
9 that small area. Giving 220 per day to the small area. So 220 and 200
10 times 30 is 6,000 to the big volume and 6,600 to the gross tumor volume.
11 Both with IMRT and with IMPT they're giving the same amount of
12 radiation. It's the two different volumes. Not two different -- not two
13 different amounts depending upon modality.

14 Q Okay. So there's -- and if I hear you right, 6,600 or 66 gray to
15 the center of the -- of the tumor?

16 A Exactly.

17 Q And then 6,000 or 60 gray to the area right around the
18 tumor?

19 A That's right because the highest rate -- the highest number of
20 tumor burden is right in the middle. So they're giving more radiation
21 right to the -- to the nitest [phonetic] of that tumor because that's the
22 hottest area, that is the highest risk.

23 Q So is that something that any competent radiation oncologist
24 would know?

25 MR. ROBERTS: Objection. Form. It's incredibility.

1 THE COURT: Sustained.

2 BY MR. TERRY:

3 Q If you had a first-year resident, would they know that?

4 A Yes, they would.

5 MR. TERRY: Okay. So let's do this. Jason, would you pull
6 up Exhibit 160, page 8.

7 BY MR. TERRY:

8 Q Now, what is this, Dr. Chang?

9 A This is the isodose graph representation of the treatment
10 planning system. So when we look at a treatment plan, when I am
11 evaluating a patient every day, I develop a treatment plan for a patient,
12 and we create these models, and this is the representation of that
13 treatment -- the actual treatment plan that I'm looking at.

14 Q So this one happens to come from MD Anderson, right?

15 A Yes. This looks like the one from the medical record of the
16 patient himself.

17 MR. TERRY: Hey, Jason, would you blow up just right here
18 in this top corner. It's a little hard to see perhaps. Way up here in the
19 corner up there.

20 BY MR. TERRY:

21 Q See this right here, Dr. Chang? I don't know if you can see
22 where I'm pointing. The very top left corner of it.

23 A Yes.

24 Q There's a logo up there. Do you see what it says?

25 A Yes, I do. It says, "Pinnacle."

1 Q Okay.

2 MR. TERRY: All right. You can take that part down, Jason.

3 BY MR. TERRY:

4 Q Now, is this an IMRT plan or a proton plan?

5 A It looks like an IMRT plan to me with the way that the
6 radiation lines are going.

7 MR. TERRY: Okay. Now, Jason, next to that put Exhibit 161,
8 page 70.

9 BY MR. TERRY:

10 Q What is this, Dr. Chang?

11 A This is another treatment plan looking at the CT scans of that
12 three-dimensional treatment plan that I was speaking of. And the lines
13 are, in essence, the contour lines of where the radiation is going to any
14 one specific target, whether that be tissue or tumor.

15 MR. TERRY: Okay. Jason, let's blow up -- hold up. Just this
16 -- just this imagery in the top right of 160, page 8.

17 BY MR. TERRY:

18 Q Okay, Dr. Chang, this is a little hard to see. There are -- there
19 are colored lines that go through that image. Do you see those?

20 A I do.

21 Q A little hard to see, though?

22 A I -- it is a -- I can see it on my screen here.

23 MR. TERRY: Okay. Now, let's -- Jason, let's pull up this top
24 right image right there.

25 BY MR. TERRY:

1 Q So there's the proton image, right?

2 A Yes. It looks like a treatment plan for a proton treatment.

3 Q Okay. So it's my understanding that you have prepared a
4 demonstrative exhibit that makes it easier to understand what these
5 reflect. Is that true?

6 A That is. There are -- the colors were different between the
7 two programs that were utilized here and so I asked if they could draw
8 this using the same what's called color wash that's easier for us to see
9 that utilizes these actual treatment plans from his images.

10 Q So you took these actual treatment plans and worked with a
11 medical illustrator?

12 A Yes.

13 Q And that person created some colorized images of these two
14 slides -- or images that we're looking at here that are easier to look at?

15 A Yes.

16 MR. TERRY: Okay. Why don't we -- why don't we take a look
17 at that? Jason, could you pull that up or does Dr. Chang do that?

18 BY MR. TERRY:

19 Q Okay. This is the first slide I want to ask you about. This is --
20 this is from your demonstrative exhibit, right?

21 A Yes, that's from his medical report, the CT scan.

22 Q And the idea was that you wanted the jury to be able to
23 understand better what you're talking about, right?

24 A That is correct. The understanding of radiation a lot of it
25 comes down to seeing what is the anatomy and where is the radiation

1 going to this target and the normal tissues in the area.

2 Q Okay. Well, let's just orient the jury to what we're looking at.
3 It's looks kind of like a blob if you don't know what you're looking at.

4 A Sure.

5 Q At least that's the way I felt. So let's take a look at what
6 we're looking at. Down here in the lower left-hand corner is a R.

7 A Yes.

8 Q So that seems kind of weird that it's R when it's in the left-
9 hand corner because over here in the lower right-hand corner is an L.

10 A That's correct.

11 Q Now, explain how that works out.

12 A So this is a CT scan slice. And when we do the treatment
13 planning, I will take CT scans and we slice them multiple layers through
14 the body --

15 Q Images?

16 A Images, multiple slices --

17 Q Okay.

18 A -- so that we can see inside the patient. This particular one is
19 the slice right about the level of my upper chest here, and it is as if I am
20 looking at you head on. So what's on the left side of the picture is the
21 right side of the body as if I'm looking at you -- at you directly --

22 Q Yeah.

23 A -- exactly, and then what's on the right side is the left side of
24 the body.

25 Q So is it -- is it shot from like from my feet up?

1 A The feet up. Exactly.

2 Q So if I was over here laying down on the ground like this, it
3 would be shot up through my body and it would be a shot of my chest
4 right here like that?

5 A That is correct.

6 Q Okay. All right. So let's then go to your -- the next slide.
7 This has been colorized and labeled a little bit at your direction, right?

8 A Correct. This is what we would do in the first step of the
9 treatment planning for the physician is for me basically to take my pen or
10 a mouse on a computer like I was doing and drawing out. These are the
11 structures that are in this patient. Draw out the lungs, that's the two pink
12 things that's been colored here.

13 Q Okay. So the big pink oval shape sort of are the lungs?

14 A That's correct.

15 Q Okay. What else do we have?

16 A The bright white and very kind of bottom middle is the -- is
17 the -- where I spot the spine, and in the middle there's a yellow area.
18 That' s the spinal cord that runs through the middle of the spine.

19 Q Okay. And this image is shot from his feet up?

20 A Correct. It's as if we were looking from the feet up.

21 Q In fact, it's the same image as the first?

22 A It's the same image as the one we just showed taken from
23 his chart.

24 Q Okay. What else do we see here?

25 A The blue right in the middle is the trachea which is the

1 airway connecting kind of the mouth to the lungs. It goes down.

2 Q That's what you breathe through?

3 A That's what you breathe through.

4 Q Okay.

5 A The esophagus is that little pink oval right behind that. And
6 that is what carries food from your mouth down into your stomach.

7 Q Okay. Let's talk about the esophagus for a second. The
8 trachea is your windpipe. That's what a lot of people call it, right?

9 A That's correct.

10 Q All right. So your esophagus is what you eat and drink
11 through?

12 A That's correct.

13 Q Okay. So what is the anatomy of the esophagus like? Is it a
14 tube?

15 A Yes, they're both tubes that run right next to each other. The
16 trachea runs right in front and the esophagus runs right behind. The
17 trachea is a rigid kind of almost like a -- like a PFC pipe. It's rigid all the
18 way through to keep open. Whereas the esophagus is like a little muscle
19 that is when empty collapsed, and then it -- when food passes through it,
20 it opens up and then it kind of squeezes the food through in a rhythmic
21 motion.

22 Q It kind of squeezes it down the tube into your stomach?

23 A That's correct. And they're right next to each other. And so
24 when we swallow food, there's a -- there's like a little lid that blocks off
25 the airway, so the food goes down into the right way. That's why

1 sometimes if you don't swallow properly, you're laughing or something,
2 it doesn't close all the way any food or water that goes in the front of the
3 pipe it means you choke and cough it up because you don't want water
4 or food to go into the windpipe.

5 Q So if the esophagus is working correctly, it's -- it is squeezing
6 the food down the esophagus to the stomach?

7 A That's correct. It -- that's the whole pipe actually squeeze
8 down into the stomach, and then from the stomach the same thing.
9 There's intestines that squeeze the residue after it's been absorbed all
10 the way down to the rectum, colon or rectum, where it continues to
11 squeeze it. And everything that we didn't absorb is then excreted.

12 Q All right. Okay. So let's skip forward a slide. Now, we're
13 back to the one that's colorized but with no labels on it, right?

14 A Yes. Oh, and I didn't point out is that the tumor is that
15 yellow --

16 Q Oh, yes.

17 A -- in the bottom left corner. There's two tumors. One in the
18 bottom left corner. You said I could poke, right? Let's see. Wait, I
19 missed. There. And then there's a little lymph node just to the left of
20 that. It's not quite where I'm poking, but to the left of that blue is a
21 lymph node that's in the mediastinal.

22 Q They look brown to me. Do they look brown to you?

23 A It's kind of brownish yellow to me here.

24 Q Okay. Those are the tumors?

25 A Those are the tumors.

1 Q So the one -- the one with the two arrows beside it, that's the
2 tumor in the lung, right?

3 A Correct.

4 Q And then the one here toward the middle of the screen that's
5 the mediastinal, too, right?

6 A That's the mediastinal lymph node, yes.

7 Q Between the -- between the lungs?

8 A Yes --

9 Q Okay.

10 A -- between the two lungs.

11 Q Okay. So now let's go to the next slide.

12 THE CLERK: Those arrows are going to stay on there unless
13 he cleans them off.

14 MR. TERRY: I'm sorry?

15 THE CLERK: There's arrows are going stay on there unless
16 he cleans them off.

17 MR. TERRY: Would you take those arrows off, Doctor.

18 THE CLERK: It's the bottom right corner.

19 THE WITNESS: Okay.

20 THE CLERK: You just got to tap it.

21 THE WITNESS: Tap the bottom right corner?

22 THE CLERK: Yeah.

23 MR. TERRY: Yeah, there you go.

24 THE CLERK: There you go. Perfect.

25 BY MR. TERRY:

1 Q Okay. So this -- what does this slide represent?

2 A So this represents the radiation amounts, the treatment plan
3 that depicts how much radiation is being given to the specific areas. And
4 this is the one that is just a colorized image of the treatment plan that we
5 showed earlier --

6 Q Okay.

7 A -- with the lines.

8 Q So this over on the left there's this scale that starts with blue
9 at the bottom and goes to dark red or maroon at the top. Do you see
10 that?

11 A Yes, I do.

12 Q And so at the bottom the blue says 500 centigray which
13 would be 5 grays, right?

14 A Correct.

15 Q Then the light blue is 10 gray, the darker green is 20 gray, the
16 lighter green is 30 gray and so forth all the way up to 7,260 centigray or
17 72.6 gray, right?

18 A That's correct.

19 Q So do the colors that are associated with these numbers, are
20 those -- are they reflected here in the image?

21 A Yes, they are. And this goes very well with what was shown
22 before of the -- around the tumor. Kind of the big ring around the tumor
23 is 6,000 centigray and of the tumor and the lymph node itself it's the
24 6,600 centigray color that shows how much radiation to those two areas.

25 Q So the tumor itself, 6,600 and then the area immediately

1 around it, 6,000?

2 A That's correct.

3 Q Okay. Now, what about these areas -- these green areas and
4 these sort of teal colored areas or blue, the purple? I mean, what do
5 those tell us?

6 A Those are telling us kind of fall off of the radiation energy
7 that's passing through the body, absorb those to the other normal
8 structures in there.

9 Q Okay. And we also can see right here sort of in the center of
10 that image where the esophagus is, but it's crossed over with several
11 lines there you can see, right?

12 A Yes. So the esophagus is -- let's see if I can get it.

13 Q Can you draw a circle around it or not?

14 A I don't know. I haven't used this program before.

15 Q Okay.

16 A All right. So right about there. That's the esophagus at the
17 tip of that arrow.

18 Q Just right in there behind those lines, right?

19 A Yes.

20 Q Okay. So this is a visual depiction of the x-ray -- IMRT
21 photon plan, right?

22 A Yes.

23 Q Let's go to next slide. Now, we're going to reset here for a
24 second. This is back to everything unlabeled, no radiation shown on it,
25 right?

1 A That's correct.

2 Q Now let's look at what the proton plan looks like.

3 MR. TERRY: Next slide. Can you take that arrow off? Okay.

4 BY MR. TERRY:

5 Q So this depicts the radiation coming into Mr. Eskew's body

6 with the proton plan, right?

7 A Yes.

8 Q It accurately reflects it based on the radiation planning

9 documentation from MD Anderson?

10 A Yes.

11 Q All right. Same sort of thing here. We can see tumor, tumor,

12 right?

13 A Yes.

14 Q And then we can see the esophagus right here in the middle?

15 A That's correct.

16 Q Now, you can see around the edges of the radiation a lot of

17 Mr. Eskew's body is not touched by radiation at all, right?

18 A That's correct.

19 Q Okay.

20 A And here it likewise shows the 6,600 centigray to main the

21 tumor and then the rind around it.

22 Q Okay.

23 A This touch screen is not very accurate. Here's the 6,000

24 centigray for those two areas again.

25 MR. TERRY: All right. Now, let's go to the next slide, Jason.

1 Now, we put these side by side. You can take those arrows off there.

2 Those are not lining up with anything anymore. Okay.

3 BY MR. TERRY:

4 Q So now we've got the IMRT plan on the left and the proton
5 plan on the right, right?

6 A Yes.

7 Q And you can see there's some difference there?

8 A Yes.

9 Q Can you describe generally speaking the difference?

10 A So the tumors and the targets are getting the anticipated
11 planned amount of radiation. It's the normal tissues that are outside the
12 areas are getting varied levels of less radiation per plan. Now, in this
13 particular case, it's because of one showing IMRT x-rays and the other
14 one showing proton radiation. But as a radiation doctor, these are just --
15 the way I look at it is these are different tools of radiation, and the right
16 one versus the left one if I didn't know what tool it was showed, it
17 wouldn't matter to me. You would want to give the one that does less
18 radiation to the normal body.

19 It happens to be in this case it is using protons. In some instances,
20 I would have things like this treat a different type of cancer like breast
21 cancer where I might say you know what, actually electrons looks better
22 than either of those. So we look at these comparatively, these plans, and
23 we as doctors choose which one is best and then the tool that allows us
24 to get that end result.

25 Q Okay. Now, you understand about this case that Mr. Eskew's

1 family, Sandy, alleges that the fact that Mr. Eskew was denied proton
2 therapy and as a result underwent an IMRT caused some complications
3 or side effects to his esophagus, right?

4 A Yes.

5 Q And you've looked at that issue?

6 A Yes, I have.

7 Q We'll talk about that in a second, but let's do this first.

8 MR. TERRY: Let's zoom in on the esophagus if you can.

9 Let's go to the next slide.

10 BY MR. TERRY:

11 Q Now, we're zoomed in, Doctor, we can see right here in the
12 middle of the left-hand slide, which is IMRT, or photons is the
13 esophagus, right?

14 A Yes.

15 Q It's sort of a little peanut-shaped little thing?

16 A That's correct.

17 Q Okay. And that's where it is. And then here's the esophagus
18 in the proton plan, right?

19 A Yes.

20 MR. TERRY: Okay. So let's go one more slide ahead. That
21 will help us locate the esophagus.

22 BY MR. TERRY:

23 Q The white line is drawn around the esophagus, right?

24 A Yes.

25 Q Okay. So let's talk about the difference to the esophagus of

1 these two plans. On the left-hand side of the screen, the IMRT plan, we
2 see that the lines line up -- the lines showing the amount of radiation line
3 up differently with the esophagus than do the lines on the right-hand
4 side, right?

5 A Yes.

6 Q Okay. So can you tell us by looking at the left-hand slide, the
7 IMRT or x-ray slide, how much radiation is being delivered to the
8 esophagus in whole?

9 A So on this particular level, I can see the lines and the colors
10 and that kind of light pink line or like a light lime colored line is --
11 correlates to 2,000 centigray.

12 MR. TERRY: Yeah, could you put that --

13 THE WITNESS: I can't --

14 MR. TERRY: Jason, can you pull up the scale down here at
15 the bottom, please. Just slide that down.

16 THE WITNESS: So it correlates to the 2,000 centigray line.
17 Whereas --

18 BY MR. TERRY:

19 Q So this line here, Dr. Chang, the one that's to the right-hand
20 side of the esophagus is the 20 gray line?

21 A Yes, that's a 2,000 centigray line, yes.

22 Q Okay. And so at least 20 grays of energy is being delivered
23 to the whole esophagus in this --

24 A In this slice, correct. And on the one on the right image, it is
25 carving out part of the esophagus with that 2,000 line.

1 Q Okay. When you say carving out, are you talking about the
2 green line?

3 A Yes. It's the kind of the one that has a little peak to it there.

4 Q Yes.

5 A That kind of carves out part of the esophagus from that
6 radiation dose line.

7 Q Okay. So how much radiation is going to the esophagus in
8 the area right here, the lower or really right-hand part of the esophagus
9 in the proton plan?

10 A So there in this image, I can't tell because the steps are 2,000
11 down to 1,000 so it's somewhat less than 2,000 to above 1,000. And
12 from the images, the pdfs I was provide I wouldn't be able to tell that.
13 But on the computer plan, you can just hover your mouse over there and
14 it will tell me how much.

15 Q So it could be as much as 1,000?

16 A Yes.

17 Q Ten gray?

18 A Yes.

19 Q Maybe a little bit less than that?

20 A Not on this slice because it's encompassed by the 1,000 line,
21 but --

22 Q Okay.

23 A -- less than 2,000, somewhere between the two.

24 Q So let's say that there is 1,000 more centigray or ten more
25 grays of energy delivered to the whole esophagus in the IMRT plan

1 versus the proton plan, ten more. How many dental x-rays is that?

