

SECRETARY'S ADVISORY COMMITTEE
ON GENETIC TESTING

EDUCATION CONFERENCE

GENETIC TESTING AND PUBLIC POLICY:
PREPARING HEALTH PROFESSIONALS

Monday,
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(8:33 a.m.)

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DR. BOUGHMAN: Could we have everyone take their seats, please? Such a quiet and compliant group. We'll have to get you revved up a little bit before we have this afternoon's sessions, because today is a participatory meeting, as you well know.

Good morning. My name is Joann Boughman. I'm a member of the Secretary's Advisory Committee on Genetic Testing and chair of the Education Work Group of that committee. Since the SACGT was appointed and has been ably chaired by Dr. Ed McCabe, nearly every topic that has come before the committee has involved an element or questions, discussions, concerns about the interpretation and application of that information or the results of those discussions, with a focus on the health professions and the ability and capabilities of all health professionals to utilize the advances in genetics.

That's really over the years what has led to the convening of this meeting today, and on behalf of the entire committee and the work group, I'd like to welcome you to today's meeting. As I mentioned before, it is clearly an audience participation meeting, so the success of the meeting is mutually dependent on our speakers and the audience, and we look forward to a very successful meeting today.

It's very appropriate that we convene this meeting in Baltimore and in the State of Maryland, not only because we have multiple centers of excellence in the training and application of health professions here in Baltimore, but also because the State of Maryland has been a leader in genetics and the use of genetics in public health, and I'm very pleased that Dr. Georges Benjamin, the Secretary of Health and Mental Hygiene for the State of Maryland, has joined us today to bring greetings on behalf of the state.

1 DR. BENJAMIN: Well, good morning.

2

3 PARTICIPANTS: Good morning.

4

5 DR. BENJAMIN: That's kind of weak. You've got to do that again. Sorry. Good morning.

6

7 PARTICIPANTS: Good morning!

8

9 DR. BENJAMIN: Great. Thanks for getting up this morning. I know it's Monday and
10 everyone wished it was Friday, but it's not. Let me just say that I remember when I was in
11 college and back then I wanted to be a gene splicer, so I actually cared about this stuff, and it's
12 funny kind of the dogma that I came in with as a freshman was pretty similar to the dogma that
13 we had around genetics when I graduated. I mean, we learned a little bit, but this stuff didn't
14 move that quickly.

15

16 We are undergoing an explosive change in genetics. We're undergoing one in which changes
17 are not just occurring very quickly, but what we teach our students today may not necessarily
18 be true a week from now or an hour from now or minutes from now. The amount of
19 information that is being generated is extraordinary and it's moving at an extraordinary pace.

20

21 One of the things that we have to do I think as scientists, politicians, public
22 health experts, health policy people, whatever your slant, that we have a duty and obligation to
23 make sure that both the clinicians and scientists understand that information and figure out how
24 we're going to appropriately use that in the clinical setting.

25

26 You know, here in Maryland, we've had a genetics program since the early
27 1960s, and have had an advisory committee to the Secretary and the Governor since about
1973. So we've been in the genetics business of thinking about how best to do this for quite
some time.

1 I'm pleased to say that in Maryland we have put in place non-discriminatory
2 legislation that tried to, certainly, curb potential abuses by many and various industries. We're
3 always concerned about the issues around insurance. That's always a big issue.

4 I'm also pleased to say that we were one of the states that was first out of the
5 box in terms of newborn screening. Last October, we began screening for congenital adrenal
6 hyperplasia, and my staff tells me that our tandem mass spec machine is in the lab and
7 undergoing testing.

8 So we're beginning to move fairly aggressively, again, to try to understand
9 really the problems that we all have that are genetic in basis, but the problem, of course, with
10 new knowledge is that you have to use that knowledge appropriately. You have to understand
11 what that stuff means. As you know, anyone who's done a test on someone that you really
12 didn't want and then the test came back, you always have to ask that fundamental question, now
13 what do I do with these results? That's the problem we have in genetics.

14 So as you go through your program today, the purpose of this is to try to
15 make sure that we all understand and begin the understanding process of how best to use some
16 of these new genetic tests.

17 We are pleased that you're here in Maryland to do that. We like to think
18 that Maryland is going to become, if we're not already, the biotechnology capital of America,
19 but more importantly, for me as a state health department which spends 25 percent of the state's
20 dollars, I want you here to spend money.

21 (Laughter.)

22 DR. BENJAMIN: So please, at the end of the conference, walk across the
23 street, go to the Inner Harbor, enjoy the weather, enjoy the arts, enjoy the sights, and spend
24 money.

25 Thank you very much.

26 (Applause.)

27 DR. BOUGHMAN: Other states should be so lucky to have that kind of

1 Secretary of Health and Mental Hygiene.

2 We are also delighted today to have Dr. Eve Slater, the Assistant Secretary
3 for Health of the U.S. Department of Health and Human Services, deliver opening remarks by
4 video. Dr. Slater could not be with us because she is in Geneva at the World Health
5 Organization meeting.

6 She serves as Secretary Thompson's primary advisor on matters involving
7 the nation's public health and oversees HHS' U.S. Public Health Service for the Secretary.

8 According to the provisions of the charter of the Secretary's Advisory
9 Committee on Genetic Testing, recommendations of this committee are transmitted to the
10 Secretary through the Assistant Secretary for Health. As the conveyor of our reports, Dr. Slater
11 obviously has a critical role in this administration as it relates to the work of this committee.

12 Prior to her nomination last October, Dr. Slater was senior vice president of
13 external policy and vice president of corporate public affairs at Merck Research Labs. Her
14 career at Merck began in '83 as the senior director of biochemical endocrinology. Over the next
15 two decades, she took on more and more responsibility, heading up Divisions of Regulatory
16 Affairs and Clinical and Regulatory Development.

17 She supervised worldwide regulatory activities for all of Merck's medicines
18 and vaccines, which included responsibilities for FDA submissions and international liaison,
19 product labeling, quality assurance, and postmarket surveillance, all of the kinds of issues that
20 the Secretary's Advisory Committee on Genetic Testing has been dealing with as they relate to
21 genetic testing.

22 While at Merck, she's also managed new editions of the famous and/or
23 infamous Merck Manual, was responsible for over-the-counter clinical development programs,
24 and served on a number of important boards and advisory groups, including several dedicated
25 to advancing globalization of regulatory standards.

26 Dr. Slater received her medical degree from the College of Physicians and
27 Surgeons at Columbia University and completed residencies at Mass General Hospital. She is

1 board-certified in both internal medicine and cardiology.

2 Now, we'd like to hear from Dr. Slater.

3 DR. SLATER: Good morning, and on behalf of Secretary Thompson and
4 the Department of Health and Human Services, welcome to Genetic Testing and Public Policy:
5 Preparing Health Professionals. The subject of today's conference, genetics and the education
6 of health professionals, is an important topic to all of us in the Department who have a role in
7 assuring the safe and effective incorporation of new medical technologies into health care. I
8 regret that other commitments keep me from attending this meeting in person, but I am glad to
9 be able to extend a warm welcome by video.

10 I also want to express support for the conference, encourage your work
11 today, and let you know that the Secretary and I look forward to receiving the proceedings of
12 this event and hearing your suggestions for advancing the genetics education of health
13 professionals.

14 Next year, we will celebrate the 50th anniversary of the discovery of the
15 double helix. Since Watson and Crick published their landmark paper describing the structure
16 of DNA, the field of genetics has made tremendous progress. Completion of the draft sequence
17 of the human genome and other exciting advances, including discovery of genes involved in
18 cystic fibrosis, breast and colon cancer, and other conditions, have transformed what was once
19 considered a largely academic field into one with tremendous practical applications.

20 One of the first clinical applications of this new knowledge is the rapidly
21 expanding use of genetic tests. Already more than 500 genetic tests have been developed and
22 hundreds are in the pipeline that may diagnose disease or identify disease risk before symptoms
23 occur. With the availability of rapid and accurate tests, pharmaceutical companies are
24 exploring the means to tailor drugs to certain populations based on their genetic makeup. One
25 day soon, health professionals may be required to run genetic profiles on their patients before
26 prescribing medications.

27 These are clearly very positive developments. However, we must ask if the

1 revolutionary advances in genetics are having an equally revolutionary effect on our
2 educational programs.

3 As the use of genetic tests expands and a broader range of health providers
4 begin using these powerful diagnostic tools, health professionals will be faced with answering
5 questions and requests for genetic tests from their patients. Often these patients may know very
6 little and what they think they know may be inaccurate or, at best, incomplete. Health
7 professionals will need to be equipped with the knowledge to understand when it is appropriate
8 to order a test for certain patients and how to interpret and apply the test results when they are
9 returned. They must also be able to recognize when it is appropriate to refer patients to a
10 geneticist or other specialist.

11 Some of the challenges posed by genetic testing for health professionals
12 have already been documented. Several years ago, a study published in the New England
13 Journal of Medicine reported some worrisome findings. The study assessed indications for the
14 use and interpretation of the genetic test for the APC gene, which is responsible for familial
15 adenomatous polyposis. In almost 32 percent of the 177 cases studied, physicians
16 misinterpreted the test results. Only 19 percent of the patients received genetic counseling
17 before the test, and only 17 percent provided written informed consent.

18 In addition, many of the physicians interviewed did not recognize the
19 limitations of the testing. As a result, patients may have undergone unnecessary testing and
20 experienced additional stress. Some may still be undergoing unwarranted additional
21 surveillance today.

22 In a prescient report almost 30 years ago, the National Academy of Sciences
23 recognized that the education of health professionals in genetics would need to be enhanced.
24 Since then, many efforts have been initiated among schools, foundations, professional
25 organizations, and government to address this need.

26 For example, the National Coalition of Health Professional Education in
27 Genetics, an organization created through a public/private collaboration for the express purpose

1 of addressing genetics education, has developed core competencies in genetics that may be
2 adapted by health professions to design curricula to meet their professional needs.

3 Given that many of us received our training prior to the advances in
4 genetics we see today, such efforts in continuing education is a critical component in assuring
5 appropriate integration of new health technologies and services into the clinical and public
6 health settings. Innovative strategies for educating today's health professionals will be
7 important in ensuring that professionals are equipped to properly use and interpret genetic
8 information.

9 Understanding the science of genetics and the medical benefits of testing
10 are only part of ensuring the appropriate use of genetic tests. Providers must also be sensitive
11 to the ethical, legal, and social implications of genetics, including concerns about the misuse of
12 genetic information.

13 Since 1990, the National Human Genome Research Institute has devoted
14 between 3 and 5 percent of its annual budget to build academic scholarship on these issues.
15 Today, I hope, among other questions, that you will ask how these concepts can be translated
16 into practice guidelines and educational programs.

17 A well-trained health care workforce is a key element to ensuring that
18 genetic tests are safely used and properly interpreted. Ensuring the adequacy of our
19 educational efforts is a critical challenge and it is important for us to consider whether we have
20 the right educational tools in the right place at the right time.

21 On behalf of the Secretary, I want to thank you for taking time from your
22 busy schedules to participate in this important meeting and for sharing your perspectives on this
23 critical issue. We look forward to learning the outcome of today's conference. Thank you, and
24 best wishes for a productive meeting.

25 DR. BOUGHMAN: I think that introduction does a wonderful job of
26 challenging us in our agenda setting and the activities of the day, and just in case anybody had
27 any question, I don't know whether anybody saw the front page of USA Today, but a DNA

1 identity kit made the front page of that newspaper. So today, as you well know, we're not only
2 talking about challenging issues, but extremely timely issues.

3 The Education Work Group has deliberated for some time now, and we had
4 a roundtable discussion last November to try and crystalize some of the questions that we had,
5 and in fact from that roundtable we learned several things.

6 One of the challenges was to get past the denial, the denial that this really
7 doesn't apply to me. We needed to find common ground, identify model programs, define the
8 desired behavior change in our health professionals, develop faculty, and identify resources and
9 use the team approach.

10 Today we've got the teams together here in the audience. We represent a
11 wide variety of perspectives. By being here today, hopefully we will increase our own
12 awareness of the challenges before us, we can identify what's good, and find out where we need
13 more resources and programs, identify the gaps better, and then, at the invitation, which was
14 very clear from Dr. Slater and Secretary Thompson, challenge the Secretary and the agencies
15 and the SACGT to find support, to find methods, to find mechanisms to search for and make
16 available additional resources for further development.

17 Today we're going to have a few presentations and a plenary session to set
18 the stage. We will then move into a panel discussion, where several people from different
19 perspectives will discuss how genetics affects their own profession and identify some of the
20 gaps for us, and then this afternoon we will move into our focus groups, and hopefully by the
21 end of the day we will have heard the clarion call and be able to put forward very specific
22 recommendations through the SACGT to Secretary Thompson and the federal agencies. It is an
23 opportunity that I hope everybody takes very seriously and we hope to hear some great
24 challenges today.

25 So this morning, I'd like to start with our plenary session. You have the bio
26 sketches of our speakers in your folders, so I'm not going to go into detail for each of the
27 speakers, but get right on with the program and ask Dr. David Mallott, associate dean of

1 medical education from the University of Maryland, to start us off.

2 Dave?

3 DR. MALLOTT: Good morning.

4 (No response.)

5 DR. MALLOTT: Oh, you're back asleep again.

6 (Laughter.)

7 DR. MALLOTT: I was given a couple of tasks to do this morning. One
8 was to wake you up and the other was to stay on time. So I'm going to see if I can get both of
9 those done and we'll try to get a little information along the way.

10 You'll hear me talking about genetics from a kind of large educational
11 perspective. I won't pretend to be an expert on the fine points of genetics. We'll cover a few of
12 those as we go.

13 The first thing, though, I'd like you to do, and this is in the wake yourself up
14 phase, is to think about how old you are. Some of you, that might be comforting. Some of you,
15 that might not be comforting. I know that every once in a while, when I start getting prepared
16 for these lectures, I always put on my little historical hat and I usually find that I'm getting
17 much older than I really wanted to be, and I remember two incidents that go back to when I was
18 a medical student. I like to think that that's only a couple of years ago. In fact, it was about a
19 quarter of a century ago.

20 It's about two different tests that I saw, and at the time they were the new
21 thing. At least, we thought they were the new thing when I was in medical school. One, and
22 most of you will remember this regardless of where in the health care field you are and it may
23 actually have occurred in your own life, I remember sitting around in the OB/GYN
24 ultrasonography suite at McGee Hospital in Pittsburgh, and we were going to really be able to
25 tell a lot from this new ultrasound test, this new sonography.

26 Of course, the women who were involved had to fill their bladders up to
27 about 150-percent capacity. They weren't allowed to go to the bathroom or somehow that

1 would ruin the entire schedule for the entire week, and so you would walk into the lab and you
2 would see a group in the waiting room, a group of women kind of with their legs crossed, their
3 eyes crossed, pleading that they could go get their test.

4 On one level, as a kind of newly minted third-year medical student, it was
5 striking. You'd say, wow, this is really an advance in medicine somehow. I'm not sure what
6 those ultrasounds ever told us, and in fact in retrospect we found out how little in fact they did
7 tell us compared to now.

8 All right. That's Example Number 1. I'll get back to that.

9 Example Number 2. Also my third year in medical school, we came across
10 a brand new technology, the CT scan, and if you were really cool, you really found out early on
11 to call it a CAT scan.

12 Another test, and I don't know if you guys remember, but if you think back,
13 what were the first CT scans like? Well, we had a CT scan of the head, and you'd make these
14 very dramatic announcements. "That's the skull." "Oh, wow."

15 (Laughter.)

16 DR. MALLOTT: "And what's that, Doctor?" "Well, I'm not sure, but I
17 think that's a ventricle." "Oh, wow."

18 And you couldn't look at the posterior fascia and you couldn't look below
19 the wings of the sphenoid, of the skull, you couldn't really see what was going on with the
20 pituitary, and I still remember probably seeing some of the last pneumoencephalograms ever
21 done. Inject some air into their back, turn them in all sorts of funny positions. It was a bizarre,
22 uncomfortable test.

23 It was not clear, though, to any of us that these CT scans that looked pretty
24 much like a fuzzy tennis ball -- that was about all you could really see -- somehow it was very
25 unclear as to how that was the next great thing that was going to happen in medicine.

26 Well, fast forward now 25 years, and I would submit to you that the imaging
27 that we use in the world of health care has really been the truly dramatic change over that

1 intervening 25 years. We have lots of therapeutic advances, obviously, we have lots of
2 pharmacologic advances, but the amazing thing that I see our medical students doing now, that
3 I see our nursing students now, that I see everybody on the floor is this whole issue of we can
4 look at the body in ways that we never looked at it before. We can almost teach anatomy from
5 a radiograph, from a CT electronic image, as opposed to the body itself.

6 It's been an amazing revolution in medical testing, and I think that this
7 conference is right on the beginning of the next major revolution in medical testing, and we're
8 going to look at and to try to think about how this testing is like any other test and how it is
9 different, because we are going to be and one of our problems is going to be trying to fit in
10 genetic testing in particular into the larger world of medical or health care testing.

11 So I pulled out my old medical dictionary. You say, well, what's a test?
12 And the committee's probably already thought about this, but I think we should probably start
13 with that. "A procedure to identify a constituent, to detect changes of a function, or to establish
14 the true nature of a condition."

15 I want to focus on this just for a minute or two because without going
16 through too much of an epistemologic review of what is truth, I think if you look at that phrase,
17 "to establish the true nature of a condition," this really has become in the minds of the public,
18 and I think in our minds as well, synonymous with a test. A test somehow equals truth. Our
19 patients say, "Oh, my doctor gave me tests," and oftentimes they say it in this kind of sotto
20 voce. You know, "I'm going for tests." It's like, wow, that'll cure all of your problems.

21 I think all of us fall into that trap, that the tests that we have within
22 medicine somehow have linked themselves in our minds to what is truth, and I would ask us to
23 step back for a minute to remind ourselves that that's in fact not true, that that's not true at all,
24 that that may be true, that somehow tests may give us insight as to the underlying nature of
25 what the individual's suffering is, but it may not. But it may not.

26 So, a test. Genetic testing. I pulled this off the Secretary's Advisory
27 Committee's Website as a definition. "Chromosomes, DNA, RNA, genes and/or gene

1 products."

2 Now, of course, you have to remember that your body is a gene product, or
3 at least I'm a multiple gene product, so this isn't the most specific definition. It gives us a little
4 room to roll around and define what is genetic or not.

5 It tells us that, and we've already heard, there are already hundreds of so-
6 called genetic tests on the market. There are likely not to be hundreds more. There are likely
7 to be thousands more.

8 Now, I don't know about you, but I have trouble comprehending a thousand
9 of anything. I mean, I was always happy that there were only 50 states that I had to memorize
10 and the capitals of them. Can you imagine a thousand? Can you imagine memorizing a
11 thousand state capitals? I don't think I'd really want to do that.

12 And what are we going to use this genetic testing for? We have a wide,
13 wide range of use, everything from preimplantation diagnosis through predictive testing. I
14 won't read the slide to you. I think you're probably awake enough.

15 But let's point to a couple of the uses, and again, one of the problems I think
16 that we're all going to face as health care professionals is to use that genetic testing not as
17 global terminology, which will likely confuse our patients, but to be specific, and we may
18 actually end up making up a different vocabulary in order to separate out how we think about
19 certain testing versus other.

20 If you came up to the average person on the street and said, "Do you know
21 what genetic testing is?," you know, what kind of answers would you get? First of all, we
22 could ask this highly informed group in this room, and I'm not sure the number of answers that
23 we would get, but certainly one of the challenges is going to be within health care spelling out
24 what we mean by genetic testing, the various types you see listed up there, and even a greater
25 challenge will then be translating those terms to our patients, to the public, to the policymakers,
26 who may be very in favor of spending money on newborn screening, who may be less excited
27 about spending a lot of money on presymptomatic testing, who, if they are lumped all together

1 in one giant goo of genetic testing, may just finally throw up their hands and say all of this is
2 not worthwhile.

3 Now, I've just talked a bit about testing, genetic testing, and I think the real
4 issue that we can start talking about today, because I think we're going to have to talk about it
5 and I know the committee's considered it quite a bit, what makes genetic testing different?
6 Right? What makes genetic testing different?

7 I'm very simpleminded, so I'm going to only talk about two differences.
8 There are lots more, but I'm going to pick out two major ones for your consideration, especially
9 in your focus groups.

10 One is, unlike other tests in medicine, genetics has a tremendous predictive
11 capacity. We can make something that seem more than wild guesses, more than just kind of "in
12 my clinical experience." We can apply numbers to a variety of conditions that a patient might
13 -- might -- suffer from.

14 It is at this point that I always like to bring to mind Lord Kelvin. We
15 always deal with kelvin degrees. He made one of my favorite statements. "When you know
16 something and do not have numbers to attach to it, you're knowledge is of a very meager sort,
17 but when you have numbers that you can apply to knowledge, ah, that's knowledge."

