CHEMICAL HERITAGE FOUNDATION

PETER MELDRUM

Life Sciences Foundation

Transcript of a Research Interview
Conducted by

Brianna Rego Lind

Salt Lake City, Utah

on

25 October 2013

(With Subsequent Corrections and Additions)

CHEMICAL HERITAGE FOUNDATION
Center for Oral History
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INTERVIEWEE

Peter Meldrum was born in Salt Lake City, Utah. He attended the University of Utah, where he received his bachelor's in chemical engineering. After graduating, Meldrum joined the army, where he was a lieutenant in the Chemical Corps, specializing in radiological nuclear warfare. While serving in the army, Meldrum read James Watson's *The Double Helix*, which inspired him to begin pursuing a career in biology and genetics. He received his master's in business administration from the University of Utah, after which he joined the agricultural biotechnology company NPI. Meldrum left NPI in 1990 to start the venture capital group Founders Fund, which focused on investing in new life science companies. After attending the Alta Conference, Meldrum wanted to enter the genetics field and met with Mark Skolnick at the University of Utah. With Meldrum's experience in raising capital and Skolnick's work in genetics, the two founded Myriad Genetics, with Meldrum being the company's CEO. As CEO, Meldrum wanted Myriad Genetics to focus their attention on common adult-onset diseases. The company's breakthrough discovery was that of the breast-cancer-causing BRCA1 gene; though they were late-comers in the race to find the gene, their utilization of the University of Utah's genealogy database helped them narrow it down before any other institutions in the summer of 1994. One year later, the company also discovered the BRCA2 gene. Meldrum and Myriad Genetics faced difficulties, though, when the ACLU challenged their patent on the BRCA genes. The case bounced between the Federal Circuit Court and the Supreme Court until the Supreme Court ultimately ruled that genes found in nature could not be patented. Outside of the work with the BRCA genes, Meldrum has facilitated partnerships between Myriad Genetics and Novartis, Bayer, and Schering-Plough. Outside of his work, Meldrum is an active outdoorsman, enjoying hiking and kayaking.

INTERVIEWER

Brianna Rego Lind is a historian and science writer based in Berkeley, California. She has published on the history of the tobacco industry, especially the internal research conducted by tobacco industry scientists on the health effects of smoking. She has a PhD in History and a MS in Geology, both from Stanford.

ABOUT THIS TRANSCRIPT

Staff of the Life Sciences Foundation conducted this interview, which became a part of our collections upon the merger of the Chemical Heritage Foundation and the Life Sciences Foundation into the Science History Institute in 2018. The Center for Oral History at the Science History Institute edited and formatted this transcript to match our style guide, but, as noted, Science History Institute staff members did not conduct the interview.

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proceeds through review and editing by staff of the Center; interviewees also review the typescript and can request additions, deletions, or that sections be sealed for specified periods of time. We have established guidelines to help us maintain fidelity to the language and meaning of each recorded interview while making minor editorial adjustments for clarity and readability. The transcript also includes time stamps at five-minute intervals. We omit without noting most instances of verbal crutches and all instances of nonlexical utterances. We also make small grammatical corrections where necessary to communicate interview participants' meaning. Finally, staff of the Center create the abstract, chronology, and table of contents. With the availability of online full-text searching of our transcripts, the Center for Oral History opted to discontinue the practice of preparing a back-of-the-book index for each oral history transcript in 2020. **The Science History Institute is committed to the responsible presentation of the history of science by addressing evidence of inequality and oppression as well as the subsequent silences in our collections. To that end, we recognize there may be language in our oral history collection that is outdated, offensive, or harmful, such as, but not limited to, the following: racist, sexist, Eurocentric, ableist, and/or homophobic language or depictions.**

INTERVIEWEE: **Peter Meldrum**

INTERVIEWER: **Brianna Rego Lind**

LOCATION: **Salt Lake City, Utah**

DATE: **25 October 2013**

[. . .]

MELDRUM: Well, I was born in Salt Lake City. Went to the University of Utah, got a bachelor's degree in chemical engineering.

LIND: What did you . . . what made you interested when you were in high school and when you were younger in that?

MELDRUM: I've always been interested in science, and it actually took me five years to get out of the University of Utah because I started as a math major and then my sophomore year I switched to physics major and then my junior year I switched to a chemistry major. [laughter] And then I finally graduated in chemical engineering because it actually puts all of those disciplines, kind of, together.

LIND: You're always searching for that field.

MELDRUM: But I've always been interested in science and have loved really all of the sciences.

LIND: Were your parents scientists?

MELDRUM: Nope. It's just something I was interested in. That was during the Vietnam War, and so I went in the Army as a lieutenant in the Chemical Corps, and in the Chemical Corps, you can specialize in either chemical warfare, nuclear warfare, or biological warfare, and I choose radiological nuclear warfare.

LIND: Can you explain what that means a little bit?

MELDRUM: Yeah, chemical officers in the radiological component of that particular division of the Army specialize in understanding the effects of radiation and helping troops and/or installations operate in a fallout environment. So should the United States be attacked with nuclear weapons and there's radiation and fallout, how do you survive, protect, you know, food, water, air supply, things of that nature. And so despite my chemical engineering background I chose instead of chemical component of the Chemical Corps or biological, the radiological. So, I became a radiological officer for NORAD, and my job was to fly around all of the major Nike Hercules sites and inspect them to make sure they could operate in a fallout environment. The Nike Hercules missiles were missiles around major cities like Pittsburgh, Chicago, San Francisco, LA.

LIND: I hiked up to one of those at . . . over in San Francisco.

MELDRUM: Okay, yeah.

LIND: It was out in the Santa Cruz Mountains. I don't remember what it was called but . . .

MELDRUM: And it was an installation that should we be attacked by an enemy, the Nike Hercules missiles would be launched and would be able to shoot down a plane that was trying to bomb the US or supposedly a missile, although Nike Hercules was a pretty slow missile. It would take out a plane, but I'm not sure that it could take out an ICBM. So I did that for two years and mostly just inspected sites and made sure that they could function should the country be attacked. And a lot of that was really fun. I got to . . . one of the things we did is I got to write the disaster recovery plan for the Greater Pittsburgh Airport. So should a commercial airliner crash at the Pittsburgh Airport, I wrote a plan that coordinated all of the Army helicopters and the military to go to the site and take injured passengers to various hospitals to make sure everybody didn't try to go to the same hospital, things of like that nature.

LIND: Were you stationed in Pittsburgh?

MELDRUM: Yeah. I flew all over the country, but I was stationed at the 18th Artillery Group, which was at Pittsburgh, and they had four Nike Hercules batteries that protected Pittsburgh because it was not only an important city but with the steel manufacturing, it was, kind of, a military industrial complex. While it was fun and I enjoyed it, it was also a little bit boring, and so I started reading books to keep my mind active, and I read *The Double Helix* by James Watson, and at that point I thought, well, I tried math and physics and chemistry and chemical

engineering, but I thought, you know, biology and genetics is really what is exciting and what I saw as kind of **<T: 05 min>** the future. So when I got out of the Army, I went back—

LIND: I have to interrupt you for just one second.

MELDRUM: Oh, sure.

LIND: Because we're actually working on a magazine right now for the anniversary of the discovery of *The Double Helix*.

MELDRUM: Oh, yeah.

LIND: And we have a whole sidebar that has . . . because we've had a lot of people say they read *The Double Helix* and that inspired them on their track. And so we have a whole sidebar that has clips of quotes of exactly that nature. So that was really exciting. It's amazing how a book can turn—

MELDRUM: It's fascinating, and of course, genetics is such a fascinating science. But, yeah, how the discovery was made, it was kind of cool. So I went back to the University of Utah, and when I gradated as a chemical engineer, I had a short stint before I went in the Army. And so I was hired as a research assistant at the University of Utah to work on a project with NASA, and this was a project where we took the isocyanurate foam, which is the foam insulation in the Apollo series spacecrafts, to see if we could adapt it to protect commercial craft.

The isocyanurate foam is fabulous in that it builds up . . . if it gets lit by a fire, it builds up a char that's self-extinguishing. So under the contract, a group down in Texas had actually taken an old DC airliner, put isocyanurate foam in half and regular airline insulation in the other half, put flight fuel, lit it on—of course melted the skin off of the plane. Completely destroyed the half without the insulation, cut into the half that had the isocyanurate foam and they had flowers on a table that weren't even wilted. So what I did was to see if chemically there were any problems. And unfortunately, we did mouse studies, and the isocyanurate foam, when it builds the char and burns, it releases a cyanide gas, which is—

LIND: They'll survive the burn, but . . . [laughter]

MELDRUM: Yes, but you'll die of cyanide poisoning. So unfortunately, right as the project was getting exciting, they stopped the funding from NASA. So with that experience, I decided

that when I went back to graduate school, rather than being a scientist that is told your project is no longer significant, I'd rather be the manager that makes that decision. [laughter] And so I got an MBA and . . . from the University of Utah and then started my career from there. And, yes, the first company I got involved in forming was an ag biotech company and . . . with a focus on genetics. The company was called NPI. We used a technology called restriction fragment length polymorphisms or RFLPs to identify genetic markers across a genome. So this was very early in our understanding of genetics, but we were able to develop the first genetic map of corn and we worked with and sold that to Ciba-Geigy. We developed the first, kind of, genetic map of tomatoes and worked on a project to develop high solid tomatoes with H. J. Heinz and were successful in that. So I can say with some authority that Heinz ketchup is thicker and richer. [laughter] And then we worked on developing onion varieties for McCormick, which was the world's leading onion dehydrator company.