2 A So a dental x-ray is a lot -- is a lot of dental x-rays equivalent.
3 Each gray is probably about 10,000 dental x-rays. So looking at 100,000
4 dental x-ray equivalent.

5 Q 100,000 dental x-rays additional with the proton plan?

6 A Less with the proton plan.

7 Q Oh, yeah, I'm sorry, less with the proton plan.

8 A About -- I would also say that this is just one slice. When I
9 evaluate -- and when radiation doctors evaluate which of the plans, we're
10 not looking just at one slice of the body. We look at every single slice
11 that comprises it and that allows us to create a volume of how much is
12 not just at this level, but how much is the total esophagus or whatever
13 structure is getting. And that's where we look at the multiple slices of
14 images, usually 100 to 200, and then summate it onto a graph called the
15 dose volume histogram that -- that sums that up for us to then determine
16 what is the risk of toxicity to that normal tissue.

17 Q Okay. So using this image, you can see that more radiation
18 is delivered to the esophagus with IMRT than protons?

19 A Yes, in this slice, that's correct.

20 Q All right. And then if we -- if we want to know exactly how
21 much or have a better idea of exactly how much, we can look at the dose
22 volume histogram?

23 A That's correct.

24 Q Let's do that.

25 MR. TERRY: Jason, if you would, please pull up Exhibit 160,

1 page 8 on one side of the screen and -- I won't get ahead of you. You
2 might take your arrows off the screen, Dr. Chang.

3 Oh, I'm sorry, Jason, that's not what I meant. I meant 160,
4 page 29. Sorry about that. There we go. And on the right-hand side of
5 the page, would you please put 161, page 2.

6 BY MR. TERRY:

7 Q Okay. Dr. Chang, what are these?

8 A These are the dose volume histograms. In essence, the
9 summary of all of the treatment planning that has been done on a
10 patient. It's hard to -- us to digest over 200 images in the head
11 sometimes, and so we summarize that for any one structure what is the
12 amount of radiation at a particular volume of that particular structure
13 that we're interested in.

14 Q Okay. So is this another way that the treatment planning
15 computer program depicts the images and the lines drawn images that
16 we saw earlier?

17 A That's correct. This is the summary of all the images, all 200
18 slices or so, and this is what we utilize, the images as well as the
19 summation, for us to determine which plan is acceptable or which one is
20 not or which one is better than another or in some cases this would also
21 show me okay, you know, in this particular case, I can get two plans that
22 have the equivalent tumor coverage, but this plan I'm going to have
23 more kidney dose and this other one I'm going to have more liver dose.
24 So I have to trade off and allow me as a physician to decide for any
25 specific patient, which plan I would choose to go with.

1 Q These dose volume histograms that we're looking at here are
2 those things that a radiation oncologist uses in their practice every day?

3 A Yes. We look at dozens of these every week because this is
4 what we do to evaluate our patients, and this is, in essence, the
5 summary of what radiation is about.

6 Q Would a first-week resident of yours know what these are?

7 A Maybe the first month but not the first week.

8 MR. TERRY: All right. Let's zoom in on one of these. Can --
9 Jason, can you just pull up the box here. And you can pick up the stuff
10 in the right-hand side of the box to the right. Well, let's get the whole
11 box, Jason, to start with. Sorry about that. Yeah, there you are.

12 BY MR. TERRY:

13 Q Let's just orient ourselves with what this shows, Dr. Chang.
14 So we're seeing these lines that go across this graph that are different
15 colors, right?

16 A Yes.

17 Q And the different colored lines are correlated with the key on
18 the right-hand side of the dose volume histogram, right?

19 A That's correct.

20 Q So for example, the -- sort of the bright green line that we
21 see here is esophagus?

22 A Yes, that's correct.

23 Q Okay. So what does this bright green line related to the
24 esophagus, generally speaking, what does it show?

25 A And so the things that this graph is representing, being

1 called the dose volume histogram, is along the bottom axis it says dose,
2 and you can see the numbers, 500 centigray; 1,000; 1,500; 2,000; so forth;
3 5,000; 5,500; 6,000 centigray. And then on the left side, the -- the Y axis,
4 up and down, is what percentage of that structure got that much
5 radiation. So remember that this is a -- we're looking at a volume of
6 something.

7 So in this particular case, one at the very top means 100 percent.
8 And what you want is the tumor -- 100 percent of the tumor to get as
9 much radiation as you're planning. So that's why those three lines kind
10 of go all the way across the top --

11 Q Right.

12 A -- that tells that they're all covered, 100 percent of it is
13 covered by at least 5,500. And then at 6,000, it starts to fall off a little bit.
14 And then at 6,500, it drops off because that tells us that the tumor has
15 been covered by that 6,000 or 6,500 that we're trying to treat.

16 In the ideal world, everything else would be zero for the whole
17 way. But again, we can't get zero for the whole way. So then they tell us
18 any one organ how much radiation is that other organ getting. So that,
19 for instance, the spinal cord line that -- the red line right there --

20 Q Yeah.

21 A -- it tells me that 50 percent of the spinal cord, a little higher,
22 there, crosses over a 1,500. So 1,500 centigray to at least 50 percent of
23 the spinal cord. Now, the spinal cord there at 4,000, kind of our tolerance
24 of the spinal cord, only about 15 percent of the spinal cord got that
25 much. So that means it's good. The spinal cord got some, but it's only a

1 small part of the spinal cord that got a lot of -- that got modest amounts
2 of radiation. Because for our structures, we're not just interested in how
3 much dose to one slice we're looking at. We want to look at what is the
4 whole thing.

5 In this particular case for the esophagus, this showed that at -- kind
6 at the higher dose lines, that 6,000 centigray there crosses over about
7 the 20 -- I guess 28 percent -- 20 percent -- 28 percent of the esophagus
8 got about 6,000 centigray. So those are the representations to us to
9 know how much of that dose to how much volume of that target or
10 normal tissue.

11 Q This is the photon x-ray plan?

12 A This one particularly is, but it could be again, any plan that
13 we look at will have DVH's that will show us.

14 Q Okay. So we can look at how much of the esophagus got
15 how much radiation with the IMRT plan?

16 A Correct. And we use these graphs because we know for
17 most patients what is the tolerance of radiation to volume of tissue. For
18 instance, I know that the spinal cord the reason it ends there is if we give
19 above 4,500 to the spinal cord, the risk of a spinal cord being damaged
20 and then developing paralysis forever starts going up to 5 percent, 20
21 percent, 50 percent of the time it will get damaged if we stay below sort
22 of like a certain amount.

23 So these -- part of the training as a radiation doctor is knowing
24 what is the limits of radiation to every structure in the body because that
25 will constrain how much radiation I can give to a target.

1 MR. TERRY: Okay. Jason, take this down. Dr. Chang,
2 remove your arrows, please. Now, Jason, just pull up the box here on
3 the proton DVH, dose volume histogram.

4 BY MR. TERRY:

5 Q This one looks different, right?

6 A It looks slightly different. The normal curves are shifted
7 down and to the left which is what I would expect from the images of the
8 slices that the normal tissue around got less radiation.

9 Q Okay. And so the line for the esophagus, the green line, is
10 shaped differently, right?

11 A Shaped a little differently, yes.

12 MR. TERRY: Okay. So Jason, take this down, and can you
13 pull up just -- slide that over here and then do the same over here with
14 the proton, please.

15 BY MR. TERRY:

16 Q Okay. Dr. Chang, do you see how those two lines at that
17 point look different?

18 A Yes.

19 Q Now, is that -- can you tell us what we can take from the fact
20 that those lines are shaped differently right there?

21 A So that tells me that the volume of the esophagus that got
22 that 6,000, and the reason I use 6,000 is that is one of the indicators for
23 us to determine what is a risk of developing esophagitis. The V60 which
24 stands for volume of the -- volume of the tissue. It gets 60 gray or 6,000
25 centigray. So the V60 in the plan on the left is about 28 percent.

1 Q Twenty-eight you said?

2 A Yeah, about 28 percent of the esophagus got about that
3 6,000.

4 Q Okay.

5 A On the proton one, there I looked at it before, that is the
6 green one. Sorry, I can't point to it, but right where that 6,000 crosses
7 that is about the 15 percent line for that plan on the right. So about 15
8 percent of the esophagus got that 6,000 centigray.

9 Q And can you -- from that data, can you conclude what the risk
10 of esophagitis would be, the increased risk with the IMRT plan?

11 A Yes. So V60 for esophagus is one of the known factors that
12 helps determine what the risk of developing grade 3 or more
13 esophagitis. When it is at the 15 percent line, it's about 3 percent risk to
14 develop esophagitis. At the 28 percent, it's about 15 percent risk of
15 esophagitis.

16 Q Fifteen?

17 A Fifteen. So there's about a 5 times higher risk of developing
18 esophagitis at the -- that higher dose point.

19 Q So between the IMRT plan for Bill Eskew from MD Anderson
20 and the proton plan for Bill Eskew from MD Anderson, there was a five
21 times higher risk that he would develop esophagitis?

22 A Yes.

23 Q Okay. Well, let's talk about that. Is it your opinion based on
24 your review of the -- of the medical records on Bill Eskew that he in fact
25 developed radiation-induced esophagitis?

1 A Yes, that's what it appears to be as a result of the symptoms
2 that he was experiencing which is very classic for esophagitis.

3 Q Okay. And so tell us what radiation-induced esophagitis is.

4 A So radiation side effects would split into two types. Acute or
5 early and late and long term. Acute side effects occur up to about 90
6 days after radiation finishes. Those are ones that tend to be temporary,
7 transient, and go away. And the way I explain it to my patients are it's in
8 essence a sunburn to wherever the radiation touches. So if I'm treating a
9 patient, I tell them you're going to get a sunburn in the skin in the
10 direction I come in. It's going to give a sunburn to everything else in that
11 pathway that the radiation goes to.

12 Sunburns, for instance, if I'm treating mouth cancer, develop in
13 essence a mucositis. So basically a large canker sore in the area I treat.
14 And then after a few weeks, it gets better and goes away. If I'm treating
15 a brain tumor, that sunburn causes inflammation and can lead to nausea
16 or headaches. In the lung, the biggest concern for a central lung tumor
17 is developing the sunburn to the esophagus called esophagitis. That
18 leads to swelling like a sunburn and difficulty for food to pass through.

19 Fortunately, most of the acute side effects get better and go away.
20 But what we as radiation doctors are looking for is not just the acute, but
21 the most important part is what happens long term, the late effects of
22 radiation. Because what we do can have impacts on patients, months,
23 years, to decades later.

24 So the subacute side effects, the ones that happen after 90 days, or
25 the chronic late effects in essence, to an area that gets sunburned

1 repeatedly is it begins to develop scarring and what we call fibrosis. The
2 best example I give my patients is, you know, everybody is in the sun
3 when we were kids, we get sunburns, they go away. As you get older,
4 our skin becomes more leathery, tougher, thicker. It's scar tissue that's
5 forming as a response to that.

6 For mucosal tissues like the esophagus, like the skin, what happens
7 is the scarring leads the muscles to become tight and not as flexible; and
8 therefore, becomes less ability to stretch and move. So for my patients
9 that have -- when I'm treating head and neck cancer, they'll develop
10 tough skin to their necks. They can't stretch as much. If I have to treat
11 their jaw, the muscles get scarred down after six to nine months, and
12 they start having a difficult time opening their mouth wide.

13 For something like the esophagus, it scars down, and it doesn't -- it
14 can't -- as a tube, it can't open and push through food. It becomes
15 scarred down. And what I tell patients that we have to do is you have to
16 try to stretch it out, but it's not easy to do because it's very similar to
17 when, you know, we were kids, we could do splits easily. We were very
18 flexible and malleable. I see it in my son. He can just like split, and I'm
19 like wow. We get older, right, we can't do that. We can teach ourselves
20 to do it again, but involves breaking down of muscles and scar tissues,
21 and it's the same concept. We can get patients' mouths to open if I
22 stretch it. You can open tissues, but it requires a lot of work at it.

23 Q So radiation esophagitis can happen when radiation hits the
24 esophagus?

25 A That's correct.

1 Q And it causes the esophagus to become inflamed?

2 A Initially, that acute period is inflamed and swollen and
3 painful to go through. And that gets better within a couple of months
4 after the radiation is finished. And then typically six, to nine, to twelve
5 months afterwards the scar tissue starts settling -- setting in. And then
6 it's not so much painful as more it becomes tight, and the food gets
7 stuck. It's hard -- people tell me I just can't get food to go down it. It
8 feels like it's stuck in my throat. And then it -- people vomit it up as a
9 result of that because the food just gets like a lump in the throat.

10 Q So why -- I mean, we can describe the esophagus as being a
11 tube of muscle that sort of pushes the food down the esophagus. If it is
12 scarred, what happens?

13 A It forms what's called a stricture. So scar tissue like a scar
14 tissue it just tightens. And so food tries to squeeze from above and it
15 gets there; and if you force it, you can push it and try to open the
16 esophagus up and force the food through, but it's not easy to do. And so
17 in some cases, which are very severe, we would go in and do what's
18 called a dilation. In essence, do a scope down the mouth, get in there,
19 and physically stretch that esophagus out and in some cases put a cage
20 to help to keep the scar tissue from collapsing that esophagus.

21 MR. TERRY: Jason, would you put up the last slide of Dr.
22 Chang's demonstrative exhibit, please.

23 I'm going to ask you, Dr. Chang, about the way in which the
24 radiation affected Bill Eskew's esophagus.

25 Thanks, Jason.

1 BY MR. TERRY:

2 Q So the -- on the right-hand side, you see the -- a portion of
3 the esophagus is speared with what you said like 10 grays of energy,
4 right?

5 A Somewhere around there, 10 to 20.

6 Q Okay. So in the IMRT plan, the whole esophagus is covered
7 with 30 gray, right?

8 A 2,000 -- 20 gray.

9 Q Twenty gray. Twenty gray. I'm sorry. So if Bill Eskew's
10 esophagus had been spared, this part of it right here, the right-hand side
11 of it had been spared, would he have more easily been able to swallow
12 food?

13 A Likely, yes, because what happens is if you scar only part of
14 the esophagus, then the other part is still malleable and then food -- in
15 essence, the other side has to distend out bigger to compensate for the
16 side that doesn't move out. Again, I wouldn't necessarily say it's just this
17 one slice. We use multiple layers because this slice is only maybe two-
18 and-a-half millimeters in thickness. But when it's over a length of a tube,
19 that becomes an issue. If it's strictured down all the way versus one side
20 being able to still open up, you have one side is discarded.

21 Q So I guess what -- is it -- are you telling us that if you have a
22 scar that goes all the way around, the whole esophagus is scarred then
23 there's no muscle left that's malleable to push the food down?

24 A There might be some, but it's, again, just tougher and
25 difficult to get food to pass especially if it's a length -- a set -- sort of

1 length of the esophagus.

2 Q Okay. So you have reviewed Bill Eskew's records. Did you
3 reach any conclusion about whether Mr. Eskew suffered from acute
4 radiation esophagitis?

5 A Yes, he certainly had acute radiation esophagitis from the
6 notes that I reviewed.

7 Q And did you reach any conclusions about whether Dr. -- or
8 I'm sorry, Mr. Eskew later developed what you described as chronic
9 esophagitis?

10 A It sounds like it from the testimony I heard of what he was
11 suffering from prior to him passing away of difficulty getting food down
12 and food getting stuck which is a classic presentation of what
13 esophageal scarring stricture looks like for chronic esophagitis.

14 Q What about did you -- did you note any reference in Mr.
15 Eskew's records about something called TPN?

16 A Yes, I did.

17 Q What is TPN?

18 A That is -- stands for total parenteral nutrition. Basically, it's
19 liquid food that's given straight into the blood vessels for someone who
20 for whatever reason cannot take food by the mouth or into the stomach.
21 And it is used in extreme circumstances to try to maintain a patient's
22 caloric intake.

23 Q So did you -- did you note in the records that Bill Eskew, and
24 the other documents that you reviewed, that Bill Eskew struggled to
25 swallow his food?

1 A Yes. I reviewed the reports of what he was struggling with
2 from the depositions of the family members in determining what was the
3 symptoms he was facing and that was a very common refrain that came
4 up. He couldn't keep food down. And that by itself is not necessarily
5 bad because one can accommodate that. Sometimes we'll have patients
6 drink liquid diets, Boost, Ensure, to keep it up. But when it becomes a
7 problem is when the weight starts dropping off. And there was
8 substantial weight losses of 10, 20, sometimes 30 pounds. It would
9 bounce up and then come back down again.

10 Q Well, how could it bounce up if he has radiation-induced
11 esophagitis?

12 A A lot of times it's in that intermediate period after the acute
13 esophagitis has resolved, patients are feeling pretty good, you can eat a
14 lot. And I tell my patients look, this is your time -- actually even before --
15 eat as much high calorie food as you can because you are going to lose
16 it. I encourage my patients this is the time to get the milkshakes and the
17 steaks, as much fat and high calories because during the course of this
18 acute esophagitis, they're going to lose it.

19 After the healing of acute esophagitis, patients feel pretty good.
20 They are to start able to get some food in, start getting better, and then
21 the chronic, that scarring starts to form, and then it progressively starts
22 getting more difficult. And so we see the weight drop off once again
23 once that stricture starts coming away.

24 Q So if somebody were to say to you well, wait a minute, Dr.
25 Chang, wait a minute, if he had some acute esophagitis symptoms for a

1 time right after the radiation, he was going to have that any way. What
2 would you say about that?

3 A I say that yes, patients if they don't have -- if they get the
4 radiation treatment, they would get the esophagitis and it's expected,
5 and we will try to account for it and treat for it. What we're trying to do
6 and are trying to avoid really is the chronic long-term acute toxicity.

7 Q So then if somebody were to say to you well, Dr. Chang,
8 there was a time that went by where he seemed to be doing better. And
9 then six, eight, nine months later, whatever it was, he started doing
10 worse with his esophagitis symptoms. What would you say about that?

11 A That is a classic presentation of a resolution of the acute
12 symptoms and start of the chronic, long-term toxicity. We don't see it
13 just in esophagitis. I see it after my brain tumor patients where after
14 radiation they've had a lot of swelling, it gets better, and then if there's
15 toxicity it flares up six, nine, twelve months afterwards.

