

1 MS. ABEL: I have absolutely no idea
2 what I'm supposed to be talking about this afternoon
3 because we were busy trying to summarize the
4 workshop so we could do our wrap-up session this
5 afternoon.

6 I'm going to just sit here. I'm tired.

7 Just see if there's anything rational on
8 these slides, since I haven't looked at them for a
9 couple of days.

10 I had planned to do was to talk about
11 what we had done at the last workshop, summarize the
12 results from the last workshop, talk about the
13 clinical and preclinical status as of this workshop,
14 which I think Roy pretty much hit on pretty well and
15 then summarize this workshop. But actually, I
16 probably won't take too much time trying to
17 summarize. I'll keep loading the slides there.

18 So why didn't you tell me the slides are
19 not there? I'm tired. There you are.

20 And then what the future may or should
21 hold regarding preclinical testing.

22 Would you all like to read that?

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1 So the status of the clinical issues as
2 of the last workshop, I only came up with three
3 little bullets as comparison to Roy who had much
4 better information. But I just thought that there
5 were was less sophisticated imaging and there's an
6 inability to define the physiological environment
7 and there's disagreement on the source of forces.
8 For example, compliance pressure and flow leading to
9 the adverse clinical events.

10 The status of the preclinical testing as
11 of the last workshop was that we didn't have any
12 published standards and that there were no
13 standardized test methods that were drafted at the
14 time.

15 The goals of the last workshop were to
16 identify the important morphologic; and
17 physiological characteristics in an aneurysmal
18 abdominal aorta and then to determine a range of
19 values for these characteristics. We wanted to
20 determine a range of values for the characteristics
21 after the endovascular graft was placed and as the
22 morphology changed.

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1 Then we wanted to discuss possible
2 improvements to the preclinical testing excluding
3 animal studies. We didn't talk about those. So the
4 results of the last workshop.

5 With respect to the sealing fixation
6 effectiveness, we talked about migration resistance,
7 conforming to the vessel wall and simulated use.
8 Not too different than what we tried to do this
9 time. And decided that we needed to incorporate neck
10 and vessel wall characteristics into the testing.
11 That was three years ago.

12 Full tests for modular components.
13 Should consider testing in both straight and worse
14 case configurations and need to determine the forces
15 on the junction. I would say we came up with
16 comparable thoughts this time, except no one
17 probably needed to do worse case configurations.

18 Simulated use. Need to incorporate neck
19 and aneurysm wall characteristics, blood flow rate,
20 pulse pressure and longitudinal shrinkage. Not sure
21 how we thought we were going to incorporate
22 longitudinal shrinkage in a simulated use model, but

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1 that is what we came up with.

2 At this workshop I believe we decided
3 simulated use came too late in the day and we didn't
4 really want to think about it.

5 The compliance discussion from last time
6 was unbelievably long and drawn out. And what we
7 came up with was pretty much a list of questions.
8 Does compliance go away at the point of fixation?
9 Is the compliance in the test system important to
10 establish measure and monitor? What is the
11 compliance of the untreated vessel and the treated
12 vessels with the endovascular graft in place? And
13 what form attachment system and stent breaks does
14 compliance underestimate in designing tests? Those
15 are the thoughts that we had with respect to
16 compliance.

17 Workshop comments regarding fatigue
18 testing and FEA. I'm not going to go into this in
19 detail because all this information is available on
20 the website still from the last workshop. But the
21 characteristics that we thought we needed to
22 consider with this testing were the longitudinal,

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1 axial and torsional loading. So I don't know that
2 we went too far in the torsional this time, but we
3 still said that there are other forces and other
4 types of loading that we needed to look at.

5 Curvature, tortuosity angulation. Well,
6 that's not new, is it? Changes to a neck angle
7 shape and length. Handling of loading on the
8 catheter, conditions of samples and simulating
9 peripheral resistance.

10 Potential failure modes to consider, we
11 did talk about the need to look at failure at the
12 transition zones and late fractures of the level of
13 the noncompliant neck. Potential effects such as
14 device integrity with respect to secondary
15 procedures. So, if you're doing additional
16 ballooning.

17 As far as information sources, we used
18 actual patient images to get a range of anatomical
19 values. Mmm, sounds familiar.

20 Purpose of testing, screen out poor
21 designs may not be completely physiologically
22 accurate.

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1 Test method requirements. Need to
2 duplicate the excursion seen in vivo and the most
3 stringent test condition is within an empty
4 aneurysm. So, again, these were all things that we
5 talked about the last time.

6 Testing needed. Separate tests for
7 different attributes. That is, either different
8 components and their interactions or looking a
9 different forces may be necessary. Talked about
10 that a little bit today.

11 There will be some tests common to all
12 devices. Others will need to be designed
13 specifically to evaluate a particular failure mode
14 or design characteristic for an individual device.
15 Pretty much the same thing today.

16 Is it necessary to test outside the
17 limits of the labeling? Talked about that.

18 Fatigue testing, the final comment.
19 There was disagreement as to the importance of
20 forces due to flow in relation to forces due to
21 pressure. And for those of you were here, there was
22 a long discussion about the fire hose. Everybody

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1 remember that. I still don't quite get it.

2 The work assignment summary on animal
3 studies. WE didn't talk about the animal studies,
4 but we did ask a couple of questions in the work
5 assignment. The animal studies weren't discussed,
6 but what people wrote in was that kinking of the
7 graft limbs, migration and looking for sutured seam
8 failures were identified as the most critical
9 failure modes to evaluate in the animal studies in
10 the work assignment.

11 Some indicated that it would be nice if
12 animal studies could be used to evaluate everything,
13 but the bottom line is they just couldn't.

14 So the summary of the last workshop.
15 Way too ambitious of an agenda. Just like this one.

16 Good interaction, I'd like to believe
17 just like this one.

18 Little consensus, especially on the
19 importance of fluid flow and the relevant
20 measurement and clinical significance of compliance
21 of the abdominal aorta, just like this one.

22 Ended up being very much a problem

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1 definition activity.

2 The outcome from the last workshop. The
3 ISO test methods do make note of some of the
4 characteristics that should be considered in the
5 various tests. For example, angulation. But there
6 are no standardized tests incorporated in these
7 characteristics at this time.

8 Individual manufacturers have improved
9 their testing, but the improvements are not in the
10 public domain, and it really is exceptionally
11 inconsistent.

12 The status of the clinical issues as of
13 this workshop. We have better imaging, as Roy very
14 nicely demonstrated.

15 We may have the tools needed to define
16 physiological environment, hopefully, at least we
17 heard about some good ones today. And there's
18 disagreement on the source of forces, for example,
19 compliance pressure flow leading to the adverse
20 clinical events. That's the same as last time.

21 The status of preclinical testing as of
22 this workshop, we do have a published standard, the

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1 ISO 25539-1. And the test methods will be published
2 soon for that standard. Probably within about six
3 months if we're lucky.

4 Goals of this workshop. We were hoping
5 to identify what has been learned in the animal
6 studies and determine what can and should be
7 evaluated in animals in the future.

8 We wanted to identify the potential
9 modifications to tests intended to evaluate sealing
10 fixation effectiveness and device integrity. And we
11 wanted to identify additional information needed to
12 implement these improvements.

13 The outcomes from this workshop. I don't
14 know yet. We'll talk about it this afternoon.

15 In summary, preclinical testing past and
16 present.

17 In the past testing was geared toward
18 getting a primary device to the market. In the
19 present, the testing is geared toward not just
20 getting those devices to the market, but testing
21 modified devices and finishing up the longer term
22 preclinical testing while completing the clinical

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1 study. And also looking at other types of devices
2 such as thoracic devices.

3 The future, which Roy pointed out, we
4 need to be testing some new configuration
5 modifications for example branch devices, testing
6 systems that combine laparoscopic techniques with
7 catheter-based endovascular repair; we didn't hit on
8 that one. And then testing new devices developed to
9 address problems with current devices.