18 DR. MALLOTT: Now, you know, by training I'm a psychiatrist, right?
19 (Laughter.)

20 DR. MALLOTT: It's not like we've lived in a world of precise numbers all
21 the time in my field, but we get very jealous of statements like Lord Kelvin's because, oh wow,
22 I wish we really had numbers. You know? I mean, just think about the weather last night. And
23 for those of you who flew in at 9:30, hopefully today will help you recover from your post-
24 traumatic storm disorder of landing in your airplane.

25 But just think about the weatherman. If the weatherman came on last night
26 and said, "You know, it's probably going to rain tomorrow," you'd say, well, okay. But just
27 think how much more powerful it is when that guy gets on and says, "There's a 65-percent

1 chance it's going to rain." Oh, 65 percent. Wow. I better take the umbrella, or at least 65
2 percent of my umbrella. I'm not quite sure what that means.

3 (Laughter.)

4 DR. MALLOTT: We have the ability to now add numbers to predict
5 oftentimes on a statistical basis the future of patient lives. That is a radical shift in the way we
6 think about medical tests. Up until now, medical tests have defined what has already happened.

7 Then the other thing that makes genetic testing very different is it provides
8 information beyond the patient, and as we know, we've always been able to kind of figure out
9 that -- certainly, if you go back to the last slide and talk about carrier testing, we can figure out
10 who obligate carriers have been, but this isn't a small problem. This is now going to be true of
11 every genetic test. It's going to tell us something about the patient and something beyond that
12 patient to the people who statistically have a chance of sharing the same genes with that
13 individual.

14 Now, we'll wrestle with some of those ethical problems in a little while,
15 most of the afternoon. You all know the various problems that that presents in terms of
16 confidentiality. It seems to me that no better time -- as bad a bogeyman as HIPAA is -- I mean,
17 HIPAA is usually one of those acronyms that sends an entire room like this into something the
18 equivalent of anaphylactic shock, but if we're sitting here dealing with information beyond our
19 patients, we know that privacy concerns will be attached to every genetic test, not just the
20 privacy of that individual. Again, this makes this far, far different than medical testing that we
21 have had to date.

22 So where does that take us? We have these new tests, we have medical
23 education, and first, we already heard in our videotape that whatever you were trained for,
24 including the geneticists in the audience, may or may not be relevant to the genetic tests that are
25 being propounded today.

26 One of the things I used to do, my father's a physician, and he used to
27 always have a bunch of old textbooks lying around the house, and I would come down at dinner

1 time dragging some large textbook, and I would read dramatically about just how ill-informed
2 he must be based on these textbooks.

3 I remember one time at dinner saying, "And guess what? Look at this right
4 here. It says that everybody knows that information is passed from generation to generation by
5 proteins, except for this group of crackpots who believe in this thing called nucleic acid."

6 (Laughter.)

7 DR. MALLOTT: At which point, my father would look down and say,
8 "Well, you know, those were out of date even by the time I was in medical school. We really
9 knew what the answer was." I said, "Yes, sure, Dad. Absolutely."

10 I mean, it's hard to imagine. Here's a guy who just stepped down from
11 practice last year. From the time he was in medical school until the time he retired, he went
12 from not even being sure that DNA was the molecule of information transfer to the condition
13 we are currently in in terms of our ability to test genetically. That's a long way to go in a
14 relatively short period of time.

15 So the questions are what do we want to talk about? And let's start with that
16 entire, you know, spanning the course of the curriculum, going all the way back to
17 undergraduate school. Maybe even high school. Let's start with what. What do we want to
18 teach? Okay? What do we want to teach?

19 It's astonishing to me, as an associate dean, that we still require, for
20 example, calculus and physics to be admitted to medical school, but not genetics or
21 biochemistry.

22 Now, for those physicians in the room, how many of you have recently used
23 your physics?

24 (Show of hands.)

25 DR. MALLOTT: And how many of you needed to know calculus to get
26 through medical school, as opposed to biochemistry?

27 (Show of hand.)

1 DR. MALLOTT: Well, thank you, Susan. That's very good. You sat in the
2 front row then, I'm sure.

3 (Laughter.)

4 DR. MALLOTT: So when we talk about what we're supposed to teach, are
5 we supposed to, whether they are doctor, nurse, whether any of the other health care
6 professions, are we supposed to start their genetic training at the beginning of their professional
7 education or is part of the initiative going to be that we need to assume that people are coming
8 to us for their health care training much better prepared in these basic concepts?

9 I would argue that we should not be having to tell medical students, nursing
10 students, allied health care students that DNA is a molecule that's important. That should
11 already be part of their working, educated vocabulary.

12 Where? Well, this gets into one of my favorite medical school turf wars.
13 Somewhere along the line, somebody said, you know, if you want to capture medical students'
14 attention, you have to get them early. It's very hard to teach four years of medical school in the
15 first month.

16 (Laughter.)

17 DR. MALLOTT: And yet, that seems to be the message, and it's not just
18 intrinsic to medical students. It's true all the way across the health care world. Where in the
19 curriculum are we going to teach people?

20 As I already said, this consists of some high school, some undergraduate,
21 some, then, professional training along the way, and if we take medical students as an example
22 -- only because I know them better, not because I really believe they're better students, and in
23 fact it's about the time of the year when I think they're probably not as good students as they
24 think they are -- anything we do in our formal education of medical school followed by
25 residency training is again only one small bit of the overall education that they are going to get.

26 So where in that long span of time are we going to put how do you apply
27 genetic testing? Again, historically, if you look, we have taught most of what we've taught

1 about testing in a clinical setting, not in a classroom. We've taught basics in the classroom and
2 we expect them to kind of just pick up the testing as a byproduct of being in clinical
3 conferences, clinical seminars, on clinical rounds. Much the same is true of the rest of the
4 health care profession.

5 In fact, there's a danger in trying to introduce various aspects of testing too
6 soon. We can sit down with a first-year student, whatever flavor student you want to say that
7 is, and we can tell them all about the importance of this test, that test, whatever. If there is not
8 a patient sitting in front of them, it goes way over their head, way fast, and they're not interested
9 in it. Unless, of course, it's on the test.

10 So where are we going to put these various things, and even more so, when
11 do we then move into the continuing medical education world?

12 Now, realize as we go to our focus groups this afternoon, you are a very
13 highly selected audience. You're here because you like to update and increase your knowledge.
14 You think it's somehow part of your civic duty -- right? -- to go to conferences you really don't
15 want to go to. You go to San Francisco, telling all of your colleagues you're going to do all this
16 shopping and you're not going to the meeting, and you go to the whole meeting.

17 (Laughter.)

18 DR. MALLOTT: That's this room. So don't necessarily extrapolate from
19 your experience when we talk about the health care world in general and how we're going to
20 inject new information into that. It gets to be very, very problematic.

21 Again, I would say that our need for understanding, not just nodding
22 acquaintance, is going to increase the need in continuing medical education to have people
23 actually demonstrate competency with this knowledge, not just familiarity.

24 Whether that's going to be more standardized sort of testing, whether we're
25 going to be moving more into standardized patients, whether we're going to be using computer-
26 assisted exams, that's not quite clear, but the pressure will be -- because we already said these
27 are going to be high-stakes exams. Genetic testing you can look at as high-stakes exams. It's

1 going to tell us things, remember, about the future. Predictive, highly confidential.

2 In order to feel good about health care professionals, I think it means we're
3 going to have to show more competence, not just that you signed up at the front door and
4 walked into a lecture and listened. That's probably not going to cut it with this information.

5 The next point I'd like to talk about a bit is the invisible world. Unlike the
6 testing I talked about before, unlike imaging – in fact, it's almost the antithesis of imaging.
7 Because what was the power of imaging? The power of imaging is, when all was said and
8 done, the patient said, "What is wrong with me?" and you could either put up an x-ray or turn
9 on a computer or show them on a fancy graph, and you could say, "See? There it is. There is
10 the tumor," or "There is the abnormal blood vessel," or "There is the block in your artery."
11 Right? That was the power of the image.

12 No longer. I mean, for an old-fashioned neurologist doing one of those
13 wonderful bedside exams – you know, raise your arm, tap your nose, hop on one foot, roll
14 around in circles -- they knew where that lesion in the brain was. They knew it. None of the
15 rest of us knew it. We said, "Oh, yes. Of course. Dystonias. Foolish me. I can see the
16 lesion in the cerebellum now," and we never saw anything like that, but the power of imaging
17 was you put up the picture. There it is.

18 It's going to be a little different with genetic testing. A little different. A lot
19 different. We're going to be living in the invisible world, the world that our patients don't
20 understand very well, the world of chemistry.

21 Chemistry is not most patients' wonderful pastime. Do they think
22 chemically? They don't think chemically, right?

23 Now, things change. Things change. Yesterday, I was reading the New
24 York Times Review of Books. There was a book review. The book was "Making Sense of
25 Life:" -- oh, that's a good title -- "Explaining Biologic Development with Models, Metaphors,
26 and Machines." I might actually read the book. I'm not sure.

27 But within this is a phenomenal statement by the reviewer, who says, "Life

1 is simply complicated protein chemistry." Period.

2 Wow. That's astonishing. I hadn't realized that all those times I was in
3 chemistry lab, I was really delving into the meaning of life the whole time. I thought that was
4 over in the Philosophy Department, but no, I was doing that the whole time I was in my
5 chemistry lab.

6 In fact, whether we believe that statement is true or not, to the extent that
7 we believe it's true is the extent to which, within that invisible world, we will be challenging
8 fundamental questions of life. That's the discomfort that we all feel when talking about genetic
9 testing and these gene products.

10 But if we feel uncomfortable, then the world around us, the citizenry around
11 us that's going to come for health care, is either going to feel clueless or overwhelmed.

12 Now, we will, as part of this effort, therefore, have to have a tremendous
13 translational effort to show our patients what that invisible world means, and I would argue that
14 that may be the greatest challenge that we're going to face, because it turns out -- well, I won't
15 talk about my patients. That's a different sort of subset. But patients in general really don't sit
16 around watching PBS and being informed by really good scientific reporting. They don't,
17 okay? If we're lucky, they read USA Today. I mean, they probably know more about paternity
18 testing from looking at the Jon Benet Ramsey stuff on the tabloids in the supermarket than they
19 do any kind of studied, well-coordinated public education effort, yet that is where they're going
20 to get their information about this invisible world and that is a major problem with this testing.

21 The last point up there, all of you know this, attributed to Mark Twain.
22 "There are lies, damnable lies, and statistics." This is always kind of the plaintive wail of the
23 medical student, who somehow wants to believe statistics are wrong.

24 Well, I have it up there turned on its head because again I think this is
25 another challenge that we're going to face. We don't live in the world of lies, damnable lies,
26 and statistics. We actually live in the world of statistics, damnable statistics, and lies. We
27 don't, or we haven't up until now, proffered an explanation to our patients on statistical grounds

1 in the same way that we will with genes and genetic testing.

2 As one of my former teachers used to tell me, if anybody really understood
3 random behavior, they'd never buy a lottery ticket. Right? But they do. They buy millions of
4 them and they think they're going to win.

5 So what does that say? I mean, if you ask the average person on the street,
6 you have a 30-percent chance of developing X at some point in your life, what will they do with
7 that information? Well, they'll do all sorts of bizarre things with it, I will guarantee you, but
8 one of the things that we've not been particularly successful at as health care professionals is
9 translating risk, as determined by group studies, to individuals, and yet that, as health care
10 workers from now out into the future, will be one of our primary roles -- will be one of our
11 primary roles -- and we cannot count on our patients being either mathematically adept nor
12 chemically adept.

13 Now, having laid out those challenges, what are we going to do about it?

14 Well, it seems to me, in addition to a couple of the suggestions I've made before, we're
15 hamstrung by yet one more unfortunate factor. Most of health care is still organized in
16 traditional disciplines, whether that's doctors versus nurses, whether that's internists versus
17 surgeons, whether that is basic scientists versus the clinicians, and at least around our medical
18 school and every other medical school I've been at, you can take perfectly nice words and turn
19 them into epithets. You know, "Oh, basic scientist." "Oh, clinician." "Internist." "Nurse."
20 "Doctor."

21 One of the challenges that we will face through genetic testing is since
22 genetics forms this pervasive thread through patient lives, it also has a parallel pervasive thread
23 through traditional disciplines. You heard Dr. Boughman earlier talk about one of the issues is
24 interdisciplinary teams. That kind of goes without saying, but within each educational
25 endeavor, whether that's a CME course, whether that's training residents, whether that's training
26 nurse practitioners, who is going to speak for genetics? Who is going to speak for genetics?

27 It's kind of like the Lorax model, for those of you who know the Lorax from

1 Dr. Seuss. The Lorax stands up to speak for the trees. Who's going to be the Lorax that kind of
2 gets up in whatever educational setting to speak for genetics? In most places, it is not an
3 organized separate department. Based on the history of that institution, it may have sprung
4 from pathology, from OB/GYN, from pediatrics, from internal medicine.

5 Well, when you then organize education, whether it's at the undergraduate
6 level, the graduate level, or the continuing medical education level, who is going to speak for
7 that, and as we add tests, especially in the primary care setting, who then becomes the level of
8 expertise?

9 Now, all is not doom and gloom. We have I think, within these challenges,
10 the actual answer, and that is we have the ability to deliver tremendous new care to our
11 patients, and it's within that that the pressure is going to build to educate our primary care, our
12 secondary and tertiary care, providers, and yet it's not going to be at all a simple task.

13 And since I said I would stay on time, there I will stop.

14 (Applause.)

15 DR. BOUGHMAN: I'm sure you're awake now.

16 Next we have Dr. Gene Rich, who is a professor and chairman of internal
17 medicine at Creighton University. He's going to be talking to us about some of that common
18 ground that we are trying to find and speak to us about the family history and its use as a
19 predictive test.

20 DR. RICH: Well, as an academic general internist and a department chair,
21 I've relied on many colleagues in order to provide me references and insights. These are just a
22 few of the many colleagues that have provided me some suggestions.

23 I should point out that many of the good ideas are related to them and my
24 other colleagues from the GPC. The bad ideas are all my fault. So don't hold them responsible.

25 What I hope to do over the next 25 minutes or so is first describe the
26 emerging importance of the genetically informed family history in adult primary care, to
27 contrast family history-taking practices between medical genetics and adult primary care, to

1 briefly review the role of the family history as the primary predictive test in genetics, to identify
2 current barriers to enhance family history-taking in primary care settings, and to identify some
3 of the characteristics of tools that might support a revitalized family history.

4 I also hope to avoid the fate of Great Uncle Bob here, who got sucked into a
5 tar pit. I'll try to stay on time.

6 Of course, as you've already heard this morning, things are very different
7 now for the family history than they were back in the 21st Century B.C.E. You've already
8 heard that there are many impending applications of genetics in primary care. There are many
9 relatively common conditions of adults that already have a well-recognized genetic component.
10 There are numerous common and rare conditions with genetic tests already available, and many
11 hundreds and hundreds more to come.

12 Dr. Francis Collins, at the recent NCHPEG meeting, observed that "The
13 major contributing genes for heart disease, Alzheimer's, Parkinson's, and asthma will be
14 identified in the next five to seven years."

15 Well, we already have a discipline in medicine that specializes in genetics
16 and genetic testing. That, of course, is medical genetics, and their colleagues the genetics
17 counselors, and the family history is a critical element of the practice of medical genetics.

18 From Robin Bennett's excellent book, the forward here, "The most
19 traditional diagnostic tool in clinical genetics is the family history," and Robin Bennett noted it
20 was "the gateway to recognizing inherited disorders in a patient."

21 Now, many of you are very familiar with the process of taking a family
22 history, called taking a pedigree in medical genetics. It often starts with a medical family
23 history questionnaire sent to patients before they're seen. The preliminary pedigree may be
24 taken by telephone. There's an emphasis on documenting and confirming family medical
25 information. Validation of family medical information is an absolute necessity, many
26 authorities would observe, in medical genetics. Of course, the face-to-face interview in the
27 clinic is important, and the basic pedigree includes at least three generations.

1 Now, in the medical genetics practice, there is a wide variety of information
2 collected related to family members, not just age, year of birth, cause of death, and diagnoses,
3 ethnic background of parents, exploration of consanguinity issues, pregnancy status, et cetera.
4 Not only of the patient, but all of their relatives.

5 So substantive resources are required to take this family history in medical
6 genetics, not only tools like medical family history questionnaires and pedigree drawing and
7 recording resources, but telephone calls, including previsit patient interviews and tracking
8 down medical records, and, of course, a lot of time. A study by Bernhardt and Pyeritz
9 suggested three to five and a half hours of time for the initial consultation, with over half of that
10 occurring outside the clinic visit.

11 Now, what are the outcomes that are achieved by this effort in family
12 history-taking in medical genetics? Well, as Robin Bennett points out, establishing rapport and
13 facilitating patient decisionmaking and patient education are all important benefits of an
14 extensive family history, but its fundamental use is as a cost-effective tool for genetic diagnosis
15 and risk assessment.

16 So now we're going to turn to considering the family history as the primary
17 predictive test in genetics.

18 There are several definitions of predictive genetic testing out there. Let's
19 look at the SACGT definition. "Predictive testing determines the probability that a healthy
20 individual with or without a family history of a certain disease might develop that disease."

21 Now, this definition has some resonance to the academic general internist in
22 me because I've spent years thinking about the predictive value of traditional screening tests.
23 So I'm going to spend a moment going over some of the basic concepts of predictive value in
24 traditional tests for screening.

25 As you're all aware, sensitivity is the chance that a test will be positive in an
26 individual with the disease, and specificity the chance that a test will be negative in an
27 individual without the disease. The predictive value is what the patient's concerned about, the

1 chance of having the disease, given the test result, and predictive value, as we all know, is a
2 function of prior probability, the patient's personal risk of having the disease.

3 Now, what about the predictive value of genetic tests? Similar concepts,
4 but a change in nuance. Sensitivity is the frequency with which a test yields a positive result
5 when the gene mutation in question is actually present in the individual tested, specificity the
6 frequency with which a test yields a negative result when the mutation is absent.

7 Predictive value is also nuanced. It could be the likelihood that an
8 individual with a positive test result actually has the particular gene mutation in question or that
9 they will actually be affected or develop the disease associated with that gene mutation.

10 Now, in considering the predictive value of genetic tests, an emphasis is
11 made on distinguishing background or population risk from the patient's personal risk. The
12 background risk is the proportion of individuals in the general population who are affected with
13 a particular disorder or carry a certain gene, whereas the prior probability again is the patient's
14 personal risk. So family history is often the crucial determinant of prior probability in
15 predictive genetic testing.

16 Let's consider the example of predictive testing for FAP. Now, for a 35-
17 year-old patient, the background risk of a typical 35-year-old is a less than 1 in 10,000 chance
18 of having colorectal cancer. They have about a 1 in 8,000 chance of having an FAP mutation.

19 Now, the prior probability, the patient's personal risk, if they have a positive
20 family history, if the parent has FAP, the risk is 50 percent that the child will have FAP. And
21 what's the risk of being affected? Well, it's close to 100 percent for those with the gene
22 mutation in question.

23 Now, what's the sensitivity? What are the diagnostic characteristics of this
24 particular genetic test? Well, the sensitivity of a full gene sequencing test is estimated to be
25 about 95 percent.

26 Well, what's the specificity? What's the chance that the test will actually be
27 negative if the patient doesn't have the disease? Or the reverse? What's the chance of being

1 falsely positive?

2 Well, I can't find the population-based studies that would be required to tell
3 us what the real specificity of gene sequencing would be for FAP. It's obviously quite high,
4 much higher than the tests we typically use for screening in adults, but given human
5 imperfection, it's unlikely to be perfect. Is it 1 in 100, 1 in 1,000, 1 in 10,000? We're going to
6 assume that the specificity of a full gene sequencing test is a fabulously high 99.9 percent for
7 our example here. That would be far higher than any other screening test used in adult
8 medicine.

9 So then let's consider, for our 35-year-old patient, their baseline risk of
10 having FAP is 1 in 8,000. If we do a gene sequencing test, this wonderfully sensitive and
11 fabulously specific test, with the baseline risk and positive gene sequencing test, they still only
12 have an 11-percent chance of having FAP, or 89 patients in 100 who had a positive gene
13 sequencing test in this circumstance would in fact be falsely positive.

14 Now, a positive family history of FAP alone without testing gives the
15 patient a 50/50 chance of having FAP, and then with a positive family history and a positive
16 gene sequencing test, the patient is virtually certain to have FAP. In fact, a 99.9-percent chance
17 of FAP. Thus, the family history is often the crucial determinant of the predictive value of
18 genetic tests.

19 Now, what's the state of the family history in adult primary care? Is it up to
20 the task of guiding professionals to advise patients? Well, let's look at the traditional teaching
21 about the family history for medical students. I'm going to look at medical students because
22 these are who I'm involved in teaching.