16 Q So are there different grades of esophagitis, like, one, two,
17 three, four?

18 A Yes. There are different grades for the various toxicity to
19 different tissues that we would use.

20 Q So did you form an opinion about what grade of esophagitis
21 Mr. Eskew had?

22 A Yes. The grading system is more of a descriptive factor. We
23 say what happened, and then we assign a grade to it.

24 Q Okay.

25 A And if the what happened is -- specifically, grade three is

1 defined as severely altered eating or swallowing or TPN or a intervention
2 like that, it is counted as a grade three. A grade four is counted as if it
3 requires urgent hospital admission for that toxicity, then we call it a
4 grade four. And if that toxicity leads to a death of patients, grade five.

5 Q So what grade of esophagitis did you conclude Bill Eskew
6 suffered from?

7 A So because there was a need for the TPN, that by definition
8 is a grade three esophagitis. One -- otherwise, the subjective is altered
9 eating or swallowing versus severely altered. Altered is grade two.
10 Severely altered is grade three. You know, at what point does it become
11 severe? I think that's a subjective line, and that involves discussion with
12 the patient. You know, how bad is this, in essence? And then you can
13 assign it.

14 But again, the grading I would say is a -- something that's done
15 after the toxicity. So it's more descriptive. We don't say okay, it's grade
16 three, now we'll do something about it. We say we have to do
17 something to treat the patient. Because we did this, then it was a grade
18 three or grade two or whatever grade.

19 Q And it's my -- if I just heard you correctly, it's your opinion
20 that Mr. Eskew suffered from grade three esophagitis?

21 A Well, he suffered from esophagitis that required at some
22 point TPN. And TPN sets it up as a -- defines it as a grade three. Now, it
23 could have been earlier if there was considered severe altered
24 swallowing. From the notes, it didn't quantify how severely altered the
25 eating and swallowing was so it could have been grade three earlier.

1 But at some point, it was a grade three.

2 Q Okay. And now, the Court provided the jury some jury
3 instructions before we got started here. One of them has to do with
4 what's called legal cause, okay. It says, "a legal cause of injury, damage,
5 loss, or harm is a cause which is a substantial factor in bringing about
6 the injury, damage, loss, or harm." Did you follow it?

7 A Yes.

8 Q Substantial factor.

9 A Okay.

10 Q So my question for you, Dr. Chang, is to a reasonable degree
11 of medical probability, do you believe that Mr. Eskew developed
12 radiation-induced esophagitis as a result of the use of IMRT instead of
13 proton therapy?

14 A There was a much higher risk of the esophagitis and severe
15 or the grade three plus esophagitis with the radiation plan for IMRT than
16 proton therapy, yes.

17 Q And you believe that the use of IMRT was a substantial factor
18 in the development of grade three esophagitis?

19 MR. ROBERTS: Objection. Leading.

20 THE COURT: Sustained.

21 BY MR. TERRY:

22 Q Do you believe that the use of grade -- of IMRT was a
23 substantial factor in Mr. Eskew developing --

24 MR. ROBERTS: Objection.

25 BY MR. TERRY:

1 Q -- grade three esophagitis?

2 MR. ROBERTS: Legal conclusion.

3 THE COURT: Overruled.

4 THE WITNESS: Yes. We -- seeing -- in seeing these plans,
5 we know that one of the risks of toxicity of radiation exposure to the
6 esophagus is esophagitis. In patients when we don't have any other
7 options, we accept it. If I didn't have proton therapy, and I have many
8 patients I treat that do not have access to proton therapy, I tell them
9 going in you are going to have esophagitis. And I can either, in essence,
10 cheat, don't give as much radiation to the cancer and hope that the 5,000
11 is going to be sufficient and avoid the risk of toxicity or I tell the patient
12 this is going -- there's a high chance of this happening, and be aware
13 that at some point I'm going to need to put a G tube, a tube to your
14 stomach, to bypass your esophagus in order to get this. And we can tell
15 the -- determine the risks of that based upon knowing the DVH's that
16 gives us probabilities of what is likely to develop at the different levels.

17 Q Once proton therapy was off the table as a treatment
18 modality for Mr. Eskew and now we're talking about either IMRT or no
19 treatment, what would have happened with that tumor that we've looked
20 at, a mediastinal tumor, if there had been no treatment?

21 A Well, if the patient wasn't able to get any treatment, then that
22 cancer will continue to grow and will begin to invade and erode into the
23 surrounding areas. And in that particular part of the body, as we showed
24 earlier on these slides, it will erode and poke a hole into the trachea or
25 potentially poke a hole into the big blood vessels and the patient will

1 bleed out as a result or the tumor will spread to the brain and begin to
2 cause swelling in the brain and lead to the death of a patient in that
3 manner.

4 And so if a patient was not able to get the treatment on the right,
5 the proton plan, it is appropriate to treat with IMRT. And again, I would
6 say I have many patients I treat with IMRT with lung cancers. During the
7 lunch break, I got a call from one of my patients with this exact area. Her
8 esophagus is right there. And it was a discussion of do I skimp a little bit
9 or just tell her that we have to expect esophagitis and that's a risk we
10 have to take in order to try to cure the cancer.

11 So in light of no option, we treat with what -- the best tool we have
12 available. So I don't think it's -- I'm saying that you can't use IMRT. If
13 that's what we have available, then we treat with it. If there's another
14 tool that lowers the risk, that would be the preferred method of the
15 radiation delivery, but it does have -- come with a higher risk.

16 Q Do you believe that the proton plan for Bill Eskew was
17 superior to the IMRT plan?

18 A Yes. It was easy to see that it was much less normal tissue
19 that got radiation dose; and therefore, less risk of side effects.

20 MR. TERRY: Jason, pull up Exhibit 160, please, page 1.

21 JASON: 160?

22 MR. TERRY: Yeah, 160, page 1.

23 BY MR. TERRY:

24 Q This is something, Dr. Chang, that UHC's lawyers were
25 looking at with Dr. Ahmad.

1 MR. TERRY: Let's just blow up this part here.

2 BY MR. TERRY:

3 Q So this is a radiation oncology IMRT planning note from MD
4 Anderson. Do you see that?

5 A Yes.

6 Q Now, this planning document, IMRT planning note, is
7 comparing IMRT to what?

8 A And so this particular planning note that they written is
9 comparing IMRT to 3-D conformal radiation therapy.

10 Q Not proton therapy?

11 A Not proton therapy.

12 Q Another form of photons or x-rays?

13 A Correct. Because in addition to my patients requiring
14 preauthorization to use protons, often times they require IMRT
15 preauthorization as well before I can use it. And so this is a letter saying
16 okay, can we use IMRT at least for the treatment of this patient.

17 Q Okay. So this letter is referring to a comparison between
18 IMRT and 3-D conformal, not IMRT and protons?

19 A That's correct.

20 Q And so any statements being made here about IMRT, dose
21 limiting structures, et cetera, relate to IMRT versus the earlier iteration of
22 photons, the less accurate iteration of photons, right?

23 A That's correct.

24 Q So any suggestion that somehow MD Anderson in this -- in
25 this document here was in any way saying that IMRT was just as good or

1 better than protons that wouldn't be accurate; would it?

2 A That is not accurate. It was -- in the context that I saw this,
3 the proton, the tool, the proton, was no longer available. And so then it
4 was the ask of let us use IMRT radiation as opposed to 3-D conformal
5 radiotherapy.

6 MR. TERRY: Your Honor, one second.

7 BY MR. TERRY:

8 Q So Dr. Chang, there's been a position taken here that Mr.
9 Eskew was, quote, unquote, going to die anyway, okay. And there's
10 been reference to the fact that he was a stage four lung cancer patient.
11 Now, I want to ask you, is it your belief that because he was stage four
12 that no hope for him?

13 A No. In the radiation oncology notes that are provided, it
14 stated that they were treating the patient with curative intent. And that
15 means the idea is -- that the goal is to cure a patient of the cancer. We
16 have patients that we treat otherwise for palliative intent. That is if we
17 know that there's not a chance to cure the patient, we can do radiation
18 simply to alleviate the symptoms of the cancer and to keep it from being
19 too much of a problem until they die as a result of the cancer.

20 So for palliative treatment, for instance so lung cancer like this, we
21 would typically give about 4,000 or 4,500 centigray because at that level
22 it's much less risk of injuring anything and you keep it contained for a
23 month or so until the patient dies from something else, unfortunately.
24 The curative intent is to say look, we can attempt to get rid of this cancer,
25 eradicate it. Therefore, we'll take the higher risk and give the higher

1 doses of radiation, the 6,000; 6,600.

2 Q But come on, Dr. Chang, he's stage four. He's going to die,
3 right?

4 A I would say that everybody dies eventually, right, if it's
5 cancer or not. Give it 50 years, we all will die. The risk of -- the chance
6 of cure is less in a patient that has stage four cancer versus a stage three,
7 or two, or one. But the control has gotten better with improved systemic
8 therapies and immunotherapies that are utilized. Fifteen years ago, I had
9 stage four patients that I remember literally telling them you got 12
10 months. There's not much I can do. I have a very vivid memory of a 26-
11 year-old woman I had to tell that to who was trying to determine
12 whether we radiate or not because she was pregnant. So we radiate, are
13 you going to lose a pregnancy? If we don't radiate, you're going to have
14 spinal cord compression. But you have to keep in mind, 12 months this
15 is about the life span.

16 Fast forward five years, this disease now is something that is
17 chronic condition, stage four metastatic melanoma, that the patient
18 comes in every six months for medicine, and we've turned it into a
19 chronic condition. Patients are living now. I saw a patient about three
20 months ago who was eight years out now from a stage four diagnosis.
21 So stage four does not necessarily mean death in any short time frame.

22 Q So have you treated people with stage four metastatic lung
23 cancer with proton therapy successfully?

24 A I have. It's not very many. Again, I will concede that stage
25 four is aggressive lung cancer, and many of those patients will die from

1 the tumor going someplace else at some point. But there are ones that
2 we can cure. And if a patient is healthy otherwise and can tolerate the
3 aggressive treatments, then it is something we aim for.

4 Conversely, I have patients that I see are stage one and they are in
5 such bad health overall that I recommended to a patient about three
6 months ago that had stage one lung cancer, but she had a host of other
7 medical conditions, had multiple heart attacks and had a stroke and she
8 was in wheelchair and diabetes and all these other things, I told her, I
9 looked at her, I said this is stage one lung cancer, yes. But you're not
10 even going to be able to complete just radiation alone. And so for her, I
11 recommended palliative therapy for stage one.

12 So the stage by itself is not -- is not the only indicator. It's how is
13 the overall health of the patient and can we do curative intent or can we
14 not. If we cannot, then that's a separate discussion versus someone who
15 said in the patient's notes this patient is going for curative intent because
16 there is a response.

17 Q Dr. Chang, have you given your opinions here today to a
18 reasonable degree of medical probability based upon your education,
19 experience, and expertise?

20 A Yes, I have.

21 Q And based on your review of the materials that you
22 reviewed?

23 A Yes, I have.

24 MR. TERRY: Nothing further, Your Honor.

25 THE COURT: Okay. We're going to take a 15-minute recess.

1 You are instructed not to talk with each other or with anyone
2 else about any subject or issue connected with this trial. You are not to
3 read, watch, listen to any report of or commentary on the trial of any
4 person connected with the case or by any media information, including
5 commentation, newspapers, television, internet, or radio. You are not to
6 conduct any research on your own relating to this case such as
7 consulting dictionaries, using the internet, or using reference materials.
8 You are not to conduct any investigation, test any theory of the case,
9 recreate any aspect of the case, or in any other was investigate about the
10 case on your own.

11 You are not to talk with others, text others, Tweet others,
12 Google issues, or conduct any other kind of book or computer research
13 with regard to any issue, party, witness, or attorney involved in this case.
14 You are not to form or express any opinion on any subject connected
15 with this trial until the case is finally submitted to you.

16 So we'll come back in 15 minutes.

17 THE MARSHAL: All rise for the jury.

18 [Jury out at 2:24 p.m.]

19 THE COURT: Any issues outside the presence?

20 MR. TERRY: No, Your Honor.

21 MR. ROBERTS: Nothing, Your Honor.

22 THE COURT: We'll be back in 15 minutes.

23 MR. TERRY: Thank you.

24 MR. ROBERTS: Thank you, Your Honor.

25 [Recess taken from 2:24 p.m. to 2:39 p.m.]

1 THE MARSHAL: Come to order and back on the record.

2 THE COURT: All right. Thank you. Please be seated. Are
3 the parties ready for the jury?

4 THE MARSHAL: Ready for the jury, counsel?

5 THE COURT: Counsel.

6 THE MARSHAL: Are you guys ready for the jury?

7 MR. GORMLEY: Yes, Your Honor.

8 MR. TERRY: Yes, Your Honor.

9 THE MARSHAL: All rise for the jury.

10 [Jury in at 2:40 p.m.]

11 THE MARSHAL: Okay. All jurors are present.

12 THE COURT: Do the parties stipulate to the presence of the
13 jury?

14 MR. TERRY: Yes, Your Honor.

15 MR. GORMLEY: Yes, Your Honor.

16 THE COURT: Thank you. Please be seated. Mr. Gormley,
17 please proceed.

18 MR. GORMLEY: Thank you.

19 CROSS-EXAMINATION

20 BY MR. GORMLEY:

21 Q Good afternoon, Dr. Chang. My name is Ryan Gormley. I'm
22 here on behalf of the Defense Counsel. You might remember me. I took
23 your deposition. Do you remember that a few months ago?

24 A Yes, I do.

25 Q And that was remote, not in person as things have been

1 lately, due to COVID. But it's nice to meet you here in person and
2 welcome to Las Vegas. I'm not quite -- the date I have down was
3 November 21st, 2021 for your deposition. Does that sound about right?

4 A Yes, it does.

5 Q Okay. And also one last thing, as Mr. Terry said, you're a
6 little bit soft spoken. I've definitely been accused of being soft spoken
7 before; so if you can't hear me at any time, just let me know. And I'm
8 also not the best at medical pronunciation; so if you think I'm trying to
9 say something that doesn't sound like a real word, just correct me and --
10 and let me know how it actually should be said. Does that sound fair?

11 A Yes, it does. I'll try to speak up. Thank you.

12 Q Okay. Thank you. Let's start on some opinions that I think
13 we have even ground on. You agree that proton and photon therapy or
14 IMRT administered at the same dosage and same volume are equally as
15 effective at treating a tumor, correct?

16 A That is correct.

17 Q Okay. And you agree that here the difference in the radiation
18 dosage to Mr. Eskew's tumor between the proton plan and the IMRT plan
19 was immaterial, correct?

20 A That the difference in doses were immaterial?

21 Q In terms of treating the tumor?

22 A Correct. They were both treated to the same dose of
23 radiation that was planned for either the protons or the x-ray IMRT plan.

24 Q Okay. And you also agree that after Mr. Eskew received the
25 IMRT treatment that his cancer progressed, correct?

1 A At some point after the completion of his treatment, the
2 cancer progressed in other areas of his body.

3 Q And you do not attribute that progression to the use of IMRT
4 instead of proton beam, correct?

5 A That is correct.

6 Q And at the time -- do you recall that you prepared a report in
7 this matter?

8 A Yes, I do.

9 Q And at the time you prepared your report, you did not render
10 the opinion that the use of IMRT instead of proton beam caused Mr.
11 Eskew's death, right?

12 A Correct. The cause of death was not as a result of radiation
13 modality. But the radiation side effects of the esophagitis contributed to
14 the decline of the patient's overall health as he was not able to get
15 sufficient calories into his body.

16 Q And we'll get to that. And that's related to what you
17 discussed with Mr. Terry with the swallowing concerns and the
18 esophagitis concerns?

19 A That is correct.

20 Q One other matter. You -- would you agree that Mr. Eskew at
21 MD Anderson was not part of a clinical trial?

22 A From my understanding, that's correct. He was not part of a
23 clinical trial.

24 Q And also at the time of your deposition, you were not aware
25 which delivery method for proton beam therapy would have been used

1 at MD Anderson, correct?

2 A What do you mean by what delivery method?

3 Q That's fair.

4 A Could you clarify, please?

5 Q Referring to delivery method, my understanding is two of the
6 common ones would be passive scattering and pencil beam. Does -- do
7 those terms sound familiar to you?

8 A That is correct. Those are different ways of delivering the
9 proton radiation.

10 Q Okay. And when it came to Mr. Eskew at MD Anderson, at
11 the time of your deposition, you were not aware which modality of
12 delivering the proton beam therapy would have been used to administer
13 proton beam therapy to Mr. Eskew, correct?

14 A That is correct. From the radiation plans that I saw, they did
15 not define which modality of the protons, which sub-ability of the proton
16 therapy.

17 Q And you're aware that MD Anderson at the time had
18 machines that delivered protons through passive scattering, correct?

19 A They had machines that could do both passive scatter, to do
20 3-D conformal protons, or to do IMPT which is the active scatter -- active
21 scattering proton therapy.

22 Q Okay. And let's take a step back and go over your
23 background a little bit more and some aspects of your resume.

24 A Sure.

25 Q I just want pinpoint some points that Mr. Terry went over

1 with you. Now, from a clinical perspective, you've treated patients with
2 lung cancer, correct?

3 A Yes, I have. And I do.

4 Q But your specialty is breast cancer and pediatric cancer,
5 right?

6 A No, I say my specialty is radiation oncology. And then I have
7 a focus on research of breast cancer and pediatrics which are additional
8 training. But our specialty is radiation oncology.

9 Q And you would agree your research specialty is not lung
10 cancer, correct?

11 A That is correct.

12 Q And then in terms of clinical trials, have you ever served as
13 the principal investigator in a multi-institutional clinical trial before?

14 A Yes, I have.

15 Q And what's the principal investigator?

16 A The principal investigator is the individual who designs and
17 oversees the running of the clinical trial.

18 Q And what's a multi-institutional clinical trial?

19 A That means that the clinical trial is not done just at one
20 institution, but that there are other institutions that also are enrolling
21 patients on that clinical trial.