LIND: How'd you become involved in that company?

MELDRUM: A friend of mine started the company, and I got involved when the company was just very early at its beginnings. And the company had more of a nursery focus, and I was excited about the new biotechnology sciences and genetics and things of that nature. **<T: 10 min>** And so we said we could leverage some of our horticultural expertise but go for more ornamental nursery stock to more commercial food opportunities and see if we could create new products that would be more nutritious or drought-tolerant or insect-resistant or things of that nature. So it was really a group of three of us that, kind of, charted the direction of that company and . . .

LIND: And who were the other guys? Just so I can—

MELDRUM: Mike Alder was the original founder of the company, and Hugh Bollinger was the individual we brought in as our head of research. But agriculture is a tough business. The margins are very thin, and, after being the chief executive officer of NPI for about twelve years, I recognized that really where I think the genetic sciences needed to go was in human healthcare where the margins are not as thin. And it's hard—it' s a very expensive science—and it's hard to make a lot of money in agriculture because it's just doesn't have the financial structure.

So I left NPI in about 1990 and started a venture capital group called Founders Fund, and Founders Fund was focused on life science companies and had a number of portfolio companies that we were involved with that turned out to be very successful. The concept around Founders Fund was very different than traditional venture capital. Without being disrespectful to traditional venture capitalists because many of them, my companies wouldn't be here without them. It's a somewhat more passive involvement.

You'll look at a business plan of a company and make a decision whether or not to invest in it and then go on the board and help the company with advice, but you don't really get involved in running the company or starting companies usually; occasionally, they do. Well, Founders Fund, because of the name, is we would never invest in an existing company. So we want to found new companies, and so we proactively walked the halls of major universities talking to scientists who had published leading research and asking them, "Have you ever thought of starting a company, and would you like to start a company with us?" So we never invested in an existing company, never read a business plan, but we started a number of companies that—through mostly luck—turned out to be quite successful.

LIND: Such as?

MELDRUM: One of the companies we started is Sonic Innovation. Sonic Innovations recognized that you don't hear linearly, and they developed an algorithm that mimics the way the ear hears and has developed really fabulous hearing aids based on that technology. And the last time I checked, they were the seventh-largest hearing aid company in the world, and that was started by scientists down at BYU, the University of Utah, and my partner and I. One of the other companies we started was Acacia Biosciences. Acacia had a very exciting technology that came out of UC Berkeley that then we merged the company with Rosetta Informatics and then eventually Rosetta was sold to Merck for six hundred and fifty million dollars. We started a company called Myriad Genetics.

LIND: We'll get to that in a minute. [laughter] Who was your partner in Founders Fund?

MELDRUM: Denis Farrar.

LIND: And then before we go on to Myriad, I want to just close up NCI quickly—NPI, sorry. So I have a couple notes here that in 1983 you're discussing collaborations with BAT in Asia and I just . . . what BAT is this?

MELDRUM: British American Tobacco.

LIND: So I'm a historian of tobacco. **<T: 15 min>** So I thought . . . that caught my eye, so I would love to hear a little bit about that side of that.

MELDRUM: NPI was able to do a lot of very exciting collaborations as I mentioned with Heinz and McCormick and Ciba-Geigy here in the US, but we wanted to have a more

worldwide focus. So we collaborated probably first with Sumitomo Corporation in Japan and set up a ag biotech company in Tsukuba City in Japan. It was a joint venture between NPI and Sumitomo Corporation and a pharmaceutical company called Kyowa Hakko, and that looked at rice and other agricultural crops that were really important to Japan. We then set up in Singapore a subsidiary for Southeast Asia with the Tata companies.

Tata is a major corporate conglomerate in India, one of the largest Indian corporations, and they have automobiles and textile mills and copper mines and things of that nature. In fact, Tata was the group that bought Jaguar from Ford and created a lot of interesting new varieties of tropical fruits and used the technology in that regard. Then in Europe we set up a collaboration with a group in Gembloux, Belgium to focus on the European market opportunity. And the last one we did was with British American Tobacco, and I met with Sir Patrick Sheehy, who was the CEO of BAT at that time, and of course they had worldwide operations mostly on tobacco—but not exclusively on tobacco—and wanted us to focus on South America and they wanted to diversify into some of the crops that were important and would be exported from South America.

So we established a joint venture called Bio Planta that was located, headquartered in São Paulo, Brazil and had a collaboration with them. So we had major international collaborations in Europe, South America, Southeast Asia, and Japan.

LIND: That caught my eyes. I wanted to ask you about that. All right, so—

MELDRUM: The guys at BAT were really neat. They had a different philosophy, and it was one that they believed genuinely, but they felt that smoking was good and important for people because the nicotine, sort of, relaxes you in stressful situations, and they thought many more people would die of heart attacks and strokes for being stressed out than cancer and lung problems for smoking. So obviously, totally wrong on that side of the equation.

LIND: That's hilarious.

MELDRUM: But they genuinely . . . at that time, now you have to realize, this is back in the eighties. And if you flew a Delta airlines plane there would be smoking on the plane, so it was . . . we didn't understand a lot back then. But they genuinely were arguing for the medical benefits of smoking.

LIND: Did you have little conversations with them about that?

MELDRUM: I did, we did.

LIND: Little debates? [laughter]

MELDRUM: But it was interesting that—

LIND: Did they acknowledge the cancer risk of smoking?

MELDRUM: Not completely. They would, sort of, say that it's early evidence and it hasn't been proved conclusively and they would defend against that, and back then they had probably somewhat legitimate arguments because the science was somewhat new, but not really. They were on the wrong side of the equation but—

LIND: Well, they are a tobacco company.

MELDRUM: Yeah, yeah. But they really thought that they provided a health benefit by relieving stress in individuals through smoking and . . . [laughter]

LIND: That is so interest . . . my . . . the book project I'm working on is a history of the research and development department of Philip Morris. I wanted to just ask you about that. Okay. But meanwhile, you're prowling the halls of science departments at universities around the country, and you stumble **<T: 20 min>** upon something that leads to Myriad Genetics.

MELDRUM: Yeah. I'd read about a geneticist at the University of Utah, and I mentioned RFLPs in NPI—restriction fragment length polymorphisms—and that was a very exciting discovery or insight that occurred at I think what was called the Alta Conference. Anyway, there were four leading scientists who met up at Alta.

LIND: And who were these guys?

MELDRUM: Um . . .

LIND: Or the ones that you—

MELDRUM: I could probably . . . we could probably google it and find it. But Mark Skolnick was one of the four and . . . I'll have to get the . . . we'll have to get the four names for you. Because at the Alta . . . the famous Alta Conference, they together came up with this concept of RFLPs and that really allowed you to map the genome and, kind of, figure out where along the genome you were, and it became very useful in terms of very early on exploring genetics and the genome. And then was rapidly replaced with other technology, so it's kind of an ancient technology today. But because we had used RFLPs in agriculture and Mark Skolnick was one of the four kind of geniuses that were part of this Alta group, I decided, you know, this is an area that I really loved on the ag side, but I see the commercial promise on human healthcare and we need to start a company that can somehow commercialize knowledge that comes out of understanding human genetics. And this was even before the Human Genome Project.

So I walked up to the University of Utah and knocked on the door and introduced myself and told Dr. Skolnick how exciting I thought his science was and said, "Have you ever thought of starting a company?" [laughter]

And he says, "You know, I was just thinking that there would be an opportunity here in genetics to start a company and that might be kind of fun." And so Founders Fund gave him early seed money, and we started Myriad Genetics. And because ever since I read the Watson *Double Helix* book, that's just been fascinating and exciting part of science. After a while, Myriad had been successful in raising money and advancing, I decided that's really where my love is. And so I stepped down from my role at Founders Fund to . . . at the time it was the interim CEO and we were kind of thinking about we need a full-time CEO, and I decided that I'd throw my hat into the ring at that time and go with Myriad Genetics.

LIND: Where did the name Myriad come from?

MELDRUM: The original name of the company was Helix Biosciences, I think. No, Helix Technologies. And I never liked the name, but when Founders Fund starts new companies we always let the founder—the scientific founder—name the company because the name of the company doesn't mean that much, and so Mark Skolnick liked Helix Technologies. Fortunately, when the company was a little more mature, we originally incorporated it as a Utah company and were thinking about going public and you need to really be a Delaware corporation as the company evolves and matures because the laws under Delaware are more favorable for corporations. So we needed to reincorporate in Delaware, and fortunately, Helix had been taken. [laughter]

So we had a context within the company to a new name for Helix Technologies, and one of our young scientists, a Ph.D. and molecular biologist by the name of Maureen Cox, came up with the Myriad because she said there will be a myriad of opportunities **<T: 25 min>** if we really do understand genes and the role genes play in human disease. And from literally the day we started Myriad our goal was just that: understand genes and how genes play a role or cause disease and then we'll develop molecular diagnostic and therapeutic products based upon that

knowledge, and she said, "Well, boy, that opens up a myriad of opportunities." So Myriad Genetics was reincorporated in Delaware.

LIND: Okay. So I don't . . . obviously there's a lot to tell in the history of Myriad Genetics, and I don't know how you want to go through that. Do you want to go through it . . . chronologically is always, sort of, simplest.

MELDRUM: Probably chronologically is the best.

LIND: Okay. And I do have a cheat sheet here so I can keep . . .