10 So if we can better define the
11 environment, preclinical testing can be improved
12 such that patients enrolled in clinical studies will
13 have a relatively low risk compared to now.
14 Modifications to devices may be evaluated primarily
15 with preclinical testing. And longer term
16 performance may be more predictable.

17 And if it can be done for the AAA
18 devices, we can build on that knowledge for thoracic
19 devices.

20 So now we're going to get into the
21 session wrap-up, unless there's anything that anyone
22 wants to talk about that we didn't already talk

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1 about in the last however many hours we've been
2 gathering together here.

3 I guess in terms of starting with the
4 wrap-up, I wanted to hit on some other information -
5 - did we put this in here -- that people provided in
6 response to the work assignment. And it actually is
7 in your binders, I'm finding out as we speak.

8 So, again, I don't want to take the time
9 to go over it in detail, but you can see that people
10 did respond with respect to things that we have
11 learned and how a testing strategy has changed and
12 what new testing they're doing. And that's on page
13 2 of your nice pink binder -- tab. I'm sorry.

14 So we did learn more about the
15 physiological environment, the importance of neck
16 angulation and various anatomical aspects and the
17 difference between device designs.

18 We know that success is highly dependent
19 upon proper sizing of devices, patient's anatomy,
20 and patient selection, follow up and that sort of
21 thing is required to have good performance. And we
22 also have learned something about the significance

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1 of remodeling of the aneurysm space after stent
2 graft placement.

3 The testing strategies have changed.
4 People are performing tests under a highly
5 accelerated conditions. It's really been
6 accelerating lately. More closely following the ISO
7 25539 standard because it didn't exist before.

8 There's testing for device improvements,
9 product line extensions rather than testing for a
10 new interventional device design. And developing
11 the bifurcated fatigue test is new.

12 Implementing whole stent fatigue
13 testing, adding an emphasis to using a statistical
14 approach to sample size determinations and
15 increasing the use of cadaver studies for device
16 delivery assessment during deployment.

17 Some new testing being performed,
18 conducting longitudinal fatigue testing, expanding
19 to bench animal testing to include failure modes
20 seen clinically. And improved migration testing to
21 simulate human dynamic pressure loading under
22 exercise conditions.

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1 New testing performed. The others are
2 improve ware testing to better simulate
3 systolic/diastolic changes in the boundary
4 conditions and flexible models of the aortic
5 aneurysms. Whole stent graft fatigue testing to
6 better simulate actual use. And improved testing
7 fixtures and modelings to be more reflective of
8 patient anatomy.

9 So there you have it. Now you're all up
10 to date and we can wrap-up.

11 So what we did over lunch was try to put
12 some of this stuff together. And we have some
13 individual tables, but wanted to start by talking a
14 little bit about controls, because it was something
15 that was brought out several times during the
16 discussions; it would be really nice to have control
17 data. You know, whether it's in an animal model or
18 with some of the other testing that we've talked
19 about. And I think it would be useful to talk about
20 kind of the difficulties in trying to use controls
21 and be able to have control information.

22 Obviously, if it's your own device,

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1 you've already got the data or if you just have to
2 use your own device, that's one thing. But how
3 realistic is, for example, to require a controlled
4 animal study? And that's one that we very
5 specifically talked about that it would be -- you
6 know, you need to have a control. And,
7 unfortunately, I don't see Mark and he's one that
8 thought it was critical.

9 DR. FOGARTY: No.

10 MS. ABEL: I know you say no.

11 DR. FOGARTY: No.

12 MS. ABEL: The only thing he said yes to
13 was galvanic corrosion that nobody else wanted to
14 do.

15 DR. FOGARTY: That's because I don't
16 know anything about it. I was trying to get him to
17 tell me if it's easy or hard to do.

18 MS. ABEL: Gotcha.

19 DR. FOGARTY: And nobody answered me.

20 MS. ABEL: Gotcha. Well, yes,
21 eventually you got an answer.

22 DR. FOGARTY: Well, you know, still I

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1 haven't been answered. There must be somebody in
2 here that can answer that question: Is it easy or
3 hard to do?

4 MR. SMITH: It's not that hard.

5 DR. FOGARTY: Okay. Thank you.

6 MS. ABEL: But that's for him. Now if
7 we're talking about for you.

8 DR. FOGARTY: You know, that's the
9 problem.

10 MS. ABEL: Well, now we're getting
11 personal.

12 MR. WOODS: What is an animal control?
13 You have an animal without a graft in it?

14 MS. ABEL: No, with a competitor's
15 device.

16 MR. WOODS: Is that a value?

17 MS. ABEL: You know, when we were
18 talking about -- I am not the one that said we
19 should do it, personally.

20 DR. FILLINGER: I thought the controls
21 were just for looking at biological response.

22 DR. GREENBERG: Yes. I think when we

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1 were talking about animal controls it's really
2 because you don't know what, for example, the
3 intimal response is going to be for one given graft.
4 And you're going to risk terminating your whole
5 device development because there's a new intimal
6 response but yet a commercially available device
7 that does quite well may have that same new intimal
8 response.

9 MS. ABEL: But would you need to set out
10 to do a controlled study or if you saw something
11 negative, would you want to do additional study to -
12 -

13 DR. GREENBERG: I hate to reach the same
14 conclusion we've reached for almost every other
15 thing; it kind of depends on what you're looking
16 for.

17 MS. ABEL: That's fair. It can't be
18 important, Tom. I'm sitting right here and I'm not
19 on the phone.

20 DR. FOGARTY: The think the role of
21 controls on the animal studies is probably best
22 characterized as you indicated there to help shed

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1 additional light on an unusual or unexpected
2 observation during the routine animal study.

3 There's no endovascular device that has
4 performed so well in clinicals that it is just the
5 gold standard and it's got you know very, very long
6 follow-up, etcetera. So I think it really behooves
7 us to evaluate each device individually and
8 comparative device. I don't know if I'd call it a
9 control, but a comparative device may be useful in
10 certain cases, but certainly not in all cases.

11 MS. ABEL: That's a very good
12 clarification. It would be comparative device as
13 opposed to a gold standard control sort of
14 situation.

15 PARTICIPANT: I think it would also be
16 difficult to get your hands on some miniaturized
17 competitor devices. I mean, you know, Lou is an
18 awfully nice guy but if I called him up and asked
19 him to send me some miniaturized Gore grafts, I
20 don't think he could do it for me.

21 MR. SMITH: It depends on what you want
22 to pay.

1 MS. ABEL: That's a very good point. You
2 know, is it even realistic that you could do that.

3 All right. You know, just since we're
4 going down the discussion of controls, if I could
5 just very quickly talk about controls for clinical
6 studies, which is not part of this workshop but just
7 reminded me of.

8 You know, there are other endovascular
9 grafts that are marketed now. Should we still be
10 doing clinical studies comparing with surgical
11 repair? Should we be spending our money on treating
12 surgical patients to get the data or should we be
13 comparing device-to-device? Any thoughts on that?

14 MR. RODGER: Or can we use published
15 data for open repair if we're going to use that as a
16 control group?

17 MS. ABEL: Historical control, you can't
18 -- there's not adequate information in the
19 literature in order to establish a historical
20 control. But it would be a very good thing if we
21 could establish a historical control, whether you
22 want to call it OPCs from the standpoint of let's

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1 just all agree that the rate for operative mortality
2 for surgical control comparison will be 2 percent.
3 You know, we could do something like that.

4 All right. Well, I was just wondering
5 what people thought.

6 MR. MESSENGER: I think there might be
7 other ways to establish data if that was the intent
8 that was historical in nature as opposed to what
9 your controls. But definitely agree that redoing
10 surgical controls is at this point not reasonable.

11 MR. RODGER: Sorry. Can I just back to
12 that one? Isn't there a fair amount of data,
13 current clinical data on, for example, open repair
14 of aneurysms and available to the similar patient
15 population group?