22 Q And fair to say serving as the principal investigator in a
23 multi-institutional clinical trial is a notable achievement in the career of a
24 radiation oncologist?

25 A It is a notable achievement for any physician to be able to be

1 a principal investigator of a trial.

2 Q Okay. And have you ever served as the principal investigator
3 on a multi-institutional clinical trial regarding lung cancer?

4 A No. Only served as the PI for one multi-institutional clinical
5 trial and it was breast cancer. And most individuals will serve in one or
6 two for their career that defines their career.

7 Q Okay. And what is the National Cancer Institute?

8 A It is the branch of the federal government -- well, I believe it's
9 the federal government that is funded by the NIH, the National Institute
10 of Health, to develop better outcomes for cancer treatments. In general,
11 they oversee the various clinical trials that are run in the United States.

12 Q Okay. Was another way would you agree that they're the
13 federal government's principal agency for cancer research and training?
14 Is that a fair characterization?

15 A They are one of them. The -- primarily for adult patients. But
16 they are also other ones that fund pediatric patients.

17 Q And would you -- and they -- and that agency goes by NCI for
18 short?

19 A Yes, it does.

20 Q And would you agree that the NCI is the largest funder of
21 cancer research in the world?

22 A I don't know. I can't speak to the rest of the world.

23 Q Would you agree that they are one of the largest if not the
24 largest?

25 A Likely, yes. Solely in the United States, yes.

1 Q Okay. And have you ever served as the principal investigator
2 on a trial funded by the NCI?

3 A I have not.

4 Q And talking about academic roles, my understanding is
5 you've served as an assistant professor at a university before, correct?

6 A That is correct.

7 Q Have you ever served as the chair of a department of
8 radiation oncology at a university?

9 A I have not.

10 Q Okay. And we didn't see your resume, but it lists various
11 peer review articles and pieces of medical literature you've written
12 before, correct?

13 A Yes.

14 Q Have you ever published any literature discussing adult lung
15 cancer?

16 A Not in a specific paper. I have published or I have been
17 involved in papers that publish cancer treatments that include adult lung
18 cancers in the aggregate but not specifically for adult lung cancer.

19 Q And Doctor, you're -- you understand you're here as a
20 retained expert witness, correct?

21 A I am, yes.

22 Q And would you agree that for someone to be a good expert,
23 they would not be biased?

24 A Yes. I would say that the best expert witnesses are those
25 who are the most knowledgeable in their field that they're being retained

1 to speak on.

2 Q That's fair. But would you agree an important part of being
3 an expert is also not being biased?

4 A I believe that every individual brings in their own biases from
5 their experience and background. But for biases of any particular case,
6 that is correct. One wants to be as unbiased as possible.

7 Q So it's important to be neutral and objective?

8 A Yes.

9 Q Okay. And you're being paid for your work in this matter,
10 correct?

11 A Yes, I am.

12 Q And for experts, you're understanding that's the standard
13 practice, right?

14 A Yes. My understanding for expert witnesses is that they get
15 paid to have their time retained and compensated.

16 Q Okay. And you're charging \$750 an hour, right?

17 A That is correct. I didn't know how much to charge before. I
18 just asked my lawyer, and I put the same number he charges me. So
19 that's how I came to the number.

20 Q Seems like a good strategy. And do you understand that
21 Defense's radiation oncology expert is charging \$800 an hour in this
22 matter?

23 A I did not know that.

24 Q Okay. But those are pretty comparable numbers, right?

25 A Yes.

1 Q And I'm sure you've billed in excess of \$10,000 in this matter
2 to date?

3 A Yes, I have.

4 Q Do you have an estimate of how much you've charged in this
5 matter?

6 A The last I looked it was about \$30,000 for the hours that I
7 have put in in looking over all the material that has been presented.

8 Q It was how much? What was the last part of that?

9 A 30,000 with all the materials that have been presided --
10 presented to me to review and discussion with you and writing up my
11 reports.

12 Q Okay. But let me go a little bit beyond that into your
13 background a little bit more. So you graduated medical school in 2002,
14 right?

15 A That's correct.

16 Q And that was at Loma Linda University School of Medicine?

17 A Yes, that is correct.

18 Q And you also did your internship at Loma Linda?

19 A I did.

20 Q And also your radiation -- residency in radiation oncology at
21 Loma Linda, right?

22 A Yes, I did.

23 Q Okay. And you were talking about with Mr. Terry Loma
24 Linda had the nation's first commercial proton beam therapy center,
25 correct?

1 A It's the world's first proton beam center. Not necessarily
2 commercial, but just the world's first that was designed for medical
3 treatments.

4 Q Okay. It's the world's first for medical treatments, right?

5 A Yes.

6 Q And then your resume, people call it your CV, I'll try to call it
7 your resume, that was provided in this matter it lists publications you've
8 authored before, correct?

9 A Yes.

10 Q And the first one in your list dates back to 2008. Do you
11 recall that?

12 A I don't remember what the dates are.

13 Q And I can represent to you the first one dates back to 2008
14 and that's one year after you finished your residency, right?

15 A Yes.

16 Q And are you aware that that article discussed proton beam
17 therapy?

18 A Perhaps. I don't remember exactly which articles as I've
19 published many since then.

20 Q Okay. If you have a -- would it help refresh your recollection
21 to look at your resume?

22 A Sure.

23 MR. GORMLEY: And Madam Court Reporter, is it possible
24 for us to put something --

25 THE COURT RECORDER: [Indiscernible]

1 MR. GORMLEY: -- onto his screen without putting it on the
2 big screen.

3 COURT REPORTER: Oh. No.

4 MR. GORMLEY: Then maybe if we used the binders. It's
5 193-19. If I could approach, Your Honor?

6 THE COURT: Yes.

7 MR. GORMLEY: So it will be the very last binder.

8 THE WITNESS: Oh, I didn't know there was more.

9 MR. GORMLEY: Yes.

10 THE WITNESS: Thank you.

11 BY MR. GORMLEY:

12 Q And is that your -- your resume, Dr. Chang?

13 A Yes, it appears to be.

14 Q And if you look in the section entitled "selected
15 publications" --

16 A Okay.

17 Q -- would you agree that the first article listed is from 2008?

18 A Yes.

19 Q And that article discusses proton beam therapy, correct?

20 A Yes.

21 Q In fact, the vast majority of your publications that are listed in
22 your resume discuss proton therapy, correct?

23 A That is correct.

24 Q And your resume also lists selective presentations invited
25 talks. Is that right?

1 A Yes, it does.

2 Q And if you go to the start of that list, do you see the first
3 three, 2005, 2007, and 2007?

4 A Yes, I do.

5 Q And those were -- you presented those prior to finishing your
6 residency, correct?

7 A That is correct.

8 Q And all three of those discussing proton therapy?

9 A That is correct.

10 Q Have you ever been paid to give a talk or presentation before
11 on proton therapy?

12 A I have.

13 Q And have you ever been paid by proton beam device
14 manufacturers to speak about proton therapy before?

15 A I have.

16 Q And isn't it true you've presented on proton therapy all over
17 the world?

18 A That's correct.

19 Q And you've presented on proton therapy in China multiple
20 times?

21 A Yes.

22 Q You've presented on proton therapy in United Arab Emirates
23 multiples times?

24 A That's correct.

25 Q In other countries as well, right?

1 A That's correct.

2 Q And since finishing your fellowship training, your CV shows
3 that you've worked with five proton centers. Does that look right to you?

4 A Yes, that sounds about right.

5 Q Okay. And in addition to that, you also have business
6 interests in proton therapy, right?

7 A In terms of helping to find or to consult for institutions that
8 are interested in proton therapy, yes. That's correct. I do not own any
9 proton centers. I don't hold stock in any companies that do proton
10 centers or anything like that.

11 Q Okay. And in fact, in recent years, you've spent more of your
12 professional time on administrative and developmental effort as
13 opposed to clinical practice, correct?

14 A In the last two years or so, it's about 50 percent
15 administrative and 50 percent clinical.

16 Q And you're also part of a company you talked about with Mr.
17 Terry called Proton Doctors Professional Corporation?

18 A That's correct.

19 Q And you're the president of that company, right?

20 A Yes, I am.

21 Q And that company staffs radiation facilities?

22 A That is correct. With --

23 Q And for instance -- go ahead.

24 A Staffs radiation facilities with a specific specialty in proton
25 therapy because there's not many physicians that are very comfortable

1 using the proton therapy tool.

2 Q Okay. And I was going to get to that. For instance, it staffs
3 your current facility, California Protons, right?

4 A That is correct.

5 Q And California Protons only treats with protons?

6 A That is correct.

7 Q And then you also started a company called Proton Center
8 Development Corporation, right?

9 A That is correct.

10 Q My understanding of what they do is they help develop
11 proton centers. Is that correct?

12 A That is correct. We consult with places that are interested in
13 putting proton centers together because it is a large time-intensive and
14 expensive project. And so they would bring us on to help them in best
15 deciding if they should build a proton therapy center; and if so, how to
16 do it in a way that is going to be workable.

17 Q And I think it seems obviously, but is it fair to say that's --
18 that's not volunteer work, right?

19 A That is correct.

20 Q And that's a company that you're paid for your time and
21 effort in helping develop those centers?

22 A Yes.

23 Q And my understanding is it's done either on an hourly or flat
24 fee arrangement?

25 A That is correct.

1 Q Okay.

2 A I should actually also include it could also be project
3 dependent. For instance, the United Kingdom building their centers in
4 London and Manchester was a set fee for just helping them develop their
5 projects until the United Kingdom's governments had the centers up and
6 running to treat their own patients. Prior to that they were sending 150
7 patients every year to the United States for two months at a time to get
8 proton therapy. And so we helped them build a center in the UK, so
9 those patients don't have to travel here.

10 Q Let's talk about proton therapy related to Mr. Eskew and his
11 esophagitis. Now, it's your opinion that Mr. Eskew suffered from
12 complications from the IMRT including radiation-induced esophagitis
13 that he would not have suffered had he received proton beam therapy,
14 right?

15 A The risk of developing it would have been lower with a
16 proton radiation plan that has been developed. When we look at these --
17 these plans, it is most important how much radiation is to each of the
18 normal tissues. And regardless if it's protons or x-rays or electrons, the
19 whole goal is again reducing the dose to the normal structures. And in
20 his particular case, the proton therapy plan came up with one that would
21 have led to a lower risk, a quite a bit lower risk, of developing
22 esophagitis as compared to the best IMRT plan that was developed.

23 Q Okay. And so it's your position that the proton plan
24 presented a lower risk of esophagitis than the IMRT plan, right?

25 A Correct.

1 Q Is it also your opinion that Mr. Eskew suffered from radiation-
2 induced esophagitis because of the use of the IMRT plan instead of the
3 proton beam plan?

4 A Again, there was a higher, much higher risk, of developing
5 that esophagitis with the radiation plans that were there. What we do in
6 our field is we look at those dose volume histograms that were shown
7 earlier that determines the amount of radiation to the volume of any
8 specific tissue, and then we have in our -- in essence, our textbooks the --
9 the manual that shows how much each individual organ can take before
10 they get developing risks of developing esophagitis.

11 In his particular -- or actually in general for patients, we have
12 something called the quantic which breaks down each individual tissue
13 type and says okay, what is a risk of developing X complication if X
14 amount of radiation is given to this tissue. In particular for Mr. Eskew's
15 plan that was presented, the plans that were presented, the one that had
16 the V60 was much lower risk of esophagitis Grade 3 on the quantic as
17 compared to the higher amount of dose that was provided in the IMRT
18 plan.

19 Q And is it your opinion to a reasonable degree of medical
20 probability that because of that difference that is why Mr. Eskew
21 eventually had radiation-induced esophagitis?

22 A Yes. The volumes that were on the -- presented on the two
23 plans would indicate a approximately 3 percent risk of esophagitis
24 versus a 15 percent chance of esophagitis in the IMRT plan.

25 Q Okay. So 3 percent versus 15 percent chance, right?

1 A Correct.

2 Q And when you're saying chance, are you saying chance of
3 Grade 1, chance of Grade 2, chance of Grade 5, which grade?

4 A Sorry, I should have clarified. In that particular dose volume
5 characteristics, specifically Grade 3 plus esophagitis, 3 percent versus 15
6 percent.

7 Q And just to translate I think what you just said, you just said
8 that the basis for that is -- was the dosage difference between the
9 comparative studies, right? That's a simple way of saying it?

10 A Correct.

11 Q Okay. And you stated that degree -- that opinion to a
12 reasonable degree of medical probability, right?

13 A Yes, that's the best that we have for the field of radiation
14 oncology. And the reason we say that is we can't simply take a person
15 and just keep rating one person to how much -- X -- 1,000, another
16 person 2,000, another person 3,000 and just decide who gets esophagitis
17 and stop. It's taking a look at all the thousands of patients we treated
18 beforehand, and we work backwards. How many patients got this much
19 radiation; and therefore, what is the risk that they developed? If 100
20 patients that got this much radiation, what was the risk of developing
21 this toxicity. If 100 patients got this radiation amount, what's their
22 chance of toxicity. And then we model that and say this is the best
23 model that we have to determine the risks of a specific toxicity like
24 esophagitis.

25 Q Okay. And in your own words, what does a reasonable

1 degree of medical probability mean?

2 A So in the field of radiation oncology, we aim to keep toxicity,
3 Grade 3 plus toxicity, to less than 5 percent. That's kind of the cutoff we
4 use to say if it's more than 5 percent, it is a -- it becomes -- starts
5 becoming a substantial risk of toxicity. And the difference is, again 3 to
6 15 percent, is five times factor.

7 Now, if I didn't have the option of doing 3 percent, if I didn't have
8 proton therapy, and many of my patients do not have access to proton
9 therapy, I tell them, here's the risk. It's about 15 percent. It's -- it's high,
10 but it's still smaller than the cancer progressing.

11 So we need to take that -- we should take that risk and treat
12 because you need to cure the cancer first, and we'll deal with toxicity if it
13 comes up. If I had a tool that allows me to reduce it even more, I would
14 say yes, let's use this other tool to be able to reduce that risk as much as
15 possible.

16 Q Okay. Appreciate all that testimony, Doctor, but I think the
17 question is what's your definition of reasonable degree of medical
18 probability. I don't think your answer addressed that. If you --

19 A So reasonable degree of medical probability, if it's over 5
20 percent, we try to limit the toxicity to above that amount.

21 Q What level of certainty do you need to be able to say
22 something is within a reasonable degree of medical probability?

23 A I'm sorry, I don't understand what you're --

24 MR. TERRY: Objection, Your Honor. Calls for a legal
25 conclusion.

1 THE COURT: Overruled.

2 BY MR. GORMLEY:

3 Q Doctor, what level of certainty do you need in order to be
4 able to say that something falls within a reasonable degree of medical
5 probability?

6 A So I think probably the way I would answer that from what
7 I'm trying to understand is if I could say that 95 percent of the time this
8 toxicity will not occur, I think I could say that that is a reasonable
9 probability that something will not happen. If it's less than 95 percent,
10 then it's difficult to say that it's reasonably probable that will occur. And
11 so that's why we use the 5 percent cutoff rule. If it's 5 percent or less,
12 then it's unlikely to occur.

13 Q And do you understand that you're here today, Doctor,
14 giving an opinion as to medical causation?

15 A Yes.

16 Q And you're testifying as to the likelihood that there were two
17 options and the likelihood if you go with option A instead of option B of
18 a result occurring. Do you understand that?

19 A Yes.

20 Q And my understanding is that it's your testimony that
21 because Mr. Eskew was given the IMRT instead of the proton beam that
22 is why he developed Grade 3 chronic esophagitis, correct?

23 A That is correct.

24 Q And I'm saying to what level of certainty are you saying that
25 opinion?

1 A Oh, okay. From that perspective, I would say it's above 95
2 percent and even more than that because the best data that we have is
3 our computer modeling and basing that upon our -- in essence, our
4 manual of radiation toxicity.

5 Q Okay. So you're saying -- you're saying that opinion with 95
6 percent certainty?

7 A Yes.

8 Q Okay. And again, to circle back, you're basing that on the
9 dosage difference from the comparative studies?

10 A That is correct.

11 Q Okay. Now, hypothetically, if the benefits from proton beam
12 therapy were theoretical, would you agree that you could not state that
13 opinion to a reasonable degree of medical probability?

14 A Yes. I'm not sure that anyone in the medical field would say
15 the treatment plans that we see of proton therapy are theoretical. We
16 treat, again, hundreds of thousands of patients and hundreds of patients
17 -- thousands of patients daily and so we see. If it were theoretical, we
18 wouldn't have been doing this for 30 years.

19 Q Appreciate that. I think that was answering my next
20 question. My next question, and I'm assuming you don't agree with the
21 statement that the benefits of proton beam therapy for lung cancer are
22 theoretical, right?

23 A Not at all. There are a lot of studies and a lot of patients
24 treated with lung cancer with proton therapy.

25 Q And do you recall that in preparing your report in this matter,

1 you reviewed a 2008 paper authored by the author Wyatt Scott?

2 A Yes, I did.

3 Q And that paper was published in the Journal of Radiotherapy
4 and Oncology, correct?

5 A I can't remember which paper it was published in now, but it
6 was a paper that was published in 2008.

7 Q Okay. And if -- would it refresh your recollection to take a
8 look at that -- that paper to see what journal it was published in?

9 A Sure.

10 Q That's Exhibit 189. It could be in that binder. Can you tell? If
11 not, I can grab it for you. This time I know where it is.

12 A I'm at 190 on this one.

13 Q Okay.

14 MR. GORMLEY: May I approach, Your Honor?

15 THE COURT: Yes.

16 THE WITNESS: Thank you.

17 BY MR. GORMLEY:

18 Q And does that refresh your recollection that this paper was
19 published in the Journal of Radiotherapy and Oncology?