MELDRUM: Yeah. So the company was founded on the vision of understanding the role genes play in human disease. We did have two initial focuses—one therapeutic, one diagnostic—but the diagnostic was a very different focus. I did not like the conventional diagnostic industry. You just diagnose disease; there aren't a lot of proprietary products in the margins and diagnostics tend to be generally low. And so it's a very different industry than therapeutics, which tends to have high margins, proprietary products, and I said, "There's got to be an opportunity in diagnostics to look more like therapeutics." And I said, "We can't think of diagnosing disease; we've got to think of something that's more valuable or more important information for a patient."

So understanding that in the initiation of the cascade of events that leads to cancer, there are tumor suppressor genes that become defective so they no longer function appropriately and that can predispose individuals for cancer, and Mark Skolnick was a very early proponent that cancer was . . . had a major genetics component. At the time, before Myriad—early eighties—a lot of people thought cancer was an environmental disease. Obviously, if you got sun exposure, you got lung cancer, if you smoke . . . sorry, you got skin cancer; if you smoked, you got lung cancer. It was an environmental disease. And Mark says, "No, no, there's a huge genetic component," and he would observe in families that they had a propensity of cancer.

And we said, "Well, a new diagnostic opportunity, which didn't exist before Myriad, would be to look at major common diseases and understand the genetic component of those diseases and then individuals who have a family history of that disease we can see if they have a genetic defect that explains the disease so that they can try to prevent the disease or take action to increase surveillance to catch the disease at an earlier stage when it's more treatable."

LIND: And you were focusing on cancer at this point? Okay.

MELDRUM: And mostly—

LIND: And that's because Mark Skolnick's research was on cancer?

MELDRUM: It was, it was, and what Mark did at the University of Utah was take the Mormon Genealogy Database, which was huge, because it's very important for Mormons to have genealogy and understand their genealogy, and he linked that to the cancer tumor registry in the State of Utah and computerized it and developed the first computerized database of families with cancer. And so at the time, there was a hotly contested race for the discovery of the first breast cancer gene.

LIND: Yes. I want to get into that.

MELDRUM: It had been identified to be located somewhere on chromosome 17q by Mary-Claire King and a number of leading scientific labs—I think there were probably fifteen major scientific labs across the world—a lab in the UK, a lab in Japan, Francis Collins involved in trying to find the BRCA1 gene, Ray White, **<T: 30 min>** which was a very powerful group. We were, kind of, late to the game, but we thought we had a strategy and a tool with this Mormon database that could help the company maybe have a shot at discovering the BRCA1 gene.

LIND: Now, what was the makeup of the company at this point? Who was in the leader . . . so who were the founders? And then who stayed? And then how large is the company? Where were you located? That sort of thing.

MELDRUM: The founders were basically Mark Skolnick and myself. Mark was the chief scientific officer, but he worked as the University of Utah, I was the chief executive officer, but I worked at Founders Fund, and initially, we had a part-time secretary who helped us, administrative assistant who helped us with things. We were able to attract some early financing and with that, bring in a few scientists.

LIND: Who were the early investors?

MELDRUM: Founders Fund. A group in New York called Spencer Trask invested about half million. It got us enough to not be a virtual company but not really be a serious player. Mark sat on an NIH study panel with Walter Gilbert who received the Nobel Prize for developing DNA sequencing technologies in 1980. Wally became really fascinated and has always been fascinated with genetics as well. We founded the company in May of '91, and within a year, Wally joined, and we consider Wally a founder. Wally joined, so pretty much the three of us—

Mark Skolnick, Wally Gilbert and myself—and Wally was vice chairman of the board, Mark was chief scientific officer, I was CEO, but none of us worked for Myriad, Helix at that time. And so we had an opportunity to interact with a group at Hybritech, which at that time was owned by Eli Lilly, and we told them of our idea of discovering . . . entering the race to discover the breast cancer gene, and Hybritech liked the idea, introduced us to Eli Lilly, Eli Lilly was excited about the opportunity, and so we would give Eli Lilly worldwide therapeutic rights, Myriad would keep diagnostic rights. Lilly provided the company with about four million dollars and research funding and equity investment in the company, and that allowed us then to hire a number of scientists and really build a scientific team at Myriad. But then that team worked directly in conjunction with Mark's group at the University of Utah.

And we had other collaborators. So when you look at the patent owners of the BRCA1 gene it's not Myriad because Myriad assigned its ownership rights to the University of Utah in exchange for worldwide exclusive license. So the patent owners were the University of Utah, the University of Pennsylvania, Hospital for Sick Children, NIH—we worked with a group at NIEHS—and so a lot of labs working in concert, and we were funding the work at those labs through the generosity of Eli Lilly enabled us to be very fortunate and discover the first gene, BRCA1. At the same time, we know that BRCA1 was involved in maybe only half of familial breast cancer, so we thought there was another major gene out there.

LIND: Let's back up just a little bit and go through that. So I interrupted you right when you were about to start talking about the race to find the BRCA1 gene. So Mary-Claire King had discovered it was on a particular chromosome.

MELDRUM: Yeah. Mary-Claire located it to a larger region on chromosome 17q and sort of—

LIND: Have you seen the movie yet?

MELDRUM: I haven't seen the movie. [laughter] I know about the movie, but I haven't seen it. **<T: 35 min>** So all of the scientists then madly started trying to find the gene and worked for several years before Myriad even entered the race. So we were really the last group to enter the race to the—

LIND: So that was in the late eighties then?

MELDRUM: No, it was in the early nineties.

LIND: Okay. Oh, she found it in 1990, I think?

MELDRUM: Yeah. I think she isolated it to chromosome 17q in 1990. And people started looking in 1990. While Myriad was formed in '91, it didn't get funding from Lilly till '93, so it wasn't until 1993, three years after she had linked it to chromosome 17q.

LIND: It's for those . . . it was during those three years that all the labs were—

MELDRUM: Yeah. All the labs were madly looking, and so we actually entered the race quite late and—

LIND: I have a note here that says that Mark was skeptical of King's data originally.

MELDRUM: That could be, that could be.

LIND: I'll have to ask him about that.

MELDRUM: Yeah, yeah. Now that . . . scientists are very competitive and skeptical of each other, and so that doesn't surprise me at all. But it was funny because Mike Waldholz, who's a journalist at *The Wall Street Journal*, wrote a book on the discovery of the BRCA1 gene. And it was mostly written, and he talked about each of the major labs and what they were doing, and the last chapter would be who found it. [laughter] And when Myriad found it, he had to madly . . . [laughter]

LIND: Because you weren't even in the book.

MELDRUM: He had to insert us into the book because literally, we entered the race three years after most of the labs were looking for it, but I think we were very fortunate because Mark was very disciplined, and scientists at the time would look at candidate genes. So here's the gene involved in estrogen and that's got to be the breast cancer gene, and Mark says, "We're not looking at any candidate genes or genes that are involved in cell division or genes that we think, you know, might look like they could be a breast cancer gene. We're going to very methodically use this Mormon Genealogy Database to carefully go through the chromosome and see if we can find the gene. So I think his strategy to not be detracted by hot leads or candidate genes or things that looked . . . shiny objects off in the distance . . . he just stuck with this approach very

carefully and in a very focused manner exploring the genome and uncovering hopefully the BRCA1 gene. And we were fortunate to win the race.

LIND: How long did that take? From . . . ?

MELDRUM: We started . . . not that long. We started in earnest in fall of '93, and we had done work before that, but we got the Lilly financing summer of '93 and so really fall of '93, and summer of '94 is when we discovered the gene and published it October of 1994 in *Science*.

LIND: Okay, so a year.

MELDRUM: So a little over a year of, you know, very intense methodical, well thought out . . .

LIND: And about how many researchers were working on that?

MELDRUM: There's probably twenty or thirty guys on the publication. We had at Myriad probably seven or eight PhDs and maybe twenty technicians at the time working on it. Mark probably had a similar number in his lab at the University of Utah, and then of course we used collaborations with other folks as well.

LIND: Now when hiring the scientists, were you mostly interested in biologists, geneticists, or did you have a collection of expertise?

MELDRUM: At the time, a lot of what we were doing was molecular biologists, and we did a lot of the wet lab work. Mark is not a molecular biologist, he's actually a population geneticist, and so a lot of the genetic epidemiology and population genetics and informatics around the Mormon Genealogy Database were done by Mark and his group.

One of the earliest scientists . . . Maureen Cox might have been our first but probably the second scientist we hired was **<T: 40 min>** Dr. Alexander Kamb, Sasha Kamb. He is Linus Pauling's grandson, and Sasha was brilliant. He wasn't actually directly involved with the discovery of the BRCA1 gene, but he discovered P16, which was involved in melanoma. And Sasha's since gone on to . . . he was head of oncology, I think, at Novartis, and I'm not sure where he is now, but he's a very senior pharmaceutical executive.

So it was a very talented team, and a lot of the scientists at Myriad at that stage have gone on to do really exciting things. And then at . . . in parallel with that through Mark's lab, we were looking to link BRCA2 and published a paper shortly after the discovery of the BRCA1 gene saying that the BRCA2 gene was located on chromosome 13. So much like Mary-Claire linked BRCA1 to 17, we linked BRCA2 to 13, and then a second hotly-contested race launched. [laughter]

LIND: With some more players?

MELDRUM: Some of the players, yes. Yeah. Bruce Ponder's lab in the UK was definitely involved in it; probably not as many, not as hotly contested, but certainly some of the players.