16 MS. ABEL: There's a huge amount of
17 literature. You can pull out any number you could
18 possibly want. It's a matter --

19 MR. RODGER: I thought that was the
20 idea.

21 MS. ABEL: It's not good data and you
22 don't have the individual results, and there are a

1 lot of problems with it. It's just not been a
2 mechanism that's been able to be applied for this
3 technology.

4 DR. FILLINGER: The problem with the
5 open controls in the clinical trials is that they're
6 not really a comparable group either. And having
7 participated in these, I mean we all know sitting in
8 this room that they're not comparable groups of
9 patients.

10 You know, the endographs for patients
11 are always older, sicker. If you look at the
12 numerical values, they aren't greatly different. But
13 I can guarantee you if you line up five of the
14 patients, five of the endovascular group and you say
15 how long do you think this person is going to live
16 and how long do you think that person is going to
17 live or what their risk for surgery is, it's obvious
18 by looking at them. But one group is more robust
19 than the other, and that's why the mortality rates
20 have been so low for open controls is because
21 everybody is putting in the healthier, as we should,
22 the healthier better risk patients in the open

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1 control group.

2 MS. ABEL: Okay. So we need to
3 randomize it.

4 DR. FILLINGER: Yes, I think that's the
5 problem is that nobody wants to randomize it. So I
6 think the idea of just saying, you know, we could
7 either continue to do more open controls and sort of
8 pool them all or just say, look, we know from
9 statewide and nationwide data on open patients, the
10 mortality rate is roughly this. And that's what
11 we're comparing to.

12 MS. ABEL: I think that's an effort that
13 would have to be done on a everybody sitting around
14 here and a bunch of other clinicians should do it as
15 opposed to individuals thinking that they can do it
16 and use it as their basis. So I just wanted to
17 clarify that.

18 All right. Enough about controls, unless
19 anyone has any other thoughts on it.

20 DR. GREENBERG: I had one question. I
21 mean, the reason that we originally embarked on
22 surgical controls or these sorts of studies is

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1 because we were comparing a mortality in primary
2 morbidity endpoint. And to be honest with you, I
3 agree with Mark, the groups aren't comparable for
4 the reasons he stated. But they're also not
5 comparable anatomically. I mean the studies are
6 just not. They're different anatomically.

7 And so I think we need to consider
8 endovascular controls.

9 MS. ABEL: I would say they're not
10 comparable -- with respect to the A points and
11 potential complications and that sort of thing, too.
12 So it's not a good comparison in a lot of ways.

13 DR. GREENBERG: But if you're going to
14 design the study to evaluate a new device and you
15 want a control population, the control population
16 should be a commercially available endovascular
17 device.

18 MS. ABEL: Are we at the point where we
19 can do that yet? Because --

20 DR. GREENBERG: No, we're far better at
21 doing that than we are at comparing it to surgical.
22 Because at least the patient population is --

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1 MS. ABEL: It would be a more direct
2 comparison, but normally you'd compare it to the
3 gold standard. And so has the gold standard been
4 changed away from surgery to the endovascular? And
5 is it Cook or Gore or Medtronic or --

6 DR. GREENBERG: Or, does it matter? You
7 never told people to a transperitoneal or
8 retroperitoneal incision or to clamp below the
9 renals or above the renals or to use a dacron or
10 PTFE graft for the controls. These were all up to
11 the investigators.

12 I just think that the repairs are
13 reaching a confluence where you're going to look at
14 a patient and decide to do an endovascular graft or
15 not. And if you want to bring a new device forward,
16 it makes sense to compare it. If you want to
17 control group, if you don't want a control let's
18 just say that and say we've got certain standards.
19 But if you want a control group, I don't think it's
20 right to use surgical controls for more endovascular
21 graft studies.

22 MS. ABEL: Okay.

1 DR. FOGARTY: You know, I was going to
2 take my comment about FOS back, but I'm not now.

3 DR. GREENBERG: That really upsets me.

4 DR. FOGARTY: I knew it would. That was
5 the intent.

6 MS. ABEL: So what we've done for the
7 wrap-up, and this is really going to be the tough
8 part of the workshop which is hard at the end of it
9 all, but we wanted to talk about what those
10 conclusions were in the sessions. And then if we
11 identified any additional information that was
12 needed, how we should accomplish either getting the
13 information or addressing the conclusion or the
14 proposal that we had. And then we wanted to talk
15 about how soon this should be accomplished.

16 And so, for example, we had talked about
17 development of an aneurysm model. I think the answer
18 for most of the folks who are left in the room would
19 be no great hurry. So we wouldn't necessarily put a
20 time frame on it. But I think we've known about
21 some of the necessity for defining things, and we've
22 got more tools more now that we should be a little

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1 more aggressive with respect to saying not just it's
2 time to start thinking about defining compliance, it
3 ought to be done. And what was it? Six months
4 we'll have the data we need, Tim?

5 DR. WHITE: No problem.

6 MS. ABEL: So starting out with the
7 animal study, can anyone read that? Should we turn
8 the lights down?

9 MR. CARDELLA: We can't read it from the
10 cheap seats.

11 MS. ABEL: Okay. Well, we'll read out
12 loud to you also, but I thought it might be better
13 to turn the lights down.

14 So we had talked about the fact that the
15 primary end points for the animal studies would be
16 biological response and delivering deployment. And
17 so that would just be a modification in the
18 methodology and certainly is something that could be
19 applied immediately. Is there agreement on that?

20 As far as secondary endpoints, we said
21 that we should document any anomalies basically. So
22 if you say any loss of patients, if you saw any

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1 device integrity issue and that sort of thing, it
2 should be documented and then you should figure out
3 why you saw them, which again would be a
4 modification to a protocol. Okay?

5 MR. CARDELLA: When you say that they
6 get documented, do they get centrally reported? Is
7 that what documentation means or it's it -- what
8 happens to the documentation? Because I think if
9 you're trying to push a frontier backwards, I
10 understand the vagaries of corporate espionage and,
11 you know, proprietary information and that kind of
12 stuff, but to what extent is that information shared
13 or to what extent do you want to facilitate sharing
14 of bad outcomes or anomalies? Because I've sensed
15 early in the discussion that -- I've heard the
16 comment made on more than one occasion that a
17 particular device may be getting R&D'd. The result
18 comes up unfavorably and then it just gets buried
19 and it doesn't progress any forward.

20 MS. ABEL: I don't think anyone would
21 say it gets buried. I would say develop the product.
22 You may go through iterations during your

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1 development and so you will provide information on
2 the product as it is in the end. It's not that
3 information gets buried. I think there may be times
4 when there are failures and they're be explained in
5 terms of why it's not a failure of the device
6 altogether, but there was an anomaly seen in the
7 testing, and that does get reported. And, you know,
8 it would be in the summary of safe and effectiveness
9 data, for example.

10 So I'm not sure what you mean.

11 MR. CARDELLA: Well, suppose you're two
12 months into a 12 month development cycle and you
13 find out that product X cracks under stress. Is
14 that information made publicly available so that
15 others don't go down the same road and make the
16 mistake again? And I'm talking about sort of
17 societal benefit rather than individual benefit.

18 MS. ABEL: That's not espionage, that's
19 industry. You know, that's --

20 MR. CARDELLA: Espionage I said as a
21 joke. I'm pretty serious about the comment, though.
22 Is the intent to have it centrally reported

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1 desirable?

2 MS. ABEL: Go ahead.

3 DR. WHITE: I don't know if we'd have a
4 place to store all the information on every failed
5 prototype.

6 DR. FOGARTY: There's not a whole lot of
7 adverse events. There's not a journal of adverse
8 events, there probably should be.

9 MR. CARDELLA: That's the purpose of the
10 question. I mean, it doesn't have to be a journal
11 of adverse events, but is there a centrally
12 depository for, you know, devices that don't turn
13 out?

14 DR. FOGARTY: Not to my knowledge. But
15 ask industry. Well, probably if they're truthful
16 say no.

17 MR. ELLER: It seems to me that
18 publication of failures in early device development
19 would do little to benefit the public health. It
20 would primarily serve as an aid to other company's
21 development.