20 A Yes.

21 Q And is that a reliable journal in your field?

22 A Yes, it is.

23 MR. GORMLEY: And I know you guys have objections. I'm
24 going to move to admit.

25 [Defense counsel confer]

1 MR. GORMLEY: Do you have an objection?

2 MR. TERRY: Yes. Hearsay.

3 [Sidebar at 3:09 p.m., ending at 3:10 p.m., not recorded]

4 MR. GORMLEY: Your Honor, we'll move to admit what was
5 premarked as Exhibit 189.

6 THE COURT: 189 will be admitted into evidence.

7 [Defendants' Exhibit 189 admitted into evidence]

8 MR. GORMLEY: Thank you. Audra, can you bring up 189,
9 please. It's a smaller font so we'll have to do our best on the zooming in.

10 BY MR. GORMLEY:

11 Q Do you agree this paper is entitled "Proton Therapy and Lung
12 Cancer Clinical Outcomes and Technical Issues. A Systematic Review"?

13 A Yes.

14 Q And what is a systematic review?

15 A It is looking at all the literature that had been published up
16 until that time that -- regarding that specific topic that they're interested
17 in. In this case, proton therapy and the treatment of lung cancer.

18 Q And there are certain types of constraints for someone in
19 your field to use the term systematic review?

20 A Yes.

21 Q And just not anyone can just call something a systematic
22 review, right?

23 A One could call it and they should define it in their methods
24 material what they did to define that as a systematic review. Did they
25 only look in journals that published in English, for instance, or did they

1 look at ones that were throughout the world in a different language?
2 And so the constraints would be listed in the methods material section of
3 this paper.

4 MR. GORMLEY: Okay. All right. And Audra, can you go
5 ahead and zoom in into the abstract under the title, the first three lines.
6 Just the first three lines so that is readable.

7 BY MR. GORMLEY:

8 Q Can you see that, Doctor? And you have it in front of you as
9 well.

10 A Yes.

11 Q And so that says, "To determine" -- "Background and
12 Purpose. To determine whether according to the currently available
13 literature, proton therapy has a role in the treatment of non-small cell
14 lung cancer, NCCLC -- NSCLC, to assess its safety and efficacy and to
15 evaluate the main technical issues specifically related to this treatment
16 technique." Did I read that correctly?

17 A Yes.

18 MR. GORMLEY: Now, Audra, if you can bring up page 9.
19 And then under the heading "conclusion." It's going to be on the top
20 paragraph.

21 BY MR. GORMLEY:

22 Q Can you see that, Doctor?

23 A Yes.

24 Q And under there it says, "The use of" -- and PT is your
25 understanding it stands for proton therapy?

1 A Yes.

2 Q "The use of proton therapy in non-small cell lung cancer is
3 mainly based on the theoretical advantages in dose distribution." Did I
4 read that correct?

5 A Yes, you did.

6 Q And dose distribution discusses those differences in dose
7 which is reflected in the comparative planning studies that we were
8 talking about earlier, correct?

9 A That's correct.

10 MR. GORMLEY: And then, Audra, if you can go -- oh, we
11 have it up. Never mind. I thought we just did the first sentence, but
12 yeah, just that whole paragraph again.

13 BY MR. GORMLEY:

14 Q Then after that it says, "Little clinical data are available in
15 terms of number of institutions involved, number of treated patients, and
16 quality of studies conducted; i.e. lack of randomized control trials making
17 it impossible to draw definitive conclusions about its efficacy." Did I read
18 that correctly?

19 A You did.

20 Q And what is a randomized controlled trial?

21 A So what they are asking for to say is let's look at all the
22 papers that have been published in proton therapy that have shown
23 what the outcomes are of these patients. And they look good from the
24 treatment planning studies. What is not present is a study that says let's
25 take half these patients and flip a coin. Half of them will get x-rays and

1 half of them will get proton therapy. That's the randomized study that
2 they said did not exist at that time, flipping a coin to see which one
3 would be superior.

4 Q That's your description of a randomized controlled trial?

5 A That is correct.

6 Q Okay. Are they done in -- do the physicians that perform
7 randomized controlled trials do they -- do they just flip coins to see who
8 gets what and who does what?

9 A In essence, it's a coin flip, but there are -- it's usually a
10 computerized generated one that goes one to the other. They do a few
11 things first. They'll -- called stratify so they'll say let's break out first all
12 the Stage 1s and then we'll randomized that. All the Stage 2s, and we'll
13 randomized that. And so they'll have different stratum that are utilized to
14 determine that randomization. It's typically done in studies where -- in
15 cases where we are not sure which one is going to be better than the
16 other. We have many patients treated one way with A, many patients
17 treated with B. They both look pretty good. Let's figure out which one is
18 better. Let's randomize it at that point between A and B. What this study
19 is concluding; and actually if you go back to the first page of this exhibit,
20 the study, in the conclusion of the abstract it says that there haven't been
21 a randomized study that shows that proton therapy is superior to x-ray
22 therapy.

23 Q Thank you for that, Doctor. And you would agree that in the
24 medical clinical research field that randomized trials are considered the
25 gold standard?

1 A No. The treatment of a patient the gold standard is what is
2 best for an individual patient. Randomized studies are utilized when we
3 are trying to tease out the difference between a very small outcome of
4 typically a few percentile, 3 to 5 percent, is something much better than
5 the other. Studies that show that if you suddenly have a treatment A
6 that is 50 times better than treatment B, you switch to treatment A.

7 It's called a non-inferiority or in some cases a few house study.
8 There -- the majority of the treatment of cancer patients, 95 percent of
9 treatment decisions are based upon non-randomized studies because we
10 find a new medication or a new treatment modality that just works much
11 better than the prior treatment modality. And so the field shifts without
12 doing a randomized controlled study.

13 Q Okay. Let me -- that was a long answer for I thought a
14 straight-forward question. Let me just recap it. So it's your testimony
15 that randomized trials are not the gold standard when it comes to
16 medical research?

17 A For the treatment -- for the use of radiation therapy, no. The
18 flow of the field has always been more radiation to targets, less radiation
19 to non-targets. The randomized studies are used to determine how
20 much is the difference in, let's say, reducing the amount of radiation to a
21 target tissue, does it actually show a clinical impact. If we give more
22 radiation to a cancer, does that improve the cancer control rate of it.
23 Randomized studies are typically limited to when we are trying to tease
24 out small differences like that.

25 Q Wouldn't you agree to break it down that randomized

1 controlled trials are meant to determine if something works better, as
2 well as, or not as well as something else?

3 A That is correct. That is the goal of using it for teasing out the
4 small differences that would exist.

5 Q Wouldn't you agree that that's an important goal?

6 A That is an important goal for many instances. But there are
7 cases where we know something is better, and we would not be prudent
8 to run a trial on that. For instance, there's no randomized study that
9 shows treating lung cancer with radiation and if I treat the leg with
10 radiation as well. Do I treat the leg? Does that help? No, because that's
11 giving excess toxicity with no benefit to doing so.

12 And so the field has always been -- there is no randomized study
13 between 3-D conformal x-rays and IMRT radiation. It's been -- with 3-D's
14 we can never get 6,000 -- 6,600 gray -- 6,600 centigray to a target;
15 whereas, with IMRT, we could. So how does IMRT then become widely
16 accepted. It's simply because the prior tool that we had was not able to
17 get us there.

18 MR. GORMLEY: Okay. And I'm going to keep reading.
19 Audra, if you can just drop down and highlight the rest starting at
20 "current data" of that section.

21 BY MR. GORMLEY:

22 Q It says "Current data suggests that proton therapy is a
23 promising modality of radiation in the treatment of early stage disease
24 producing favorable results and low toxicity. Both acute and light
25 indications for proton therapy in advance stages are based mainly on

1 planning studies that should be followed up by further clinical
2 investigations. Well-designed clinical trials and perspective studies will
3 allow to better evaluate the benefits of proton therapy with respect to
4 other high-precision radiotherapy treatments, e.g., tomotherapy,
5 stereotactic radiotherapy, cyberknife, and IMRT provided that the
6 technical peculiarities of proton therapy in lung treatment will be
7 adequately taken into account." Did I read that right?

8 A Yes, you did.

9 Q And I know your opinion on randomized trials, but my next
10 question is would you agree that the authors here look like they think
11 there should be a randomized trial?

12 A They said that that would be helpful in confirming that the
13 benefits that are being seen with these treatment planning studies carry
14 out and are born out in the actual patient. And that's why, again, if you
15 would mind pulling up that first page, the conclusion to their abstract, if
16 you could highlight that for me.

17 Q Yeah. Which -- which --

18 A The very first page under the abstract of the title page of this
19 document.

20 Q Are you saying you want to just read what you're referring
21 to?

22 A Or if you could pull it up on the screen as well.

23 MR. GORMLEY: Audra, if you just want to pull it up, I guess
24 on page 1.

25 THE WITNESS: The last portion of -- just the last sentence of

1 that abstract. So it's the -- too big?

2 MR. GORMLEY: That's starting at because.

3 THE WITNESS: There. "Because of the small number of
4 institutions involved in the treatment of this disease," again, in 2008,
5 there was only half a dozen proton centers in the country, "number of
6 patients and methodological weakness of the trials, it is therefore not
7 possible to draw definitive conclusions about the superiority of proton
8 therapy with respect to photon techniques currently available for the
9 treatment of non-small cell lung cancer."

10 The reason I highlight that is because in the actual body of
11 the text itself what they started seeing is that for patients treated with
12 proton therapy the risk of esophagitis Grade 3 is 5 percent treated with
13 proton therapy and those treated with IMRT had a 44 percent risk of
14 esophagitis Grade 3. And so with that, you would say wow, that's a --
15 what is that a eight times less risk of esophagitis in patients treated with
16 proton therapy. But they said that's a small population. We need to do a
17 larger study to see if this actually carries out in many, many patients
18 because some proton institutions, for instance, could not account for the
19 tumor moving, which is again I had mentioned very important to us as
20 radiation doctors. We want the tumor to be very specific.

21 And the difference is, for instance, the concern that with x-
22 rays, you know, if you -- going back to my analogy of the shotgun and
23 the target rifle, if you got a tumor that's moving around, if I use a
24 shotgun, I'm not going to miss as easily. But of course, there's more
25 collateral damage. And the concern at that time was well, if you use a

1 target rifle, maybe we're going to miss this cancer more often and have a
2 high rate of cancer recurrence. This is the time before we had things like
3 breathing control, respiratory gating, and targeting at a very precise
4 level. And so they said this esophagitis rate, yes, it's only 5 percent in
5 protons and 44 percent in x-rays, but does that -- does that mean that
6 then we are missing more cancers.

7 And so the study was not to determine does protons work or
8 not. It was saying well, proton looks like it's better. We just can't say
9 how much better unless we do a randomized controlled study.

10 BY MR. GORMLEY:

11 Q Okay. And so let's see if I can translate that. You're saying
12 based on -- this was published in 2008, right?

13 A That's correct.

14 Q Based on what was available then, that statement mainly
15 based on the theoretical advantages in dose distribution was true?

16 A It was true in the sense that it looked much better on the
17 treatment planning, but they didn't have -- did not have sufficient
18 numbers of patients treated with lung cancer at that time to say that it
19 would be born out in a large group of patients because in the small
20 numbers of patients they studied here, they saw a very large discrepancy
21 in the Grade 3 esophagitis, 5 percent versus 44 percent. And the
22 question is, does this really carry out to the wider population.

23 Q Okay. And that last paragraph that I read other high
24 precision radiotherapy treatments and it listed IMRT, that's what Mr.
25 Eskew received, right?

1 A That is correct.

2 Q Okay. And now -- so that was 2008. Since then such a
3 randomized control trial that was called for in this paper has been
4 performed, right?

5 A Some subsets of it has been performed, yes.

6 Q And what was some small what --

7 A Subsets of that randomized controlled study have been
8 performed. Not in ever subset of lung cancer patients.

9 Q And would you agree that the first randomized study
10 comparing proton beam and IMRT for the treatment of late stage non-
11 small cell lung cancer was published in 2018 in the Journal of Clinical
12 Oncology?

13 A Yes.

14 Q And you would agree that the Journal of Clinical Oncology is
15 a reliable source in your field?

16 A Yes. That is a very reputable journal in that source of
17 oncology.

18 Q And in fact that study was actually lead by Mr. Eskew's
19 treating physician Dr. Liao at MD Anderson, correct?

20 A That is correct.

21 Q And in that study Dr. Liao and her fellow researchers were
22 comparing outcomes of using proton beam therapy versus IMRT both
23 with concurrent chemotherapy for inoperable non-small cell lung cancer,
24 correct?

25 A That is correct.

1 MR. TERRY: Objection, Your Honor. Can we approach?

2 THE COURT: Yes.

3 [Sidebar at 3:26 p.m., ending at 3:29 p.m., not recorded]

4 THE COURT: Ladies and gentlemen of the jury, this line of
5 questioning related to causation has no bearing on the issue of bad faith,
6 it only has bearing on the issue of medical causation that the doctor is
7 testifying about. Do you understand that? All right. Thank you.

8 MR. GORMLEY: Thank you, Your Honor.

9 BY MR. GORMLEY:

10 Q So we just established 2018 study published in the Journal of
11 Clinical Oncology, a reputable source led by Dr. Liao at MD Anderson,
12 right?

13 A Yes.

14 Q And you agree that the study -- they were comparing
15 outcomes of using proton beam therapy verse IMRT with patients that
16 had concurrent chemotherapy for inoperable non-small cell lung cancer,
17 right?

18 A Yes. A subset of lung cancer patients, that's correct.

19 Q Okay. And you -- would you agree that Dr. Liao and her
20 coauthors hypothesis on that article was that proton beam exposes less
21 lung tissue to radiation than IMRT and thereby reduces toxicity without
22 compromising tumor control?

23 A That is correct.

24 Q And as these articles tend to do, it gets more technical from
25 there. Let me take a step back. So when it says reducing toxicity that is

1 what you've been talking about the idea of reducing toxicity surrounding
2 healthy tissue, right?

3 A That is correct.

4 Q Okay. When it says without compromising tumor control
5 that's what we established at the beginning that it's the same -- that
6 whether using IMRT or proton beam will have the same effectiveness at
7 killing the cancer cells, right?

8 A That is correct.

9 Q Okay. And you agree that the results from that study show
10 that the outcomes were worse for the patients that received the protons
11 as opposed to the IMRT or the x-ray, correct?

12 A In that subset of patients, that is correct.

13 Q And you would agree that that article triggered discussion in
14 the medical community, right?

15 A That is correct.

16 Q In fact one radiation oncologist Dr. --
17 MR. TERRY: Objection, Your Honor. Can we approach again,
18 please?

19 THE COURT: Yes.

20 [Sidebar at 3:31 p.m., ending at 3:32 p.m., not recorded]

21 MR. GORMLEY: Your Honor, can I -- can we approach again?

22 THE COURT: Yes.

23 MR. GORMLEY: I just want to make a point of clarification
24 real quick.

25 [Sidebar at 3:33 p.m., ending at 3:35 p.m., not recorded]

1 MR. GORMLEY: Thank you, Your Honor.

2 BY MR. GORMLEY:

3 Q Dr. Chang, so remember we said that article from Dr. Liao
4 triggered discussion in the medical community?

5 A Yes.

6 Q And then following that article on July 1st, 2018 Dr. Liao sent
7 -- wrote correspondence, it's called an article in the Journal of Clinical
8 Oncology, are you aware of that?

9 A Yes.

10 MR. GORMLEY: And Your Honor, we would move to admit
11 what was pre-marked as Exhibit 133 the article that we were just
12 discussing related to Dr. Liao.

13 MR. TERRY: Subject to our same objections, Your Honor.

14 THE COURT: Thank you. Exhibit 133 will be admitted into
15 evidence.

16 [Defendants' Exhibit 133 admitted into evidence]

17 MR. GORMLEY: Thank you, Your Honor.

18 MR. TERRY: I'm sorry, what number was that, Ryan?

19 MR. GORMLEY: 133.

20 MR. TERRY: Thank you.

21 MR. GORMLEY: And Audra, if you can bring up Exhibit 133,
22 please. And if you can go ahead and highlight that top paragraph, "To
23 the Editor".

24 BY MR. GORMLEY:

25 Q And so this July 1st, 2018, right, Dr. Chang?

1 A Yes. I believe that's the date. I don't have the article in front
2 of me.

3 Q Okay.

4 MR. GORMLEY: You can -- Audra, if you can just zoom out
5 and highlight the date at the very top to show the doctor.

6 BY MR. GORMLEY:

7 Q Do you agree this is July 1st, 2018?

8 A Yes.

9 MR. GORMLEY: And then can we go back to that first
10 paragraph?

11 BY MR. GORMLEY:

12 Q And this article was written by Dr. Liao and a coauthor Dr.
13 Mohan [phonetic], correct?

14 A Yes.

15 Q And that first paragraph says, "In her editorial in Journal of
16 Clinical Oncology Kahn thoughtfully comments on a randomized phase
17 two trial that compared protons, passively scattered proton therapy with
18 photons, intensity-modulated photon therapy for lung cancer." Now
19 where it says intensity-modulated photon therapy, that's IMRT, right?

20 A Intensity-modulated photon radio therapy, so yes.

21 Q That's IMRT?

22 A Yes.

23 Q And the passively scattered proton therapy, PSPT that's what
24 we've been calling proton therapy, right?

25 A That is correct. 3D conformal proton therapy.

1 Q Right. The next sentence says, "Her closing remarks shed
2 light on the prospects for future randomized studies to one day measure
3 the clinical advantages of proton therapy, which have remained largely
4 theoretical, although progress is being made." Did I read that correctly?

5 A Yes, you did.

6 Q And Doctor, would you agree that the definition of theoretical
7 is existing only in theory?

8 A That is correct.

9 Q And then another word for theoretical is hypothetical?

10 A They're related, but not identical.

11 Q And then is it your view, Doctor, that something that is both
12 theoretical and hypothetical can be proven?

13 A Yes. That can be shown. Are you going to continue reading
14 some of the other parts of this response on her article?

15 Q Those are all the questions I have for you on that one,
16 Doctor. I'm sure --

17 A Okay. Because in your questions to me about --

18 Q -- your attorney's can you ask you some follow up.

19 A I'm sorry?

20 Q I said I'm sure your attorney's can ask you some follow up if
21 they have any thoughts on it, but we are on a time crunch and my
22 understanding is that you only have available today to testify, correct?