LIND: Was Mary-Claire King involved in that one or not?

MELDRUM: I don't think so.

LIND: Yeah, I don't think so either.

MELDRUM: But I'm not sure. I don't think so. And then a year later—fall of '95—we were fortunate to discover the BRCA2 gene.

LIND: And you went about it the same way with the Mormon Database? Yeah. So you said at the beginning that you got an MBA because you wanted to be the guy telling scientists when their project was over.

MELDRUM: That's right.

LIND: So how much involvement did you have in these projects deciding when to do them and what to do and so on?

MELDRUM: None . . . no involvement scientifically but deciding what projects we would work on and funding—getting funding for those projects was my primary responsibility. So Myriad has discovered probably more human disease-causing genes than any other company in the US. We discovered BRCA1 and BRCA2, and early on, I really wanted the breast cancer gene as our first project and Mark was a little reticent initially.

LIND: Why did you want that as your first project?

MELDRUM: Mark was thinking that let's start the company off, and we can make oligos and I said, "You don't want to make oligos. That's . . . there's nothing to that." And the most interesting, exciting program was the hunt for the breast cancer gene, and whoever discovered it . . . up until Myriad discovered the breast cancer gene, all of the genes discovered had been rare genetic disorders: cystic fibrosis and Huntington's disease and things that are rare, that are not adult-onset diseases. And all along I was thinking of a new diagnostic opportunity where we can assess your risk of disease later in life and then intervene, prevent the disease, save the life. Not only is that fabulous for the patient but it's great for the healthcare system because if you can prevent cancer, that's a lot less expensive than treating a patient for the rest of their life with cancer.

So we needed something that was, kind of, spectacular, and the breast cancer gene was spectacular. So, you know, Mark was excited about it too, but Mark correctly understood that we were late to the rate, we were a tiny company, and we had no chance of winning the race. [laughter] And it's nice when you don't know everything because if I knew everything now that I know today back then, I wouldn't have done it because I knew I couldn't win, but I was dumb enough back then to think we could, and for . . . with luck we were able to. So, Myriad wanted to go after major common diseases, adult-onset diseases, and so we formed strategic alliances with Novartis **<T: 45 min>** on heart disease and discovered a number of genes involved in cholesterol and lipid levels. We entered into a collaboration with Bayer on asthma, obesity, and osteoporosis. We entered into a major strategic alliance with Schering-Plough on prostate cancer and discovered a gene called ELAC2, which is involved in prostate cancer. So I wanted to focus on major common diseases, and I wanted to focus on doing something to prevent the disease. So we wouldn't be interested in Down's syndrome because . . .

LIND: There's nothing you can do.

MELDRUM: What can you do with that information? Well, you could abort the child or something, but that's not good. But cancer, heart disease, obesity, osteoporosis—all of these have a genetic component and all of these run in families that have a propensity of that when some aspect of the gene is not functioning properly, and if you can identify that, you can take action to prevent the disease. And we have a chart that we use on Myriad's corporate presentation. I may have lifted it from this one. Yeah, I did. It shows why this idea of genetic predisposition is . . . give me one second.

LIND: Yeah. He's going to go get me a chart.

MELDRUM: My assistant is out. I'll show you a chart that shows why it's so exciting because if you look at a woman's risk for breast cancer, it's about 12 percent lifetime risk for breast cancer. If they carry a mutation in BRCA1 or BRCA2, it's as high as 87 percent risk lifetime risk for breast cancer.

LIND: Which, of course, recently got a lot of press with Angelina Jolie.

MELDRUM: Yeah, yeah. And that's scary, but you can take action and if you give a woman tamoxifen for five years and—only for five years—that gives a woman a lifetime benefit that reduces her risk of breast cancer by over 60 percent. Once a woman is past the childbearing age, if she goes on oral contraceptives, it reduces her risk of ovarian cancer by over 60 percent. So there's lots you can do . . . be . . . you know there's a whole grade of MRIs instead of mam- mammograms. MRIs at an earlier age than you typically have mammograms because hereditary breast cancer is earlier age of onset, but there's so much you can do, and then up to prophylactic mastectomy but that would be, kind of, at the extreme to reduce your cancer risk and if you take those actions you can reduce your breast cancer risk to a lifetime risk of 5 percent, actually lower than somebody who doesn't have the genetic defect. With colon cancer, general population risk, 4 percent of getting colon cancer. If you have the genes involved in colon cancer, as high as 82 percent risk of getting colon cancer during your lifetime, and if you have a colonoscopy—

[side conversation with assistant]

If you have an annual colonoscopy, in the process remove any precancerous polyps, colon cancer's a completely preventable disease. If you have this deleterious mutation and a gene that gives you an 82 percent chance of getting colon cancer, and yet by removing the precancerous polyps, you'll never get colon cancer, you'll never die of colon cancer, so your risk is actually substantially less than somebody in the general population. So this was kind of our early diagnostic vision. We didn't want to diagnose disease because then it's too late. I mean, the person's already sick, already has the disease. We wanted to assess your risk of getting disease and then allow you to hopefully prevent the disease or at least delay the onset of the disease or at least catch the disease in an earlier stage when it's more treatable, and that has huge value to the patient—prevention.

We think of medical science over the past **<T: 50 min>** twenty years or so, and, you know, it's okay, but it's all been focused on treatment. We passively sit by and wait for somebody to get a disease, and then science kicks in and we figure out drugs and ways of treating disease, but what our vision was is let's focus on prevention, not treatment. Let's identify those at risk, let's develop therapies and healthcare systems to actually prevent the disease, and not only is that phenomenally better for the patient, it'll save the healthcare system a substantial amount of money. An ounce of prevention is worth a pound of cure. So that was really what Myriad's diagnostic focus started on, and our goal . . . we are a molecular diagnostic

company, but we do not diagnose . . . now actually we do today, but at that point in time we do not diagnose disease, and I was adamant about that. We assess your risk for disease later in life, so you can take action, you can proactively prevent yourself from suffering that fate.

LIND: Were you at that point treating disease? No, just—

MELDRUM: No.

LIND: Assessing the risk, okay.

MELDRUM: Just assessing the risk. And as I mentioned, uncovering a lot of different genes and a lot of different diseases.

LIND: Yeah. So let's . . . can you talk a little bit about how the patents work? Was that part of the original idea, and did you . . . the moment you discovered something you would immediately start the patent process? And was that unusual at the time?

MELDRUM: I don't think it was unusual. The colon cancer genes were discovered—some of them—by Bert Vogelstein at Johns Hopkins [University] and patented and licensed to Myriad nonexclusively. So it wasn't unique that we were patenting genes—I don't think—but the BRCA1 breast cancer gene was the first major common disease gene discovered. It was the most hotly contested race ever to discover a gene. And I think the fact that a private company discovered it might've been a little different. I think most of the gene discoveries up until then had been made by academicians.

LIND: Well, there weren't really private biotech companies. That was the new thing.

MELDRUM: I think the only thing that would be unique about it would be that here a commercial, private biotech company discovered and patented a gene.

LIND: What was the response to that . . . to the fact that the discovery was made by a private company?

MELDRUM: I don't think there was a negative response that it was made by a private company necessarily.

LIND: Surprise?

MELDRUM: You have to under . . . well, yes. I mean people were shocked because, you know, we did it in about a year, and others had been working on it for four years. There's a lot of . . . and if you read more about Watson and Crick's discovery of DNA, there's a lot of jealousies and, kind of, backstabbings within science, and the saddest thing is . . . I think her name is Rosalind Russell.

LIND: Rosalind Franklin, yeah.

MELDRUM: That she got no credit and yet she was instrumental, and had Watson not seen her image, he wouldn't have gotten the idea.

LIND: There were others as well. The article we're writing for the [inaudible] magazine is called the "Supporting Cast," and it was all about the people who supported Watson and Crick and their discovery.

MELDRUM: Yeah.

LIND: Watson and Crick hardly feature in the article at all, which was our goal. [laughter]

MELDRUM: Yeah. And they should get credit, and Rosalind should've gotten the Nobel Prize along with Watson and Crick. But so there's kind of jealousies in science, so a lot of people weren't happy and a lot of people were certainly surprised, but I think it was more that they lost the race than any animosity against a private company. Let's get back to your thing.

But let me just show you this one chart that . . . So these are all cancers that our myRisk Hereditary Cancer panel can identify. And again, what's exciting to me is the purple is the genetic . . . is the risk in the general population of contracting the disease, the brown is if you've got a gene that predisposes **<T: 55 min>** you, it's way high, and it's not 50 percent higher, it's not double, it's like almost in order of magnitude higher. But the neat thing is this teal color is once you know that information, you can take positive action to reduce your risk in most cases below that of the general population—not quite with ovarian but with the others—below that of the general population risk, and that's to me what's really exciting. Now we focused on cancer because you can do a lot with cancer. We had a project, and we've looked at the discovery of

genes involved in Alzheimer's—presenilin1, presenilin2, APOE4—but the problem is what do you do with that information?

So at Myriad not only does it have to be a major adult-onset disease, but it's got to be a disease that if you know you're at risk, you can do something. With Alzheimer's, there's no cure, there's no treatment, there's no way to prevent the disease. Catching it early doesn't help. Unfortunately, that's just a very hard disease to focus on. So while the scientists did all the work, I did set the parameters on, okay, what types of diseases we're going . . . are we going after, and we're not going after Alzheimer's because you can't do anything with that information.