22 DR. FOGARTY: Part of the basic problem

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1 is everybody should learn from their failures. And
2 they probably want to implement the improvement on
3 their own.

4 MS. ABEL: Yes. I'm not sure having not
5 ever developed a product. But it's not like you'd
6 say, Lou tried to use nitinol and it didn't work,
7 I'd better not use it. I think sometimes you have
8 to have more than just the fact that something
9 didn't work. You have to have so much level of
10 detail, and that kind of gets back to what he's
11 talking about, the controls for the clinical. You
12 have to have enough information that you know what's
13 going on. And I don't think it's rational to
14 believe that industry would be willing to share
15 that.

16 I mean, they do get along nicely. And
17 they've worked well together with respect to talking
18 about what kind of testing they do, which is a huge
19 advance compared to a lot of other industries.

20 MR. CARDELLA: I mean, would it be of
21 any benefit to the FDA for example if you had
22 information that welding technique A does not work

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1 well to hold nitinol and titanium, or whatever,
2 together? The next time a proposal comes to you for
3 a titanium/platinum interface that's welded by the
4 same junction, would it be of benefit to you to say
5 to the vendor without giving away proprietary
6 information, you know, we have information that that
7 welding technique does not hold nitinol and platinum
8 together very well?

9 MS. ABEL: We can't even do that in the
10 balance of confidentiality. We would be able to say
11 that. But also they would have to have data with
12 their proposal to demonstrate that there was not a
13 problem. If the problem only showed up in clinical,
14 it would be in the public domain, more than likely,
15 and so they would be aware of it.

16 I just can't think of a scenario. I
17 mean, I think we run into it more when we see people
18 have developed good tests. And it'd be really nice
19 to be able to tell others, you know, this is the way
20 I tested. But each time we have to kind of go
21 around and say please consider addressing this in
22 your evaluation of -- you know, we have to write it

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1 like bureaucrats because we are very limited with
2 respect to confidentiality. But, you know, and that
3 it can be difficult but it's the only way the system
4 can work, too. The companies are quite willing to
5 share information with us, some more than others,
6 but you know that way we can actually have enough
7 data to do our evaluations and they don't have to
8 worry about helping out the other guy too much.

9 So as far as the secondary endpoints and
10 documenting anomalies, it would be in your animal
11 study you would write down if you saw anything. You
12 go back to figure out why you saw it, and certainly
13 it would be reported to a notified body. What is
14 it?

15 DR. WHIRLEY: Regulatory authority.

16 MS. ABEL: Was it regulatory authority?
17 Something like that.

18 So testing plans for the future could
19 include stopping roles and possibly incorporate
20 nondestructive evaluations. And that, again, is
21 something that the next person who comes up with a
22 proposal or methodology could go ahead and do that.

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1 It's not like we need any additional information to
2 move in that direction, right?

3 DR. FOGARTY: Correct.

4 MS. ABEL: So it's an immediate. It may
5 be possible to develop a battery of standardized
6 tests. That was a comment that came from Medtronic,
7 maybe. You know, so think about whether we should
8 say test delivery deployment in a bovine for this
9 duration, would that be something useful. Should we
10 consider doing that? Anyone?

11 DR. FILLINGER: Well, didn't we sort of
12 agree to basically be -- animal testing was fairly
13 limited in its utility and that we were basically
14 just talking about biologic response over a very
15 limited time frame. So it was fairly well focused
16 to -- I mean batteries sounds like too many tests.

17 MS. ABEL: Oh, I'm sorry. Yes, I just
18 mean like might evaluate delivery deployment in a
19 calf and then evaluate biological response in a dog.
20 That's all I mean by battery.

21 But, I mean I think what this was -- I
22 remember the discussion was people kind of do what

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1 they do already, but is it worthwhile for us to help
2 out the next guy coming along if he doesn't already
3 have a way of doing things to tell him what they
4 ought to do? No one wants to help anyone else?

5 DR. FOGARTY: Not really.

6 MS. ABEL: Yes. Yes. We'll just say
7 when should this be accomplished? If someone can
8 put together a proposal, we'll be happy to consider
9 it.

10 Let's go to the next one.

11 MR. CARDELLA: I think it gets back to
12 the point whether or not you want to facilitate some
13 standardized testing conditions. Whether this body
14 does it or ISO does it, or IEC does it, the fact
15 that some type of standardized testing should be
16 promulgated by somebody --

17 MS. ABEL: There is a testing
18 methodology included in the ISO standard that talks
19 about the specific aims for the animal model. And
20 it goes into quite a bit of detail in terms of the
21 type of information that should be provided. And
22 there's a lot of stuff in there.

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1 What it doesn't do is specify that you
2 have to use calves, you have to use dogs and you
3 have to use particular sacrifice periods. Because
4 as we had discussed yesterday, that varies somewhat
5 according to device design. And actually since the
6 sensitivity of the test isn't really that phenomenal
7 and you don't see a lot of difference in those
8 different animal models, there's no reason to
9 restrict people.

10 It maybe worthwhile to develop and
11 validate an accurate sporadic disease model. So how
12 should this be accomplished? And this is where
13 we've got this other little slide up here that we've
14 said, you know, depending on what we're looking for
15 you may want to obtain data from existing registries
16 or bodies of data. We might want to conduct some
17 research and try to figure out the answers to
18 questions. And that if research could be industry
19 sponsored, some sort of a society sponsored,
20 individual clinicians could do it, academia,
21 government sponsored. And like if we need to
22 develop test methods, should that be done by

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1 industry or a standards committee or academia?

2 And then another action I maybe just
3 suggest modifications to the ISO standard, and
4 certainly we could specify any other types of
5 actions. So these are some examples that we're
6 thinking of in terms of.

7 So it may be worthwhile to develop and
8 validate an athelosclerotic disease model, how
9 should this be accomplished or obtained? So, is
10 this something that would be, you know, if we could
11 convince someone in academia to do the research,
12 that would be the way to go? I mean what --

13 DR. FILLINGER: It's the only way it's
14 going to happen. The elder sclerotic disease model
15 and the -- model that's the only way those are
16 likely to happen with sclerotic edema and, you know
17 as Fogarty says an NIH grant.

18 DR. GREENBERG: Tell NIH it's a
19 recommended funding from you guys.

20 MS. ABEL: I don't know if I recommend
21 it.

22 DR. GREENBERG: Then scratch it off the

1 list.

2 MS. ABEL: All right. So when should
3 this be accomplished or obtained? Does anyone have
4 a sense that this is something urgent or it may be
5 of value if it ever happens, but it may not really
6 make a huge difference in the world?

7 DR. FOGARTY: It's urgent if we get the
8 NIH grant. If you could help out with that, that
9 would be good.

10 It would probably take a year to review
11 the literature on experimental and animal models and
12 developing the athelosclerosis or you can appoint of
13 your interns to do that.

14 MS. ABEL: I got so many more things for
15 my interns to do. But thank you for the suggestion.

16 DR. GREENBERG: I think that it should
17 be noted that for either of those to be useful to
18 industry, they would have to be progressed to a
19 fairly high level, not be just at the point of kind
20 of publishing academic research --

21 MS. ABEL: Well, that's why I said
22 develop and validate.

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1 DR. GREENBERG: If it will be tool of
2 some utility to industry, it's got to be pretty
3 mature.

4 MS. ABEL: So develop, validate and
5 mature?

6 PARTICIPANT: Validate is a big word.
7 That's probably enough.

8 MS. ABEL: Should we make it an
9 athelosclerotic diseased mature model? So those are
10 it for the animal studies?

11 Moving onto session two, the workshop
12 wrap-up, sealing fixation effectiveness. We said
13 that it seems reasonable to incorporate tolerance
14 limits and safety factors in the testing. Now how
15 should this be accomplished? And I guess I would
16 suggest it may be modification CISO standard.