23 This is from that classic of medical education, Degowin and Degowin.
24 Many of the physicians in the audience probably studied from this textbook and this is where
25 they learned how to take a family history. It involved finding out about the age and health
26 status of parents and siblings, and then going through a checklist of conditions. From the point
27 of view of medical genetics, this is a fairly primitive technology.

1 Things are a little better. This is from the current textbook used at
2 Creighton University to teach interviewing and physical diagnosis. Although it has a lot of the
3 features of the old Degowin and Degowin, including the checklist, at least it mentions that it
4 might be useful to record the information in a pedigree or a genogram.

5 Now, the profession of family medicine has emphasized the importance of
6 the family history since the establishment of the discipline, and here are some wonderful quotes
7 from Rakel's "Textbook of Family Practice."

8 First, it obviously takes to task the traditional teaching in Degowin and
9 Degowin, decrying this ritualistic inquiry of yes/no answers for the family history. It goes on to
10 observe that "the primary objective" of the family history "is to search for possible
11 threats to health of present family members and their future offspring," and then mentions that
12 documenting the family history in a genogram may be helpful.

13 Now, the genogram is an interesting development in family medicine. This
14 really comes from the social work and family counseling literatures. The purpose of a family
15 genogram is to develop a realistic overview of a family's background and potential health
16 problems.

17 Now, it has a lot of similarities to a pedigree -- three or more generations --
18 and much information that would typically be obtained by a medical geneticist taking a
19 pedigree, but it also emphasizes relationships and, for example, functional charting showing
20 social and interpersonal relationships.

21 This is a nice example of a genogram that you can download from the
22 AAFP Website. You can see that the structure is very reminiscent of a pedigree, and you can
23 see the three generations displayed there. Again, the distinguishing feature of the genogram is
24 the expression of not only biological but social relationships among the family members.

25 Well, how are primary care physicians actually doing with implementing
26 family histories as taught in their primary care practices? Well, in chart review studies in 1986
27 from a family practice teaching clinic, it was noted that family histories of alcoholism,

1 emphysema, and mental illness were seldom recorded.

2 In a survey study done by Acton, family histories were reported as regularly
3 obtained by 63 percent of family physicians, 74 percent of internists, and 85 percent of
4 OB/GYN physicians. In another survey study, only 48 percent of non-OB physicians routinely
5 obtained information regarding family ethnicity, obviously kind of a problem in an emerging
6 era of predictive genetic testing.

7 In a very nice study of family practice clinics, the Direct Observation of
8 Primary Care Study, it was observed that family histories were obtained in only 51 percent of
9 new patient visits in these family practice offices, and genograms were only available in 11
10 percent of charts.

11 Further analysis by Acheson of these data showed that there was a higher
12 rate of family history-taking for younger, residency-trained physicians, but the average duration
13 of family history discussion was less than three minutes for new patients, which is rather
14 different from the practice in medical genetics.

15 So what are the barriers to improved family history-taking in primary care?
16 Well, what's involved in the time and effort in actually taking a good family history in primary
17 care? There's one study, by Waters, that showed that taking an expanded, three-generation
18 genogram takes 20 to 30 minutes to complete, and it doesn't take Einstein or a health economist
19 to understand that time is actually money.

20 So what are the current reimbursement policies that might influence family
21 history-taking in primary care? We did an analysis working with two of our expert billing
22 coders in the Department of Medicine at Creighton University looking at current Medicare
23 regulations regarding a level of charge that an internist could bill.

24 For new outpatient visits, adding a family history would justify increased
25 reimbursement only for the 99202-coded visits. That represents 11 percent of new patient visits
26 in general internal medicine nationally, and if the physician had actually done a family history
27 and therefore been able to bill a 99203, instead of a 99202, the practice would have received an

1 increased reimbursement of approximately \$27.

2 For established outpatient visits, adding a family history would justify an
3 increased reimbursement for only one code, the 99213 code. Now, in general internal
4 medicine, those do represent the majority of follow-up visits nationally, and physicians would
5 get increased reimbursement of approximately \$26.

6 In the inpatient setting, adding a family history would justify an increased
7 reimbursement for no visits, and recognize that at a typical reimbursement of \$26 for adding the
8 family history, the primary care physician would be paid for approximately 10 minutes of effort
9 to not only obtain the family history, but record it and analyze it.

10 Now, physicians are expected to do a lot of things for which they're not
11 directly reimbursed, but changes in the organization and financing of primary care in the United
12 States over the last 25 years suggests it's going to be difficult for highly motivated primary care
13 physicians to start spending 15 or 20 minutes on family histories.

14 Seventy-five percent of physicians are in some form of group medical
15 practice in the United States now, and a higher proportion for primary care physicians.
16 Individual physician productivity as measured by charges or RVUs remains the predominant
17 form of primary care physician incentive, and optimizing group net revenue -- and, of course,
18 one way to optimize group net revenue is to keep overhead expenses low so you're not tying up
19 nurses and telephone lines and rooms doing elaborate family histories -- optimizing group net
20 revenue is the most powerful and effective form of primary care physician incentive.

21 Quality of care remains an uncommon factor in primary care physician
22 incentives, and where it is used, record completeness, like whether you got a family history
23 documented, has not been a key element. Indeed, where quality of care is used, patient
24 satisfaction is the most common quality of care measure.

25 So what are patient expectations for family histories in primary care? Well,
26 there's one interesting study in family practice that perhaps provides some insights here.

27 Patients of family medicine physicians with a style of using the family history in the context of

1 care, those patients rated their physicians more highly on preventive service delivery, but they
2 were not overall more satisfied with the care they received.

3 Looking at the question a little differently, looking at general internal
4 medicine outpatients who reported having unmet expectations, 26 percent of these unmet
5 expectations related to failure to ask about a medical or lifestyle factor, but only 9 percent of
6 these related to a family history of illness.

7 In a survey study, only 11 percent of surveyed women who had a family
8 history of breast cancer would seek advice from a primary care physician for pregenetic test
9 counseling. They weren't thinking about going to their primary care physicians on that issue.

10 Then finally, if a primary care physician were willing to undertake the time
11 to take an extensive family history, would patients who are seeking care from a primary care
12 office be as willing to divulge detailed family history information as patients who have chosen
13 to seek care from a medical genetics clinic? Certainly an open question right now.

14 Well, and the final problem, the final barrier confronting primary care
15 physicians, is that many of them are feeling like this student here. Their brains are full. Their
16 brains are full with new information regarding new pharmaceuticals, regarding new and varying
17 recommendations on the use of traditional screening tests, regarding other emerging therapies,
18 regarding changing regulations that influence their practice, and so their brains may feel too
19 full to be able to comprehend all of the new information about human genetics.

20 There are certainly studies that suggest this may be the case. General
21 practitioners in England and Scotland reported in two different studies that they do not feel they
22 have the skills to take an adequate family history, Australian general practitioners reported their
23 knowledge of genetics was poor and they were inadequately prepared to manage patients with
24 genetic conditions, and even a highly selected group of general internists and family physicians
25 in the U.S. who chose to participate in the Genetics in Primary Care initiative reported only
26 average knowledge and skills regarding genetic conditions and identified a high need for
27 curricular materials and tools to help them in practice.

1 Well, what are some of the current family history tools that might help out
2 these primary care physicians? Well, there are already a variety of paper family history tools
3 and personal computer-based examples, but these have been well-incorporated into medical
4 genetics practice, and as I already mentioned, medical genetics practices still have a substantive
5 resource demand to take family histories.

6 There are family history Web tools for physicians that they can download --
7 you can get tools from the AAFP and from the AMA Website -- but these are basically Web
8 versions of paper family history tools and don't represent a substantive advance in that sense.

9 What about the electronic medical record? Well, unfortunately, right now
10 electronic medical records, all too often the family history is simply a place to put in, to type in
11 or dictate in, free text regarding the family history or, at best, go through a yes/no checklist
12 template reminiscent of Degowin and Degowin's 1960s family history. So, not a very advanced
13 approach to taking and documenting and interpreting the family history.

14 Now, recognizing the challenges to practice in primary care to applying the
15 advances in medical genetics to practice in primary care, the participants in the Genetics in
16 Primary Care initiative have identified a variety of tools that are required. One of these are
17 tools with respect to the family history, and there is a work group, led by Dr. Caryl Heaton in
18 the audience here, developing and conceptualizing tools that would support more sophisticated
19 practice of the family history in primary care. This group is involved in preliminary work on
20 updating the family history interview in primary care, on drafting improved family history chart
21 tools for adult primary care, and have begun discussions to characterize the ideal family history
22 tool for the 21st Century.

23 These are a few of the characteristics that have been identified for this ideal
24 family history tool. First, given the realities of reimbursement in primary care, it's been
25 suggested that the ideal family history tool will have to involve heavy patient responsibility. It
26 will need, of course, to be adapted to patient age, gender, ethnicity, common conditions,
27 language, and literacy.

1 It would need to elicit specific patient concerns, highlighting specific
2 patient concerns about their family history or about heritable disease, so that these could be
3 addressed directly by the primary care physician.

4 It obviously has to be brief, simple, and easy to use, and it needs to be
5 adaptable to multiple clinical applications, given the diversity of medical practice in the United
6 States today. So it would have paper versions as well as electronic medical record versions.

7 It needs to offer a clinical decision support function. That is, it needs to
8 highlight issues that arise because of the patient's positive family history, raising issues that the
9 primary care physician can explore further with the patient.

10 Now, where are we in the United States right now with respect to
11 developing these kinds of electronic family history tools? Well, there are a variety of Web and
12 electronic tools for patient entry of family history data. Some of these relate to specific risk
13 factors for specific conditions. Others are more general family history tools. But none of them
14 really meet these characteristics of the ideal portable electronic family history.

15 But even if a portable electronic family history were developed, there are
16 still substantive research questions that would remain. Again, will patients be willing to
17 divulge detailed family history information? Won't validation of family medical information be
18 necessary? There's considerable research showing that patients misremember or misperceive
19 their family histories. For example, misperceiving that a diagnosis of benign prostatic
20 hypertrophy was in fact prostate cancer. So how would we document the accuracy and
21 reliability of the portable electronic family history?

22 But even assuming that we resolve the issues with the portable electronic
23 family history, there are still the challenges of applying this wisely in primary care practice.
24 Now here, the opportunities of point-of-care computing, hand-held computers, show some
25 promise. Already, one can add a variety of utilities onto your hand-held computer that offer
26 prediction rules. For example, the Gail model for predicting individual risk of breast cancer is
27 on a utility called MedRules.

1 But these give you, for specific conditions, information on patient-specific
2 risk. It doesn't provide much additional information on what kind of advice would be relevant
3 to this patient or how to interpret test results. I think the ATP III Cholesterol Management
4 Guidelines represent a more promising example of how point-of-care computing might be
5 integrated into primary care practice to help support wise application of genetic testing.

6 Now, as an academic general internist, I pride myself on knowing all kinds
7 of things about risks related to coronary heart disease and how the epidemiologic data apply. I
8 like to think that I've actually read, at one point or another, most of the papers that are
9 incorporated into the ATP III Cholesterol Management Guidelines. But I honestly can't, in my
10 head, interact the patient's age, their gender, their degree of hypertension, and their family
11 history and put them into the right risk class.

12 But I've got my handy Palm Pilot, I just touch "interactive guideline tool," I
13 plug in the patient's total cholesterol, LDL, HDL, age, gender, what their risk factors are and
14 note, of course, family history of early coronary heart disease as one of them, punch "assess,"
15 and I get this individual's coronary heart disease risk classification based on the interaction of
16 their specific lab tests with their unique characteristics.

17 Now, if I want to remind myself what the basis for this recommendation is, I
18 punch "I" and I can get a variety of kinds of information relating to the epidemiologic
19 information. If I'm trying to remember what the therapeutic lifestyle changes would be, I can
20 just punch that little spot there. If the patient is in a class that they need LDL-lowering therapy,
21 I just punch that button and I'll be reminded what my treatment options are.

22 So you can imagine now a set of tools that would apply for a family history
23 for the 21st Century in primary care. This portable electronic family history interacting with an
24 electronic medical record, which interacts with point-of-care computing tools to support
25 thoughtful, individualized primary care physician advice regarding predictive genetic testing
26 and regarding referrals.

27 However, I think primary care physicians right now are not there. They're

1 more like here. Science has cracked the genetic code, but the primary care physicians are in the
2 sort of practice equivalent of trying to figure out how to program their VCR.

3 So hopefully, over the course of the day today, you folks in your work
4 groups will be able to help us out here, so that rather than just wishing for the solution for the
5 family history for the 21st Century, we'll actually get some work done so that we can get things
6 in order.

7 Thank you very much.

8 (Applause.)

9 DR. BOUGHMAN: These are obviously not your usual primary care
10 physicians, the way they have just rearranged all the audiovisual equipment without even the
11 assistance of the A-V folks here. We'll count on them leading us through some of these things.

12 We'd like to turn now to Dr. James Evans from the University of North
13 Carolina, who will talk to us about the Genetics in Primary Care initiative and integrating
14 genetics into primary care.

15 Dr. Evans?

16 DR. EVANS: Thank you.

17 One of the risks of going last in a session is that a lot of the slides are going
18 to look familiar, but I hope that at least my apparel will appear unique. I'm wearing my DNA
19 tie that shows semi-conservative replication.

20 (Laughter.)

21 DR. EVANS: It's part of my full nerd regalia. I have some DNA boxer
22 shorts, too. I'll spare you those.

23 I wear two hats in my professional life. I am a general internist and I also
24 run the cancer genetics services at UNC, and so I go from world to world, and I see this kind of
25 thing when I'm not in my professional role, and it really makes me very uncomfortable, because
26 we've been hearing and we're inundated all the time in USA Today and in Time magazine and
27 Newsweek about how the future is here and genetics is right there in the thick of things in

1 medicine, and yet when I walk into my general medicine practice, I wonder where the genetics
2 is frequently.

3 I'm reminded oftentimes of a quote that an announcer at the World Cup
4 playoffs a few years ago made about soccer. He said that "Soccer is the sport of the future in
5 America, and it always will be."

6 (Laughter.)

7 DR. EVANS: You know, sometimes I feel that's the way it is with genetics,
8 but I remind myself then that we do use genetics in primary care. I was on the medicine consult
9 service, not too long ago, and I got called to the emergency room, and all I was told on the
10 phone was that this patient was 41 years old and had substernal chest pain. I thought to myself,
11 well, this will be great. I'll give him Prilosec and he'll be out of the ER in a minute. Because
12 he's 41, right? He probably doesn't have ischemic heart disease.

13 But going down there and talking to him, I did what any general internist
14 would do -- not what a geneticist would do -- and I asked him about family history. I found out
15 that he had two paternal uncles and his father who all had MIs in their early forties, and of
16 course this changed my thinking considerably.

17 This is the kind of knowledge, then, that alters our threshold for admission
18 and our diagnostic workup, and this is an example of how physicians right now in 2002 think
19 genetically. All right? But we do so in a way that would not have impressed Lord Kelvin
20 because we do so in a way that is vague and non-quantitative.

21 Likewise, we have known for a long time, and now we have very good
22 evidence on a molecular level, that virtually any disease that one can think of has a genetic
23 component, and I would point out the obvious ones like cancer or heart disease, Alzheimer's
24 disease, but also there, on the second column, head trauma outcome appears to have a
25 significant genetic component.

26 Well, what we are seeing in genetics now is we're seeing a shift from a
27 focus on the past to a focus on the future, at least in the medical setting, and Richard Dawkins,

1 the evolutionary biologist, who's really responsible for the concept, for example, of the selfish
2 gene, a brilliant evolutionary biologist, really put it in eloquent terms when discussing the past
3 and what genetics tells us about the past, because genetics has been a field that has focused and
4 concentrated on the past up until now.

5 He said, "It is in this indirect sense that our DNA is a coded description of
6 the worlds in which our ancestors survive. We are digital archives of the African Pliocene, and
7 even of Devonian, seas, walking repositories of wisdom out of the old days. You could spend a
8 lifetime reading in this ancient library and die unsated by the wonder of it."

9 It's a beautiful quote that captures I think the beauty of genetics, but also the
10 fact that genetics has indeed focused on that past.

11 Well, that's changing, because now what we're starting to do in medicine is
12 we're beginning to use genetics to tell us something, however imperfectly, about the future.

13 Well, we've discussed already this morning a little bit about how genetic
14 tests, predictive genetic tests, differ from conventional medical tests, and I would echo what
15 was said earlier by Dr. Mallott that genetic tests affect other individuals who have not chosen to
16 undergo testing. Now, so do certain other tests, right? Like you diagnosis HIV in an
17 individual, that individual's spouse is very interested in those results. It brings up issues about
18 duty to warn versus confidentiality. Again, these are not absolutely unique to genetics, but I
19 think they have been brought along that continuum, so that we in genetics, we have to deal with
20 them in the extreme form.

21 In addition, as was already said, conventional medical tests inform us about
22 the here and now, whereas genetic tests, and I put "inform" in quotes, tell us about a possible
23 future condition. When I get a CT of the head on somebody, I'm finding out something about
24 that patient right now. When I do BRCA1 or BRCA2 analysis on the patient, I'm getting some
25 very fuzzy information about a possible future that that patient might have to contend with.
26 This adds a new dimension of uncertainty. It affects societal attitudes.

27 I think another issue that makes genetic testing different from conventional

1 testing is that we really can't change our genome in a meaningful way, and more to the point,
2 even if we could, or perhaps some would say when we can, there is great concern about
3 whether this should even be pursued.

4 That really brings me to what I think is probably the most fundamental
5 difference between predictive genetic testing and other tests, and it is that genetic testing
6 touches upon concerns related to the underlying essence of who we are. When I get a blood
7 test in somebody to look for their red cells, their hematocrit, when I get a potassium on a
8 patient, nobody is really concerned about that getting to the essence of who they are, but there
9 is a basic understanding that DNA is related to our essence as individuals. Not to be a genetic
10 determinist, not to say that, you know, DNA is us, right? We are more than the sum total of our
11 DNA, but it would be silly to deny the fact that DNA has a lot to do with who we are.

12 That's what brings up, I think, much of the discomfort and much of the
13 reason why we are here today and why these conferences exist, because somehow we have to
14 grapple with that uncertainty.

15 This slide really sums it up. She says, "There's a gene in here that explains
16 why you're such an idiot."

17 (Laughter.)

18 DR. EVANS: You know, the reason that's funny is because there's a little
19 bit of truth to it, right? It's not completely true, but that we understand that our genes do have
20 something to do with who we are on a very personal level, and when we're going to talk today
21 about the application of these tests in the medical realm with hardcore issues like breast cancer
22 and heart disease, what we have to remember is that the subtext or a subtext underlying all of
23 those discussions is this uncertainty and this discomfort with the fact that genetics tells us
24 something a little deeper, and perhaps a little less welcome, about ourselves.

25 Well, what makes a predictive genetic test useful? I have a cold right now,
26 as many of you have probably noticed. You know, nobody's going to be doing genetic tests to
27 see who's more or less susceptible to colds, but I would certainly posit that there are genetic

1 factors that influence that. We have to be dealing with a serious disorder, one that really
2 matters whether you get it or not.

3 It has to have high predictive power, and that's limited by the concept of
4 penetrance in genetic disease. That is, if you have a certain mutation, what are the chances that
5 you're actually going to have clinical ramifications from that? It's also greatly influenced by the
6 nice discussion we just heard about. For example, a priori risk and what the prevalence of the
7 condition is in a given population.

8 We need an ability to intervene in the disease process and affect the
9 outcome, and I would argue, and I'll argue a little bit later, that what's very important in making
10 a predictive genetic test useful is that our interventions are imperfect, because if we have great
11 interventions, we may not need predictive genetic testing.

12 And obviously, the utility of the test is a moving target, and it hinges on
13 such factors as the current available treatment, et cetera.

14 Well, how might we use predictive genetic testing over the next 10 to 20
15 years? Well, it obviously offers the opportunity to detect an increased susceptibility to disease
16 and alter lifestyle, although most of my patients don't listen to me, I think, when I ask them not
17 to smoke cigarettes, not to drink in excess, and to exercise, et cetera, but perhaps showing
18 somebody that they are indeed at greater risk for smoking might prompt them to quit smoking.

19 We also have to deal, however, with the fact that we are going to find
20 people who are less susceptible to certain diseases from what we consider to be undesirable
21 lifestyles.

22 These individuals can take preventative measures, and those can run a
23 whole gamut. They can be surgical. Women that I talk with on a very regular basis in the
24 cancer genetics clinic, one of the options they consider are prophylactic mastectomies,
25 prophylactic oophorectomies.

26 The real hope, I think, one of the real desires for predictive genetic testing
27 to pay off, is that we will learn what type of pharmacological interventions prior to someone

1 actually manifesting a disease might mitigate that disease, might delay that disease. So that's a
2 real hope, that by doing predictive genetic testing, we'll know who to target with pharmacologic
3 therapies. Perhaps there will be dietary interventions that are easy.

4 One of the refrains that I hear in my cancer genetics clinic on a regular basis
5 -- and I put this in quotes, because patients use this term unprompted. They say that
6 "knowledge gives them power."