And we aren't going to go after just the fun, exciting gene discovery, we're going to go after something that can result in a genetic predisposition test that gives you information that you can do something with so that the physician, whether a person tests positive or negative, will then proactively do something different to the person that tested positive, manage that patient's healthcare care differently than the person who tested negative. But—

LIND: Can I keep this?

MELDRUM: Yeah, you can. That's just our corporate slideshow.

LIND: That's great. Yeah.

MELDRUM: You can keep the whole thing. Yeah.

LIND: Thank you.

MELDRUM: This is out of order, but this is exciting to where we've evolved. So Myriad's mission—or Myriad's vision—has evolved from we don't want to diagnose disease, we want to assess your risk so you never get the disease in the first place, and that's risk assessment and that's what we've been talking about. But now our vision is we want to be a trusted advisor to the physician to address all of the patient's concerns about their healthcare. So a patient has four major questions about their healthcare.

First question is what is the chance I'm going to get cancer? Next question is do I have cancer? Next question is how aggressive is the cancer, and how aggressive should we treat it? And third is what drugs should you give me, what therapy's going to work best? So we've gone from just understanding a patient's risk for cancer to actually diagnosing it molecularly. For example, if you had a skin lesion and there are two million skin biopsies in the United States

every year, a dermatopathologist will look in the microscope and look at the cells and see if it's a malignant melanoma or a benign nevi. That's great, and it works about 85 percent of the time, which is pretty darn good.

Fifteen percent of all the patients get an indeterminate result; you can't tell just by looking at the cells under the microscope if it's malignant or not. That's 280,000 patients a year who get an indeterminate result. Now Myriad has a test called my Path Melanoma that looks at the molecular structure of the cells and can say definitely that's a melanoma; that's just a benign nevi. Progression of disease—a physician has to know how aggressive a disease is to know how to treat it, and a good example is our test Prolaris for prostate cancer.

The sad thing in the United States today is that a man diagnosed with prostate cancer is different than most of the other cancers. Prostate cancer tends to be a slow-growing, indolent form of the disease. In fact, 80 percent of the men diagnosed with prostate cancer will never die from that cancer. They will die with the cancer, but they'll die of a heart attack or a stroke long before cancer's a problem. Yet, you know how many men have radical prostatectomies?

LIND: So many. So unnecessary.

MELDRUM: Ninety-one percent of the men will have radiation or radical prostatectomies. Twenty percent need it. And it's . . . there was no way of determining do you have the slow-growing kind or prostate cancer rarely can be aggressive. **<T: 60 min>** And our Prolaris test does that, and I make the comment that most men are overtreated; they have the slow-growing form of cancer and so they get overtreatment. They don't need radical prostatectomies. Watchful waiting would be just fine. But 20 percent of the men are undertreated. It would be unheard of for a woman diagnosed with breast cancer or a man or woman diagnosed with colon cancer to just have surgery and no chemotherapy, yet no man gets a radical prostatectomy and chemo or radical prostatectomy and radiation. So 80 percent of the men are undertreated. Twenty percent of the men are . . . sorry, 80 percent of the men are overtreated, 20 percent of the men are undertreated, so I say all of the men are mistreated with prostate cancer. And so we're excited about Prolaris, obviously, because it can save the healthcare system a lot of money, reduce a lot of unnecessary surgeries, and also improve the quality of life for men because of the side effects. And then last is personalized medicine-guiding therapy, and this is a companion diagnostic that identifies the patients who would likely respond to a particular drug. And Myriad, of course, is working with six major pharmaceutical companies on a very exciting new drug called PARP inhibitors, and PARP inhibitors treat breast cancer, ovarian cancer, but also lung cancer, gastric cancers, and possibly prostate cancer.

And the PARP inhibitor has a very safe profile. It's not a chemotherapeutic drug, and it's based on a concept called synthetic lethality. So in genetics, synthetic lethality is you have two things and separately they don't work but together they cause cells to die. So you can have a mutation in a gene, and that alone will do nothing. You can have a drug, but if you give that to

the patient, that alone does nothing. But if the patient with the mutation gets the drug, then it forces the cells into apoptosis—programmed cell death—and basically the cells commit suicide.

LIND: And there's, of course, a famous breast cancer example. Were you involved in that? Was Myriad . . . ?

MELDRUM: In the what?

LIND: I can't remember the name of the drug, but a particular kind of breast cancer would basically obliterate it.

MELDRUM: Oh, Herceptin.

LIND: Yes, thank you.

MELDRUM: Yes. We were not. And yeah, there is a companion diagnostic, the HER2/neu test that identifies women who would respond to Herceptin. So that one we were not involved with, but the new class of drugs—the PARP inhibitors—we definitely are, and they could be on the market in Europe in about a year and in the United States shortly after that.

LIND: Cool.

MELDRUM: Okay, so let's go back.

LIND: So let's go back, yes. So you've discovered BRCA1 . . . is it . . . how do you guys say it? BRCA, or BRCA?

MELDRUM: Both are correct.

LIND: Both? Okay. So you've discovered the genes and then what happened to Myriad Genetics? Were you . . . you weren't Myriad yet at the time? You were still—

MELDRUM: Yeah, we were—

LIND: You were? You were, okay.

MELDRUM: At that time, we were Myriad. We madly started trying to develop a test, and Myriad is a pioneer in the whole field of molecular diagnostics in two respects. Number one, we were the first company to ever discover a major common disease gene, but up until then all of the genes that had been discovered—Huntington's, cystic fibrosis—the test would either be linkage analysis or looking at a handful of common mutations that explained most of the disease. So cystic fibrosis had twenty-five mutations that explained 90 percent of the cases of cystic fibrosis. Mark Skolnick said, "This is different, and we're going to have hundreds of mutations." And Wally Gilbert said, "No, it's going to be like cystic fibrosis." And they bet a case of wine. And after we had discovered our thousandth mutation, Wally paid off Mark the case of wine. But, this was a situation where we couldn't look at a handful of common mutations because there were no common mutations, now with the exception of the Ashkenazi Jewish population, which did have a few common mutations, but in the general population all of the mutations were fairly rare, they were **<T: 65 min>** not common, and so we had to develop technologies to sequence the entire gene. And the BRCA1 was a huge gene. It's 5,500 base pairs long, and you have to sequence it for accuracy in the forward and reverse direction. So we've got to sequence eleven thousand bases, and so the company madly started developing technologies and the quality necessary to sequence that.

Now at the time, sequencers and ABI 377s were what most people used—were great for research but they weren't accurate enough for clinical trial purposes. So we had to write our own software that culled the bases because the base-culling software on the 377 wasn't accurate for patient clinical use. So we have a huge informatics group at Myriad that writes all of our own software program. We had to develop positive sample tracking within the lab, we have barcode readers within the lab, so we know exactly where a patient sample is at any particular time, and the whole effort of Myriad was to try to do this. And we had almost done it within a year, and we found the BRCA2 gene, which was eleven thousand bases long. [laughter]

Twice the [inaudible]. So now we have to sequence something like thirty-five thousand bases for every patient and do it economically or as economically as we could. So we were fortunate and about a year after that—October of 1996—we launched the first full-length DNA sequence-based test for major common disease gene, and that was BRACAnalysis.

LIND: So was that before or after IPO? When did the IPO happen?

MELDRUM: The IPO happened after the discovery of BRCA1 . . .

LIND: But before . . .

MELDRUM: But before the discovery of BRCA2. So the IPO was in October of '95.

LIND: Okay. Can you walk me through that?

MELDRUM: Yeah. I mean . . .

LIND: It said here that you hadn't yet—obviously because you hadn't released the test yet—you hadn't yet made a profit at the time of the IPO.

MELDRUM: No, we—

LIND: So what were you selling?

MELDRUM: We weren't selling anything. We were losing money because we were spending a lot of money on research; the market was not good. There was a company—and I think the name of the company was Sequana that had, kind of, tried to go out in the summer of '95, and it hadn't gone well, and we were really struggling with whether the market was receptive. The IPO window wasn't closed, but it was pretty closed. [laughter] But fortunately, we talked to two banks that had confidence in Myriad—Cowen and UBS—and we hired those two as bankers to take us public, and we thought we had a really exciting story. And when we started talking to investors about genetic predisposition and preventing disease and the vision of Myriad and the potential of what maybe the company could create, we got strong, strong reception, and the offering was twenty times oversubscribed, and there was an article written in *The Wall Street Journal* that was titled "What Made Myriad's IPO Sizzle?" And it talked about, kind of, the vision we have—the future of diagnostics. So it was a very . . . we priced at the upper end of the range. Now I think we have priced above the upper end of the range. Very successful IPO, raised about fifty million dollars and . . .

LIND: Which you needed to sequence all those genes.

MELDRUM: And went on from there, went on from there.

LIND: Is that when the office in Zurich opened, or was that later?

MELDRUM: No.

LIND: Okay. Just UBS mainly?

MELDRUM: Yeah, yeah. We've always had a lot of investors from Switzerland. We had a good friend Peter Friedli, who heads Friedli Financial Corporation out of Zurich, and so we've always had a strong following from Switzerland, but we've always been just a US company, and we didn't open the Zurich offices until literally a year-and-a-half ago. So that's **<T: 70 min>** really new. So we've always been focused on the US. About the time that BRACAnalysis started to make revenues and grow and do well, I wanted the company to turn its attention to the other opportunity. So by understanding the role genes play in disease and with the goal of, sort of, commercializing that information, diagnostics is one part, but therapeutic is the other part. And so we formed Myriad Pharmaceuticals as a wholly-owned subsidiary and started working on a number of drugs, including cancer, HIV, and, interestingly enough, Alzheimer's disease.