17 DR. FOGARTY: Yes.

18 DR. FILLINGER: Safety factors may be
19 had to incorporate, though. The way we think of
20 factor and safety, I mean, it's not really -- it's
21 fairly constant with safety factor, but we don't the
22 loads well enough --

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1 MS. ABEL: Right.

2 DR. FILLINGER: -- to do real formal
3 factor of safety --

4 MS. ABEL: I agree. It's not a true --

5 DR. FILLINGER: Yes. Maybe calling it
6 safety factor is --

7 MS. ABEL: Shall we just leave it at
8 tolerance limits?

9 DR. FILLINGER: Or make it quotes around
10 the safety factor.

11 MS. ABEL: Okay. Good.

12 Consider testing to failure. How should
13 this be accomplished and obtained? And I would say,
14 you know, are we considering testing to failure or
15 can we agree that it's something that should be
16 done, not necessarily for every test and not
17 necessarily with huge numbers, but would it be
18 something that would be of value? Because I don't
19 think we have too much testing to failure right now
20 that ever gets reported to us, anyway.

21 DR. FILLINGER: I think that as we
22 discussed yesterday, that while manufacturers may

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1 find benefit in that, that wouldn't be appropriate
2 to have in the labeling of the device.

3 MS. ABEL: No, it wouldn't be in the
4 labeling, it would be regulatory submissions is all
5 I'm thinking of.

6 MR. CARDELLA: I just want to clarify
7 that. WE did talk about that.

8 MS. ABEL: Gotcha. Yes. Yes. Thank you.

9 MR. CARDELLA: If you test the device to
10 failure, it will help you with the items on it. It
11 will give you some idea of the safety limits or the
12 tolerances.

13 MS. ABEL: Yes, Tom?

14 DR. FOGARTY: Dorothy, I don't think the
15 patient wants to be tested to failure. I mean, I
16 don't think I want to do anything to test to
17 failure.

18 Now, the engineers should and do. But
19 to turn that into an approach to patient care is not
20 a good idea.

21 MS. ABEL: Okay. We'll make sure we
22 don't include as a requirement in the clinical

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1 study.

2 DR. FOGARTY: Could you include dogs?

3 MS. ABEL: Okay. Sealing fixation
4 effectiveness. Bench top testing. Testing to
5 failure.

6 I hate to always say it, but I think
7 maybe the ISO committee should consider whether
8 there's, you know, changes that can be incorporated
9 or additions that could be done to look at that
10 possibility. Is that fair? Because we don't have
11 enough to do.

12 MR. WANINGER: And when you do that,
13 you'll end up getting the industry input into that.

14 MS. ABEL: Exactly. But it makes it --
15 the group from industry and those who don't should
16 as opposed to individuals coming up with stuff.

17 MR. SMITH: You realize that
18 modifications to the ISO are probably a long way
19 out?

20 MS. ABEL: Yes.

21 MR. SMITH: Okay.

22 MS. ABEL: But you know, it's like

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1 saying we don't have test methods for endovascular
2 grafts yet because they're not published. Most
3 people have access to it. So I think even if it
4 didn't actually get incorporated into the ISO
5 standard, that committee could talk about it as a
6 modification and suggest it, and it could even be in
7 public domain before it's actually an official
8 document.

9 And I wouldn't say it's long term in
10 terms of being published. I don't think it's long
11 time with respect to when we could start on it.

12 MR. SMITH: Put it on the list.

13 MS. ABEL: Well, which is exactly what I
14 want to do right now, is try to figure out where it
15 goes on the list. Because like I say the last time,
16 the last workshop we discussed a lot of things that
17 were pretty comparable to what happened here. And I
18 don't want to talk about them all again next time
19 without having anything done. And so that's why we
20 want to come up with some time limits, thanks to
21 David. It's his fault.

22 MR. SMITH: I see a future project

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1 leader.

2 MS. ABEL: We're currently, for those of
3 you who don't know, working on drafting part two of
4 the standard for vascular stents. So we have that
5 going on. But the test methods are almost finished,
6 so we could almost use the ad hoc committee from the
7 test methods. Get them altogether again at some
8 exotic place and talk about this stuff. So we'll
9 say within a year to have a meeting to talk about
10 it?

11 Yes, you're the perfect leader of that.

12 DR. FOGARTY: Oh, my God.

13 PARTICIPANT: That's all I could say.

14 DR. FOGARTY: I didn't hear what you
15 said. Oh my God. For the record.

16 MR. SMITH: How about within two? I
17 mean, if you think about, what we've got -- you know
18 -- we're not even allowed to met.

19 MS. ABEL: We're not even what?

20 MR. SMITH: Without special permission
21 from some organizations or whatever. Getting
22 together has been more and more difficult.

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1 MS. ABEL: Well, you know what we could
2 do is pretend it's -- we'll use the ISO distribution
3 list, we'll just all come and gather at FDA
4 unofficially.

5 DR. HILBERT -- use the STM.

6 MS. ABEL: Oh, yes, they're useful. I'm
7 just kidding.

8 MR. SMITH: I'm serious about suggesting
9 maybe it's an FDA guidance in addition to the ISO?

10 MS. ABEL: Yes.

11 MR. SMITH: I'm just trying to pass the
12 buck.

13 MS. ABEL: So we could do it at FDA.

14 So I think within a year we could gather
15 together and discuss this, couldn't we? It wouldn't
16 be necessarily finished, so we could say begin with
17 a year. Lou won't come to a meeting anyway, so why
18 he's whining.

19 DR. FOGARTY: What's ISO mean?

20 MS. ABEL: International Organization of
21 Standardization, but somebody's got to say it in
22 French to the ISO as opposed to IOS.

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1 DR. FOGARTY: I thought it was "in some
2 of stock options."

3 MS. ABEL: That's the difference between
4 you and me. I don't know what a stock option is.

5 DR. FOGARTY: We're going to make that a
6 requirement for any regulatory agency. I think it
7 would help.

8 MS. ABEL: Consider evaluating
9 parameters as a function of neck angles and
10 oversizing and those types of things. We just keep
11 coming back to that. It's all in the same meeting.

12 Modify migration resistance testing to
13 incorporate vessel morphology, for example, in
14 eccentric lumin, those sorts of things. Now that to
15 me is a bigger test development sort of thing as
16 opposed to just talking about tweaking some testing
17 and doing some testing within a range as opposed to
18 with one point parameter. So, developing a test
19 method, you know, is this something that individual
20 industry should be response for doing, should the
21 standards committee try to do it or is it an
22 academic kind of thing? Who should be trying to

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1 come up with the appropriate test methods?

2 DR. FILLINGER: I think that's one for
3 industry as opposed to the other one that was
4 academia. I think that's -- because industry has a
5 vested interest in trying to make the best devices
6 possible, the best testing possible. And all this
7 stuff, like you can begin talking about it within a
8 year, but if you're a manufacturer sitting here
9 listening to this, you can say well we can start
10 thinking about how to make our tests better now. I
11 mean, you don't have to wait for a year for somebody
12 to draft up a standards document.

13 MS. ABEL: That's fair. So I think
14 industry sponsor actually development of a test
15 method, not even research. So industry -- yes.
16 That's fine.

17 And then I would suggest that we should
18 as far as the when should this be accomplished,
19 think more in terms of where it could be become more
20 mainstream. So maybe individual everybody should
21 work on it now, but as far as it would be nice
22 within a couple of years, possibly, to be able to

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1 sit down and talk about whether it's been
2 standardized yet.

3 DR. FILLINGER: And the same thing for
4 the one above it because like testing to different
5 degrees of roller sizing, that's a fairly device
6 specific sort of thing because some devices are
7 designed to be oversized more than others. So that,
8 again, the individual manufacturer is going to have
9 to figure out how to do that best for their own
10 device.

11 MS. ABEL: Good. Something got taken
12 off the ISO list, aren't you glad. Oh, I'm sorry.
13 You're not paying attention.