23 A That's correct. I have a full clinic schedule starting at 6:00
24 tomorrow.

25 Q The -- so now let's go ahead and look at what's been

1 admitted as Exhibit 24.

2 MR. GORMLEY: Audra, if can go ahead and bring that up.

3 BY MR. GORMLEY:

4 Q And this is -- you've reviewed this before today, correct?

5 A I have.

6 Q And this is the proton beam medical policy that's been
7 discussed at length in this case, correct?

8 A Yes. That's correct.

9 Q And it says that proton therapy is unproven and not
10 medically necessary for treating lung cancer, correct?

11 A That's correct.

12 Q And I understand you disagree with that conclusion, right?

13 A That is correct.

14 Q Okay. Let's see if there's a few points we can agree on
15 related to it. Do you agree that the proton policy clinical evidence
16 section regarding lung cancer contains references to peer review
17 literature, right?

18 A That is correct.

19 Q And you agree that the proton policy clinical evidence
20 section regarding lung cancer contains references to evidence-based
21 reports and guidelines published by nationally recognized professional
22 organizations, correct?

23 A That is correct.

24 Q And at the time of writing your report in this matter you did
25 not identify any published peer reviewed article or study that the proton

1 policy should have cited but did not, right?

2 A That is correct.

3 Q And at the time of writing your report you did not provide an
4 opinion that the policy was missing any material clinical evidence,
5 correct?

6 A That is correct.

7 Q And at the time of writing your report you did not contend
8 that any of the summaries of evidence in the policy regarding lung
9 cancer were not accurate, right?

10 A The summary that were listed were accurate, but the
11 conclusion was inaccurate.

12 Q Okay. And you took the words out of my mouth. It's your
13 opinion that the studies then there show that it's proven and medically
14 necessary, right?

15 A That is correct.

16 Q Okay. Would you agree that there are references in there
17 that disagree with you?

18 A Not the ones that are listed in the policy itself starting from
19 page 16 the lung cancer section.

20 Q Okay.

21 MR. GORMLEY: Audra, can you go to bates label 5245,
22 please.

23 BY MR. GORMLEY:

24 Q And Dr. Chang, this is where the clinical evidence that
25 underlies this policy begins, right? If you look at the top there.

1 A Okay.

2 Q Do you agree with that? Have you had a chance to look at
3 this before?

4 A I have not looked at it recently, but this looks like the
5 beginnings of it.

6 Q Okay.

7 MR. GORMLEY: And then, Audra, can you highlight where it
8 shows American Society for Radiation Oncology?

9 BY MR. GORMLEY:

10 Q And Doctor, you're -- you have an affiliation with ASTRO,
11 correct?

12 A That is correct.

13 Q And you were talking about that earlier today with Mr. Terry,
14 right?

15 A Yes.

16 Q Okay. And what's been highlighted there reading the first
17 sentence that says, "ASTRO's emerging technology committee
18 concluded that current data do not provide sufficient evidence to
19 recommend proton beam therapy outside of clinical trials in lung cancer,
20 head and neck cancer, GI malignancies with the exception of
21 hepatocellular carcinoma and pediatric non-central nervous system
22 malignancies."

23 Did I read that correctly?

24 A Yes. You did.

25 Q Okay.

1 MR. GORMLEY: And Audra, if you can go to what's bates
2 labeled as 2413, please.

3 THE WITNESS: Well, before you move on, that next section
4 it's about the reason why they do not -- no data showing it's superior to
5 photon radiotherapy.

6 MR. GORMLEY: And if you can go to the next page 14
7 actually, go there. And if you can highlight the top paragraph, please.
8 Just the very small one at the top.

9 BY MR. GORMLEY:

10 Q That says, "A systematic review concluded that there is
11 insufficient evidence to recommend proton beam therapy outside of
12 clinical trials for lung cancer, Allen, et al 2012." Did I read that right?

13 A Yes.

14 Q Okay. And --

15 A Are you going to read the other paragraphs that are listed
16 there? Because they all then have the opposite conclusion that proton
17 therapy is a -- useful in the treatment of lung cancers. And the question
18 is how much more superior proton therapy is, is the question.

19 Q Okay. And I understand your view, Doctor. I'm trying -- my
20 question was, did you think anything in this policy disagreed with you
21 and I'm going through some examples.

22 A Okay.

23 MR. GORMLEY: And then Audra, if you could go to the next
24 page 2415, please. And right above NCCN where it says lung cancer.

25 BY MR. GORMLEY:

1 Q And that says, "Lung cancers are included in the AHRQ report
2 referenced above, which stated that the evidence is insufficient to draw
3 any definitive conclusions as to whether proton beam therapy has any
4 advantages over traditional therapy." Did I read that correctly?

5 A That is correct.

6 Q And what does AHRQ stand for?

7 A It is -- I don't remember the acronym of what it stands for,
8 but it is a group that was assembled by the federal government to
9 determine what are areas that can -- need more research to determine
10 the benefits that exist for that treatment, whatever it may be. And they
11 looked at over I think it was five or six different treatment types. Proton
12 therapy is one of those.

13 Q Does it sound right that it stands for the Agency for
14 Healthcare Research and Quality?

15 A That sounds about right, yes.

16 Q Okay. And that's a, I think you just said a federal agency
17 charged with improving the safety and quality of health care?

18 A That's correct.

19 Q And it's part of the U.S. Department of Health and Services?

20 A I don't know at what level it's part of the government.

21 Q Okay. You have no reason to disagree with that statement,
22 do you?

23 A No.

24 Q Now Doctor, you talked about Medicare for a second earlier
25 today, do you recall that?

1 A Not specifically.

2 Q I believe you said that it's your -- that Medicare covers proton
3 beam therapy?

4 A Yes. For the treatment of cancer specifically.

5 Q Okay. And is it your opinion that that goes to show that
6 proton therapy is proven and medically necessary?

7 A That is correct. As well as the quotes that you just showed.
8 They are all talking about whether proton therapy is more effective than
9 photon therapy or x-rays. None of them are saying that proton therapy
10 does not work, the question is how much better or if it is better. None of
11 those would indicate that proton therapy does not work or is unproven
12 for the treatment of cancer.

13 Q Okay. And when it comes to Medicare, what's CMS is noted
14 that time?

15 A Yes. That is the organization that oversees Medicare, the
16 Centers for Medicare and Medicaid services.

17 Q And do you know the standard that CMS applies to
18 determine coverage for Medicare?

19 A I do not know.

20 Q Okay. And --

21 MR. TERRY: Your Honor, can we approach real quick?

22 THE COURT: Yes.

23 [Sidebar at 3:49 p.m., ending at 3:50 p.m., not recorded]

24 THE COURT: Ladies and gentlemen, this next line of
25 questioning again is not related to the issues of bad faith in this case, it's

1 the issue of medical causation with respect to the doctor's testimony, is
2 that understood?

3 MR. GORMLEY: And Audra, if you can bring up Exhibit 188,
4 please.

5 BY MR. GORMLEY:

6 Q And Doctor, are you familiar with MedPAC?

7 A Yes. It's the Medicare Advisory Committee, Payment
8 Advisory Committee.

9 MR. GORMLEY: And if we can just go to page 2 and
10 highlight the first paragraph, please.

11 BY MR. GORMLEY:

12 Q It says, "The Medicare Payment Advisory Commission is an
13 independent congressional agency established by the budget act of 1997
14 to advise the U.S. Congress on issues affecting the Medicare program.
15 In addition to advising the congress on payments to health plans
16 participating in the Medicare advantage program and providers in
17 Medicare's traditional fee for service program, MedPAC is also tasked
18 with analyzing access to care, quality of care and other issues effecting
19 Medicare."

20 Doctor, do you have any reason to disagree with any of that?

21 A No.

22 Q Okay.

23 MR. GORMLEY: And then if we can go to 1885, please. And
24 there if you can highlight the first paragraph in through in the 10
25 chapters of this report. And actually sorry, before that, sorry, if you can

1 just highlight that dear part and the part above that.

2 BY MR. GORMLEY:

3 Q And so you understand this is being sent to the president of
4 the senate, the vice president and then the speaker of the house, is that
5 your understanding?

6 A Yes.

7 Q And there it says, "I'm pleased to submit the Medicare
8 Payment Advisory Commission's June of 2018 report to the congress,
9 Medicare and the healthcare delivery system. This report fulfills the
10 commission's legislative mandate to evaluate Medicare payment issues
11 to make recommendations to the congress."

12 Then it says, "In the 10 chapters of this report we consider." And
13 what we want to focus on here is the 10th chapter there at the bottom,
14 "Medicare coverage policy and use of low value care." Do you see that?

15 A Yes.

16 Q Okay.

17 MR. GORMLEY: And then -- because this is a long document,
18 we'll skip ahead to Chapter 10, which is bates label 315. And if you can
19 highlight the first paragraph, please under chapter summary. Thank you.

20 BY MR. GORMLEY:

21 Q So chapter 10, Medicare coverage policy and use of low
22 value care. It says there, "Some researchers contend that the substantial
23 share of Medicare dollars is not spent wisely. Many new services
24 disseminate quickly into routine medical care and fee for services -- fee
25 for service Medicare with little or no basis for knowing whether to what

1 extent they outperform existing treatments. In addition, there's
2 substantial use of low value care, the provision of a service has little or
3 no clinical benefit or care in which the risk of harm from the service
4 outweighs its potential benefit."

5 Did I read that right?

6 A It looks like it, yes. This is a thousand pages. I haven't
7 looked at this before, so I'm trying to follow along.

8 Q Do you recall looking at this during your deposition?

9 A I'm sorry?

10 Q Do you recall looking at this document during your
11 deposition?

12 A No. I don't believe it was given to me during deposition.

13 MR. GORMLEY: Okay. We'll keep going here. If you can go
14 to page 316, please. And first sentence in the third paragraph starting
15 with, "we examined".

16 BY MR. GORMLEY:

17 Q And just reading that first sentence, this is describing what
18 they're looking at. "We examined three case studies of care of
19 potentially low value in FFS Medicare. The trend in starting dialysis
20 earlier in the course of chronic kidney disease, proton beam therapy and
21 HP Acthar Gel." Did I read that right?

22 A Yes.

23 Q Okay. And just going to look at their conclusion here on
24 proton beam therapy.

25 MR. GORMLEY: Audra, if you can just go to the next

1 paragraph.

2 BY MR. GORMLEY:

3 Q And that says, "Proton beam therapy, a type of external
4 beam radiation therapy used primarily for cancer treatment was initially
5 used for pediatric cancers and rare adult cancers. However, its use has
6 expanded in recent years to include more common conditions, such as
7 prostate and lung cancer, despite a lack of evidence that it offers a
8 clinical advantage over alternative treatments for these types of cancer.
9 Medicare's payment rates are substantially higher for proton beam
10 therapy than other types of radiation therapy. From 2010 to 2016,
11 spending and volume for proton beam therapy in FFS Medicare grew
12 rapidly, driven by a sharp increase in the number of proton beam centers
13 and Medicare's relatively broad coverage of this treatment. During that
14 time period of" --

15 MR. GORMLEY: Sorry, if you can go to the next page.

16 BY MR. GORMLEY:

17 Q "And during that time period, spending rose from 47 million
18 to 150 million. Prostate cancer was by far the most common condition
19 treated by proton beam therapy in Medicare." Did I read that correctly,
20 Doctor?

21 A Yes. You did.

22 THE COURT: Mr. Gormley, are you moving to admit that or
23 no?

24 MR. GORMLEY: No.

25 THE COURT: Okay. Just want to make sure.

1 THE WITNESS: Sorry, was there a question for me about
2 that because it was talking about --

3 Q No. I was --

4 A -- the same topic about --

5 Q I was done.

6 A -- whether protons was more advantage -- advantages than
7 x-rays.

8 Q I was just looking at my outline to see -- going to the check
9 time and see where we're at.

10 THE COURT: Why don't we take a five minute recess?

11 MR. GORMLEY: Okay.

12 THE COURT: You are instructed not talk with each other or
13 with anyone else about any subject or issue connected with this trial.
14 You are not to read, watch or listen to any report of or commentary on
15 the trial by any person connected with the case or by any medium of
16 information including without limitation newspapers, television, the
17 internet or radio. You are not to conduct any research on your own
18 relating this case such as consulting dictionaries, using the internet or
19 using reference materials.

20 You are not to conduct any investigation, test any theory of
21 the case, recreate any aspect of the case or in any other investigate or
22 learn about the case on your own. You're not to talk with others, text
23 others, tweet others, google issues or conduct any other kind of book or
24 computer research with regard to any issue, party, witness or attorney
25 involved in this case. You are not to form or express any opinion on any

1 subject connected with the trial until the case is finally submitted to you.

2 So let's take a brief five minute recess.

3 THE MARSHAL: Okay. Rise for the jury.

4 [Jury out at 3:58 p.m.]

5 [Outside the presence of the jury]

6 THE COURT: Mr. Gormley, how much time do you think you
7 have with this witness still?

8 MR. GORMLEY: I didn't hear you, Your Honor?

9 MR. TERRY: How much time?

10 MR. GORMLEY: Oh time. Maybe 40 minutes probably. I can
11 try to do it in 40 minutes. I think that's --

12 THE COURT: And he's done?

13 MR. GORMLEY: I'll try to go faster, but.

14 THE COURT: He's not coming back?

15 MR. TERRY: What's that?

16 THE COURT: He's not coming back after today?

17 MR. TERRY: He's booked tomorrow with patients.

18 THE COURT: Okay. All right. Let's take a brief restroom
19 break and come back.

20 MR. TERRY: Your Honor, what time are we knocking off
21 today, 4:40 or 4:45?

22 THE COURT: The problem stopping at 5:00 is that the staff
23 needs to end about 15, 20 minutes before hand or otherwise they get
24 overtime. And the court administration has said not to have overtime.
25 But we can potentially get overtime today because he's not coming back,

1 so we can end at 5:00.

2 MR. TERRY: I don't need a very long time with him, just a
3 very short time with him.

4 THE COURT: Okay.

5 MR. TERRY: Okay.

6 THE COURT: We've just been told multiple times no
7 overtime.

8 MR. TERRY: I'm familiar with the rule.

9 UNIDENTIFIED SPEAKER: It doesn't sound like it's affecting
10 you all that much, Judge.

11 THE COURT: All right. So back in a couple of minutes.

12 [Recess taken from 4:00 p.m. to 4:05 p.m.]

13 [Outside the presence of the jury]

14 THE COURT: Now we're on the record.

15 MR. GORMLEY: Okay. Your Honor, we have one
16 housekeeping matter to speed things along. I was planning to get you
17 some medical records that have a pending objection and I don't think
18 they plan to make the objection, so we were wondering if we can just get
19 those admitted into evidence?

20 THE COURT: Which exhibits?

21 MR. GORMLEY: It's 154, the MD Anderson ones. 169,
22 Comprehensive Cancer. 166, Dr. Kam [phonetic]. 164 for Mountain
23 View. And I didn't mention this one, but the kidney specialist, can I use
24 that one?

25 MR. TERRY: That's fine.

1 MR. GORMLEY: And 172 for the kidney specialist.
2 THE COURT: Any objection, counsel?
3 MR. TERRY: No, Your Honor.
4 THE COURT: Okay. They'll be admitted.
5 [Defendants' Exhibits 154, 164, 166 and 169 admitted into
6 evidence]
7 MR. GORMLEY: Thank you.
8 MR. ROBERTS: I think that's all we have, Judge for outside
9 the presence.
10 THE COURT: Okay. The jurors did ask the schedule, so when
11 they come back in the Court's going to remind them of the schedule for
12 trial.
13 MR. TERRY: Judge, we start at 9:30 tomorrow?
14 THE COURT: We're going to start just after 9:00 a.m.
15 MR. TERRY: Okay.
16 THE COURT: The Court just has one brief matter in the
17 morning, so we can **4:06:20.
18 MR. TERRY: Okay.
19 THE MARSHAL: All rise for the jury.
20 [Jury in at 4:06 p.m.]
21 THE MARSHAL: All jurors are present.
22 THE COURT: Thank you. Do the parties stipulate to the
23 presence of the jury?
24 MR. TERRY: Yes, Your Honor.
25 MR. GORMLEY: Yes, Your Honor.

1 THE COURT: Thank you. Please be seated. Ladies and
2 gentlemen of the jury, with respect to the schedule for the upcoming
3 weeks, this week we'll be going Monday through Friday. Everyday we'll
4 start at 9:00 a.m. and end at 5:00p.m., except for Thursday, March 24th
5 we will start at 10:00 a.m. So we're going Monday through Friday this
6 week 9:00 to 5:00 except Thursday would be 10:00 to 5:00.

7 Next week which would be the week of March 28th, we're
8 going Monday through Wednesday only 9:00 to 5:00.

9 The week of April 4th, Monday will be 9:00 to 5:00. April 5th
10 will be -- which is a Tuesday, will be 1:00 to 5:00, so there's no morning
11 session on April 5th. And then the 6th, 7th and 8th if we need it will be
12 9:00 to 5:00. But we should be done sometime during that week. Yes?

13 UNIDENTIFIED SPEAKER: So this week the full week 10:00
14 Thursday. Next week Monday through Wednesday?

15 THE COURT: Monday through Wednesday, yes.

16 UNIDENTIFIED SPEAKER: Thank you.

17 THE COURT: 9:00 to 5:00.

18 UNIDENTIFIED SPEAKER: Thank you.

19 UNIDENTIFIED SPEAKER: Can you say it one more time?

20 THE MARSHAL: So this week is going to be a whole week.

21 UNIDENTIFIED SPEAKER: Whole week?

22 THE MARSHAL: Yeah.

23 UNIDENTIFIED SPEAKER: And what day is 10:00?

24 UNIDENTIFIED SPEAKER: Thursday.

25 UNIDENTIFIED SPEAKER: Thursday, okay.

1 THE COURT: Any other questions? Thank you. Mr.
2 Gormley.

3 MR. GORMLEY: Thank you, Your Honor.

4 BY MR. GORMLEY:

5 Q Dr. Chang, I want to talk about grade three esophagitis. So
6 it's your opinion that Mr. Eskew suffered from grade three esophagitis,
7 right? That's what you testified to earlier today.