So while Alzheimer's isn't the greatest diagnostic opportunity because you can't do anything with it, it's a huge therapeutic opportunity because there is no treatment, no cure for Alzheimer's disease. So our scientists felt we understood the primary cause of Alzheimer's disease and felt we had developed a drug that could address that cause of disease. And so we had in parallel a diagnostic group that was growing rapidly and becoming profitable and a therapeutic group that had exciting future opportunities and was consuming money like a powerful vacuum, just sucking it up. But it was two very exciting, genetic-based opportunities that the company was exploring.

LIND: But that was eventually spun off, right?

MELDRUM: Yeah. So Alzheimer's is a very, very hard disease to attack, and there've been a number of companies who have not been successful, and the problem is we think of a patient with early onset, early diagnosis of Alzheimer's disease, but by the time you're diagnosed with Alzheimer's disease, you've lost a lot of mental capacity. So you are forgetful, you have signs of dementia, and the brain is a fabulous organ in that a lot of the brain can be damaged and you can still function well. So if you're . . . if you have outward signs of dementia, there's probably been at that time—even though it's classified as early Alzheimer's—there's probably been so much damage that it's almost beyond repair, and so my personal belief is that until we can identify a person as having Alzheimer's before there's any outward sign of memory loss or loss of cognitive function, there won't be a good chance to do much to treat or cure that disease.

So we had the two largest Alzheimer's clinical studies in the world—one in Europe, one in the United States—and when the one in the United States failed to show statistical significance, then as a company we had to reassess the status of where we were. Drug

discovery's very expensive, very risky and attracts a certain type of shareholder. Molecular diagnostics is also very exciting but much lower risk, growing rapidly, profitable at the time, but the company as a whole was not because the pharmaceutical side was spending so much on research and attracted a different type of investor who was looking at earnings per share and profitability and growth, and I decided that the two businesses just were not compatible, but I still had belief in the pharmaceutical side.

So I said, "As much as I hate to do it, we have to divide the company, and I'm going to take the molecular diagnostic side and try to continue to grow that and become profitable and make money for shareholders, and a certain shareholder group will follow that." And Adrian Hobden would the chief executive officer of Myriad Pharmaceuticals, and he would take the pharmaceutical company forward as just a pure play biotech company and hopefully create wonderful drugs that cure diseases. And so in **<T: 75 min>** 2009, I think, 2009 we spun off Myriad Pharmaceuticals as a wholly-owned . . . as no longer a wholly-owned subsidiary but now it's completely independent company. We didn't have any stock in it. Traded on NASDAQ.

LIND: Okay.

MELDRUM: And they went their direction.

LIND: Now I just have a note here that I want to ask quickly about was . . . were you at one point studying HIV/AIDS as well?

MELDRUM: Yes. We had—

LIND: That seems to be very different. It's not . . . there's not a genetic . . . or is there a genetic risk?

MELDRUM: Um, no.

LIND: Okay.

MELDRUM: No.

LIND: I mean, I know there's not actually a risk, but are some people more genetically not capable of fighting off the virus or something like that?

MELDRUM: The answer's yes, but it's a qualified answer. There's not a genetic predisposition to AIDS, but genetically, some people are able to resist the virus, their immune system is more robust, and so different people will respond differently, and some people will contract the HIV virus but never go on to full-blown AIDS, and some people will go on very rapidly. So there's probably a genetic component there that allows you to resist or not the virus, but not in the sense of causing.

LIND: Right, of course.

MELDRUM: Like BRCA1 causes cancer.

LIND: You won't just spontaneously develop.

MELDRUM: Yeah, but no, we had an HIV drug, an Alzheimer's drug and two cancer drugs—one for solid tumors and one that was a very fascinating drug—and to this day I think it would be successful if they had stuck with it—that was able to cross the blood brain barrier. So it could treat gliomas and glioblastomas. So brain cancer's really hard to treat because we have this wonderful blood brain barrier that prevents anything bad from getting from the blood into the brain, but it also prevents drugs from getting from the blood into the brain, and it's hard to inject stuff into the brain. [laughter] So here was a drug that would kill tumors that could cross the blood brain barrier. Now the problem is brain cancer's pretty rare, and so the clinical trials just took forever, and finally they gave up and abandoned it, so we never knew if it worked or not, and I'm convinced today that it probably had a great shot at being successful, but unfortunately, the company that we spun off gave up on it and pursued other things.

LIND: That's too bad. I had the chance to do a similar interview with Frank McCormick at USCF who's doing virus treatments of brain tumors. That was really interesting to hear about brain tumors from him. Okay, so let's see what . . . where are we? So is there anything you want to go back and talk about with the BRCA genes and the tests?

MELDRUM: I don't think so. Just chronologically, we launched the breast cancer/ovarian cancer test, BRACAnalysis.

LIND: Are they the same tests?

MELDRUM: Yes.

LIND: Because it's the same genes.

MELDRUM: Yep. And we won't yet—

LIND: But you'll be able to determine—correct me if I'm wrong—for an individual woman you'll be able to determine that woman's chances of developing . . .

MELDRUM: Breast or . . .

LIND: Breast and separately and/or . . . okay.

MELDRUM: Ovarian cancer. We launched a test called COLARIS, which is our second or third fastest-growing, largest test for colon cancer and endometrial cancer, and interestingly, these genes cause multiple cancers. So like BRCA1 causes breast and ovarian, and we give you a risk for both; the colon cancer genes cause both colon and endometrial cancer in women, and we give you your risk for both. A test called MELARIS for melanoma predisposition risk based on the p16 gene, a test called PANEXIA for pancreatic cancer risk based on PALB2, and, interesting, BRCA2 increases risk for pancreatic cancer. And so over the course of the years we've launched ten commercial tests, and we've launched three tests over the last three years. This year is kind of a unique year. In September, we launched myRisk Hereditary Cancer panel, and in October, we launched myPlan Lung **<T: 80 min>** Cancer, which will for patients with early-stage lunch cancer determine whether or not they need chemotherapy because right now tumor staging is a very poor predictor of whether or not a patient would benefit from chemotherapy post-surgical removal of the tumor for lung cancer patients, and right after the first of the year, we'll launch myPath Melanoma, which was the one I was talking about. And so we will have launched three commercial products in a single year, which is amazing.

LIND: What do you . . . that is very impressive. Congratulations. What do you use for the . . . what tissue do you take from the . . . is it all the same? So could somebody take one, say, vial of blood . . . ?

MELDRUM: Well, this is, I think, an important differentiator with Myriad. As we think about biomarkers and as we think about genetic predisposition, personalized medicine, more accurate

diagnosis, prognostic medicine, which are the four areas we focus in, there are three basic technologies that will lead to the discovery of biomarkers that can become diagnostic products. First is DNA, and, of course, Myriad is expert at DNA. We have one of the largest DNA sequencing labs in the world. Second is RNA, and Myriad is expert at RNA—all nucleic acid.

And our prostate cancer test, for example, and the lung cancer test that we've recently launched, both of those are RNA expression-based tests, not DNA sequencing-based tests. But the third biomarker discovery platform is proteins, and proteins are particularly exciting in the companion diagnostic arena, and Myriad was always strong in nucleic acid, but not so strong in protein, and so we acquired a company called Rules-Based Medicine two years ago that is probably the leading company in the world in terms of being able to multiplex and analyze multiple proteins from a single sample of blood, and they can analyze 550 different proteins from a single patient's single sample of blood. So DNA, RNA, protein—the three-legged stool of . . .

LIND: And all from blood.

MELDRUM: Biomarker discovery.

LIND: And all from blood.

MELDRUM: Many of those are from blood or can be from blood, and certainly the DNA, all of the genetic predisposition, hereditary cancer is blood-based. The protein is frequently blood-based, and we're developing a diagnostic that can determine whether a patient, when they go into the psychiatrist has major depression or is in the depressive phase of bipolar disease, and the two patients you can't tell the difference between the two. Yet if you were to give a bipolar drug to a major depressive patient, that could be life-threatening, and so you have to decide if it's bipolar or major depression. So we think this is going to be a very exciting . . . and that will be blood-based product.

For companion diagnostics, though, in particular, we're not dealing with the patient's genetics so much; we're dealing with the genetics of the tumor—how was the cancer caused, what genes are involved in the formation of the disease, and then how can we develop a drug or find whether or not the patient will respond to a particular drug based upon that genetic makeup, and so that's all tumor-based. So for products like Prolaris, the sample would be a biopsy from the prostate—not a blood sample—because we're trying to assess how aggressive the cancer's growing, not necessarily what the genetics of the patient look like.

LIND: So that's the difference between prevention and treatment?

MELDRUM: Yeah, yeah.

LIND: Okay. That's interesting.

MELDRUM: So we work . . . we're really the only molecular diagnostic company I'm aware of that has expertise in all three of the major biomarker discovery platforms: DNA, RNA, and protein.

LIND: It's all very interesting stuff. So all of the tests have been successful? Some more so than others?