7 Oftentimes, people want to know about their risk simply because they want
8 to know. People like answers. Humans like some degree of certainty or to refine their
9 uncertainty, and that is a very legitimate role for predictive genetic testing.

10 Pharmacogenomics I throw into this predictive genetic test bin in a way
11 because pharmacogenomics will ultimately I think allow us to tell who will respond to what
12 medicines with the fewest side effects. When an individual comes to me in my general
13 medicine clinic and has hypertension, it's kind of hit and miss. I put them on a diuretic or I put
14 them on a beta blocker or sometimes I'll use an ACE inhibitor, but I don't really know what
15 agent they're going to respond to best and I don't know what agents they're going to have side
16 effects to, and certainly there is hope, through this form of predictive genetic testing, that we
17 will be able to define just those issues.

18 And I don't need to tell you that this is a rapidly moving target.

19 Now, right now there are lots of genetic tests, as you've heard, and what I'd
20 like to do is kind of array a few of those along a spectrum, so that you can get some idea of,
21 well, what makes a genetic test useful and what makes it not useful or even harmful?

22 At the highly useful end of the spectrum, we have tests for the
23 endocrinological condition multiple endocrine neoplasia type 2. This is a very serious disorder,
24 the most serious aspect of which is the development of medullary thyroid cancer at young ages.

25 Genetic testing is now considered standard of care for any family in which
26 this exists or in anyone that this condition is suspected in. It's done by surgeons, it's done by
27 pediatricians, and it's done by endocrinologists because it's a great test. It has extraordinarily

1 high predictive value, it's very sensitive, it's very specific, and it far exceeds the biochemical-
2 type testing that it supplanted.

3 Hemochromatosis is another disorder in which genetic testing is certainly
4 gaining in ascendancy. I put it lower than MEN2 because of issues related to penetrance. That
5 is, if one is homozygous and has two of the mutations in the HFE gene, one has inherited a
6 propensity for hemochromatosis, but by no means does that mean that an individual will
7 develop clinical manifestations. So the genetic test then has a little less relevance to the real
8 world.

9 Colorectal cancer, which I'll go into more detail in a minute, is on a solid
10 part of this spectrum. It is useful. Breast/ovarian cancer is useful, but I would put an asterisk
11 by that, and it takes a lot of discussions with the patient to try to decide whether it's useful for
12 an individual in their particular circumstance, and right now I would suggest that genetic testing
13 or predictive genetic testing for Alzheimer's disease is worse than useless and probably
14 harmful, although the test does exist.

15 Well, let's look at colorectal cancer for a minute. I think it can tell us some
16 good lessons about the utility of genetic testing.

17 As you can see, as you move to the right along the axis and get more and
18 more individuals in your family who are closer to you with colorectal cancer, your chances of
19 developing colorectal cancer increase. If you have a mutation in one of the mismatched repair
20 genes that causes the syndrome of hereditary non-polyposis colorectal cancer, or HNPCC, one
21 has a very, very high risk of developing colorectal cancer throughout one's life.

22 The clinical features of HNPCC are that it probably accounts for 5, maybe
23 up to 10, percent of sporadic cancers. There is early but variable age at diagnosis, and the
24 average is 45 years, which is of course far younger than the average age at which an
25 individual's sporadic colon cancer is diagnosed.

26 The tumor site is typically within the proximal colon, but one can't really
27 hang your hat on that, and importantly, there are other cancers that occur in individuals who

1 carry this genetic disease, most importantly endometrial cancer, but a variety of others as well.

2 If you look at some of those others, again, the chance of colorectal by the
3 age of 80 approaches 80 percent, the chance of endometrial cancer is over 40 percent, and then
4 there's a whole host of other cancers that have significantly increased odds, but not as high as
5 those two, the colorectal and the endometrial.

6 Well, this is a woman who came to see us about a year or two ago, the one
7 that's arrowed there on the right, and she, of course, was interested in what her chances were of
8 developing colon cancer. She wanted to refine those risks for a couple of reasons. Her family
9 history shows really a stunning conglomeration of the types of things we worry about. We have
10 young ages at diagnosis, we have uterine cancer, we have colon cancer, and we have three
11 generations affected.

12 But she wanted to know whether she should be getting colonoscopies every
13 year, should she consider having her colon out, and she was most worried about her two
14 daughters, who were in their twenties and were not thrilled about the idea of undergoing
15 colonoscopy every year, especially when the closest individual to them who had had these
16 problems were their aunts and uncles.

17 Well, it turns out that she did test positive for the familial mutation, which
18 we found in the sister with ovarian cancer. She was actually very happy with these results. She
19 had resigned herself to being at high risk for colon cancer and she was already undergoing the
20 appropriate surveillance.

21 What she was most delighted about, however, was the fact that her two
22 daughters both tested negative, and now their family history becomes a moot point for their
23 risk. They can dispense with concerns about an exceptionally high risk of colorectal cancer.
24 They're now at the baseline population risk and certainly don't need to consider colorectal
25 cancer screening until anyone else in the population would need to.

26 I would emphasize that one of the things that makes genetic testing for
27 colorectal cancer a rational thing to do in the right circumstance is that we have a great test for

1 it. GI doctors are very fortunate in the type of screening test they do.

2 When we do mammograms on patients, we aren't preventing, of course, the
3 diagnosis of breast cancer. We're just trying to pick it up early, right? But when the GI folks
4 scope somebody and remove the premalignant lesion – that is, the polyp – they actually reduce
5 the chances that the patient will ever be diagnosed with cancer, and as you can see with
6 individuals with HNPCC, if one has had endoscopic surveillance, the risk of even being
7 diagnosed with cancer drops dramatically.

8 Well, that's why, one of my gastroenterologist friends says, when Socrates
9 said "The life which is unexamined is not worth living," he was talking about colorectal cancer
10 screening.

11 (Laughter.)

12 DR. EVANS: And I remind him that probably isn't true because Socrates
13 didn't die with a lot of money.

14 (Laughter.)

15 DR. EVANS: Breast/ovarian cancer I put down farther down on this
16 spectrum. Interestingly, I think because logic doesn't really drive medicine, it is probably, 10 to
17 1 or 50 to 1, the patients I see in the genetics clinic are interested in issues related to
18 breast/ovarian cancer screening and genetic testing, as opposed to colorectal cancer. I'm not
19 sure the explanation for that. I suspect it has deep-seated Freudian type of answers there.

20 But nevertheless, what's high on the radar screen for physicians, for
21 patients, is the whole issue of BRCA1 and 2 testing. That's really where the spotlight is right
22 now on these issues related to predictive genetic tests.

23 Well, this is a woman who came to see me in my general medicine clinic.
24 She was 39, she needed a physician, and again, in doing what any general internist or family
25 practice doctor would do, I took a family history. It turned out that her mother had had breast
26 cancer twice at 53 and at 60, and she had an aunt with ovarian cancer at a young age, and of
27 course these started to cause red flags to raise in my mind, and then I find out that in the

1 preceding generation, most specifically I think in the grandfather's sister, there was breast
2 cancer at a young age. So she was very interested in genetic testing.

3 Well, what are the kinds of things we need to think about when we try to
4 figure out whether a genetic test like BRCA1 or 2 makes sense to apply? Well, you know,
5 breast cancer is common in the general population. There will be 180,000 new diagnoses made
6 this year, 45,000 deaths will occur from it, and ovarian cancer, while not as common with about
7 40,000 cases this year in this country, there will be over 20,000 deaths. So obviously an
8 extraordinarily serious conjunction of risk here.

9 About 5 to 10 percent of breast and ovarian cancer is familial, and the
10 majority of those familial cases are secondary to mutations in BRCA1 and BRCA2.

11 BRCA1 is located on Chromosome 17. It's a relatively large gene, but
12 certainly no records. The transcribed portion and the translated portion is relatively large, and
13 it's split up into 24 exons, which makes the test itself difficult. You've got to look through a lot
14 of nucleotides to try to find a mutation.

15 We don't know exactly what BRCA1 does, but we think it's involved in
16 DNA repair and recombination. It's almost certainly a transcriptional activator and it's involved
17 in early development, and perhaps, for example, this involvement in DNA repair and
18 recombination could have some effect ultimately on how we treat individuals who have cancer
19 because of a germ-line mutation in BRCA1 or 2. Since the agents we use to treat cancer all
20 share, or most, the property of damaging DNA, it's interesting to think about whether there
21 might be differences in how we would treat a person who has breast cancer because of an
22 inherited genetic susceptibility in this context versus a sporadic tumor.

23 Well, the lifetime risks are substantial. The breast cancer risk is between 50
24 and 85 percent. Secondary breast cancer -- that is, once you've had it, another diagnosis of an
25 independent tumor -- is about 60 percent by the age of 60, and the ovarian cancer risk is
26 between 15 and 45 percent.

27 These numbers are wide, these intervals are wide, probably for several

1 reasons. Part of it is we just simply don't understand which of those is right, but part of it
2 probably is due to different mutations, different genetic backgrounds, and the role of chance,
3 giving one a wide range of risks.

4 That's something I would emphasize about genetic testing. We're never
5 going to achieve certainty. There will always be a range of risks and it's never going to be 100
6 percent or 0 percent, much less a particular value like 52 percent.

7 There is probably increased risk for other cancers as well, but their
8 magnitude is not nearly as large as breast and ovarian.

9 Well, BRCA2 is cloned next, hence its name. It's located on Chromosome
10 13, and although the size of the gene from a genomic standpoint isn't as large, it has almost 50
11 percent more nucleotides, which again makes testing problematic because one has to find a
12 mutation in that haystack.

13 It's split into 27 exons. Again, its function isn't clear, but it appears to be
14 involved in the same types of processes as BRCA1.

15 Again, a 50- to 85-percent risk of breast cancer in females. Ovarian cancer
16 risk is a bit lower, 10- to 20-percent risk, and it appears that males who carry this mutation have
17 a risk about 6 percent lifetime. New data has just come out in the past couple of weeks to
18 suggest that male breast cancer is not as rare as we once thought in BRCA1 either. There's
19 increased risk, we think, of a variety of other cancers as well.

20 Well, what are the options, then, when you've got a patient who appears to
21 be in a high-risk family? You can do heightened screening, although we're not sure that really
22 does anything. This is highly problematic for ovarian cancer. There are certainly things on the
23 horizon that may change that. We can hope, but we have lots of proof to obtain before it's
24 applicable.

25 Chemoprevention, as I mentioned, is a real hope. Selective estrogen
26 receptor modulators may influence and decrease the risk of cancer. For example, tamoxifen
27 and raloxifene. Birth control pills probably decrease the risk of ovarian cancer, but the

1 risk/benefit equation is difficult, especially for SERMs. You've got some significant risks
2 associated with those as well. You'd like to know who really should receive this therapy that's
3 designed to decrease risk, since it doesn't come free from a side effect standpoint.

4 Prophylactic surgery is an issue, right? Women undergo prophylactic
5 mastectomies because of high risk. They undergo prophylactic oophorectomies because of high
6 risk.

7 Genetic testing is available to help with these decisions, but a woman has to
8 understand, or an individual who's doing some other type of genetic testing has to understand,
9 the limitations of the genetic testing, because what you don't want to end up with is this.

10 "It's like this, Mrs. Cameron. The results are negative, but that doesn't mean
11 not positive exactly. Nor is it not negative. We wouldn't want a double negative there, would
12 we?"

13 You know, telling people about genetic testing can get really messy because
14 it's complicated and because it has significant limitations.

15 It's imperfect because of false negatives. What does a negative test really
16 mean? Does it mean that that family history was just a chance clustering? Does it mean that
17 there's a mutation in the family, but it's in a gene we don't even know about yet, like BRCA3 or
18 4? And there are technical limitations in mutation detection.

19 Well, what does a positive test mean? Penetrance is high, but it's certainly
20 not 100 percent. That is, if you carry a mutation, you're not guaranteed of getting breast cancer
21 or ovarian cancer, and I would emphasize to you that no matter how far we get with predictive
22 genetic testing, no matter how well we understand the human genome, we will never eliminate
23 uncertainty with predictive genetic testing. We will only refine certainties, and because of
24 these issues, counseling before and after testing is important, and that's a huge challenge in this
25 busy medical age.

26 Well, genetic testing can be harmful. It's very imperfect at present, lack of
27 sensitivity, long turnaround time. Knowledge of one's genetic status can cause anxiety and

1 depression for reasons we talked about earlier. It gets in some way, people can't help but
2 feeling, I think for very good evolutionary reasons, to the essence of who we are. Family
3 relationships can be disrupted and strained, and we have societal issues, like insurance
4 discrimination, that's a concern.

5 So as with any medical test, we try to pursue it only if it's likely to yield
6 useful information, and sometimes it doesn't. Sometimes it causes, I think, more harm than
7 good, and an example of that is Alzheimer's disease.

8 ApoE is a molecule produced by the ApoE gene that has long been known
9 to be involved in risk for cardiovascular disease, but it turns out that it's also involved in risk
10 for Alzheimer's as well. If one inherits two E4 alleles, one from mom and one from dad, the
11 risk of Alzheimer's disease is substantially increased in that individual.

12 The problem is what do you tell somebody at this point who tests positive
13 for that? We don't have anything we can do to decrease their risk of Alzheimer's disease. In
14 classic Mendelian disorders, like Huntington's disease and CF, I think it's fair to make the rather
15 provocative statement that genetics is destiny. If you inherit a sufficient expansion in the
16 Huntington's disease gene, you're going to get Huntington's disease if you live long enough.
17 That's a very safe bet.

18 In common diseases, though, in the vast majority of these predictive genetic
19 tests that we're going to be talking about from here on in, these predispose but don't dictate, and
20 prognostication is risky.

21 For example, in Alzheimer's disease, 25 to 30 percent of autopsy-confirmed
22 Alzheimer's disease individuals lacked an E4 allele. There are other things going on, right?
23 And likewise, 5 to 10 percent of centenarians carry an E4 allele without Alzheimer's disease.

24 So in spite of these risks, these odds ratios, predictive genetic testing is very
25 problematic for a disease like Alzheimer's disease at present, but that would change if we came
26 up with an intervention that, if applied before Alzheimer's hit, before manifestations occurred,
27 would decrease the risk. Then it would make abundant sense to be screening all of us for

1 ApoE4 alleles.

2 So it's not useful in 2002, but again, the discovery of a preventative agent
3 which delays the onset of Alzheimer's disease, the discovery of an effective treatment that has
4 differential effects which hinge on the genetics, would be important, right? If you found out
5 that, well, all Alzheimer's disease isn't the same. There are people who have an E4 allele and
6 they respond to this drug, but there are people who have Alzheimer's for a variety of other
7 reasons and they're not going to respond to that drug. Then, again, such testing would be
8 useful.

9 Discovery of a second gene that elevates predictive power of a test is at
10 least mathematically possible, and then new screening techniques for high-risk populations may
11 alter the equation as well.

12 You've seen this slide before. I don't need to dwell on what happened to
13 Uncle Bob, who got sucked into the tar pit, and the Jorgensons, who look to be -- I guess they're
14 barely eukaryotic.

15 (Laughter.)

16 DR. EVANS: So the position of the disease on this spectrum of utility
17 differs among individuals. Family structure will affect an individual's attitudes towards testing.

18 This is actually from a woman I saw in the cancer genetics clinic. There
19 was a high risk in her that she carried a mutation in BRCA1 or 2. She had had prophylactic
20 mastectomies, she had had her ovaries out years before, and she had had breast cancer. She
21 wasn't interested in predictive genetic testing. It wasn't going to really tell her a thing. She
22 didn't have children, she didn't have sisters, and it made abundant sense to completely dispense
23 with that conversation.

24 However, you might see somebody in the next room like this, who has
25 daughters, who has sisters. So suddenly, in similar settings differing only in the structure of
26 their pedigree, predictive genetic testing takes on a much more useful or a much less useful
27 patina.

1 Personal and family experiences will affect attitudes. So here's a woman
2 whose mother and whose sister died of breast cancer at fairly young ages. This is a patient in
3 my clinic. If those individuals had not died -- a woman made the comment to me just two
4 weeks ago, "You know, breast cancer actually doesn't seem like a very big deal in my family
5 because a whole bunch of people have had it and they all do fine." She was not as interested in
6 predictive genetic testing. So in trying to decide about prophylactic mastectomy or
7 prophylactic oophorectomy and chemoprevention, a family's experience with these diseases
8 becomes very important.

9 Well, what's going to change the utility of a predictive genetic test?
10 Significant progress in treatment of a disease will tend to minimize the role of genetic testing.

11 There are almost certainly genetic determinants about our susceptibility to
12 pneumonia or certainly we know on a molecular level genetic determinants that dictate our
13 susceptibility to tuberculosis, but it doesn't make any sense to apply predictive genetic testing
14 in these situations because we can cure those diseases. Pneumonia you can cure in a week
15 typically. TB takes longer, but we have very good treatments.

16 So as our treatments get better, the utility of predictive genetic testing will
17 likely decrease. If considerable strides are made in breast cancer, if breast cancer, as we all
18 hope, someday becomes a trivial disease because we have such acceptable and such good
19 treatments, BRCA1 and BRCA2 analysis would really go by the wayside.

20 Pharmacogenomics. If we have a very safe drug with minimal side effects,
21 we aren't going to need predictive genetic tests to tell who should get that drug and who will
22 benefit from it. Unfortunately, as we all know, however, most of our drugs have the potential
23 for serious side effects, so because of that predictive genetic testing in the pharmacogenomic
24 realm will likely be somewhat useful for some time to come.

25 If presymptomatic diagnosis is improved, the role of genetic testing will
26 increase. If techniques are developed that are risky to apply or that are very expensive to apply,
27 then predictive genetic testing will be useful, and an example of that may be MRI. Studies are

1 being pursued right now to figure out is MRI really a better screen for breast cancer than
2 mammography, and the jury's still out on that, but if it turns out that an expensive modality like
3 MRI is indeed better, I don't know whether our country can afford to be doing MRIs on
4 everybody, and it may be then that focusing on individuals who are at high risk, as defined by
5 predictive genetic testing, could help policymakers figure out who to apply these new tests to.

6 I am really overwhelmed when I see the effective interventions in medicine
7 that we're gaining at this point. You know, I go into my general medicine clinic and I see all
8 these new drugs for diabetes, the thiazolidinediones, et cetera. They're expensive, right? And
9 this puts tremendous pressure on medicine to try to figure out how to use expensive, finite
10 resources to get the most bang for our buck.

11 I think that because of these pressures in medicine, predictive genetic
12 testing will rise to the fore to try to help select who we can most efficiently target with these
13 expensive new therapies, because I'm afraid the days are coming when we won't be able to offer
14 everything to everybody. In fact, in my clinic at UNC in general medicine, I have many
15 patients who simply can't afford some of the medicines that they should be on.

16 Well, efficacious options for prevention, if they have undesirable side
17 effects, will increase the role of genetic testing, and this is currently the issue for cancer
18 treatment. Cancer treatment's about as undesirable as you can imagine any therapy to be.
19 Susan Love, in her book on breast cancer, talks about how we poison, we slash, and we burn,
20 right? Chemotherapy, we operate, and we do radiation therapy. So anything that can allow us
21 to pick up this malady earlier and target those at risk and find out who's at risk is welcome.

22 However, if these preventative measures are extremely safe, the role of
23 genetic testing will be less, and probably the best example of a magic bullet in medicine is the
24 vaccine. It has extraordinarily low downside, extraordinarily high upside. If we end up
25 developing a vaccine for Alzheimer's disease, as is being worked on right now, it may be then
26 that genetic testing wouldn't make any sense for anyone because we'd vaccinate the entire
27 population.

1 Well, I would echo something that Dr. Rich just said. I can't remember
2 everything I read, and while education is a laudable and a necessary goal, we aren't going to be
3 able to educate people to the extent that they really understand the intricacies of genetic testing
4 and can make all these decisions on their own, just like I need to get help when I figure out who
5 to put on a statin for their high cholesterol from my Palm Pilot, where I have the program that
6 Dr. Rich was describing. I read the ATP III guidelines, but I don't have time and I don't,
7 frankly, have the fundamental knowledge required to do the multivariate analysis on each of my
8 patients and figure out, yes, you're going to benefit from me putting you on atorvastatin.
9 However, if I can get some easy-to-use guidelines, like through such a program, then I can
10 apply it in more of a cookbook fashion.

11 So we're going to need clear guidelines for the use of predictive genetic
12 testing, not just to reduce inappropriate risk, which is oftentimes the real focus, but to foster
13 and encourage their use when they can really be helpful to our patients, because they certainly
14 can if applied in the right way.

15 This isn't a novel approach in modern medicine, as you just heard. The
16 ATP guidelines for cholesterol screening, the use of statins, and the list would go on and on,
17 and I think that this is a real goal for affiliated organizations and the SACGT to try to come up
18 with guidelines that are easy to use for the general practitioner and don't rely exclusively on
19 education, while that is a wonderful goal.