14 MR. CARDELLA: Do the group of
15 manufacturers and vendors here have a trade
16 organization that's analogous to NEMA, National
17 Electrical Manufacturers Association? Does any of
18 those guys get together industry wide and they
19 standard for things? They don't trade too many
20 secrets, but they talk about how to standardize
21 processes and things like that? And is there a
22 trade organization that represents the particular

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1 guys here?

2 MS. ABEL: There is a trade
3 organization, but not everyone belongs and it is
4 U.S. only, isn't it?

5 DR. FOGARTY: Well, you talking about
6 HIMA?

7 There's another organization lobbying group that
8 does represent small start-ups, little manufacturing
9 and individual physicians and/or individual
10 specialties. I can't remember the name of it. It
11 exists and they have a significant presence in
12 Washington.

13 MS. ABEL: Do they develop test methods?

14 DR. FOGARTY: No.

15 MR. CARDELLA: I guess my point was that
16 there are ways for vendors to get together that are
17 not collusive and they can discuss and standardize
18 operational procedures and testing methods without
19 giving away either trade secrets or without being
20 accused of price fixing.

21 MS. ABEL: Oh, yes. I mean, that's what
22 we do in the standards committee, very much so. And

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1 like I say, this group is really good about
2 interacting and sharing information without huge
3 fears of giving away trade secret information.

4 DR. FOGARTY: You don't fee them lunch
5 either, though.

6 MS. ABEL: I do buy them lunch once in a
7 while. A couple of times. Okay.

8 Be aware of the potential for hysteresis
9 in your test setup -- for radial force you have to
10 pay attention to hysteresis. I want you all to do
11 that when you go home tonight.

12 In radial force? In the test method?
13 All right.

14 Consider evaluating parameters as a
15 function of neck angles, oversizing, etcetera.

16 I just wanted to make sure that you guys
17 said the same thing over again. Did I mention we
18 did this during lunch before we ate. We were hungry.

19 Okay. Look, we're already on Session 3,
20 don't leave now.

21 Current post T key testing only
22 addresses metallic T and other tests are needed to

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1 evaluate other failure modes. So we've listed some
2 of the tests that have been identified or some of
3 the issues that need to be addressed. So how are we
4 going to develop these methodologies? And I would
5 assume that Mark's comment would apply here also and
6 be good -- industry should be working on them now
7 and, you know, maybe within a couple of years we can
8 try to pull it together into something more
9 standardized.

10 Now would that apply to all these you
11 think, so Angie only has to write ditto? Is
12 everybody agreed with that? And the tests that we
13 listed, the angulated graft and suture wear testing,
14 the bending and fatigue test and the longitudinal
15 fatigue test? And we have some additional ones on
16 the next page.

17 The testing to look at the constrained
18 and unconstrained transition. Testing to address
19 failure seam device with clinical use. And tests for
20 pulsatile with an angle, whatever that means.

21 Was the pulsatile with an angle or can
22 that one be deleted? Bending fatigue.

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1 MR. SMITH: I have angulated graft and
2 where is that the same thing?

3 The other thing is at the last workshop
4 we discussed you know needing to use an aneurysmal
5 model for fatigue testing which would therefore
6 natural incorporate the transition of an oversized
7 zone into an aneurysm. Basically what I'm saying is
8 that already done, and the ISO standard I think even
9 suggests using an appropriate amount. So --

10 MS. ABEL: Well, I would say the testing
11 in constrained and unconstrained transition not
12 everybody uses in aneurysm models.

13 MR. SMITH: Right. To me that means use
14 an aneurysmal model.

15 MS. ABEL: Or but not necessarily in
16 your fatigue tester? It could be separate test?

17 MR. SMITH: Okay.

18 MS. ABEL: So all these are ditto.

19 The test for pulsatile with an angle,
20 does anyone -- I mean that's from our notes. Anyone
21 have any idea what that is?

22 MR. SMITH: I think that's angulated

1 neck.

2 MS. ABEL: Industries got a lot to do.
3 They just quit goofing off.

4 May be possible to develop one test
5 incorporating more characteristic. See Lombard
6 Medical.

7 DR. FOGARTY: There's an advertisement.

8 MS. ABEL: So that would be a ditto for
9 the last one.

10 And then the other thing is consider
11 testing to failure in this type of testing as we had
12 discussed for the simulated use. And so I will put
13 the same answer that we had for the simulated use?

14 So, again, we'll suggest that it may be
15 necessary to modify ISO or to think about it and
16 begin within a year to try to accomplish that.

17 What information is needed to improve
18 implant integrity testing? These are my typos.

19 We keep talking about compliance. How
20 are we going to figure this out? Can we all just
21 agree that Mark's going to do it? All those in
22 favor? Those opposed.

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1 DR. FILLINGER: I.

2 MS. ABEL: All right, Mark, if you don't
3 want to do it all by yourself, you'd better come
4 with a plan.

5 MR. SMITH: Fortunately there are other
6 people besides my group working on it, but we'll
7 keep working with. There are actually other people
8 working on it, too.

9 DR. FOGARTY: I volunteer for Chris
10 Zahans.

11 MS. ABEL: All those in favor?

12 DR. FOGARTY: Aye.

13 MS. ABEL: Opposed? All you guys are
14 afraid.

15 How are we going to set a time frame on
16 it, though? I know a lot of individuals are working
17 on a lot of different stuff, but you know they've
18 been working on this stuff for quite some time.
19 That's why we're trying to really nail it down.

20 DR. FILLINGER: It's academic research
21 and it sort of depends on funding resources and
22 time.

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1 MS. ABEL: Can we take a guess before
2 that?

3 DR. FILLINGER: What's that?

4 MS. ABEL: Can we take a guess before
5 that?

6 DR. FILLINGER: You know, my guess is
7 there'll be a lot better information about
8 compliance within the next year. You know, my guess
9 is a year from now we'll probably have a lot better
10 information.

11 MS. ABEL: Okay. Good. So within a year
12 we'll have more information on compliance and then
13 we can incorporate that into all our tests.

14 All right. Angulation to use in testing
15 and analyses. So when we talk about these changes
16 in tests, to say that you have to look at neck
17 angles and tortuosity and whatever else, and
18 curvative of the aorta in the aneurysm, I think we
19 can all agree that you could pick any one patient
20 and have a different angle and a different anatomy
21 and what have you. So how do we determine a
22 reasonable range or configuration, or whatever?

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1 DR. WHIRLEY: I think a first step there
2 might be to standardize the measurement of angles.
3 There's really quite high interobserver variability
4 in the measurement of vascular angulation today.
5 Anybody else agree?

6 MR. GREENAN: Not too often do you see a
7 differentiation between super interangle and infra
8 interangle which have a significant different
9 effects on the device. So that's really rarely
10 talked about.

11 DR. FILLINGER: It should be
12 accomplished by a review of a large clinical series
13 to characterize, you know, a representative patient
14 population and probably using three dimensional
15 reconstruction.

16 MS. ABEL: Where is your buddy that has
17 that database?

18 DR. WHITE: Yes. And where's Bill?

19 MS. ABEL: Stand up Bill.

20 DR. WHITE: And he lives right next to
21 Mark, so Mark can do that one, too.

22 MS. ABEL: What's that?

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1 DR. WHITE: He lives right next to
2 Mark, so Mark can do that one, too, with Bill.

3 MS. ABEL: Good. They can play nice
4 together.

5 MR. GREENROSE: Yes. We have that
6 database and we're working on putting those queries
7 together. We can extract all that information from
8 about 30,000 datasets on about 16,000 patients right
9 now.

10 DR. FILLINGER: They'd need to have
11 permission from the manufacturers to not identify
12 it.

13 MR. GREENROSE: We don't identify by
14 graft type.

15 DR. FILLINGER: No, I understand. They'd
16 have to have the ability to do that.

17 MS. ABEL: Well, that's a logistical
18 issue that I wouldn't think would be too complicated
19 as long as it's not identified. And even if, you
20 know, Gore who never wants to share, would say no,
21 there's enough manufacturers -- just kidding.
22 Wanted if you were still paying attention.