MELDRUM: No. What's interesting is . . . you have kind of a filter, and if the filter's really fine, **<T: 85 min>** not many tests will get out, but a lot of them will be successful. If the filter's not as fine, you'll get more tests out, but not all will be successful. If I had told you that every test Myriad launched has been successful, you should push back and say, "Well, then your hurdle rate for launching a tube test is too high and there were probably a lot of great tests you could've launched that might've been successful." And you would be exactly right. So a company has to launch tests and have some failures, or its standards are too high and it's not taking advantage of opportunities that could be good.

So we've launched two tests that we've withdrawn from the market. One was involved in hypertension. CardiaRisk was the name of the product, and it was able . . . it was based upon a gene called angiotensinogen that is involved on salt retention pathway, and individuals that overexpress angiotensinogen can retain salt too well and that can lead to high blood pressure, hypertension. I think it was a good test, but, in cancer you're dealing with a small number of oncologists—maybe thirteen, fourteen thousand—and a company the size of Myriad can build a sales force to address the oncology market. It's a specialized physician group.

Well, with hypertension you're primary care, and there's two hundred thousand primary care physicians in the United States, and we just didn't have the financial resources or the ability to develop the primary care sales force. So I think that product may have been successful in guiding treatment for patients with hypertension, but we just didn't have the mechanism or the conduit to sell the test.

LIND: And the second?

MELDRUM: And then the second one was called OnDose, which would be able to . . . for patients diagnosed with cancer, you're given a dose based on your body surface area. So that's

not a very accurate way of dosing patients because some patients will metabolize a drug rapidly, and they need a higher dose. Some patients are slow metabolizers, and they'll have toxicity if you give them a higher dose. And so what OnDose did was based upon your ability to metabolize a drug prescribe the right dose and not focus on body surface area as a way of-of prescribing the dose.

And again, I think that's an exciting product, but it's hard for physicians . . . when a patient gets chemotherapy, you go in for an infusion about every two weeks and the doctor would have to take a sample of blood, look at your OnDose to see how you're metabolizing the drug, and then change the dose at the next infusion, and it's hard to have that much physician involvement. Typically, a physician wants to prescribe a drug and as long as there's no problems, the patient just goes to the infusion center, and the physician doesn't have to worry about it. And so it would be a significant change in how physicians are currently practicing medical care and that . . . I think OnDose could be an exciting drug, but that's a long and expensive process to try to change physician behavior. So both of those products were withdrawn from the market because they had flaws that we didn't anticipate when we launched it.

LIND: Yeah. Now how about the successful ones? Which ones have been the most successful?

MELDRUM: Well, certainly BRACAnalysis has been the most successful product. COLARIS has been very successful. It's probably our third biggest seller.

LIND: The two BRCA ones first? Or are they the same?

MELDRUM: They're the same.

LIND: Okay. So **<T: 90 min>** what's the second seller?

MELDRUM: The second is a test called BART. And BART is a very different technology. It's a microarray technology that can determine whether a patient has lost a big chunk of a gene or has duplicated a gene, and these insertions of DNA—big insertions of DNA or big deletions of DNA—are called large rearrangements and conventional sequencing confined specific mutations, but if a patient has a large duplicated section of the DNA, which would cause the protein not to be functioning properly, sequencing will not detect that. Likewise, if you've lost a big chunk of we'll say the BRCA1 gene, that's going to cause the BRCA1 protein not to be produced. That's going to increase a woman's risk for cancer.

But sequencing will only sequence what it can see, and it won't see that you've lost a big chunk of it. So we had to develop a technology to address these large rearrangements and launched a product called BART, and BART was launched in 2006. Didn't do a lot because we had to do a lot of clinical studies to show that BART was really important. Based on those clinical studies, we got professional medical guidelines to say that standard of care was to do the BART test, and the BART test last year grew from roughly two million a quarter to over twenty million a quarter, and now it's our second largest test. In the future . . . we don't yet have Medicare reimbursement for prostate cancer—our Prolaris test—but I think the Prolaris test will be a significant revenue opportunity for Myriad.

LIND: That seems like such an obvious one. They would save so much money on healthcare.

MELDRUM: Yep. And Medicare's excited about it, and they love the validation, they love the clinical study, but then they ask the question, "Will a man even if he knows he's a low risk . . . ?"

LIND: Will he want to live with cancer?

MELDRUM: Will he be courageous enough to do nothing about the cancer? I mean society has, sort of, ingrained in everyone that you can't give up, you have to fight cancer. You know, I'm going to fight cancer, I'm not going to let cancer get the better part of me, and if it's a slow-growing cancer you have to say, look, cancer's not going to bother you. Just leave it in, it grows slowly we'll monitor your PSA levels, we'll go under active surveillance, but you don't have to have surgery or radiation treatment.

LIND: Well, that's an education issue so . . .

MELDRUM: And yeah. And so Medicare said, "We're willing to cover . . . to pay for the test because it's fabulous, but only if you can demonstrate that 20 or 30 percent of the men—it doesn't have to be all of them—will actually go into watchful waiting or active surveillance and not have aggressive therapy." So we're doing a clinical study where we're testing patients and then actually seeing what they do, and we know that 91 percent of them are going to have aggressive therapy. So the question is, in this large clinical study, does that drop to maybe 70 percent have aggressive therapy and a lot more go into watchful waiting?

So as soon as that is given to . . . that data's given to Medicare, I think we'll get reimbursement for Prolaris. I think that'll be a big a big seller. We have a companion diagnostic test called HRD, which stands for homologous recombination deficiency, that I think is going to be a huge market opportunity. And I think we've got a number of products and companion

diagnostics that guide therapy for patients—personalized medicine—that I think will be very exciting in the future as well. So . . .

LIND: Yeah. Well, it will be exciting to see what happens with all that.

MELDRUM: Yeah. We'll see. We'll see what happens.

LIND: All right. So let's talk a little bit about at what point did . . . I don't really know the history of it, so I'm going to probably mess it up as I broach the subject, but **<T: 95 min>** at what point did the suit happen, how did that come to be, and was that focused exclusively on the BRCA test even though you have all these other tests as well?

MELDRUM: Yes. The woman's section of the ACLU had been discussing whether or not it's right for society to patent a gene—a human gene—that occurs in nature. Myriad didn't create the BRCA1 gene; it exists in nature. Myriad discovered it, we figured out what it did, and we figured out how you could use it to save lives and improve the quality of life of women. But the question the ACLU wanted to ask is, "Can you patent something that exists in nature?"

And they thought, "Okay, that this is worthy of our focus. What should we use as a test case?" And because it was the women's healthcare section within ACLU, breast cancer is the number one concern of most women. More women will die of heart disease than breast cancer, yet if you ask a woman what her number one health concern is, most women will say it's breast cancer.

LIND: Really?

MELDRUM: Yeah, not Alzheimer's, not heart disease, and so there was so much publicity around the race to find the breast cancer gene and the breast cancer test is by far and away Myriad's largest revenue generator and largest selling test, and breast cancer's the number one health concern around women. So the ACLU figured if we attack the BRCA1, BRCA2 genes, then that will create a lot of publicity and dialogue within the country about, "Gee, should you patent a human gene?"

LIND: So who was it over there who became interested or knew about Myriad and specifically came at you?

MELDRUM: Well, I think a lot of people know that (a) Myriad discovered the BRCA gene, and Myriad's always been a pioneer in molecular diagnostics, and as a peer in molecular diagnostic company, Myriad's the largest molecular diagnostic company in the world probably. So they would know immediately who to go after because a lot of publicity around the discovery and patenting of the BRCA1 gene and it's a very successful test, and so the ACLU decided that that would be the best test case to answer their concern, and that is, can you patent a gene? So they sued the company . . .

LIND: Lucky you.

MELDRUM: To invalidate our patents. We have twenty-four patents and five hundred claims, and they selected sixteen claims and maybe seven patients.

LIND: Okay. And when was this?

MELDRUM: So they . . . this was . . .

LIND: Two thousand ten-ish.

MELDRUM: Probably 2010. Yeah, probably 2010. They filed suit in Southern District Court of New York. [coughs] Excuse me, I'm at the very tail end of a cold.

LIND: Sorry to make you talk so long. We could take a break if you'd like.

MELDRUM: As . . . that's okay, but as I talk more and more, I start coughing.

LIND: Well we're close . . . we're almost done. [laughter]

MELDRUM: Coughing more and more. So in 2010 they sued us in the Southern District Court of New York, and that's a fairly liberal court, and so not unexpectedly the judge ruled that all of our patents and the claims were invalid. Now again, that's seven of twenty-four patents and only sixteen of five hundred claims.

LIND: And who was representing you?

MELDRUM: Jones Day is the law firm that was representing Myriad.

LIND: Had you been working with them for a while, or did you . . . ?

MELDRUM: That's the first time we worked with them, but they're one of the top litigating law firms in the country, and this was an important case, and so Myriad tried to hire the very best legal counsel we could hire. So we appealed that decision to the Federal Circuit Court of Appeals. The Federal Circuit Court only handles patent cases, and all of the cases no matter where they occur in the country go to the Federal Circuit Court, and the reason for that is the judges **<T: 100 min>** on the Federal Circuit Court largely have scientific backgrounds and technical backgrounds so they can understand better patent law. For example, the lead judge on our case, Judge Laurie, is a PhD chemist. So all patent cases go to this court and they handle nothing but patent cases. And they basically ruled in favor of Myriad. So the ACLU appealed it to the US Supreme Court, and this was probably 2011-ish.

LIND: That makes sense.