20 I'd like to just close with a great comic about the dangers of genetic
21 engineering.

22 "Create a dog that's scared of cars, that's clean enough to enter bars, who
23 never would a cat mistreat, whose breath's forever minty sweet. But first, before we splice a
24 gene, let's think about the unforeseen. Our good intent to hybridize could engineer a bad
25 surprise, a dog who might be quick to judge or, God forbid, who holds a grudge, who leaves
26 behind its role traditional and offers only love conditional."

27 (Laughter.)

1 DR. EVANS: That's Hillary Price's from "Rhymes with Orange."

2 Anyway, thank you.

3 (Applause.)

4 DR. BOUGHMAN: Because this is an interactive day all day, what I think
5 we'll do is go ahead and stay on schedule and take our break now and lead into this afternoon.
6 We know our speakers. If you have individualized questions, please find them and ask them,
7 and we can translate some of those into the panel discussion, which will come next.

8 So we'll reconvene here at 10:45 for our panel discussion.

9 (Recess.)

10 DR. BOUGHMAN: The next hour or so, we have a real challenge, mostly
11 because there are so many good things to be said and so little time.

12 But we have Dr. Reed Tuckson, who is an SACGT member and senior vice
13 president for consumer health and medical care advancement for UnitedHealth Group, who's
14 going to serve as our moderator for the panel discussion, and if anybody can keep it moving
15 along, Dr. Tuckson can.

16 DR. TUCKSON: He can?

17 DR. BOUGHMAN: Yes.

18 DR. TUCKSON: Oh, my God. All right. Well, the pressure's immense,
19 and there are people filing in and, my God, you'd better hurry up, because you're going to miss
20 what you need to know. We have an hour. We're going to go very quickly.

21 I want you to know that these people on the podium are all very, very smart.

22 (Laughter.)

23 DR. TUCKSON: And there are all kinds of things to tell you how smart
24 they are, but briefly, in alphabetical order, Allan Bombard, who has a new job now. He left
25 Aetna, where he was the medical director for women's health for the Pacific and West Central
26 Regions, where he did incredible work on national molecular susceptibility and genetic testing
27 for breast and ovarian cancer, to now become the brand new senior vice president and chair of

1 the Department of Obstetrics and Gynecology at Lutheran Medical Center in Brooklyn, New
2 York.

3 We also then have Caryl Heaton, who is a graduate of Michigan University
4 School of Osteopathic Medicine, and currently the director of graduate medical education and
5 family residency director at the Robert Wood Johnson School of Medicine in New Jersey. She
6 is chair of the Family History Working Group of Genetics in Primary Care, a Faculty
7 Development Initiative, and she is also very smart.

8 Marilyn Dumont-Driscoll, associate professor of pediatrics, University of
9 Florida in Gainesville, received a Ph.D. in medical genetics from Indiana and her M.D. from
10 Albany Medical College. She serves on national committees relating to medical education,
11 pediatric primary care, and genetics.

12 Lemmie McNeilly, because no one can say Lemmietta --

13 (Laughter.)

14 DR. TUCKSON: -- is associate professor and founding chair of the
15 Department of Communication Sciences and Disorders at Florida International University in
16 Miami. She has conducted research and made national presentations on the infusion of human
17 genomics into clinical practice for speech/language pathologists, and serves as the ASHA
18 representative for the Human Genetics Project for Health Professionals.

19 Ken Offit. Very smart.

20 (Laughter.)

21 DR. TUCKSON: Chief, Clinical Genetics Service, and associate attending
22 physician at Memorial Hospital and associate professor of medicine and public health at
23 Cornell University Medical College. His research interests focus on the impact of genetic
24 counseling and testing for breast cancer and risk factors for radiation-assisted breast cancer.

25 The next person has a wonderful name, Reed. The only other Reed in the
26 world.

27 (Laughter.)

1 DR. TUCKSON: Reed Pyeritz, first graduate of the Harvard Medical
2 Scientist Training Program, earned a Ph.D. in biological chemistry in addition to his M.D. He
3 in 2001 became chief of the Division of Medical Genetics at the University of Pennsylvania
4 and professor of medicine and genetics there. He is board-certified in both internal medicine
5 and clinical genetics.

6 Paula Rieger, nurse practitioner, worked at the University of Texas M.D.
7 Anderson Cancer Center in Houston for over 20 years, starting when she was four.

8 (Laughter.)

9 DR. TUCKSON: She most recently worked in the Department of Clinical
10 Cancer Prevention, the Human Cancer Genetics Program, providing cancer genetics counseling
11 for the last five years to women at risk for breast and ovarian cancer. She is certified as both an
12 advanced oncology nurse as well as an adult nurse practitioner.

13 Those are the smart people.

14 What we want to do here is to try to use a case and an interaction to get a
15 sense of how different disciplines are trained to think about these issues and how they see their
16 roles in either contradiction or collaboration with each other. I doubt that any of them are
17 going to really challenge the other and say, "Your discipline has no business whatsoever doing
18 anything associated with this case." They're probably going to be very polite, so I'll do my best
19 to stir it up, especially to say that the other people should not get paid to do any of this --

20 (Laughter.)

21 DR. TUCKSON: -- because we should get paid, and Allan will work all
22 that out for us at the end.

23 So we're going to give you a case. The case may or may not be worth
24 doodly-squat, but we hope that you'll like the case. It's a made-up case, and somebody will
25 criticize the case because it's made-up.

26 An oral maxillofacial malformation is noticed at birth from a woman with a
27 normal pregnancy and no past family history for birth defects, as far as we know. This child

1 has what we now understand to be SACGT syndrome.

2 (Laughter.)

3 DR. TUCKSON: This is an autosomal dominant with a known causative
4 gene for which a test is now available. It's a pleiotropic condition expressing as craniofacial
5 abnormalities that vary in severity, with speech/language impairment and swallowing
6 difficulties. There are corrective surgical procedures that can help to repair these
7 malformations.

8 We are concerned because there is a variable expression and fairly high
9 incidence and penetrance of developing head and neck cancers in the twenties and thirties.
10 With careful medical care and close surveillance, we do believe that this person can live into
11 their sixties.

12 Reed Pyeritz, help us to think about this case, but first, you are called a
13 geneticist. What does that mean, how were you trained, and how come I can't call myself a
14 geneticist?

15 DR. PYERITZ: Oh, but you can.

16 (Laughter.)

17 DR. PYERITZ: The question is will anyone believe you?

18 (Laughter.)

19 DR. PYERITZ: In 1983, Newsweek magazine came to Johns Hopkins,
20 where I was then employed, and purported to do the first major splash in a weekly
21 newsmagazine about genetics. They interviewed me for a long time and when the magazine
22 was finally published, I was quoted exactly once, much to the consternation of my mother, and
23 the statement was "Except for being hit by a car while crossing the street, all disease is
24 genetic."

25 People thought that was relatively trivial. I realize how naive I was back
26 then because there certainly are well-known genetic causes of hearing difficulties and sight that
27 predispose you to being hit by a car.

1 (Laughter.)

2 DR. PYERITZ: But my first comment, Reed, would be to say that all
3 disease is genetic. Hence, any health care professional should be a geneticist, at least at some
4 point and to some degree, and that was emphasized by one of my teachers at Hopkins, Victor
5 McCusick, who actually was quite against setting up a recognizable specialty of genetics by
6 constantly emphasizing that genetics is the most broad of all medical specialties because it
7 cross-cuts virtually all issues.

8 So I really would emphasize the point that we all should be geneticists, but
9 some of us carry added burdens by dint of special training and special qualifications, including
10 board certification to identify genetics as a primary specialty with medicine, right up there with
11 internal medicine and surgery and pediatrics and -- where's David? -- even psychiatry, and there
12 are other flavors of geneticists, including the various lab geneticists and genetic counselors who
13 are also board-certified. So at one level, there is this definition.

14 Now, we've all struggled with this in terms of defining turf on various
15 committees such as this that have tried to define the approaches to genetic diseases or diseases
16 in general. We card-carrying geneticists have struggled mightily to avoid any hint of being
17 self-serving, and for that reason, I think to our detriment, have neglected the important area of
18 defining what our turf is and when other health professionals should refer patients to us, and I
19 think that is one aspect that I hope comes out in the case that you have so nicely described for
20 us.

21 DR. TUCKSON: Well, give us a sense of that now then.

22 DR. PYERITZ: The whole notion of this condition being pleiotropic -- that
23 is, affecting multiple organ systems -- emphasizes the importance of the multidisciplinary
24 nature of many of the conditions that the general public and the general health care
25 professionals think of as "genetic," and it does require that people of various skills and various
26 perspectives get involved and one would hope that they would all be sensitive to the genetic
27 issues involved.

1 The other complexity that you've chosen to invest in this case is the notion
2 of variability, that simply knowing a diagnosis does not give a firm prognosis as to what the
3 outcome will be with this patient, regardless of what testing or what treatment the patient
4 receives, although that certainly will have some impact. So the notion of variability has to
5 underlie any approach to testing, particularly the pretest and the post-test counseling aspects in
6 this situation.

7 The final point that I would raise, and I'm sure others will emphasize it, is
8 the notion that despite there being a gene and a test that can examine the sequence of this gene,
9 let's say, we haven't been provided any information at all about the analytic validity of the test,
10 the clinical validity, and the clinical utility of the genetic test that we're supposed to be utilizing
11 in this case.

12 So those to me are the most important issues that you've raised.

13 DR. TUCKSON: Thank you so much, and we will come back to you for
14 sure.

15 Marilyn Dumont-Driscoll, you are a pediatrician. How are you trained to
16 think about this case? What are the pieces of this case that are of most interest to you?

17 DR. DUMONT-DRISCOLL: I think in looking at this case I really have to
18 focus on the serving as the medical home and as the source of the coordination of care, not only
19 for this child, but for the family as well.

20 We end up realizing that sensory overload has just occurred with the birth
21 of this child and the diagnosis that has been made, and this family, regardless of what we think
22 we're saying to them, are oftentimes hearing and retaining something quite different than what
23 we perceive. We have multiple inputs which are very appropriate for many of our subspecialty
24 colleagues, but again, slightly different messages from various individuals can leave a family
25 very much swarming with information which to them may in fact seem contradictory.

26 The long-term implications for this family in terms of not only for
27 themselves, given that it's an autosomal dominant and the fact that with the variable

1 expressivity we're unsure as to whether or not they in fact may end up having some difficulties
2 themselves that have not been previously diagnosed by their own physician, and in addition the
3 risk for the cancers that were discussed, leave you again with a family that is probably
4 overwhelmed with horrible long-term complications which, in addition to a child who's now
5 just been diagnosed with medical problems, leaves us in a situation of needing to be a major
6 source of support for this family.

7 DR. TUCKSON: Well, let me ask you. You now have reason to be,
8 perhaps, concerned about the family history that was originally taken for the family. They have
9 an obstetrician/gynecologist and there are certain kinds of conversations that need to occur in
10 terms of future planning issues and so forth between, perhaps, them.

11 What do you do? Are you the one to be the family medical home, to talk to
12 this family and get into those issues, or do you refer this information to the
13 obstetrician/gynecologist? What do you expect?

14 DR. DUMONT-DRISCOLL: I think it's incredibly important for the
15 general pediatrician or the medical home for the child to express those issues. Very often,
16 parents are not seeing physicians themselves, except perhaps in the case of an
17 obstetrician/gynecologist, and the only physician they may in fact be seeing is when they come
18 in for health maintenance visits for their children.

19 So I think as pediatricians, we have a significant obligation to this family to
20 obtain family history, and by just asking the question "Are there diseases that run in the
21 family?" isn't going to be sufficient, that, as Dr. Rich spoke about, needing to get a three-
22 generation history where you specifically ask about individual family members that triggers
23 within each mother or father a memory of that person within the family, and "Oh, yes. They
24 did happen to have this disorder," rather than just, "Oh, is there anybody in your family that
25 happens to have cancer?" Our gut level reaction to almost any question is to say, "No, my
26 family's fine."

27 DR. TUCKSON: And finally, how do you expect or what is your

1 understanding of the average pediatrician out there, their ability to understand – not you,
2 because we know you know the answer, but --

3 DR. DUMONT-DRISCOLL: Sometimes.

4 DR. TUCKSON: But the average, well-meaning, good pediatrician who
5 cares -- because that's what pediatricians do, they care – to be able to interpret the data around
6 the potential chance that this disorder will lead to a carcinoma in the twenties and thirties, what
7 their obligations and responsibility are, their understanding of the basic science of this kind of a
8 syndrome?

9 DR. DUMONT-DRISCOLL: I think unfortunately there are significant
10 deficiencies. Part of this has come out of the fact with the rapid explosion of knowledge, but
11 the other part is, in speaking with my colleagues across the country, when I end up saying
12 genetics to them, they say, "If I see a child with a genetic disorder, I'll refer him to a geneticist,"
13 and the reality of insufficient numbers of those subspecialists is clear. Plus, triggering the need
14 to know that if there even is a genetic component to a disorder isn't always there. So I think
15 that there are some significant red flags that many of us would miss.

16 DR. TUCKSON: Dr. Heaton, my gosh, family practitioner, gigantic scope
17 of concerns. How do you put this case together from your perspective?

18 DR. HEATON: Well, like Marilyn, I think that I would first focus on the
19 immediate need to get the family together and support the parents and the child.

20 It depends. There's a wide scope in family practice. I practice in a very
21 urban setting with a pediatrician next door and a geneticist down the corner, but I've also
22 practiced in Michigan, where you may have a small country doctor out in the community taking
23 care of 2,000 families with no close geneticists or developmental pediatricians around. So if
24 this patient is born in a small hospital without a whole lot of support, that family physician's
25 going to be in the position of doing the majority of the counseling.

26 It depends. Are the parents my patients? They may be my patients. Is the
27 child my patient or does the child go to a pediatrician specifically? Usually, if I was called to

1 this case, I would assume this was my patient and the family comes to me. Occasionally, I will
2 see patients that go their obstetrician for their gynecologic care, but I take care of the majority
3 of things that are going on with a family if they do come. If they're healthy and not seeing
4 much of me, I may not have much rapport. I may have immense rapport with the family.

5 So in any test or any serious diagnosis, I would get the parents together and
6 start to talk about what's going on to the best of my ability, to reassure them that I would get the
7 consultants in, to find out as much as possible, and then we would make decisions going
8 forward together.

9 This is not occult genetic disease, I don't believe. I mean, this isn't a tricky
10 one. I would be clear about getting a referral and getting consultation quickly on this.

11 So I don't think that's a problem, but immediately my thoughts would be to
12 the family unit, and there may be aunts and uncles, there may be grandparents, with a genetic
13 disease. If they learn and understand quickly that this is autosomal dominant, then there's the
14 whole feeling of guilt and responsibility that may be brought into this. So you have to start, I
15 think, with that very quickly.

16 DR. TUCKSON: How well prepared do you think family practitioners are?
17 Again, these enormously well-meaning people who, I think what you're saying is, have to
18 somehow manage the psychological issues of guilt, fear, anxiety, all the way through to
19 calculating the probabilities of cancer and worrying about the issues of the craniofacial
20 malformations and arranging the surgery. At what level do you think that family practitioners
21 are prepared to talk to a family about those kinds of issues, as well as, by the way, getting that
22 other family history that allows you to make a rational discussion about family planning going
23 forward?

24 DR. HEATON: Right. Well, first, if it's something you don't know
25 anything about, you're going to go to your consultants and if they say it's SACGT syndrome,
26 you say okay, well, I don't know anything about that. So you know where you need to go.
27 Hopefully, you do. You go to a site on the Web. The textbooks may or may not be helpful, but

1 our goal in education -- I'm primarily a family physician educator -- is to make sure that family
2 physicians know their limits, know their resources, and are there for the family interaction. So
3 if knew nothing, I would say, well, we're in a fact-finding mode right now. We're going to find
4 out as much as we can, myself included.

5 If I start to learn a little bit more, then I start to work the issues out with the
6 family. Risk is a huge issue and predicting the future is a huge, important issue, and I try not to
7 order any test without an understanding of what I'm going to do with the results or what the
8 family or the person I'm testing is going to do with the results.

9 DR. TUCKSON: What are those Websites that you turn to, by the way? Is
10 that the American Academy of Family Practice Website, specifically to teach family
11 practitioners about how to do this genetic stuff and all the continuing professional education on
12 the modern history and movement of genetics and all the various tests and how to counsel on
13 SACGT syndrome? Is that on the Website?

14 DR. HEATON: I would go to the literature, and that is on the Website, the
15 review literature, the American Family Physician, and some of those journals, but I would go to
16 GeneReviews. I would go to the University of Washington Website.

17 DR. TUCKSON: All this counseling that you're going to do, by the way, do
18 you expect to be paid for the counseling in addition to all the stuff you would normally do?

19 DR. HEATON: You're never paid for the counseling that you do.

20 DR. TUCKSON: Nurse Rieger, how are you?

21 MS. RIEGER: Good.

22 DR. TUCKSON: Paula, you are a nurse, you've got all these degrees in
23 advanced practice nursing as well as oncology nursing, and you are just itching to get into this
24 game.

25 MS. RIEGER: Right.

26 DR. TUCKSON: What is your role in telling all these other people to get
27 out of the way because here comes the nurse?

1 MS. RIEGER: Well, first and foremost, as a nurse, I wouldn't tell all the
2 other people to get out of the way, because I think one of the strengths of the discipline of
3 nursing is truly that of serving oftentimes as a case coordinator for patients and families in the
4 ability to bring all the different disciplines together, working with physicians collaboratively
5 and the other disciplines that might be out there that would be involved in the care of this child
6 and this family.

7 So just to speak to those for a moment, given the complexity of the case and
8 how it's going to affect the child throughout the life, I can see over the course of time there will
9 be a multiplicity of different health care professionals involved, such as speech therapists,
10 nutrition, social work, just to name a few.

11 To maybe make a distinction between what I might do as an advanced
12 practice nurse and nurses in general, the one thing that occurred to me, whichever discipline
13 we're speaking about here today, a nurse will be involved in each and every different setting,
14 probably working with a family practitioner specializing in pediatrics specializing in oncology.
15 So wherever in the health care system that this particular patient and family will be involved,
16 there would likely be a nurse somehow involved in their care.

17 The types of things that nursing as a discipline would do, they'd be involved
18 in assessment, making diagnoses collaboratively with the physician as to what kind of problems
19 the family and the child are facing, and what we're going to do about that and how we're going
20 to evaluate that.

21 Some other things that I think are particularly important with respect to a
22 lifelong condition like this would be health teaching, education for the patient and family about
23 how this disease is going to impact their life and how they're best going to be managing that,
24 the psychosocial implications of the disease, the surgery, and so on, just some of the things
25 you've mentioned.

26 I spoke to the case coordination component, which in today's world is
27 extremely important.

1 The other point I'd like to make, and specifically with respect to oncology
2 and education, is to educate this patient and family about potential risk factors for the types of
3 cancer that might be anticipated with this particular syndrome, what they could do to diminish
4 their risk, and then what types of screening might be potentially appropriate for this patient
5 down the road.

6 To make some distinctions between levels of nursing practice, as I said,
7 nursing across the board would be involved in the care and management of the patient. An
8 advanced practice nurse is one who has received a master's, and that could be as nurse
9 practitioner or clinical nurse specialist, but with that additional education and expertise, they
10 may potentially be involved in counseling, and potentially genetic counseling, depending on
11 their education and background that they have, but also again in case management and
12 consultation and management of the patient and family across the board.

13 DR. TUCKSON: So if you were going to expect nurses to do this sort of
14 counseling, do we expect that there's a special training that nurses must have and a certain
15 certification for genetic counseling and education or is a generic counseling qualification and
16 training enough and then by going on the Website that Dr. Heaton is going to, you can get all
17 the technical stuff you need as long as you have a generic counseling capacity? What's
18 necessary here?

19 MS. RIEGER: Well, you've asked the \$50 question and I think it applies to
20 nursing as well as other disciplines. So in a sense, there is oftentimes not a tailor-made health
21 care professional as this area is evolving.

22 The area that I obviously know best is that of cancer, and so I think at this
23 particular point in time, you have nurses that have extraordinary skills with respect to
24 management of patients and disease, and I think those nurses that would go into doing cancer
25 genetic counseling have to obtain additional information about the genetics piece in order to
26 supply that service to patients.

27 I think what always must be kept in mind, though, is that those that have

1 expertise in genetics may not necessarily have the expertise in the management of the disease,
2 and cancer in specific. So they oftentimes also need to obtain additional information and
3 training to sort of provide the whole piece.

4 So again, that gets back to arguing for the multidisciplinary care at the table
5 with each discipline bringing the expertise that's ultimately required to give the best care to the
6 patient.

7 DR. TUCKSON: Reed, how many geneticists about are there? Are there
8 100,000 geneticists?

9 (Laughter.)

10 DR. PYERITZ: Again, it depends on how you define them.

11 (Laughter.)