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1 MR. GREENROSE: It's a blind aggregate
2 database.

3 MS. ABEL: So it's already blinded in
4 aggregate, so I don't know how much permission you
5 would get.

6 MR. GREENROSE: And we're working on RX
7 permission and HIPA compliance and all that stuff
8 now.

9 MS. ABEL: Sure.

10 DR. FILLINGER: Yes, it's gone to the
11 attorneys and all that.

12 MR. GREENAN: I think it should go back
13 to IFUs. I think as new devices become developed,
14 I think some are going to be targeted to treat more
15 or less challenging anatomy. I don't think at this
16 stage we have a blanket range.

17 MS. ABEL: Get back up to the microphone
18 please, sir. Yes, I have a question to ask you
19 after I answer this question.

20 As we had discussed, I think we have to
21 -- it makes sense to us within the IFU to an extent
22 that maybe we need to go to extremes a little bit

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1 just to figure out what is happening. And so maybe
2 that means we're going on a range of either side of
3 what you determine to be your recommendation, you
4 don't have to go to the extremes. But I don't even
5 know, like Robert said, if everyone defines it the
6 same way. You know, when you make an angle, does
7 that mean you're just going like that or -- so I
8 think there's more work to be done with respect to
9 trying to incorporate angulation in testing.

10 MR. GREENROSE: If you remember 2001,
11 December when he presented to the staff college,
12 those measurements are what are in the database.
13 They've been augmented since then, but those are
14 standard protocol for doing an angle calculations,
15 diameter calculations, volumes, all of it.

16 MS. ABEL: Right.

17 DR. FILLINGER: And most of that got
18 incorporated into the SES reporting standards as
19 well. So it's all very similar for, by some
20 coincidence, all the measurement standards look
21 strikingly alike. And so --

22 MR. GREENROSE: The Lifeline Registry

1 the same matrix.

2 MS. ABEL: Right. So if we talk about
3 time frame, I know that you said that your still
4 trying to get some clearance to be able to use the
5 data to do the analyses, and somebody has got to do
6 the analyses. Is this again, you know, going to be
7 limited by academic research funding or is it
8 something you're going to do or --

9 DR. FILLINGER: It's probably within a
10 year ago.

11 DR. GREENBERG: Can I ask a question?
12 I'm not exactly sure what you're trying to
13 accomplish here. Are you trying to define angles of
14 anatomy or angles over which a device should be
15 tested? Because I agree with Trevor if a device is
16 intended to treat a 90 degree angle, you're not
17 going to have some sort of standard criteria that
18 you can apply to it. And we all know that aortas
19 can achieve pretty much any angle you can come up
20 with.

21 DR. WHITE: There is, though, in this
22 case one thing that you could consider because

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1 there's a virtual graft at three of the
2 manufacturers have agreed that that is -- you know,
3 acceptable to them, I think, as to how they would
4 size it using those definitions. And maybe you can
5 standardize -- and they actually look different from
6 one device to the other. So it has an ability to go
7 from device-to-device look at individual parameters
8 and it's not -- and it has been done. I may be out
9 of line here, Bill, I don't know.

10 DR. GREENBERG: I guess what I'm asking
11 is why is this important for preclinical testing?

12 DR. WHITE: I'm sorry? On, it's just an
13 attempt to get definitions I think what Dorothy's
14 trying to say. Is what's the standard dataset look
15 like and then what are the definitions, and then
16 where could you go from there. You may not go
17 anywhere.

18 MS. ABEL: I think that you have to
19 understand what the anatomy looks like in order to
20 develop a test that's attempting to simulate that
21 anatomy. And I don't know that that has been done
22 to the extent that would be preferable by -- to be

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1 available to everyone.

2 Now, maybe some individual manufacturers
3 have gone to lengths to make various models, look at
4 the models and what have you so they know what
5 they're looking at. But I don't know that everyone
6 has done that. And the testing certainty doesn't
7 reflect that they have.

8 MR. YU: I mean even one of the first
9 things to decide on is that when you are trying to
10 angulate a neck are you talking about angulation
11 within the attachment zone, say the first 15 or 20
12 millimeter, or are you talking the angulation just
13 beyond that, you know, as you have been into the
14 sac. I mean, the integral testing, you know, one
15 effects the attachment, the other one effects the
16 flow channel subsequent to the actual attachment
17 zone. I mean, there is some difference there.

18 DR. GREENBERG: And I would just say yes
19 we need to incorporate angulation based upon what
20 you're intending your device to treat. And whether
21 or not we define angulation because angulation is
22 very difficult to define even in the reporting

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1 service for endovascular aneurysm repair it's not a
2 really good definition that allows me to tell you
3 what my patient's angulation was in comparison to
4 Mark's.

5 MS. ABEL: Exactly. So if you don't
6 even know what your angulation is, how are they
7 going to design a test to try to look at it? I
8 mean, I hear what you're saying. You could take a
9 ring and go like this or you can go like this, but
10 you know should it be going like this? You know, I
11 --

12 DR. WHITE: There is here, though, a
13 definition that has been agreed to by the
14 manufactures for their own device, and it's part of
15 that product. So I mean they have agree on a --
16 whether you agree with it or I agree with it is
17 irrelevant. There is an agreed upon set of
18 measurements with definitions for proximal angles,
19 distal angles and it is for at least the
20 commercially available devices.

21 DR. GREENBERG: That's great. So why?

22 DR. WHITE: Why what?

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1 DR. GREENBERG: I mean if you're
2 intending your device to hit a 45 degree angled neck
3 according to that definition, then you test it to
4 that. If you're intending your device to hit a 90
5 degree angled neck for that definition, then you
6 test it to that. What more do we have to say about
7 it? Why do we have to do a study on it.

8 DR. FOGARTY: I mean, they're going to
9 use it anyway they want it, no matter what they tell
10 you. Now, and I will, too in a certain situation.

11 DR. FILLINGER: I mean, I think you're
12 right, Roy. I mean, if you want to design a device
13 to a certain standard, that's absolutely fine and
14 you don't have to know what -- you know, you don't
15 have to have data from 500 patients to say, you
16 know, within a 95 percent confidence interval this
17 is the angulation within the first 20 millimeters
18 and this is the angulation from the neck to the
19 bifurcation and etcetera, etcetera. But in order to
20 design better devices, wouldn't you like to know
21 what that is? I mean, I don't think it's necessary
22 but it would be helpful.

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1 And you're right. You don't have to
2 have that information to design your device. But, I
3 mean if I'm a manufacturer I want to design a device
4 that will treat a certain number of patients. You
5 know, I want to design it to be successful within X
6 percentage of patients. And if I'm a clinician, I
7 would like for the manufacturer to design a device
8 that I know is going to work within X percentage of
9 patients.

10 And, you know, Tom's also right. Where
11 no matter how we think, we're going to use it
12 outside the limits of how it's designed anyway. But
13 I think it would be helpful.

14 DR. GREENBERG: So test it to failure.

15 DR. FOGARTY: You do it on your
16 patients.

17 MR. SMITH: Madam Chairman, I'm with Roy
18 on this. I mean, I hate to say that. I mean, I'm
19 with Roy on this. I mean, if it's a 90 degree or --
20 I mean, the angles are anything from zero to 175
21 degrees. I mean, that's the answer. So how much of
22 that junk do you want to design your device for?

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1 DR. WHITE: This is a data reference. I
2 don't know, Dorothy, am I -- what was the original
3 question you asked?

4 MS. ABEL: Let's hear what Lori Adels
5 has to say.

6 MR. GREENROSE: Can I sit down.

7 MS. ABEL: You may sit. Thank you. I'm
8 sorry. You gave me the answer and I forgot to say
9 you may sit.

10 MS. ADELS: I think what industry wants
11 to understand is what the bell shaped curve looks
12 like. I think what the physicians want to
13 understand is what the bell shaped curve looks like.
14 And I think we all want -- physicians want to read
15 our labeling and know that it's consistent; that I
16 tested mine to a 45 degree angle and that's the same
17 45 degree angle that Gore has tested to or somebody
18 else has tested to.