8 A Yes.

9 Q And it was chronic not acute, right?

10 A He both had acute -- potentially acute, but definitely chronic.

11 Q Okay. And that affected his ability to swallow through the
12 rest of his life?

13 A Yes.

14 Q Okay. And we talked about what esophagitis is. We talked
15 about the grade -- remember talking about the grades one, two, three,
16 four and five?

17 A Yes.

18 Q And grades one and two, those are considered more minimal
19 while grades three and four are more severe?

20 A That is correct.

21 Q Okay. And grade five means you die from that?

22 A Correct.

23 Q Okay. And that's the typical scale in the oncology field?

24 A That is correct.

25 Q You use the same scale as Dr. Liao, right?

1 A Yes.

2 Q Okay. And one of those side effects with esophagitis,
3 especially grade three is difficulty swallowing, right?

4 A That is correct.

5 Q And pain swallowing?

6 A Yes.

7 Q And that can result in weight loss because you're not able to
8 eat as much or don't want to eat as much?

9 A Yes.

10 Q Okay. And just to be clear, I don't think this is known, but
11 you never diagnosed Mr. Eskew in person, right?

12 A That is correct. I have never seen him in person or examined
13 him.

14 Q Right. And by preparing your report you reviewed medical
15 records, right?

16 A That is correct.

17 Q And you reviewed records from MD Anderson?

18 A Yes, I did.

19 Q And you reviewed records from Mountain View Hospital,
20 right?

21 A Yes, I did.

22 Q And you reviewed records from Comprehensive Cancer,
23 right?

24 A Yes.

25 Q And Comprehensive Cancer that is Mr. Eskew's treating

1 oncologist and radiation oncologist here in Las Vegas, right?

2 A I can't remember about the radiation oncologist, but it was,
3 yes, the medical oncologist. I do not remember which company the
4 radiation oncologist worked for.

5 Q Okay. But it's sort of in the name Comprehensive Cancer
6 that related to his cancer treatment, right?

7 A Yes.

8 Q Okay. And you also reviewed records from Dr. Cam; is that
9 correct?

10 A Dr. -- I can't remember where that was from. I reviewed a lot
11 of records as well --

12 Q Would you have any reason to disagree that he was an
13 orthopedic surgeon that did follow up surgeries on Ms. Eskew's right
14 arm?

15 A Okay, no.

16 Q Does that sound right?

17 A Yes. I know he had surgeries and so that makes sense. Yes.

18 Q Okay. And you agree that during the course of Mr. Eskew's
19 treatment at MD Anderson he was only ever diagnosed with grade two
20 esophagitis, right?

21 A That is correct. From what I saw in the notes.

22 Q But from what you saw in the records, the MD Anderson
23 records only diagnosed him with grade two esophagitis, right?

24 A Correct.

25 Q Okay. And you're saying he has -- he had grade three based

1 on things that happened after he left the care of MD Anderson, right?

2 A That is correct. Potentially some grade three during that
3 course from some correspondence that I saw, but that was not a note.
4 Again the grading of it is something we do afterwards depending upon
5 how severe the symptoms are and what treatments we use to address
6 those symptoms. Then we grade it afterwards.

7 Q Okay. And you're of the opinion -- let me ask you this, I think
8 you said with Mr. Terry that your opinion is because he received IMRT
9 instead of proton beam he eventually had grade three esophagitis, right?

10 A Yes. He has a higher risk of it and then developed it
11 afterwards.

12 Q But it's not your opinion that the grade one and two is only
13 attributable with a use of IMRT instead of proton beam, right?

14 A I didn't do the calculations for that. I would say most of my
15 patients have -- that have tumors in the middle of the lungs there get at
16 least grade one. Some will get grade two depending upon how much of
17 the esophagus is radiated.

18 Q Okay. So your opinion just relates to the causation of grade
19 three esophagitis, right?

20 A Correct. On the higher grades of esophagitis.

21 Q Okay. And that opinion is based on when Mr. Eskew
22 received in part -- it's based on when Mr. Eskew received TPN at
23 Mountain View Hospital when he was hospitalized on November 15th; is
24 that right?

25 A That was an objective factor. Prior to that the reports of him

1 having difficulty swallowing and keeping food down, at some point he
2 came from altered swallowing to severely altered swallowing. I don't
3 know -- being subjective at one point is considered severe for that
4 specific patient, but the objective point is once TPN is needed that is
5 registered as at least a grade three.

6 Q And he needed that TPN -- this is your opinion, right?
7 Because -- well, let me clarify what TPN is. I think we went over this, but
8 it's an IV right? You're getting IV?

9 A Correct. It's basically food pre -- or digested food that given
10 directly into the vessels.

11 Q And he needed that because of difficulty swallowing because
12 he couldn't swallow. So then you had to use a different mechanism?

13 A There are other mechanisms as well, but that was the one
14 that was utilized because of severe weight loss at that point.

15 Q Okay. And that was because of the difficulty swallowing and
16 that's the weight loss and that's why they used the TPN?

17 A That was contributed to it and the difficulty of swallowing is
18 the result of radiation toxicity.

19 Q Okay. And you agree that after MD Anderson that he put on
20 weight and the symptoms subsided, right?

21 A Yes.

22 Q For a time period, right?

23 A That is correct.

24 Q And like you were talking about earlier that's when the
25 chronic symptoms kicked in later and that's what resulted in the

1 hospitalizations. Do you know -- can you put a day on when the chronic
2 symptoms kicked in or a month, do you have an estimate?

3 A I don't remember off the top of my head when it was, but it
4 started more progressive weight loss is when the late effects started
5 occurring of difficulty swallowing and the weight loss associated with it.
6 I don't remember exactly which month it was.

7 Q Okay. But then he ends up in Mountain View Hospital in the
8 hospital November 15th, gets TPN and he had weight loss during that
9 period, right?

10 A That is correct.

11 Q My recollection is approximately 20 pounds, does that sound
12 right to you?

13 A That's sound right. He had lost from very initial prior to
14 starting any treatment to the time he was admitted, it was closer to
15 about I believe 40, 45 pounds in total at that point.

16 Q Okay. And is TPN only ever used because of esophagitis?

17 A No. TPN is used whenever a patient is unable to get
18 sufficient calories by other methods.

19 Q Okay. So it could be used for an -- if someone has a bad
20 infection that can trigger TPN usage?

21 A It could trigger TPN usage, yes. Generally though if a patient
22 can have food in the body through the GI system that is always the
23 preferred route. Either by mouth or a tube that's surgically inserted into
24 the stomach directly or into the intestines and food put in through that
25 way.

1 Q Okay.

2 A If someone is unable to get those then TPN is another option.

3 Q Okay. So we have the TPN, we have the November 15th
4 weight loss, I want to come back to that, but ask you a couple questions
5 about esophagitis. Is there any way to test for esophagitis, chronic
6 esophagitis and how bad it is?

7 A So it is a clinical diagnosis of difficulty swallowing, painful
8 swallowing and reports of patient unable to get food down. The only
9 way to tell exactly where or what is going on is to do an endoscopy.
10 That is using a camera to look down the throat into the feeding tube to
11 see where the blockage is. And in that case sometimes opening it up
12 mechanical with a procedure.

13 Q Okay. And that was what I was going to ask, what's an
14 endoscopy. Is there any evidence that Mr. Eskew received an endoscopy
15 in the records that you reviewed?

16 A I did not see a report of an endoscopy, no.

17 Q Okay. And are you aware of Mr. Eskew suffering from any
18 infections around that November time period?

19 A Yes. It said when he went to the hospital he was also having
20 a bacteria growing in his blood.

21 Q And can infections result in weight loss?

22 A Infections can result in some weight loss, yes.

23 Q Can -- are you aware if Mr. Eskew was on immunotherapy at
24 all at that time?

25 A Yes, he was.

1 Q Can immunotherapy result in weight loss?

2 A Not so much, it's not like a chemotherapy that has systemic
3 effects. It can have some, but generally weight loss is not something I
4 think about for immunotherapy. But I would claim again as
5 immunotherapy falls in the province of medical oncology, it's not
6 something that I do daily.

7 Q Okay. And I know that's not your expertise, but just
8 generally immunotherapy, can that result in nausea, lack of appetite and
9 those general symptoms?

10 A Yes, it can.

11 Q Okay. Are you aware that Mr. Eskew was taking antibiotics at
12 the time?

13 A Yes, I was.

14 Q And can the use of antibiotics, especially a heavy dose of
15 antibiotics can that lead to things like nausea, lack of appetite and weight
16 loss?

17 A Yes. Those things also it can. They all tend to be what we
18 call central anorexia, that is not being able to get food down because of
19 something in the nausea centers that is causing that. As opposed to
20 what we describe as a mechanical anorexia, which is the sensation of
21 food just it can't down and when trying to get food down it gets stuck.
22 Those are things that are not related to things like medications or
23 antibiotics or immunotherapy, that's a mechanical blockage of the
24 esophagus.

25 Q Okay.

1 MR. GORMLEY: And madam court reporter, can I -- could
2 you flip me -- I want to show this real quick. Just --
3 COURT REPORTER: Is it something that's already admitted?
4 MR. GORMLEY: It's just a demonstrative.
5 COURT REPORTER: Okay.
6 MR. GORMLEY: And I checked it with --
7 COURT REPORTER: And they're okay with it?
8 MR. GORMLEY: I presume so.
9 BY MR. GORMLEY:
10 Q A simple demonstrative here, basic timeline. I just want to
11 acclimate a couple of dates here. And Dr. Chang, do you disagree with
12 any of those dates?
13 A No. That looks like accurate from what I recall.
14 Q Okay. So that -- we've been talking about the November 15th
15 hospitalization and that's there on this chart as the fourth entry.
16 A Okay.
17 Q And Mr. Eskew started his IMRT February 10th, finished it
18 March 22nd, does that seem about right to you?
19 A Yes.
20 Q And you would agree that he had his last MD Anderson
21 appointment in July, does that seem right?
22 A Yes.
23 Q Okay.
24 MR. GORMLEY: And we can go ahead and turn that off.
25 THE COURT RECORDER: Okay.

1 MR. GORMLEY: Thank you.

2 BY MR. GORMLEY:

3 Q And so for the sake of time I'm going to jump into this
4 instead of starting quite as much at the beginning. But let's say --

5 MR. GORMLEY: Audra, can you bring up 154-17, please.
6 And just highlight the whole bottom half of the page.

7 BY MR. GORMLEY:

8 Q And Doctor, would you agree that this a 2/10/2016
9 appointment note with Mr. Eskew from MD Anderson?

10 A Yes.

11 Q And it says under contributing data, "He reports having a
12 good appetite for the most part eating a variety of foods at this time. He
13 checks BS", does that mean blood sugar?

14 A I'm sorry, what was the question?

15 Q It says, "checks BS daily", does that mean blood sugar?

16 A In this context it seems like it, I --

17 Q Okay.

18 A I don't know --

19 Q That's okay.

20 A -- what he's referring to specifically --

21 Q And then it says, "Weight loss prior to treatment was
22 intentional, expressed a desire to lose more weight but understands he
23 should not intentionally lose weight at this time".

24 MR. GORMLEY: And then Audra, if you can go to the next
25 page. And highlight where it shows height. That box there is fine.

1 BY MR. GORMLEY:

2 Q So they took his weight, 85.2 kilograms, my math is that's a
3 188 pounds. Does that seem about right to you?

4 A Yeah. It sounds about right.

5 Q Okay.

6 MR. GORMLEY: And if you can go to page 20, Audra. And
7 then highlight the top paragraph, please.

8 BY MR. GORMLEY:

9 Q And it says, "performance status ECOG 1", what's ECOG
10 mean?

11 A That is how we assess the overall health of a patient. The
12 ECOG 1 is someone that has some symptoms that is able to get around
13 and do their activities of daily living, like brushing teeth, going to your
14 shopping cart and so forth, but are having some symptoms.

15 Q Okay. And what would ECOG 2 be?

16 A That is someone who is not able to do their regular activities.
17 They are still able to get up and out of bed and move for at least 50
18 percent of the time of the day.

19 Q And what's ECOG 0?

20 A ECOG 0 is no symptoms at all from what's going on for
21 patient.

22 Q Okay. And what does ECOG go up to?

23 A You know, I can't remember off the top of my head how high
24 it goes up. ECOG 3 is that a patient is confined to the bed. I don't
25 remember if it's ECOG 4 or 5 that indicates the patient is severely

1 debilitated or death as a result.

2 Q Okay. So sort of like the grades 5 --

3 A Correct.

4 Q -- death. 3, 4 more severe.

5 A Yeah.

6 Q 1, 2, not as much.

7 A And most of my patients are not at the higher grades, so I
8 don't use it very often.

9 Q Okay. So this is ECOG 1. And if we can go to -- just look at
10 the bottom there. Do you see that's a progress note from Dr. Liao from
11 2/10/2016, right?

12 A Yes.

13 Q And this is the first day of his IMRT treatment, right?

14 A Yes.

15 Q So he's ECOG 1.

16 MR. GORMLEY: And Audra, if you can go to the next page.
17 Just highlight where it shows "objective assessment and subjective
18 toxicities".

19 BY MR. GORMLEY:

20 Q So this is filled in by Dr. Liao, right?

21 A That is correct.

22 Q And she's saying, "subjective assessment, patient is well
23 without major complaints". Do you see that?

24 A Yes.

25 Q And then the toxicities, that's what we've been talking about

1 for these side effects with the grade 0 through 5, right? And that's
2 showing all zeros?

3 A That is correct.

4 Q Okay. I just wanted to establish that.

5 MR. GORMLEY: Now if we jump ahead in the treatment of
6 3/16. If we can go to page 41. And if you can highlight the bottom half
7 where it's -- a little lower. No. That's fine right there.

8 BY MR. GORMLEY:

9 Q And if you can see it, this a 3/16 appointment note from Dr.
10 Liao, correct?

11 A Yes.

12 Q And there it says, "subjective assessment, patient reports
13 difficulty swallowing and decreased oral intake over the past week",
14 right?

15 A Yes.

16 Q And that shows esophagitis grade 2, dysphagia grade 2?

17 A Yes.

18 Q And the side effects have worsened over this time period
19 since he started treatment?

20 A That is correct. That's acute esophagitis, that's sunburn to
21 the esophagus. It looks like he was at 25 out of 30 of his treatments at
22 that period of time, so he was 5 out of 6 weeks into his treatment course.

23 Q Okay.

24 MR. GORMLEY: And if we can go to page 44, please.

25 BY MR. GORMLEY:

1 Q This will show he also saw his oncologist Dr. Ferrarotto that
2 day, March 16th, 2016, right?

3 A Yes.

4 MR. GORMLEY: And if we can go then to the next page. The
5 paragraph starting with today, if you can highlight that, please.

6 BY MR. GORMLEY:

7 Q It says, "Today he notes that the toxicity from his therapy has
8 started to accumulate largely in the form of esophagitis. Pain with
9 swallowing liquids and solids and postprandial nausea. He denies any
10 other sites of pain. He still has limited movement of his arm. He has
11 lost about eight to 10 pounds throughout the duration of therapy, but
12 claims that some of this was excess weight that he gained in anticipation
13 of weight loss and is currently at his usual weight."

14 Did I read that right?

15 A Yes.

16 Q And when we were talking about grade 2 -- grade 1 and
17 grade 2 that he was diagnosed with at MD Anderson, that's what this is
18 discussing, right?

19 A Yes.

20 Q And then -- so that would -- eight to 10 pounds before we
21 said 188, that would put him at about 178 or 180 pounds, right?

22 A Yes.

23 Q Okay.

24 MR. GORMLEY: And if we can then go to page 53.

25 BY MR. GORMLEY:

1 Q We're going to jump ahead. So he finishes his treatment
2 March 22nd, right?

3 A Yes.

4 Q Then he has a follow up appointment it shows here May 4th,
5 2016, right? Do you see that?

6 A Yes.

7 MR. GORMLEY: And if we can go to the next page, please.
8 And highlight the top half.

9 BY MR. GORMLEY:

10 Q And then it says, "Patient had profound esophagitis
11 posttreatment, he lost a total of 30 pounds but has regained 20 to 15
12 pounds the past three weeks. Energy is improving also. He is back
13 working as a supervisor of his own car shop. ECOG 0 to 1." Do you see
14 that?

15 A Yes, I do.

16 Q And so that's discussing that he had esophagitis, he lost
17 weight because of it and then he put weight back on because -- we'll get
18 to that. And now his ECOG is 0 to 1, right?

19 A Yes.

20 Q And is that consistent with what you were testifying earlier
21 about the early onset acute that wears off and then chronic comes in
22 later?

23 A That is correct. So the acute toxicity was improved, and he
24 was starting to recover. Typically about a month after radiation
25 treatment, so starting to eat and swallow again.

1 Q Okay. And that's the grade 2 that he was diagnosed with at
2 MD Anderson, right?

3 A Yes.

4 Q Okay.

5 MR. GORMLEY: And if we can bring up Exhibit 169, please.
6 Admitted as Exhibit 169. And go to page 102.

7 BY MR. GORMLEY:

8 Q And this is an appointment with Dr. Cohen at Comprehensive
9 Cancer on August 24th, 2016, right? So we skipped ahead a few months
10 now.

11 A Okay.

12 Q Is that right?

13 A Yes.

14 MR. GORMLEY: And if we can go to the second page,
15 please. And highlight at the very bottom it says, "vital signs".

16 BY MR. GORMLEY:

17 Q And it's showing his weight as 180 pounds, right?

18 A Yes.

19 MR. GORMLEY: And then let's jump ahead to page 32.

20 BY MR. GORMLEY:

21 Q And this is October 4th, 2016, right?

22 A Okay, yes.

23 Q And this is with his oncologist at MD Anderson, Dr. Jean -- I
24 mean, not MD Anderson, Comprehensive Cancer?

25 A Yes.

1 Q Yeah.

2 A That's what it looks like.

3 MR. GORMLEY: And Audra, can you highlight the present
4 status?

5 BY MR. GORMLEY:

6 Q It says, "Mr. William Eskew is here today for a follow up. The
7 patient had a fall yesterday and fractured his rib. He also states that he
8 may have an infected right prosthesis in his arm. He has an appointment
9 with Dr. Galen Kim his orthopedic surgeon to undergo assessment and
10 surgery. He will also be seeing Dr. Dhaval Shah. He denies any fever,
11 denies any headache. Overall he feels well other than rib pain. He's
12 accompanied by his son and wife."