12 DR. TUCKSON: I mean card carrying.

13 DR. PYERITZ: Card-carrying clinical geneticists, about 1,100, and about
14 1,500 or 1,600 genetic counselors. Clinical geneticists, the 1,100, but we're very interested in
15 trying to define what that 1,100 people do with their time, and I guarantee you they're not
16 spending most of their time doing clinical genetics.

17 DR. TUCKSON: So we've got really a very small number of the super-
18 duper folk, super-trained specialists, and then, Caryl, you've got this challenge that, by the way,
19 you want to coordinate and she wants to coordinate and you want to coordinate.

20 PARTICIPANT: And she wants to coordinate.

21 DR. TUCKSON: No, you don't get to coordinate.

22 (Laughter.)

23 DR. TUCKSON: You get coordinated.

24 So how do you all decide who's going to coordinate? In this case right here,
25 you've got a child presenting who's going to have some problems in just immediate post-child,
26 20, who's then going to live hopefully to be 60. Do you pass the ball from the pediatrician to
27 the family practitioner to the nurse to the -- how is this supposed to work? Does it matter?

1 Caryl?

2 DR. HEATON: It doesn't matter if the patient and the patient's family are
3 the primary focus. As long as the coordination takes place, I'm happy that it occurs with any of
4 us. It depends where the patient is, what part of the country. It depends on the quality of the
5 practitioners. I mean, someone's got to I think take the role of coordination, and we talk about
6 teams a lot, but we're not real good at figuring out how to teach that and how to evaluate that.

7 DR. TUCKSON: Marilyn, let me ask you, just on the same question that I
8 asked Paula, and that is should the pediatrician be trained generically in counseling and then be
9 able to go to the Website and become an instant expert on the genetic issue that must be
10 counseled or are you expecting there to be a special designation in genetic counseling by the
11 pediatrician?

12 DR. DUMONT-DRISCOLL: Well, my bias is that all pediatricians should
13 have a very strong genetic competency in their repertoire of medical education and knowledge,
14 and that they should have the appropriate knowledge, skills, and attitudes, and part of that's
15 going to end up depending upon where they receive their training and their level of interest.

16 I think that in general what we end up seeing is that people work to their
17 strengths, and so you're going to end up negotiating, I would hope, those distribution of
18 responsibilities that would be in the best interest of the patient and a reflection of the amount of
19 resources that you happen to have.

20 DR. TUCKSON: The American Academy of Pediatrics is interested now in
21 something called the board certification and the maintenance of certification, as opposed to
22 saying that you passed a test in 1923, and therefore --

23 DR. DUMONT-DRISCOLL: It was that long ago, wasn't it?

24 (Laughter.)

25 DR. TUCKSON: Are you aware of any -- and you may not be. It's not fair,
26 but I was interested in whether you are, somebody as well educated and as current as you are in
27 what's going on. Are you aware of any efforts by the American Academy of Pediatrics to

1 ensure through some mechanism that there is a continuing professional development or
2 competence in the growing field of genetics for all American pediatricians or is this an
3 individual-by-individual crapshoot?

4 DR. DUMONT-DRISCOLL: I think when you end up looking at the way
5 the board scores are at least segmented out, what I've noticed is that genetics is lumped with
6 neonatology, and I would certainly hope that in the future that that is not what the case is, that it
7 clearly doesn't just apply to the neonatal period of time.

8 The one downside when you end up looking at the American Board of
9 Pediatrics is that the subspecialists that are represented within the development of those exams
10 are those that are subspecialties within pediatrics. We end up seeing genetics now being a
11 separate board unto itself, and so therefore there doesn't end up being the same opportunity for
12 the input, and I really feel that there needs to be a strong impetus to get the genetics into the
13 testing, that competencies are becoming the wave of the future when we look at the American
14 Board as well as ACGME.

15 DR. TUCKSON: Lemmie, you didn't escape. A speech pathologist. We
16 have a child here who has significant issues that will affect swallowing, speech, all those
17 issues.

18 When do you get involved in this case and why are you concerned about the
19 genetic issues? How come you're just not paying attention to dealing with the clinical
20 management issues and the speech and occupational therapy issues? What are you doing on a
21 panel on genetics?

22 DR. McNEILLY: Excellent question. I think that genetics is pervasive
23 across all of the health care professions, including speech/language pathology, and certainly
24 speech/language pathologists should not only be aware of the presenting symptoms in terms of
25 having a speech component, a language component, and a dysphasia to swallowing component,
26 but what are some of the etiologies upon which these particular presenting conditions are
27 based?

1 I think traditionally, as speech/language pathologists, we'd certainly had a
2 great deal of experience in training and knowledge relative to the single-gene disorders, and
3 there are more than 400 syndromes that have been identified that result in speech and language
4 problems for children in pediatric cases.

5 However, one of the areas that I think we really do not have enough
6 knowledge, understanding, and competence relative to are the multifactorial issues and what
7 the advances in the Human Genome Project can now offer us in the way of being able to infuse
8 this information in our clinical assessment practices and our intervention.

9 I think one thing that ends up being fairly pervasive for speech/language
10 pathologists that are working in pediatric medical settings is that we tend to see those children
11 and their families routinely. In the setting, we may see them daily or we definitely see them for
12 multiple visits during the week and establish an excellent working relationship and rapport with
13 family members and are very often presented with a variety of questions that most
14 speech/language pathologists have difficulty answering.

15 DR. TUCKSON: Well, Lemmie, I'm the parent of this child now and I've
16 heard all this rigmarole, but I didn't understand it from all these other people because it was fast
17 and I was so nervous I couldn't hear the words anyway, and I'm just crying when I heard it.

18 So all of a sudden, I'm at the educable moment. I'm sitting there with you,
19 and we're watching Mary play and do whatever we do and you're doing whatever you're doing,
20 and I finally just say, "You know, we're thinking about having another kid." And we're just
21 sitting there playing with the blocks. You know, we're not behind the table. We're just at the
22 educable moment.

23 "You know, Mary and I were thinking last night, and we thought we might
24 have another kid, but we're kind of scared, and we don't know what the risks are that we would
25 have to do this again. Can you tell me, Lemmie, what the real chances are and what we should
26 do?"

27 At that moment, is it the job of the speech therapist to start to calculate the

1 odds ratio, to counsel around this genetic syndrome, or is this the point where you punt quickly
2 to Caryl or to Dr. Dumont-Driscoll or to even Paula?

3 DR. McNEILLY: Excellent question. It's definitely not the time for me
4 provide the statistics, but it's definitely a time where I can provide information about the
5 various resources that are available to that individual, so that they can be a wonderful advocate
6 for their child and whether or not they're going to make some critical decisions in their lives to
7 add to their family and where they should go for that information. Absolutely, I would make
8 referrals to Caryl and to Marilyn and others, and definitely to Reed, the geneticist.

9 But I certainly would also provide them with some information, and if I'm
10 not aware of anything relative to genetics, then I'm not really able to serve in that capacity using
11 that teachable moment in a way that I think helps that family.

12 DR. TUCKSON: Four-hundred syndromes from genetic-related disorders
13 that lead to what you will treat in your clinical setting. That's a lot, but it's not impossible. It's
14 not a zillion. It's not as many as poor Dr. Offit in a minute will have to deal with.

15 So you've got 400, and poor Dr. Heaton, who's got to worry with the little
16 tiny ones to the geriatrics to the whole gamut. So you've got 400, and there's a Website, you're
17 saying. Or is there a Website you can go to that tells you everything you want to know about
18 those 400?

19 DR. McNEILLY: And more. Definitely, there are a variety of Websites
20 that are available, but I don't have a PDA that has all of that information on it. So it does mean
21 having to go to a computer and access the information, but the key is recognizing that there are
22 resources available and being knowledgeable enough to know that I can access that
23 information.

24 DR. TUCKSON: Now, it turns out that their wonderful pediatrician, who
25 you're working with, doesn't have diddley-squat of an idea that this syndrome or this thing that
26 you've picked up is actually a genetic-based syndrome. It's not in the record anywhere and it
27 doesn't say anything in the medical record that you have available that any counseling or

1 anything else has gone on. What is your responsibility to get involved at that point or do you
2 have a responsibility to get involved?

3 DR. McNEILLY: I think I have a responsibility to treat the entire child, not
4 just the child's mouth, and I think by doing that, I certainly should ask questions and if I see that
5 there are some obvious absences in the chart, to ask the questions. Not to lay blame, but
6 certainly to then move to the other resources and the other professionals, to say are there some
7 additional pieces of information here that would help us to be able to provide a more cohesive
8 rehabilitation or habilitation planned for this child and the family?

9 DR. TUCKSON: Well, Ken, you are the oncologist sitting at, my God,
10 Cornell -- great, super-duper institution -- and you really do get to think about not only the
11 oncological issues, but also, of course, the interface between this and genetics. How do you
12 sort of see this case and what are the ideas that spring forth for you?

13 DR. OFFIT: Well, the first thing that we do in academics is we want to
14 look at the important issue here, and that is that this syndrome, SACGT syndrome, is
15 unpronounceable.

16 (Laughter.)

17 DR. OFFIT: And this is a problem. So fortunately, I've written a textbook,
18 "Clinical Cancer Genetics," and I'll be revising it this summer, and this first thing that we'll do
19 is name this thing the way it should be, which is Tuckson's syndrome.

20 (Laughter.)

21 DR. OFFIT: And Alan Gutmacher sitting out there, my medical school
22 classmate, knows that there's a special conceit in genetics, which is to name the syndrome after
23 the discoverer, not the family. I might find out the name of the family and consider that.

24 DR. TUCKSON: I see.

25 DR. OFFIT: But otherwise, except for Lou Gehrig, we'll give it to you.

26 That's the first priority. Now, the second is, it's interesting that you've
27 chosen a syndrome which most of us on the oncology side have thought of as an environmental

1 cancer, and Reed's autobiographical background -- mine is I actually worked for the EPA when
2 I started my training, and cancer was an environmental disease.

3 Now, I work for Harold Varmus, and I changed my tune. Cancer is a
4 genetic disease absolutely 100 percent of the way.

5 (Laughter.)

6 DR. TUCKSON: He's a very smart guy. He knows how to get ahead.

7 DR. OFFIT: Absolutely.

8 Now, given that cancer is a genetic disease and we're oncologists, one
9 would want to look at a case like this and speculate a little bit about the management of the
10 syndrome.

11 Now, here, what will happen as you play this out hypothetically actually is
12 somewhat illustrative of the public health dilemma, and you've heard some of the numbers of
13 practitioners. What you would have is a flux of early-onset head and neck cancer out in the
14 oncology community. There are 40,000 cases of head and neck cancer in the United States
15 each year, and this not an unusual situation.

16 So what you'll have are oncologists seeing early-onset cases of head and
17 neck cancer, and this is very much akin to the pickup of hereditary breast cancer that was very
18 nicely summarized in Dr. Evans' talk, and similarly hereditary colon cancer as well.

19 So the oncologist's role is two. First, as a diagnostic resource to pick up
20 these syndromes as they come into practice, as we have done and as we have recognized is our
21 responsibility to do for hereditary syndromes which do not have physical stigmata attached to
22 them at all: breast and ovarian cancer and the colon cancer syndromes that are public health
23 issues, as was pointed out so eloquently in Dr. Evans' talk. Here the early diagnosis of head
24 and neck cancer in a young individual will then set off a discussion which hopefully will
25 involve the rest of the family.

26 Now, the second role of the oncologist, of course, is in treatment, and we
27 are improving our treatments in head and neck cancer, and there would be the opportunity for

1 trials. One of the great achievements in oncology in this country, as you know, has been
2 extraordinary success against cancers in the pediatric age group. Here we're bridging into
3 young adulthood, but nonetheless I would guess that most cancers diagnosed in the first and
4 second decade will be treated at a comprehensive cancer center, and what one would want to do
5 here would be to offer to an individual such as this participation in a clinical trial.

6 Thirteen-cis retinoic acid is now being looked at in both high- and low-dose
7 form. As you know, this is a malignancy for which there is a track record now of that fantasy
8 that Dr. Evans described, true chemoprevention. We're not to the point yet where you take the
9 pill and don't worry about it, but it is one of the malignancies where we do have the beginning
10 of a therapeutic advantage. So one could envision the oncologists, in addition to the diagnostic,
11 playing a therapeutic role in the prevention realm.

12 Now, a final comment to make just on the educational aspect of this. The
13 numbers are daunting, as we said, with these relatively limited numbers of specialists, but
14 through the auspices of this federal advisory group and those of our professional societies,
15 meetings like this have served, as Dr. Evans' lecture I think so nicely illustrates, to promulgate
16 cancer genetics to the larger community.

17 I would be remiss if not to comment that on some of those slides, there was
18 an ASCO on the bottom right corner, and that is evidence of a hypothesis that perhaps even --
19 he was arguing perhaps for the advantages and disadvantages of education, but there's an
20 example of a large investment in an educational resource by our professional society having its
21 dividend, which is the promulgation of a curriculum, and the ASCO organization now does
22 have a cancer genetics curriculum. Our plenary talk at our meeting in Orlando next week to
23 15,000 members will be a cancer genetics talk, and we will have a comprehensive course this
24 year in cancer genetics, as we have done every year for the last five years.

25 DR. TUCKSON: Since you've made a commercial for this ASCO, what is
26 ASCO? What does it stand for?

27 DR. OFFIT: It's the American Society of Clinical Oncology, and it is one of

1 a number of professional organizations that has come to realize, as was eloquently said by our
2 other panelists, that genetics is all of human disease and we have a responsibility to educate our
3 members.

4 DR. TUCKSON: Well, if there's a representative from ASCO out there,
5 please give him all credit for having done his yearly contribution.

6 (Laughter.)

7 DR. TUCKSON: Back to the mike one more time, what, if anything, is
8 important to you about knowing the level of penetrance of this gene leading to cancer? Let's
9 say we say it's 70 percent. How important is that information to you in changing or affecting
10 your clinical management of this patient, with their response to drugs? I mean, in any way is
11 that important, and if it is, what then is your experience in working with the referring physician
12 in helping them to somehow understand that information or is it basically this is such technical,
13 specific stuff that it's only germane to the rarified air of this comprehensive cancer center, that
14 the poor colleagues of Dr. Heaton who don't keep up with this don't need to know?

15 DR. OFFIT: Well, that, of course, is the question for all cancer
16 predisposition and it has to be looked at in the context of the syndrome, and I thought Dr. Evans
17 really did a wonderful job trying to show in a graphical form how that spectrum of decisions is
18 made against the background of the efficacy of the intervention, and that is really the issue at
19 play here. If we had a chemoprevention option that was completely effective, then the issue of
20 penetrance for Tuckson's syndrome would not be the critical issue of the day.

21 For the topic of breast cancer and ovarian cancer risk, where we're dealing
22 with a range of penetrance, my surgical colleagues on the gynecologic side play a very key role
23 in helping individuals to decide about a preventive surgery in the most common scenario of the
24 ovaries, and this will be our topic next week when we present these data.

25 Here we have a situation where the penetrance is variable and we don't have
26 a mammogram for the ovaries, and under those kinds of circumstances, where the prevention is
27 unsure and the detection is not proven, there a risk-reducing surgical intervention becomes a

1 difficult discussion, and one which does not happen without a multidisciplinary interface. No
2 single individual ultimately can replace the discussion, for example, with the primary surgeon
3 about a surgical procedure.

4 DR. TUCKSON: Thank you.

5 Allan, there are a lot of people here who want to do a lot of things. How do
6 you, as a -- and you can now speak completely freely, since you are no longer in the employ of
7 the health insurance company, but for the next 10 minutes we redeputize you as a member of
8 that industry. How do you think this through and what goes through your mind?

9 DR. BOMBARD: I was actually given a rather unique opportunity about
10 five years ago to leave academic medicine and to try to answer that question on a national
11 basis. It was a unique opportunity and ultimately a very gratifying opportunity.

12 The position that we took -- and I have to reiterate that I'm not today
13 speaking for Aetna, but rather kind of an assessment of what some of the health plans are
14 doing, and regrettably I'm not speaking about what Medicare and Medicaid and other payers are
15 doing. Ultimately, it should be one policy for all payers.

16 We took the position of trying to turn to the relevant professional colleges
17 for guidance. Rather than deciding what did Allan want to do for covering a test or a
18 medication, we turned to the American College of Medical Genetics. I happen to be in
19 women's health for Aetna, and as a geneticist was responsible for women's health-related
20 services and genetics policy. So I turned to the ACMG, the American College of Medical
21 Genetics, ACOG, and actually, during my tenure at Aetna, joined ASCO because I thought they
22 were doing probably the most proactive teaching of their membership in genetics.

23 The area of research that I became interested in as I was moving from
24 Einstein to Aetna was women's health-related cancer genetics, and I'm going to be returning to
25 that.

26 So we turned to the relevant professional colleges to try to determine what
27 does the literature say, what do the best people in that area say, in terms of coverage policy, and

1 then we looked at how to get the best bang for the buck.

2 As an example, there were a number of institutions looking to pursue the
3 issue of fetal surgery, or fetal diagnosis is maybe a better example, nuchal translucency
4 screening. There was a federal trial that was initiated and just about every obstetrician in this
5 country has an ultrasound machine, and I might divert a little bit to find, out in this case, was an
6 ultrasound done? Because you would think with craniofacial malformations, there was the
7 possibility of diagnosis, and clearly that would be brought up by an OB/GYN in terms of
8 recurrence risk.

9 DR. TUCKSON: It wasn't done, Allan.

10 DR. BOMBARD: Okay.

11 DR. TUCKSON: Does that make you unhappy?

12 DR. BOMBARD: Very unhappy, but not necessarily if it's a doc that
13 doesn't have the right training in ultrasound. Maybe it's better to not do it than to --

14 DR. TUCKSON: But what I want you to be unhappy about or wonder
15 about is from your experience, would it be unusual for a case like this for it not to be done?
16 What is your sense, in the end of the day, of the preparation, as you look at what's going on in
17 the field, in the profession of medicine today, and as you look at what's going on in each of
18 those colleges that you turned to, how concerned are you about the quality of how we're dealing
19 with these issues?

20 DR. BOMBARD: Well, I think most of us are concerned about quality, and
21 in OB/GYN there's a movement towards looking at certifications or credentialing on the basis
22 of quality. In ultrasound, there is the American Institute of Ultrasound and Medicine that is
23 trying to promote a level of competence based upon the equipment and experience. The Fetal
24 Medicine Foundation and the Society for Maternal and Fetal Medicine are promoting avenues
25 for certification and qualification for nuchal translucency screening.

26 I guess I should probably finish my thought.

27 DR. TUCKSON: I'm sorry.

1 DR. BOMBARD: With regard to NT screening, rather than covering it, we
2 took the ACOG position that it was investigational, and whenever we had a request to pay for
3 that test, the 100 nurses that worked for me would then refer the patients to the closest NT site
4 participating in the study to try to get these questions answered.

5 So looking to the professional colleges for what should be covered, trying to
6 direct patients to the best sources for that coverage, is important, and then, because we have a
7 fiduciary duty to the employers, the people that are paying for the health care, to provide
8 coverage of services that would benefit their employees, our members.

9 That's an issue in genetics because it's not an issue for one patient in a
10 family. It's a tremendous challenge on how this is going to be addressed. With respect to
11 cancer genetics, most commonly the proband in a family is going to be someone who's over 65,
12 and so you turn to Medicare for information, or you want to study the individual in the family
13 with the disease to see if there's a marker that you can use, but Medicare doesn't pay for
14 presymptomatic tests.

15 DR. TUCKSON: I want to ask you one other question, and I want to let the
16 people know who are running the show that we started late. So my panel gets three minutes
17 more, and then we'll stop.

18 While I ask you one more question, I'm going to come down this row, and
19 you're going to have like 20 seconds to make one recommendation to the Secretary's Advisory
20 Committee on Genetic Testing for what we should say to Secretary of Health Tommy
21 Thompson about what we need to pay attention to in terms of training health professionals in
22 this area.

23 So all the issues there, what are the policy recommendations? Because that
24 horrible McCabe needs to know what we are going to say, and he's very specific about it. So
25 you're thinking of the answer while I ask you the question.

26 These employers have very little money to keep paying for health services.
27 All these people want to do something. How much order should there be, how many rules

1 should there be, in terms of who gets paid to do what counseling, what part of this? Are you
2 worried that we're going to see everybody rushing in saying, "I am trained. I have the
3 credentials. I spent the time. I'm expecting to be reimbursed for all this wonderful talking to
4 this person and doing all this counseling" and so forth and so on? Are you worried that you're
5 going to pay for it five times, 10 times? Is this an issue and do you care about it?

6 DR. BOMBARD: I think it's a critical issue. There are only so many
7 dollars in this country to pay for health care, and then we have to be responsible about how we
8 allocate those dollars.

9 I saw it even with ultrasound testing. I see it with the request for coverage
10 of genetic testing. We at Aetna took some unique approaches to directing those services to the
11 right provider, but it's an issue.