19 So in that sense this activity belongs
20 to a standards committees because everyone has to
21 be, okay, when we say this is 45 degree angle, this
22 is the angle we're talking about and this is the

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1 angle we're measuring. Right now everyone's using
2 different terminology. We're all saying well angles
3 can be from zero to 175 degrees but we don't really
4 know really what 80 percent of those lie.

5 So there's a lot of research and sort of
6 standards questions to answer here, and I think
7 they're valuable because that way we're all talking
8 the same language and right now we're not. And it's
9 that simple to me.

10 MR. YU: I mean even the bottom line is
11 that in the instructions for use in inclusion
12 criteria there is a number 60 degree quite commonly
13 seen. And what is that 60 degree? Does anybody
14 define that? Where is the location of that 60
15 degree; in the attachment zone or in somewhere --

16 DR. WHITE: They have circulated the
17 definitions. And you ought to know this, you guys
18 sized and recommended to use that tool. I mean, we
19 did it in our clinical study and all the patient
20 follow-ups and the Gore Lab are off of MMS.

21 MR. YU: Yes. But I'm saying you can
22 read across the various devices out there, all the

1 different trials and --

2 DR. WHITE: Each manufacturer has gone
3 through with MM -- and I'm talking for them, but
4 they have gone through and for device come up with
5 what they feel are measurement relevant to that how
6 they -- and they are different from device to
7 device.

8 MR. YU: Right. But I think Bill can
9 answer that. I mean, there seems to be, and we're
10 free to discuss the differences in terms of you know
11 how each device wants to measure the angle. I mean,
12 Bill can --

13 MR. GREENROSE: For every Gore Lab
14 project that we have, there's a protocol from the
15 sponsor that we follow. But in addition to that,
16 there's a standard suite of measurements that were
17 presented to FDA, you know, three plus years ago
18 that are also done that are only available to the
19 clinicians on their personal websites password
20 protected. That's the aggregate data base so that
21 all of those measurements are the same across the
22 board. Devices may be different and some of the

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1 other measurements that the sponsors, the
2 manufacturers have may be in addition to that or a
3 subset of that, but there's a standard. There's
4 about 23 preopt measures, about two dozen post-opt
5 measurements that are standardized.

6 DR. FILLINGER: You know, having been
7 involved with all this, I mean -- I mean I know
8 exactly what the standard is, and it's still pretty
9 crude. And I think what Wayne is saying is what we
10 have, and we have a standard definition, that's a
11 start, but that's basically all it is. There is a
12 lot more information there than we're capturing
13 right now. And I would agree with what you're
14 saying, Wayne, is that we need even better
15 definition than just what we have now, but at least
16 we have a starting point.

17 MR. GREENROSE: And the nice thing is
18 because this is a digital database and all this data
19 has been archived, if the definitions evolve or new
20 measurements become necessary, depending on the
21 measuring -- it's not a guarantee, but a lot of them
22 could be done retrospectively because the system can

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1 be programmed to go back into that segmentation, go
2 down a blood flow channel or whatever and define a
3 new angle if we change the position of the marks,
4 that sort of thing. So it's not that all this data
5 is static, it can evolve if it turns out to be
6 useable.

7 MR. YU: Bill, can I just add to define
8 the present angulation definition is from the -- to
9 its -- it's referenced to the aortic bifurcation.
10 So the actual angle, the bend point could very well
11 be somewhere in the middle of the sac, right?

12 MR. GREENROSE: Yes, we do multiple
13 angles but the one that people are talking about,
14 the proximal neck to body is from the top of the --
15 from the distal renal mark, which is the slice just
16 below the renal arteries to the bottom of the neck
17 to aortic bifurcation. That probably covers 95
18 percent of them within a few degrees.

19 MR. YU: Right.

20 MR. GREENROSE: But there are -- and in
21 those instances where we see a really unusual angle
22 like a dogleg to one side or the other, we'll do a

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1 supplemental angle as well and put that in the
2 database.

3 MR. YU: Yes. But here, you know,
4 we're really talking about attachment zone
5 angulation, which is very different to -- you know,
6 that's bent inside the sack where the proximal neck
7 may be absolutely straight which has no implication
8 for attachment durability but whereas it's more of a
9 subsequent force than translation. But, you know,
10 again, you said it's a case of better definition --
11 you know, our 60 degree angle, you know my
12 understanding is that an angle within that neck
13 attachment zone. So there's -- I think it does
14 require better definition.

15 MR. GREENROSE: True or additional
16 measurements on top of what we've already got based
17 on new definitions so that there's still the
18 standard measurement across all of them and then we
19 can do this additional.

20 MR. YU: Right. Absolutely. Reflects
21 back for preclinical testing.

22 MR. GREENROSE: It's all doable.

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1 MS. ABEL: Right. Get to work.

2 DR. WHITE: You could also refer this to
3 another activity we've talked about coordinating
4 through the registry that's essentially where the
5 manufacturers participate, get a subset of data.

6 MS. ABEL: I don't know the
7 manufacturers sound very excited and interested of
8 getting the information. So I think --

9 DR. WHITE: Well, I think they say
10 they're wanting it but we have to agree.

11 MS. ABEL: He doesn't want it. He
12 doesn't want it.

13 MR. SMITH: I didn't say I didn't want
14 it, I said it's already there. I mean, what's the
15 manufacturer going to do if he already knows what
16 angulation he wants to test to and design to. But
17 if you expand the capability of the graft, you know
18 the numbers are there.

19 PARTICIPANT (Cordis Corp.) I'm with
20 Cordis Corp.

21 I think we do need it, but not so much
22 from the testing, well ultimately for the testing,

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1 but somebody mentioned from a design standpoint. As
2 a manufacturer if we know what angle we have to
3 design to, it's going to determine whether our
4 product is going to be effective in 20 percent of
5 the market or 80 percent of the market or patients.
6 So from a manufacturing standpoint, we do -- it is
7 something we would want.

8 In terms of testing we could still test
9 to failure and then determine based on our results
10 what angle we're going to recommend based on what
11 percentage or kind of conformance we want to be
12 acceptable to. So I think there it would be useful.

13 MS. ABEL: I think that's fair.

14 So what we've said it's better to define
15 the anatomy of aneurysms and it may be for design.
16 Ultimately, who knows, it could be incorporated into
17 some of the testing but even if it's just for design
18 right now, so the proposal is to review available
19 clinical information and the aggregate database
20 within a couple of years.

21 And I mean certainly I don't think
22 anyone at the table has any right to tell them not

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1 to do it. So, I think we'll just do it.

2 And after I've had a time to recoup, we
3 could talk a little more about this whole angle
4 thing, and everyone thinks they know what an angle
5 is, except the way he describes it doesn't seem like
6 he does. But it's too much. It's too much right
7 now.

8 And you'll be glad to know, Mark, what
9 time did you propose that we adjourn today?

10 DR. FILLINGER: Four.

11 MS. ABEL: We've got 20 more minutes.
12 So if everyone can fill out your evaluation form,
13 that would be useful, and we'll adjourn unless
14 anyone has any additional comments.

15 MR. SMITH: And, again, I wanted to
16 thank you for all the tremendous effort that you put
17 into this to get us all together and doing our best
18 at sharing this information. Thank you.

19 (Whereupon, the meeting was adjourned at
20 3:42 p.m.)

21

22

CERTIFICATE

This is to certify that the foregoing transcript in the
matter of: Workshop on Preclinical Testing
 for Endovascular Grafts

Before: DHHS/PHS/FDA/CDRH

Date: July 29, 2004

Place: Gaithersburg, MD

represents the full and complete proceedings of the
aforementioned matter, as reported and reduced to
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