13 And you would agree there's no notation of swallowing complaints
14 there, right?

15 A That's correct.

16 MR. GORMLEY: And then we can bring up what was
17 admitted as 166 and go to page 50.

18 BY MR. GORMLEY:

19 Q And this shows an appointment with Dr. Kim on October
20 21st, 2016, right?

21 A Yes.

22 MR. GORMLEY: If we can go to the next page and highlight
23 the assessment/plan.

24 BY MR. GORMLEY:

25 Q It says, "Assessment status post I&D of infected right total

1 elbow arthroplasty, would healing complications that resulted in multiple
2 surgeries and ultimately wound closer. Plan, patient wounds appear to
3 be stable, appears to be healing well without sign of dehiscence."

4 Do you know what that word means?

5 A Dehiscence, it means it's coming apart.

6 Q Okay. "He is on IV antibiotics to treat his bacterial infection.
7 Dressings were applied today in the new long arm posterior splint and
8 extension was placed. This was to relax the wound to prevent any
9 further wound complications. Patient understands he should not use the
10 arm, light activity only. Should continue with IV antibiotics per the
11 infections disease specialist."

12 Do you recall him having these surgeries related to this
13 complication, the infection that came with his prosthesis?

14 A Yes.

15 Q Okay. And so that is 10/21.

16 MR. GORMLEY: If we can go back to the 169. 10/25, four
17 days later. Come back to the Comprehensive Cancer Center and
18 highlight the -- on page 26.

19 BY MR. GORMLEY:

20 Q It's four days later, it's 10/25. It says he's here for a follow
21 up. It says, "Overall he feels well. States that his wound is closed.
22 Denies any nausea, denies any headache, denies any dizziness, denies
23 any shortness of breath". No notations of swallowing concerns, right?

24 A Correct.

25 MR. GORMLEY: And if we go the next page and highlight the

1 vital signs at the bottom.

2 BY MR. GORMLEY:

3 Q His weight is up to 187 now, right?

4 A Yes.

5 Q Last time he checked in it was 180?

6 A That's correct.

7 Q Okay.

8 MR. GORMLEY: Now can you bring up 164? Actually let me
9 see if I can save us some time. Let's go to 164, page 940. Actually go to
10 161, 44. Sorry, trying to skip some stuff.

11 BY MR. GORMLEY:

12 Q This is an appointment with Dr. Kim, correct?

13 A Yes.

14 Q It's November 14th, 2016, so this is one day before the
15 November 15th hospitalization, right?

16 A Yes.

17 Q And do you see -- it says today on the first page. "He is
18 having diarrhea, constipation, vomiting, fatigue, urinary tension, night
19 sweats, chills. Infection labs are higher. Considering antibiotics change.
20 Off antibiotics since Friday." Did I read that right?

21 A Yes.

22 MR. GORMLEY: If we can go to the next page, please. And
23 highlight where it says, "plan".

24 BY MR. GORMLEY:

25 Q And is says, "Plan, patient thinks that his problems are due to

1 an intolerance to his antibiotics. He has now been off antibiotics for
2 three days with no worsening of his elbow. He also relates to me that
3 his infection labs have been steadily increasing. I do not see any
4 evidence that this could be from his elbow, although I will not exclude it.
5 He tells me that the infection doctors are going to likely change
6 antibiotics."

7 Did I read that right?

8 A Yes.

9 Q And no mention of any swallowing concerns there?

10 A Correct.

11 Q And you would agree the concern seems to be with his
12 reaction to his antibiotics?

13 A Yes.

14 Q And these are antibiotics he would have been on since that
15 infection to his elbow, the prosthesis in his elbow that he had multiple
16 surgeries on, right?

17 A Yes.

18 Q And that would have been multiple weeks at this point?

19 A Correct.

20 Q And it's this point in November where you testified earlier
21 that he loses weight, right? Approximately 20 pounds.

22 A Yes.

23 MR. GORMLEY: And if can go ahead and bring up Exhibit
24 164, please, page 940.

25 BY MR. GORMLEY:

1 Q Now this is a Mountain View Hospital record, right, Doctor?

2 A Yes.

3 Q And it's dated November 15th, 2016?

4 A Yes.

5 Q And at the bottom it says, "65 year old with history of lung
6 cancer with bone metastasis presents to ED", is that emergency
7 department?

8 A Yes.

9 Q Emergency department, "care, progressively worsening
10 generalize weakness that has been an issue for one month. Patient was
11 seen today by his oncologist, Dr. Clark Jean for nausea, vomiting and
12 weakness and was referred to emergency department for abnormal labs.
13 Results showed leukocytosis and hypoglycemia. Dr. Jean is requesting
14 patient to be admitted for TPN, CT brain, IV fluids and physical therapy".
15 Right?

16 A Yes.

17 Q And that's that TPN that you -- we've been discussing, right?

18 A That is correct.

19 MR. GORMLEY: Now if we can go to the next page, 941
20 please.

21 BY MR. GORMLEY:

22 Q Now do you see where it says ROS system?

23 MR. GORMLEY: Can you highlight that, Audra, under review
24 of systems?

25 THE WITNESS: Yes.

1 BY MR. GORMLEY:

2 Q It says, all -- I read that as, "all systems reviewed and
3 negative except as marked", is that how you interpret that?

4 A Yes.

5 Q Okay. And when they say -- in the hospital when they say
6 systems, that's referring to like parts of someone's body that they check,
7 right?

8 A That is correct.

9 Q Okay.

10 MR. GORMLEY: And if we can go to 958, please. Actually
11 let's take one step back. Let's go to 953, please.

12 BY MR. GORMLEY:

13 Q Now this is the hospitalization where he was admitted, your
14 testimony is for TPN due to the esophagitis because he couldn't swallow
15 and he needed the TPN for the nutrients, right?

16 A Yes.

17 Q And so if you look at this, this relates -- this says run date
18 11/17/16 at the top, right?

19 A Yes.

20 Q And on 11/15 he was hospitalized for approximately a week,
21 is that your recollection?

22 A Yes.

23 MR. GORMLEY: And if we go down here, it's very small. But
24 if we go down to about here, it's about midway and you see sore throat.
25 A little above there, little lower, little lower, little lower. Right there.

1 BY MR. GORMLEY:

2 Q And do you see it says, "sore throat not in the last seven
3 days"?

4 A Yes.

5 Q And sore throat that would be a side effect of the
6 esophagitis, right?

7 A Typically in an acute case when it is burning and not heavy
8 inflammation that's a sore throat. And chronic it's not so much sore as
9 food gets stuck. It feels like you can't keep food -- get food down.

10 MR. GORMLEY: And can we go to 958, please?

11 BY MR. GORMLEY:

12 Q And we were talking about those body systems remember,
13 Doctor?

14 A Yes.

15 Q And on the right side of the page do you see the assessment
16 parameters?

17 A Yes.

18 Q And if we go down on that, do you see at the bottom where it
19 says nutritional -- well, let me ask you this before that. The assessment
20 parameters it says, "these are the definitions of what's in the fine
21 parameters by body system". Does that mean what the doctor at the
22 hospital and nurse and staff are checking for before they say all systems
23 reviewed?

24 A Generally, yes. I haven't seen this specific one to see which
25 ones they are addressing, but, yes, generally, that's so.

1 Q And then if we go down to the bottom one of those is
2 nutritional, right?

3 A Yes.

4 Q And so what they are checking for is no swallowing/chewing
5 impairments, right Doctor?

6 A That's correct. That's patient reported.

7 Q So you would understand that it says all systems reviewed
8 and checked, that would indicate according to this that Mr. Eskew had no
9 swallowing impairments or chewing impairments as of November 15th,
10 correct?

11 A That's correct. And he was TPN, and he probably would had
12 not have been eating at that time.

13 Q So it's your testimony that that record only says that because
14 he was on TPN, it doesn't relate to how he was doing when he came into
15 the hospital?

16 A I don't know because they didn't mention how they did that
17 assessment. Because if he was not eating they he would not being
18 having any issues there at that point. He is getting nutrition fully
19 through his vessels at that point.

20 Q Could -- and we already established that nutrition might have
21 been required because of infection, right?

22 A It could have been as result of infection, yes.

23 Q It wasn't -- it didn't have to be because of swallowing
24 concerns, right?

25 A Well, that is correct. It was more from the reports of the

1 family members who were caring for him in the deposition saying that
2 he couldn't get food down at all.

3 Q Okay. Let's see if we can make it clear.

4 MR. GORMLEY: If we can go to 960, please.

5 BY MR. GORMLEY:

6 Q And this is a report for admission date 11/15, discharge date
7 11/22. It says there, "date of service", do you see that?

8 A Yes.

9 MR. GORMLEY: And then if you go to 963.

10 BY MR. GORMLEY:

11 Q It shows that it's signed by a Dr. Kiran Reddy (phonetic), do
12 see that?

13 A Yes.

14 Q And right above that it says -- up here it says, "I did talk to the
15 patient face to face for more than 60 minutes regarding code status and
16 the patient would like to be a code 1 at this time. The patient would like
17 to have", do you see that?

18 A Yes.

19 Q So that indicates the doctor -- that's a doctor that spent time
20 with the patient?

21 A Yes.

22 MR. GORMLEY: And if we can go back to 960. Has a
23 summary of his care. And if you can just highlight that please, Audra.

24 BY MR. GORMLEY:

25 Q It says, "This is a 65 year old male patient who came from the

1 hospital from home. Was called in to come to the hospital by his
2 medical oncologist due to an elevated WBC", is white blood cell?

3 A Yes.

4 Q "White blood cell count. According to the electronic medical
5 records the patient was recently discharged on 10/19/2016 from
6 Southern Hills Hospital where he was treated for an infected right total
7 elbow osteomyelitis status post arthroplasty with bone cultures growing
8 out." That's an infection term that I won't be able to pronounce. How do
9 you say that one, Doctor? Enterococcus Faecalis?

10 A It's enterococcus faecalis.

11 Q There we go.

12 A It's a type of bacteria.

13 Q Okay. "As well as the patient also had revision of the
14 femoral and ulnar [indiscernible] secondary to a previous pathological
15 femoral fracture that was treated by an open reduction and internal
16 fixation." That's talking about the procedures that he had to have done
17 on his arm?

18 A Yes. The surgeries for his arms to fix the fracture.

19 Q And that all relates back to that initial pathological fracture
20 back in July of 2015, correct?

21 A Yes.

22 BY MR. GORMLEY:

23 Q Okay. Skip ahead a little bit it says, "At that time wound
24 cultures have grown". The bacteria name again.

25 A Yeah.

1 Q "NID [phonetic] who had seen the patient at the time put the
2 patient on Cubicin. The patient had a PICC line in place and was told to
3 continue with the IV antibiotics for about six weeks. According to the
4 patient after being discharged from the hospital he still felt that he has
5 had diarrhea, weakness and was not eating properly. The patient
6 continued on IV antibiotics until after -- until about a few days back when
7 he was taken off the IV Cubicin. At that time they were thinking that IV
8 Cubicin was causing him to have these nonspecific symptoms of
9 weakness and poor appetite and was supposed to be switch to IV
10 Zyvox". Is that another type of antibiotics?

11 A That's correct.

12 Q "The patient had gone to see his hem/oncologist two to
13 three days ago and had got some blood work done and was called by his
14 oncologist to come to the emergency department because his white
15 blood cell count had elevated. Time of discharge the patient from the
16 hospital had a white blood cell count of 5.8."

17 MR. GORMLEY: If we can skip ahead, next page please.

18 BY MR. GORMLEY:

19 Q On November 3rd, "But on this submission the white blood
20 cell count had jumped to 22.0 as well as the patient's other bloodwork
21 showed that his BUN and creatinine had also jumped. The patient's
22 creatinine on discharge was about 1.11, today it was about 2.08 with
23 hyperkalemia. The patient was already seen by oncology who has
24 recommended currently holding off on his chemotherapy agent. And he
25 was also consult in the emergency department. The patient had the CT

1 of abdomen and pelvis done in the emergency department which did
2 show markedly distended urinary bladder with moderate bilateral hydro"
3 -- how do you say that one, Doctor?

4 A Hydroureteronephrosis. It's back up of the urine into the
5 tubes that connect it to the kidney.

6 Q Okay. And that can cause swelling?

7 A Yes.

8 Q "And characteristic of bladder outlet obstruction, the patient
9 had a Foley catheter in place in the emergency department, which
10 according to him relieved some of his symptoms." Anything in there
11 about swallowing concerns, any mention of esophagitis?

12 A Yeah. On the paragraph before, you read it, he had difficulty.

13 Q Where it said, "not eating properly", is that what you're
14 referring to?

15 A That's correct.

16 Q And so that makes you think there's swallowing concerns?

17 A There's something going on that was keeping him from
18 eating and from the patient's family's reports that they said the food will
19 come down and he would throw it back up.

20 Q Okay.

21 A And felt that it was getting stuck.

22 Q Could that not eating properly relate to the heavy doses of
23 antibiotics for multiple weeks?

24 A Generally antibiotics causes things like nausea and diarrhea
25 where one does not feel like to eat or would have a lot of loose stools

1 and not having enough time to absorb the calories. The sensation, again
2 that's a central anorexia versus the mechanical, feeling food gets stuck
3 that's not something that's seen when one is taking antibiotics.

4 Q And so it's your view that's evidence of swallowing
5 difficulties, that comment?

6 A Yes. When food gets stuck or comes back up as a result of
7 not getting it down, that's esophageal strictures.

8 Q Not just that but the comment in the record that said poor
9 appetite, that's evidence of esophagitis side effects, swallowing
10 difficulty?

11 A Not the poor appetite, the one before that where it says not
12 eating properly.

13 Q Okay. That's evidence of swallowing difficulties?

14 A It can be, they didn't specify in the note. But when one can't
15 swallow that's not eating properly.

16 Q Okay.

17 MR. GORMLEY: And then let's go further in the doctor's note
18 at 962, please. And then if you can highlight, "review of systems".

19 BY MR. GORMLEY:

20 Q And this is from the doctor again. It says, "The patient is
21 positive for weakness, decreased appetite and constipation. The patient
22 is negative for chest pain, shortness of breath, fever, chills, negative for
23 burning urination, negative for swelling of the lower extremities,
24 negative for worsening weakness and numbness in the upper and lower
25 extremities, negative for pain in the right arm or left arm, negative for

1 difficulty swallowing, negative for joints swelling or rashes. All other
2 systems reviewed and are negative."

3 Did you see that?

4 A Yes.

5 Q Does that indicate to you that they checked Mr. Eskew for
6 swallowing difficulties during his hospital stay?

7 A So review of systems, the patient's report at that point when
8 he was being discharged. Saying that he -- they were treating him, and
9 he was feeling better and those are his review of systems before they let
10 him go home.

11 Q Okay. Let me -- so you think he might have been having
12 swallowing difficulties before November 15th then?

13 A Yes. And again, it's a mechanical issue. One can swallow
14 and one just needs to work at it and if one is feeling better you can get
15 that to be done.

16 MR. GORMLEY: Audra, if you can bring up 164-825, please.

17 BY MR. GORMLEY:

18 Q And this is a note from November 3rd, 2016 appointment at
19 Mountain View Hospital, right? A couple weeks before the ones we were
20 just looking at.

21 A Okay, yes.

22 MR. GORMLEY: And if you can go to the next page, please,
23 Audra. If you can highlight that top paragraph.

24 BY MR. GORMLEY:

25 Q Do you see that top paragraph, Doctor?

1 A Yes.

2 Q It's talking about before surgery since infection?

3 A Yes.

4 Q It's talking about immunotherapy, talking about being
5 referred to the hospital --

6 A Yes.

7 Q -- do you see that? And do you see --

8 MR. GORMLEY: And if you can zoom out of that.

9 BY MR. GORMLEY:

10 Q If you go below and look at review of systems. Do you see it
11 says, "all systems reviewed and negative except as marked"?

12 A Yes.

13 Q But it's your view that he was having swallowing concerns at
14 that time before?

15 A Not at that point, but that again that was before the
16 hospitalization in the weeks leading up to it.

17 Q And --

18 A I was also told that the family stated that he was dismissive
19 of some of his symptoms and would not want to report it for the fear of
20 the interventions, so there was some minimization going on.

21 MR. GORMLEY: And if we can just skip to 164-1107.

22 BY MR. GORMLEY:

23 Q Now this is January 25th, 2017, right, Doctor?

24 A Yes.

25 MR. GORMLEY: And if you go down, Audra.

1 BY MR. GORMLEY:

2 Q That also says, "all systems reviewed and negative except as
3 marked", right?

4 A Correct.

5 MR. GORMLEY: And if we can go to 164-1164.

6 BY MR. GORMLEY:

7 Q That is a February 3rd, 2017 appointment, right?

8 A Yes.

9 Q And if we can look down. That also says, "all systems
10 reviewed and negative except marked", correct?

11 A Yes.

12 MR. GORMLEY: And if we can go to 164-1351.

13 BY MR. GORMLEY:

14 Q And that is March 1st, 2017, right?

15 A That's correct.

16 Q And if you look below that that also says, "all systems
17 reviewed and negative except mark", correct?

18 A Yes.

19 MR. GORMLEY: Let me check if there's anything else. And
20 because of the timing, Your Honor, we have no further questions at this
21 time.

22 THE COURT: Thank you, Mr. Gormley.

23 MR. TERRY: Very quickly, Your Honor. I know we have a
24 hard stop at 5:00, so I can beat that I think. I will beat that.

25 THE COURT: Thank you, Mr. Terry.