12 You know, it's interesting that the promise of managed care, at least in the
13 HMO form and not the PPO form, tried to drive identification of a gatekeeper, a primary care
14 physician that would be responsible for coordinating the care, whether it was a pediatrician,
15 whether it was an internist or a family practice doc or, in some places, an OB/GYN, and pretty
16 uniformly the provider community, all the docs and nurses and genetic counselors, revolted
17 against that.

18 The patients revolted against that. When they wanted to see someone, they
19 wanted to see someone, when many times the questions could easily have been handled by the
20 gatekeeper, the primary care physician coordinating the care, and as a result, that person was
21 kept out of the loop with a lot of the specialty consultations.

22 DR. TUCKSON: Thank you very much.

23 Lightning fast, if we could close out, for Dr. McCabe to send to Secretary
24 Thompson, what's the one thing we need to tell him?

25 DR. PYERITZ: We can talk separately, I guess.

26 Actually, I have two points. The first is that we need to raise the tide and it
27 will lift all boats in terms of genetic awareness and genetic education, and there are a number of

1 ways of doing that. I think pronouncement from an august body such as this will catch the
2 attention of the specialty societies, the boards, and so forth, and help get the message out to the
3 troops who actually run training programs and set the standards.

4 The second point is in a variety of ways to have it become standard of
5 practice for pretest and post-test counseling to become inculcated in every aspect of whatever
6 we define genetic testing to be.

7 DR. TUCKSON: Good.

8 Next?

9 DR. DUMONT-DRISCOLL: I'd like to make a request for federal funding
10 for faculty development programs in order to have protected time for faculty not only to be
11 involved in the development of these educational programs, but also in the development of the
12 testing for the accreditation.

13 DR. TUCKSON: Good.

14 DR. HEATON: Oh, I can't be that fast, but to follow, I'd like to have help to
15 pay for educational resources and to pay for CME. Most primary care CME is sponsored by
16 drug companies, just drug companies, and we really need governmental support for faculty
17 development and education for the practicing physician.

18 I'd like to ask for support in paying for taking a family history, for paying
19 for the counseling, to pay for support of a family history system on the Internet or something
20 that would be standardized, regulated, something that would help us all to do that homework
21 outside of the office.

22 Last, to pay for translational research, so that we understand what to do
23 with this information. This is critically important to me that there is a lot of basic science being
24 done, but without the translational research in place to help us understand what to tell our
25 patients.

26 DR. TUCKSON: Ms. Rieger?

27 MS. RIEGER: Two points. First of all, I agree with Reed. Genetics will

1 cross-cut everything, and so the entire profession, all different disciplines out there, we're
2 struggling with how to raise the educational bar to get people more aware of genetics, but also
3 to think outside the traditional boxes and that there are a multitude of specialty societies out
4 there, and specifically to mention there is a nursing society that specializes in genetics.

5 So bringing these specialty societies into the fold as we grapple with the
6 question you asked me. How do we begin to get more specialty education for those that are
7 going to work more hands on with genetic conditions and how do we define that? And we need
8 a multiplicity of perspectives as we try to do that.

9 DR. TUCKSON: Thank you.

10 DR. McNEILLY: Education and research are definitely both critical issues,
11 and I think including health care professionals from a variety of disciplines who are not
12 necessarily M.D.s in groups that are providing education as well as being members of research
13 teams that can look at the actual clinical implications for the infusion of genomics.

14 DR. TUCKSON: Thank you.

15 DR. OFFIT: Well, here, I can't speak for ASCO. We are making a
16 statement which will come out later in the summer, and I would hope that SACGT would have
17 the opportunity to look at that and that might be a resource to them in formulating guidelines.

18 Speaking, though, as a clinician, I'm in an academic center, and
19 multidisciplinary training is a major priority, and the other, as a clinician, and I have to say I
20 feel strongly in an area, cancer genetics, where we have a very nebulous policy of Medicare
21 reimbursement and, amazingly, Medicaid not covering, for example, BRCA testing, we must be
22 committed to access of this translation of medicine, and it has to be across the board and not
23 dependent on means.

24 DR. TUCKSON: Thank you.

25 Allan?

26 DR. BOMBARD: Ken and I don't often disagree and I'm not going to
27 disagree with him here. My one request for the Secretary would be to insist that preventive

1 presymptomatic testing be covered under Medicare, because all of the health plans use
2 Medicare as their default, and it takes great initiative within the different health plans to cover
3 something that's not covered by Medicare.

4 DR. TUCKSON: Have you all met Susanne Haga yet? She put this panel
5 together. Would you thank her and this panel? Are they outstanding?

6 (Applause.)

7 DR. TUCKSON: Thank you all.

8 DR. BOUGHMAN: And thank you, Reed, for moving it along and keeping
9 us on track and focused.

10 We've heard a lot of issues this morning. We will be moving into lunch,
11 and those of you who have tickets, and your tickets are behind your badge if you signed up for
12 lunch, it's in the ballroom next to us.

13 This afternoon, our focus groups will be in the four rooms on the other side
14 of the escalators. So those of you who are going out to lunch, please make sure you come back
15 and join us at 1 o'clock to start the afternoon.

16 We will have our four focus groups. We have tried to delineate the ideas in
17 the four focus groups, one, based in the area of curriculum development; another, training
18 issues around accreditation and a variety of issues that are actually post-classroom work, if you
19 will; another group talking about the development of tools and resources that you've heard
20 referred to several times here; and Focus Group IV on the implementation of new developments
21 in genetics. We are seeing professional organizations now promulgate guidelines and to-do
22 lists, and the question that we at the Secretary's Committee have is how better to focus our
23 efforts on implementing those kinds of guidelines appropriately.

24 So we hope you enjoy your lunch and we'll see you back at 1 o'clock.
25 Thank you.

26 (Whereupon, at 11:56 a.m., the meeting was recessed for lunch and focus
27 group sessions, to reconvene at 3:30 p.m.)

AFTERNOON SESSION

(3:43 p.m.)

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DR. BOUGHMAN: Good afternoon.

The format for the remainder of the afternoon is a fairly simple one. We are going to ask the two moderators of each group to give us some summary statements and/or recommendations from their group, trying to share a little bit about the flavor of their group with the audience as a whole.

The reports that I've gotten were that people took their assignments very seriously and in fact that there was a great deal of interaction and input from nearly everybody who attended today's meeting, and for that we are very grateful and even more glad than ever that you all came to actively participate as well as to absorb and listen. We fully expect that participation and activity level to continue after you go to your homes, so that in fact the awareness and enthusiasm will continue.

I'd also like to take this opportunity to thank profusely Susanne Haga for her great work in pulling this together, the panelists, the morning speakers, and so on. She has, I think, done a terrific job and made my job as chair of this committee much, much easier.

Susanne, thank you.

(Applause.)

DR. BOUGHMAN: I would also like to say a word of thanks to our speakers and panelists and our moderators for this afternoon and the investment that they've made both before and during today's meeting.

What we'd like to do now is in fact start with Group I, and we have Dr. Bruce Korf and Dr. Jean Jenkins. Group I was Genetics Content and Curricula in Health Education.

DR. KORF: So we very hastily put together a PowerPoint summary. It will fall prey to the common PowerPoint crime of death by bullet, however.

(Laughter.)

DR. KORF: All right. So the first question that we were asked to address --

1 and incidentally, I would say that we had an extremely interactive group, for which we're very
2 grateful – is the question of whether genetics should be represented in the curriculum and this
3 is, very broadly speaking, across various health professions as a separate course or integrated
4 into the curriculum.

5 The first point is the need to excite students and colleagues. I think it was a
6 generally accepted point that genetics has to be integrated into the curriculum, but this doesn't
7 preclude a freestanding course from existing, and there is some value to highlighting the
8 fundamental principles of genetics in order to sensitize students to the integration that they're
9 likely to see from that point forward in the curriculum.

10 The point was made that students and colleagues are at different places with
11 different needs, a point we'll return to in a few moments, and therefore no one approach will fit
12 all needs.

13 The term of "guerrilla genetics," put genetics in where you have the
14 opportunity to put it in, was mentioned.

15 The use of online information and courses also came up.

16 So I would conclude from this that we don't have a conclusion firmly as to
17 whether genetics should be represented in a separate course or integration, but we feel strongly
18 that it needs at the very least to be integrated, but I think the question remains open, and as
19 you'll see later will be in part dependent on the culture in which the course is being provided as
20 to whether a freestanding course still has a role.

21 We actually could have gone on for a few more pages here, I think, in terms
22 of what are the obstacles, and I'll only highlight a handful that came up. The point was made as
23 to whether -- these are not in any particular order, incidentally – the need for knowledge of
24 genetics is well reinforced in testing and this testing we're talking about, board exams and other
25 qualifying exams, the degree to which students will tailor their learning to what they absolutely
26 know they need to know to get on to the next step.

27 The complex problem of access to time in the curriculum, which it would

1 appear cuts both ways. The idea of putting a freestanding course means somebody else has to
2 give something up which may not be easy to accomplish, but the converse is that rather than
3 eating into the time of other courses, the feeling was maybe a freestanding course would have
4 value. So both points were made.

5 The obstacle of the demand for knowledge exceeds resources, particularly
6 the number of faculty who feel qualified to provide the kind of teaching that is necessary.
7 Concerns about whether faculty are recognizing the importance of genetics in their practice and
8 the degree, as you'll see in a minute, to which we need to be teaching people today about what
9 comes some time in the future.

10 The point was made that we need to focus not on genetic disease but on
11 genetics and its contribution to biology and to health. There was an interesting point about how
12 faculty are reluctant to reveal that the students know more than they do about much of the
13 content. The need for funding and support of the faculty development and time to teach was
14 important and to return to this point which I think is an important one, it's a challenge to put out
15 the message of the importance of genetics when most of the current-day applications are
16 relatively limited, to be quite honest, and we're trying to convince our colleagues that they need
17 to be paying attention to something because it will be very important in their practice, but when
18 your feet are sort of held to the fire, so what do I absolutely need to know now to be effective
19 as a clinician, the list exists but the list is not as long as probably many of us would like, and
20 the point was made that the metaphor so often heard that the tidal wave is probably not the
21 most apt one, but clinicians nevertheless will drown from the gradual and steady trickle of
22 information if they don't try to keep up.

23 And then, the question which comes up again in a moment about whether
24 geneticists are expecting too much of their students and colleagues, whether we're trying to
25 teach them to be geneticists or teach them to use genetics in their practice, which brings us
26 indeed to the question of how much education is needed for health professionals. The
27 importance of collaborative educational design came up several times, the need to demonstrate

1 partly by rubbing shoulders with colleagues on the wards, that if the image of the geneticist is a
2 person who threw away the prescription pad years ago, as the physicians say, and was content
3 to be involved in one-time consultations with complex patients, then the specialty will surely
4 dwindle in terms of its influence.

5 There was concern raised about the difference between consultation and
6 empowerment, and I think the important point made that the more our colleagues know, the
7 more we will be engaging them and that will result actually in being asked to consult more
8 often.

9 I think it was also raised that genetics is in the process as a profession of an
10 identity crisis of sorts. It was born in an era of rare diseases in the '50s and '60s where single-
11 gene disorders, where chromosomal disorders, inborn errors of metabolism, congenital
12 anomalies ruled as what was genetics, and until geneticists recognized that they need to expand
13 their own horizons, to be involved in the genetics of more common disorders, they will risk
14 marginalization, and there is no doubt in my mind that genetics will be integrated into medical
15 practice. The question is whether those who understand genetics currently are going to help
16 lead the charge or are going to be left behind holding their copies of Smith's book and other of
17 the icons of genetics behind them while others march on, and finally, the importance of
18 tailoring the message to the audience.

19 We spent considerable time talking about the value of the NCHPEG
20 competencies. I think there was a general feeling in the room that they were a satisfactory point
21 of departure for identifying some of the major competencies, but we can't expect colleagues to
22 be mini-geneticists, I guess I understand what that means. The level of detail provided needs to
23 be clinically relevant.

24 One of the participants coined the term of developing a set of "genetics vital
25 signs." What are the critical things that a clinician needs to recognize as an impetus to do
26 further, whether it be, testing, management, referral or whatever? The core competencies have
27 pulled the basics out of medical education. Now, there's a need to try to reintegrate those back

1 into areas of practice and also to recognize the potential for using these as a basis for
2 continuing education as well as undergraduate education.

3

4 So lastly, we tried to identify what might be described as action items for
5 the Secretary's Advisory Committee, and it didn't take long for the demand for increased
6 funding to come up. It occurred to me that that won't be the first time the Secretary has heard
7 that, and the questions really were asked funding for what and what would be the value-added
8 for providing that?

9 I think among the things that were raised were the importance of developing
10 clinical educators who can disseminate the message, of recognizing the need to provide better
11 services across the diversity of the population and increase the diversity both of providers and
12 of the access to care, recognizing the challenges in achieving reimbursement for providing
13 genetic services, no surprise, came up, and the concept of moving now towards a Human
14 Genome Implementation Project. The question could be asked where is the generation of
15 clinical investigators who will need to take the information derived from the genome and
16 actually translate it into medical practice?

17 And lastly, a set of educational approaches that may warrant further
18 development, the importance of partnership with consumers, the use of information science
19 which genetics fundamentally is, the need to use varied technologies and approaches in
20 education, and finally, a recognition of the likelihood that at least some genetics knowledge
21 dissemination, whether education is the right word to use, will be provided from the
22 commercial sector, that physicians habitually use drug companies, for example, to learn about
23 the proper use of medications, and one can only assume that the same will happen with both
24 genetic testing and with management strategies.

25 I think our point here is simply to recognize that this is likely to happen and
26 maybe it is possible to get ahead of the curve here and try to create educational paradigms that
27 deal with this because arguably this may not be the most reliable source of information if not

1 done perhaps in partnership with the professional community.

2 I don't know if you want to add anything.

3 DR. BOUGHMAN: Nothing to add, Dr. Jenkins?

4 DR. JENKINS: No.

5 DR. BOUGHMAN: Well, I sat in on this group, and I think in fact the two
6 of you put together the PowerPoint and captured the essence of what was said very nicely.

7 I would ask now specifically if members of the SACGT or the Education
8 Work Group have questions that they might want to ask of our two moderators or of Group I
9 before we move on to the next report.

10 PARTICIPANT: I'd just be curious about whether you had any discussion
11 about discipline-specific versus interdisciplinary and the strengths of each of those models,
12 because I think the practice standards for disciplines are different, but also I think that there's
13 some richness that comes from bringing it together.

14 DR. McCABE: Could you repeat the question so we capture it for the
15 record?

16 DR. JENKINS: Sure. There was a question of whether our group discussed
17 at all the possibility of interdisciplinary education.

18 We actually did have a fair amount of discussion about the synergy that
19 comes from having interdisciplinary education but also the conflict that arises when different
20 disciplines are at different levels or that perhaps the focus is different, and one suggestion was
21 that perhaps we did it by specialty interests.

22 So for example, cancer genetics might be something that could be
23 approached through both physicians, nurses, disciplines, occupational health, et cetera, as one
24 possibility.

25 PARTICIPANT: Was that part of what you had in mind when you were
26 talking about taking NCHPEG competencies and then reintegrating them into practice? It
27 would be helpful to have you elaborate a little more on what you think the tasks are in that.

1 DR. JENKINS: NCHPEG competencies were designed with multiple
2 discipline input, and one of the conclusions that we came forward with was that we were at
3 different levels of understanding of genetics, plus we also would kind of target in our mind
4 different examples that would mean more to us.

5 So that myself as an oncology nurse, I would be very interested in cancer
6 genetics, and so we all felt we needed a certain baseline understanding, but then to take it
7 perhaps by scenarios or examples or role disciplines to be able to then expand that knowledge
8 base and tailor it.

9 PARTICIPANT: So it sounds to me like what you're saying, and I think this
10 is going to be very important in developing educational goals, is that one can take a generic
11 statement like the NCHPEG core competencies, but then one needs to look at different areas of
12 medicine in terms of the actual clinical tasks of those areas of expertise and interpret the core
13 competencies and what educational goals you have in context. Is that correct?

14 DR. JENKINS: Very good.

15 DR. KORF: Yes. I think you might kind of view this as there needs to be
16 some alternative splicing of the various exons of NCHPEG, that we need to be looking at this
17 as a kind of backbone along which you can then build more discipline-specific educational
18 goals.

19 DR. BOUGHMAN: Other questions?

20 (No response.)

21 DR. BOUGHMAN: Thank you very much, Group I.

22 Group II, we have Dr. Rita Monsen and Dr. Glenn Davis, who had their
23 work group on the inclusion of genetics in training, examinations, and accreditation
24 requirements.

25 DR. MONSEN: Thank you.

26 We had probably about 20 or 30 people in our room and they all talked. We
27 went ahead and put together a summary. We are not as technically advanced as the first group

1 was, but nonetheless we managed to put our work together for you.

2 We had a cycle that you'll see on your upper left that says that education
3 indeed drives testing and that includes licensure and certification and accreditation, because
4 accreditation standards often develop from the educational programming as it becomes
5 pervasive across our nation, and that those testing and accreditation standards and patterns
6 again contribute to patterns in education, new developments, the new kinds of curricula foci,
7 the new kinds of emphases, and so that cycle is a self-perpetuating cycle in many ways.

8 So we began to recognize the pressures that educators, that test-makers, test-
9 writers, certification item writers, and accreditation bodies feel. Many of them come from state
10 and federal groups, including the Medicare and Medicaid guidelines, the Guidelines for
11 Practice, evidence-based practice. Payers are very influential in what gets taught in curricula,
12 not only in medicine, nursing, and the allied health, but in many of the programs across that do
13 prepare health care providers.

14 The FDA is very influential in terms of how those products and those kinds
15 of testing and laboratory procedures are viewed. There are commercial interests that are very
16 much competing at times and are influential on our curricula and our education as well as our
17 testing and accreditation. Litigation is extremely important, and the public itself, and this
18 encompasses consumers and the media as well as watchdog organizations, who call us to pay
19 attention to how we prepare our providers, how we continue to prepare providers. We certify
20 them, we license them, we renew their certification and licensure, and all of the attendant
21 mechanisms that accompany those processes.

22 We talked about training issues and we included one of the first comments
23 that we saw was the overloaded curriculum, and where can we fit genetics? What are our
24 challenges? We have time priorities and we have priority-setting challenges. We have lead
25 faculties that are responsible for content. Of course, they change places. They move away.
26 Those gaps and those holes don't get refilled. We have vested interests in political territory
27 kinds of skirmishes that sometimes occur in schools, and we are very concerned about the

1 evaluation and the evaluation of learning as well as the evaluation of outcomes.

2 We saw a number of comments from our group that reached consensus in
3 terms of co-creating genetic competencies among provider groups and that specialty societies
4 also had a role in these competencies and had a responsibility for bringing those competencies
5 to their respective item writers, to their respective certification boards as well as their
6 accreditation arms.

7 We looked at the competencies to be supplied to specialty testing
8 organizations. We thought that this would be helpful for them. Many times, the testing groups
9 don't have individuals with backgrounds in genetics. They have people writing items that are
10 not necessarily well versed in clinical genetics and clinical services. Sometimes those
11 individuals writing items and structuring exams use the existing literature from which to draw
12 item content, to draw the distractors and the correct answers, and again our literature also is
13 important in influencing what happens in curricula, what happens in our testing and our
14 accreditation, and the competencies, of course, should be supplied to the various licensure and
15 certification boards across the nation.

16 We look for the competencies to be more performance-based, and we ask
17 our organizations, our professional societies, to focus on how to translate in their own specific
18 disciplines performances and competencies that focus on the delivery, the actual practice, the
19 behaviors, and attitudes that we would like to see in providers.

20 But we had a specific recommendation that we thought was helpful. The
21 USMLE and the NBME. These are the medical education examination boards for physicians in
22 this country. We would like to see them begin providing feedback on genetics as a subscale or
23 a specific content area for the scores that go back to the deans of medicine, and we believe that
24 there are efforts -- I think Dr. Mimi Blitzer spoke of those efforts -- that are already very helpful
25 and informative and have had quite some influence on medical education in the United States.

26 We are looking at performance indicators for clinical genetics providers,
27 and we need to see performance indicators -- in other words, specific behavioral patterns --

1 when clinical genetics services are delivered.

2 One of the things that we brought up was the fact that we are looking at
3 portfolios and portfolios that contain an array of requirements, including case studies that the
4 candidate writes. These are very detailed, very in-depth, and they reflect that provider's
5 assessment and diagnoses, consideration of family history, including the drawing of pedigrees,
6 the interpretation of laboratory and other kinds of diagnostic testing, that those portfolios with
7 case studies really demonstrate the thinking, the kinds of thinking patterns that providers --
8 well, we have the portfolio now in nursing for the credential for advanced practice nurses in
9 genetics, and I think that the idea of a portfolio with case studies was a more in-depth way to
10 measure the behaviors of providers, rather than an objective multiple-choice exam or a
11 computer-simulated testing program.

12 We want the competencies to be applicable at the baseline and general
13 practice level as a baseline for all providers, but we want competencies to be profession-
14 specific. We reached consensus in our group on all providers being very, very able to take a
15 good complete family history, to have indicators for referral clearly in their minds, and to have
16 the ability to interpret genetic testing.

17 We want payers. We reached a consensus that Medicare and Medicaid
18 indeed leads the efforts in this nation to define and reimburse for testing and genetic
19 counseling, and we saw this as extremely important. We also see that Medicare and Medicaid
20 and in a sense federal efforts and national efforts to evaluate the whole process of genetic
21 services and the whole idea of quality as well as the credentials of the providers as very
22 essential for good quality care.

23 We recognized that providers and specialty societies need to create self-
24 evaluation performance standards, so that the actual provider would be able to monitor
25 themselves, and we saw this as important and many times it's possible to develop programs
26 where the provider can take time and monitor their own performance. We are hoping to see
27 that.

1 We also know that other groups are interested in teaching providers, not just
2 the academics or not just the specialty organizations, that indeed the biotech industry is moving
3 forward rapidly in educating providers about testing as well as drug reps that educate providers
4 about other products and pharmaceutical products.

5 We do see that there was an issue about costs of testing versus not testing.
6 We're nervous about missed cases in families and misinterpretation, misperception, not only on
7 the part of providers but also on the part of families, and we see this also as part of the health
8 economics and the health effectiveness, the effectiveness of our services.

9 The biotech industry, and we had a very good contribution from one of the
10 biotech laboratories, is very concerned about the appropriate use and the appropriate ordering
11 of genetic tests, and we were concerned that evidence-based practices be part of genetic testing
12 and that evidence-based delivery of care is extremely essential in the use of genetic testing. We
13 were concerned about the careful exploration of joint partnerships that would include industry
14 as well as academics and direct care providers and clinicians.

15 This is my last. We wanted a consideration directed for the federal
16 legislation for orphan drug and orphan products. This has come out in the last several years,
17 that orphan drugs have received attention and orphan has been expanded to other kinds of
18 products for rare diseases, but we believe that this legislation could be expanded to include the
19 concerns about funding for genetic testing and the concerns about evaluation of the
20 effectiveness and the quality assurance associated with genetic testing.

21 We recognize that faculty development is important and train-the-trainer
22 models are helpful. Interdisciplinary models are viewed very positively by our group and felt
23 that there was a great deal of efficacy there. We know that combination and joint training
24 programs work. We know that genetics and educators in pediatrics, gerontology, psychiatry,
25 mental health, gastroenterology, all of those specialties, can join with people in genetics and
26 provide very strong programming to train upcoming providers and clinicians.

27 I'll open the floor for questions. What kinds of comments or questions do

1 you have for us?

2 DR. BOUGHMAN: Are there any questions or comments? Dr. Davis, did
3 you want to add anything?

4 DR. DAVIS: Excellent job.

5 PARTICIPANT: One of the things that always interests me is that knowing
6 the health profession regulation laws come out of consumer protection. Most of our licensing,
7 at least not the certification but the licensing piece comes out of the area of consumer
8 protection.

9 So I don't know if you gave any thought or any comments to consumer
10 involvement in setting standards as to how consumers believe health care professionals should
11 act.

12 DR. MONSEN: I think that our group would be very supportive of the
13 inclusion and probably actually requiring a consumer presence and consumer voices and voices
14 of diversity in those kinds of planning and policymaking processes. Absolutely.

15 DR. BOUGHMAN: Any other comments?

16 (No response.)

17 DR. BOUGHMAN: Thank you very much.

18 DR. MONSEN: Thank you.

19 DR. BOUGHMAN: Group Number III was on tools and resources. We
20 have Robin Bennett and Bonnie Pagon, who co-chaired that session.

21 DR. PAGON: Well, we're getting lower and lower tech. I hate to see what
22 Group IV is going to do. So we have neither PowerPoint nor overhead.

23 So we were asked to consider what resources and tools were needed and
24 who should develop them, fund them, and approve them. So we didn't have an answer, but
25 we'd like to start with the last question first, and that is, what role does SACGT, professional
26 societies, or other groups potentially have in dealing with these questions?

27 The group was very supportive of the SACGT process and really felt that if

1 SACGT was looking for the next place to go, we really felt that the exploration of issues related
2 to educational materials and education itself was possibly a goal where they could go, and part
3 of this, of course, is the theme that we've been hearing all day, and that is that testing and
4 education go together.

5 Another thing about the SACGT is that we were very complementary of
6 their process to bring together diverse groups and to entertain all comers and to accommodate a
7 lot of different perspectives in weighing what the oversight issues were.

8 So having said that, the group was very interested in really an ongoing or a
9 centralized or a focused discussion on these educational issues, and what the themes that came
10 out were that collaboration was going to be a key issue in developing any educational resources
11 and that the perspectives of diverse audiences -- health care providers, consumers,
12 policymakers, the media -- all needed to be considered at once. They blended together and they
13 were part of the continuum. Again, another theme from the day, that they exist on a spectrum.

14 The other issues that, of course, came up in talking about educational
15 resources were quality and currency being two of the highest standards that the group felt
16 needed to be addressed.

17 One part of the discussion that I think was extremely helpful was the
18 analogy between where we are now and where the development of guidelines and practices
19 was, I guess, a decade ago, before the U.S. Preventive Services Task Force was developed, and
20 it was suggested that maybe the SACGT, in looking at educational resources, could begin to
21 play a similar role, and the issues that could be addressed were, one, by having such a focus,
22 one is that you would get cross-discipline input, and I think the point was made very strongly
23 that genetic testing, just as you've heard again from the previous two presenters and you'll
24 probably hear from the next presenter, is that we're talking about cross-disciplinary activities
25 and that if guidelines are left and resources are left to individual disciplines, it will probably be
26 in the long run far more destructive.

27 The issue came up that when you have different groups making different

1 guidelines, you really promote rogue behavior that supports the interests of the practitioner or
2 whatever group is practicing sort of in between all of the different disparities between the
3 guidelines.

4 Secondly, that an activity like the U.S. Preventive Services Task Force
5 would help set a research agenda, and we keep hearing about evidence-based guidelines and
6 information, but if we could have those questions driven by the research agenda of again the
7 group deliberating on these issues, it would certainly promote the funding of those kinds of
8 activities and the development hence of evidence-based information and guidelines.

9 The last issue that we came up with and related to resources was the issue
10 of funding, and the thought was again that if the SACGT took on the issue of looking at
11 educational resources, they could in their process identify gaps and promote the idea of funding
12 by primarily different federal agencies. We realize that there is some role for private money,
13 but the concerns are that private money may be considered to be biased in terms of the outcome
14 of the educational efforts that they might support. So that was our discussion about resources.

15 Related to that is the other topic I'm going to mention and then Robin will
16 talk to you about tools, and that is the need for a common language, and we realize that as this
17 new science and practice is developing that having a language that can be understood with a
18 shared vocabulary by scientists, consumers, policymakers, media, legislators, and by our
19 accrediting and certification bodies was going to be essential.

20 We didn't have a good idea on how to do that, although we did have one
21 example, and I could ask the person who presented that to explain it, but it really may take a
22 long period of time with diverse input to develop this lexicon that we would then use.

23 There were several examples. One example that was given was the use of a
24 standardized pedigree tool, that prior to that development, it really was a multi-gauged railroad.
25 You could do a pedigree any way you wanted and you just had to explain every last bit of the
26 pedigree you were using so that the next person looking at it would know exactly what you
27 were trying to convey and certainly we think that that world exists now with test interpretation

1 and we kept hearing that over and over again, that test interpretation used a vocabulary and a
2 set of premises that weren't necessarily shared by the practitioners ordering the tests.

3 DR. BENNETT: One of the things that we've heard over and over again,
4 including in our lectures earlier today, was that maybe there's a need to look at family history
5 tools, and so we looked at that as a resource, and our group, like many other groups, feel that
6 this is very important, but we feel that if we had a recommendation to make for SACGT, it
7 would be that big word "money," because there really isn't much research that's been done in
8 this area in terms of evidence-based.

9 For example, what sort of tools should be used? Web-based, paper. How
10 does this get translated into an electronic medical record? These are all key issues that really
11 we don't have any basis of knowing, and so we really think that the SACGT should set an
12 agenda.

13 The CDC actually had a meeting two weeks ago addressing family history,
14 and they gathered a lot of this material, but again there needs to be some funding to move these
15 agendas forward.

16 There's a lot of push to have these medical records be transportable in terms
17 of family history, that a patient takes their own family history. So there needs to be education
18 at the lay public level that genetics is important and being able for them to update their own
19 history and to bring that to bear on their practitioners.

20 If you're going to bring these records to a practitioner, they need education
21 on how to interpret family history. So there needs to be this faculty development that was
22 mentioned before and also if you increase awareness about family history and genetics in
23 general, there needs to be more services available so access to genetics services and so training
24 not only at a base level but also more specialized training for genetic counselors, genetics
25 professionals and related specialties involved in genetics.

26 One issue that we heard earlier today that our group also addressed was
27 reimbursement for taking a family history. If we say it takes 15 minutes to obtain a family

1 history but yet it's not reimbursable, if that 15 minutes is really worth including, if that's really
2 good bang for your buck, then really we need to see how that can be reimbursed better.

3 We talked about the dissemination of tools in general, not just family
4 history, but about these tools and talked about continuing medical education as a way of
5 reaching people that are already in service. We talked about how we have a multigenerational
6 health force. Some people trained 40 years ago, some people being trained now, and so we
7 need to be able to get these tools to people at different levels. Many people still use textbooks.
8 People are always talking about Web-based, Palm Pilots, but there's still some need for
9 standard ways of education. People talked about maybe some news alerts, maybe some kind of
10 a letter that goes out with key issues in genetics.

11 Then we talked about that really we need to educate from a very early stage.
12 The resources for the lay public, not just the consumers with genetic diseases but learning --
13 they used the phrase "genetics is your friend," that really teaching about genetics at a primary
14 grade level is an important thing, and then maybe reaching out to mainstream groups in the
15 communities, such as all these millions of people that do genealogy but they knew where
16 people died and what church their ancestors were married in, but they don't know what they
17 died from. So getting them to record that kind of information and maybe some of the
18 community-based groups, like even the Boy Scouts or clergy, main groups that are leaders in
19 the field to get genetic health as part of that.

20 Then another key message is to get out about risk perception in general, that
21 we're not very good at interpreting tests and risks as a public and so if we could get that
22 message out, not just about genetics, and then I think the overlying word I would end with is
23 that we saw really key need for collaboration in education and resources. We do much better if
24 we get input from lots of different viewpoints and not just our own organizations.

25 Thank you. Any questions at this point?

26 DR. BOUGHMAN: Any questions, comments?

27 PARTICIPANT: Just a comment on your suggestion about incorporating

1 the U.S. Preventive Services Task Force. You might also want to include the Community
2 Preventive Services Task Force.

3 DR. BENNETT: Anyone else?

4 (No response.)

5 DR. BENNETT: Thank you.

6 DR. BOUGHMAN: Thank you very much.

7 Group IV, Implementation of New Developments in Genetics. We have Dr.
8 Rod Howell and Dr. Carole Kenner.

9 DR. KENNER: Well, I think many things that have been said by the last
10 three groups we will reiterate, and we're just as low-tech as the last group.

11 We concentrated on actually the steps that we felt were important because a
12 lot of the dialogue in answering the questions we were given really led to the steps, and we felt
13 as a group that this kind of meeting with open dialogue is extremely important, using the
14 various disciplines as well as consumers that were present, and that that open dialogue needs to
15 continue.

16 But along with that, that those of us that have access or represent specialty
17 organizations and professional organizations need to take this same model back there and
18 increase the dialogue among our colleagues and also consumers.

19 The other part that we focused a lot on was in terms of providing guidelines.
20 The Guidelines for Practice were incredibly important and it would make a big difference in
21 terms of moving the agenda forward. However, for example, with the cystic fibrosis one, that
22 we also needed to pay attention to the fact that while we have the guidelines, that we also
23 needed to do work as far as laboratory guidelines of how to implement, so that sometimes we
24 were creating guidelines but then the next piece or those people that were going to carry them
25 out had not necessarily been involved in the dialogue and that that was a piece that seemed to
26 be a problem.

27 I think one of the industry representatives also mentioned that as things are

1 being recognized in industry that need to be created, that they needed help in terms of getting
2 before the right public or the right population -- for example, the physician groups -- when it
3 came to pharmacogenomics and how can we help them do that or the Secretary's Advisory
4 Committee may be instrumental in putting the groups together.

5 Another large issue for us was the consent issue, issues around consent,
6 who needs it, what form does that consent need to be in, and also that many institutions are
7 using very, very long, very laborious versions of informed consent that take 15 to 20 minutes to
8 go through the document. Should there be a shorter version for informed consent, and what's
9 the middle ground for that? Should it be a brochure-type, something that is very explainable,
10 very usable, and yet still addresses the issues of informed consent?

11 There has been a discussion or there was a discussion about the fact that
12 there's been a lot of one-way dialogue, the process of giving a lot of information to
13 governmental agencies, sometimes when it comes to newborn screening, genetic testing, but
14 that we need to consider that there needs to be feedback from the groups as well and that the
15 process is a two-way street.

16 Need for resources. Same thing as the previous groups have said, that
17 there's a need for resources, but we also need to consider how, when, and what populations
18 need to be involved in that. For example, there doesn't seem to be enough time to talk to
19 patients and yet now we want to add one more thing or the history tool that might be very time-
20 consuming. So how do we hit a middle ground where that is not as much of an issue so it
21 comes to clinical utility? Also, of course, tied to that is the reimbursement issue.

22 Also, the same thing that was mentioned in the two previous groups. Not
23 enough time to teach those of us in the health care professions how to be and stay up and
24 current on genetics, including the genetic professionals are saying that that's a difficult time,
25 and so that's another issue. How do we get enough time, and how do we reach a currency and
26 stay current?

27 Again, one of the other large issues came back to the practice guidelines,

1 and that was the fact that the translational research needs to come first. We need to focus on
2 the outcomes and the evidence so that we can actually develop the practice guidelines and yet it
3 seems like we're doing it for the most part in the opposite way.

4 The clinical utility first before developing practice guidelines is critically important and yet
5 again has not always been the way that we've been able to do it.

6 Cost-effectiveness research needs to be undertaken and yet really has been a
7 problem. There needs to be more private payers involved in the discussions, also, in terms of
8 research and in terms of the guidelines.

9 We also identified some key obstacles and primarily you can guess that the
10 time and reimbursement issues were the key factors. One of the suggestions that came from the
11 audience, from the participants, was actually to use the public health officials that already have
12 some expertise and access to help in getting the information out and disseminating them to the
13 information.

14 Another thing that we spent time on and several of us, I think, have talked
15 throughout the day about this, is knowing even within this group what resources we have and
16 what is a common ground. How do we link ourselves to each other? For example, the ACOG
17 Website does have some of the newborn screening genetic testing on it. So that is a rich
18 resource, but then there are many other ways. We talked about using, as the NCHPEG Website
19 is evolving using that as another key place where the dissemination of resources could be there
20 and the linkages could be there.

21 So for the most part, we talked about, I think, the very same things that the
22 other groups did in terms of time, in terms of resources, in terms of the need for education, both
23 from a consumer standpoint as well as for the health profession standpoint, and again with the
24 issue in terms of knowing and getting to know our resources.

25 DR. HOWELL: I think that's an excellent summary.

26 Group IV was very large, very interactive, and very diverse, which I thought
27 was very good. We had a considerable number of people there from industry, which I think

1 enriched the group considerably.

2 There was handed out at this group a series of practice guidelines, and
3 you've mentioned this, but they were felt by and large to be extremely valuable, although there's
4 some difficulties with them.

5 The other area that was discussed that I think I'd like to come back to and
6 that is that our industry colleagues in particular felt that it would really be valuable to have
7 some more organized structured material on pharmacogenetics, which is clearly going to be an
8 area of great importance, and one might visualize that one of the things that the committee
9 might recommend would be an organized effort in pharmacogenetics that would prospectively
10 gather information from multiple sites around the country which could be extremely valuable in
11 moving this field forward at the current time, and I think that would be a very nice thing that we
12 can prefer to the group here to carry to the Secretary.

13 DR. KENNER: Are there questions?

14 (No response.)

15 DR. KENNER: Thank you.

16 DR. BOUGHMAN: It's been a very full and I think very successful day. I
17 would like to just run through a few things, and I'm going to then give everybody their
18 assignments.

19 My assignment for this evening is to summarize today's meeting to present
20 it to the Secretary's Advisory Committee tomorrow morning at 8:30. So I'll be busy tonight, but
21 I would just like to run through some of the themes that I heard during this last piece as
22 reemphasized from the day's taking-off point.

23 I heard a lot about integration here, to pull resources in, to utilize the
24 professional groups and the professions so that that which we have already built on from
25 NCHPEG and other groups might be pulled back in by the professions to then bring these
26 things forward with two issues that we need to pay attention to, both quality and currency of the
27 information that is there.

1 We need institutionalization of genetics and genetics learning. We need
2 that in the form of common language that we all can speak from. We need to have it
3 incorporated into the exams in the professions, into performance indicators. Back to that thing
4 I started off with this morning, what behaviors do we want to see changed? And that faculty
5 development is one of the key processes in getting a topic as broad as genetic institutionalized.

6 That brings me to novel approaches and common ground, and we heard this
7 morning about the family history, and I've heard that tool mentioned a few times this afternoon
8 as well. I've also heard that some of the novel approaches, like the GPC and NCHPEG, are
9 indeed working and that they should continue working because these models incorporate some
10 of the really important aspects, including collaboration, partnerships, interdisciplinary
11 activities.

12 I did hear some call for more diverse inclusion of the public, the industry,
13 and for SACGT to look at some of the previous models, like the U.S. Preventive Services Task
14 Force and the Community Services Task Force.

15 We need more data. We need to see studies on implementation, such as the
16 laboratory guidelines issues. We need to know more about the reimbursement processes and
17 what is not reimbursed so that we can document what does need to be reimbursed. We need
18 more translational research. We need to know more about the outcomes. Never mind that it's
19 difficult research to do, it needs to be done, so that we can convince people that genetic testing
20 is an efficacious model for us to pursue, and we need more information on pedigree tools and
21 the way that the paradigm might be incorporated and integrated into practice.

22 SACGT needs to look at and challenge the Secretary and the agencies to in
23 fact fund some of those studies, to develop new models for faculty development and to figure
24 out ways to fund teaching, including the training of geneticists to expand that workforce.

25 We also need to look at some policy, and now I will tap into my colleagues
26 in the other work groups because they very nicely mentioned several of the other work groups
27 as themes that went through today.

1 First of all, the consent issue and the way that education and consent
2 interact, and that's in fact another one of the work groups. Underserved populations. That taps
3 right into the SACGT Access Work Group. The challenge to using or adopting an orphan drug
4 kind of approach, when we talk about the Rare Diseases Work Group of SACGT, and once
5 again a reiteration of the fact that the collaborative model that SACGT has been working on
6 seems to be a process that our colleagues and the constituents at least who have attended and
7 come to speak have encouraged us to continue.

8 So I have my job for tonight to expand that and present it to the SACGT
9 tomorrow. The Education Work Group will make a formal report that will be available to you
10 via the SACGT and the SACGT Website. The SACGT's going to have some challenges to look
11 forward to.

12 The rest of you in the audience, I heard at least one specific assignment
13 today, that the open dialogue, the process, the interdisciplinary nature of what we've been able
14 to experience here today has been a good one, an enriching one, and that we want to all take
15 that home with us and use it on a daily basis and in fact build upon this model nationwide, and
16 that that will be a much bigger and better start than we've had previously and in fact will enrich
17 the genetics education in and of itself.

18 So I would encourage all of you to do that, and I have one more assignment
19 for all the moderators. We need all your notes, all the notes, so that we can put this down in
20 more complete form for the meeting tomorrow morning.

21 For those of you who can stay, the SACGT meeting of the next two days is
22 an open meeting. The committee will be working hard and anybody who would care to stay
23 and/or join us for any of those deliberations, we do welcome public observation of all of the
24 workings, and Dr. McCabe is very diligent about making sure that there are periodic portions of
25 the meeting that are set aside for public comments on the issues on the table at that time.

26 Did you have anything else, Ed?

27 DR. McCABE: Well, I just want to thank all of the people who participated

1 today, both this morning's session, the afternoon work groups, all of you in the audience.
2 We've really got a lot of good ideas from the groups this afternoon, and thanks to Joann and
3 Susanne Haga and Suzanne Goodwin and Sarah Carr and the staff for the Secretary's Advisory
4 Committee.

5 I would reiterate, please, feel free to give us input. If you can't be here in
6 person, please give us input by email. If you think of something flying home that you want to
7 tell us about that would help us, please get it to us, and thank you again.

8 DR. BOUGHMAN: Thank you all very much.

9 (Applause.)

10 (Whereupon, at 4:40 p.m., the meeting was adjourned.)