MELDRUM: And the Supreme Court decided not to hear the case but sent it back to the Federal Circuit Court because they had just ruled on another case, Mayo versus Prometheus. So the Federal Circuit Court heard it again in light of their decision on Mayo versus Prometheus and came to the same conclusion: you can patent genes and upheld Myriad's patents. So the ACLU appealed it a second time to the fed . . . the Supreme Court, and the Supreme Court decided to hear the case.

LIND: How did you feel about that?

MELDRUM: Well, wearing my Myriad hat, we were disappointed that they would hear the case because we do think that while you can't patent something that's a product of nature, you can patent something that has new utility and new knowledge around something that is found in nature. So a lot of the pharmaceutical products are derived from plants or microorganisms, and, you know, are found in nature. In fact, one of the earliest patents around digitalis, which is a plant derived pharmaceutical product . . . and there are lots of other examples. And actually, if you think about it, it's hard to find, it's hard to think of patenting anything that can't somehow be found in nature. So we felt disappointed that the Supreme Court would hear the case.

LIND: What was it about this that made them want to file the suit? I mean, was it because it's human and it's inside of us and there's something personal about it as opposed to an algae or . . . ?

MELDRUM: Yeah. The question they asked was, "Can you patent a human gene, not a gene generally?" So I think they felt that you shouldn't be able to patent part of the human body, that that's wrong, but you'd have to ask the ACLU what their motivation was behind that. So it was disappointing that the Federal Circuit Court, which is the body that's set up to hear patent cases, which has judges with technical backgrounds, it's a shame that you don't let that court, which is competent to rule on a patent case, stand a ruling. Now the Supreme Court is wonderful—those justices are brilliant, but they don't have scientific backgrounds, and when you get Supreme Court justices saying, "Now patenting a gene is, sort of, like if I were making cookies, and I wanted to patent the salt in the cookie." I think the company was disappointed that the Supreme Court wouldn't let the body designed to hear these complex technical issues make a decision, and they decided to make the decision themselves. Now attending the Supreme Court hearing was absolutely fascinating. I mean—

LIND: Yeah, I was just thinking that must have been a little . . .

MELDRUM: That was—

LIND: Secret internal thrill to get to go and see what goes on behind the closed doors.

MELDRUM: That was so cool. If I had a bucket list, it would be on my bucket list to check off. So we prepared our arguments, and we think the patent system is critical to innovation in America to giving a company a very limited period of exclusivity—twenty years or less—to where it can recoup its investments. We spent over five hundred million dollars in the discovery and launch and commercialization of the BRCA test . . . to recoup its investment so it's encouraged to make new **<T: 105 min>** discoveries and investments, and the ACLU feels that it'd be better for society not to have patents so that many companies could offer the test and maybe the test would be available at a lower price and, you know, that's probably true, but who's going to make the first test, make the first discovery because the other generic companies aren't going to discover anything new. They're just going to copycat what's made, and if you don't give the original inventor some incentive, why invest hundreds of millions of dollars in discovery if you can't patent the invention?

Also, patents are important to facilitate research. Under the patent system, we have to disclose exactly what we did, how we did it, so that scientists can study the BRCA genes, and the ACLU argued, "Well, patent system stifles research." Well, the BRCA genes have had eight thousand articles written on them, and sixteen thousand scientists do research on the genes. How

can you say that stifles research? I mean, the BRCA genes are probably the most widely published genes ever discovered. So it's a philosophical difference. We think patents are important for innovation, for creation of new products . . . we think it drives the economy of a industrialized nation. The ACLU would like everybody to have the test for free.

LIND: Now very quick, King has been pretty vocal on her thoughts about the issue, and so how do you feel going back to one of the other original, sort of, pursuers of the same find? How do the differing perspectives compare?

MELDRUM: Well, you know, again, we think the patent system is important. One of my favorite quotes is a quote from Mark Twain, who said, "A country that doesn't have a strong patent system is like a crab—it can only go sideways, it can't go forward." And so we're pro patents. The period of exclusivity does allow the company to recoup its investment, but it's not exclusive forever, and then competition can come in, and, you know, a drug needs to . . . when a pharmaceutical company manufactures a drug, it needs to help the company recoup the billions of dollars it spends on drug discovery, and then generics come in, and the price of the drug goes way down and that benefits society.

But if you don't have that limited period of exclusivity, you'll never get the drug in the first place. Now, others feel that you shouldn't patent human genes, that the information should be freely available for everybody and we should share it with our competitors and let the competitors, who spent no money finding the genes, benefit from our investment and that maybe it would create a lower-priced product. So it's just a different philosophical . . . we think the patent system works, we think it's important for the United States, we think it's important for innovation, we think it's important for economic growth, but yes, it does create a period of exclusivity.

The Supreme Court basically split the baby. So what the Supreme Court said was there were five of Myriad's claims around the isolated DNA—that's the gene as it's found in nature—that we're going to throw away; you can't patent it. But there are four claims around complementary CDNA that is not found in nature, the introns have been removed, and it consists of only the exons, and it's made in the laboratory synthetically by man and that's patentable, and I think that's an okay outcome. I think that allows pharmaceutical companies, molecular diagnostic companies, agricultural companies—a lot of the gene patents were in agriculture—to continue to innovate and create new products and benefit society through the creation of those new products. We wish they had upheld like the Federal Circuit Court did twice both isolated and CDNA, but I think it was probably an okay conclusion in the end.

LIND: How do you feel about **<T: 110 min>** being the case study of such an important decision for the future of science?

MELDRUM: Well, yeah. No, it's a landmark court decision, and it will have ramifications that are significant, but that's just what it is. I don't take any pleasure in it being a landmark court case. We, you know, aggressively defended it, and the Supreme Court decided the way the Supreme Court decided, and, you know, it just kind of is what it is, but I do think it will be a very important case going forward in the future.

LIND: Yeah. And so what does that mean for Myriad? What are you working on now, and how do you go forward from that?

MELDRUM: Well, Myriad believes that the Supreme Court upheld the patenting of CDNA, and that's how we do our tests. We don't use genomic or isolated DNA. We use synthetic DNA with the exons removed created in the laboratory. So we continue to believe you can get composition of matter patents around complementary DNA. In the hearing at the Supreme Court, which was fascinating because the Supreme Court justices are pretty open. You'd think it would be, kind of, a formal, everybody well-behaved, and Justice Sotomayor would say something and Justice Alito would roll his eyes and, you know, disagree with her visually, so it was fascinating to watch the interaction among the Supreme Court justices. But Justice Breyer, who tends to be one of the more liberal justices who would be against patenting said . . . and he's talking about genes, but his kind of exact words were, "Well, I don't think you can patent the thing." And by the thing, he meant the gene. "But I can see that you could patent the use of the thing." And so I think what Justice Breyer was saying was method patents—knowledge around the genes—is patent-eligible, but not the gene themselves. And then when Justice Thomas wrote his opinion, he went out of his way to, I think, reinforce the importance of method patents in the diagnostic sector.

Now that I think is important because in the Supreme Court decision of Mayo versus Prometheus, that was a method patent, and they basically said because Prometheus . . . all of their discoveries were known, their patents were invalid, and I think what the Supreme Court was trying to say was because there was no real novel discovery, everything was known in the art, the patents were not valid—not that diagnostic patents itself are somehow invalid, yet everybody has interpreted the Prometheus case as all diagnostic patents, method patents are invalid. So I think the Supreme Court used the Myriad case in their opinion to reinforce no, knowledge around the gene is patentable, which would be method patents, and synthetic DNA made in the laboratory is patentable, but the gene as it exists in nature is not patentable.

So our . . . I mentioned sixteen claims, four of which, by the way, were upheld by the US Supreme Court. But we have five hundred claims. Most of those are method claims. Many of those are CDNA claims. So I think for Myriad, our patent position is still very strong. I think for the molecular diagnostic industry, fortunately, I think the patent position is very strong, and I think with complementary DNA being patent-eligible, the pharmaceutical industry should still benefit from being able to patent genetic information.

LIND: I'm sure everybody was watching the case very closely, though.

MELDRUM: Yeah. So if the Supreme Court decision is interpreted correctly—and right now there **<T: 115 min>** is some confusion around it, and I think other court cases will have to reinforce what did the Supreme Court really mean—I think we'll end up in an okay place where it won't stifle the development of new drugs or the development of new, important diagnostic tools. Again, drugs save lives, but diagnostic predisposition saves lives too. We identify a risk in a patient, so we can prevent the disease, and the patient life is saved. Pharmaceutical companies when a patient gets sick give them a drug that tries to cure the disease, and the patient's life is saved, but in terms of the role of the diagnostic industry—molecular diagnostic industry—plays in saving lives, improving the quality of life of patients is every bit as important as the pharmaceutical and biotechnology industries.

LIND: Hmm. That's very interesting.

MELDRUM: So fascinating trial, landmark court case, but fortunately, I don't think it'll have a big chilling effect on either the diagnostic or pharmaceutical industries.

LIND: And, of course, their international . . .

MELDRUM: I think we'll be okay.

LIND: Patents aren't affected by it.

MELDRUM: No. You can still patent . . . it's interesting. The United States is now the only industrialized country that doesn't allow patenting of isolated DNA. Every industrialized country in the world—Japan, every European nation—allows patenting of genes. The United States is the only one.

LIND: That's interesting. So I just want to finish up with a couple of questions. So I know you like to ski. What . . . talk a little bit about your interests and passions outside of Myriad. And you have son—you mentioned him.

MELDRUM: Yeah, yeah. I have one son who is a venture capitalist in the Research Triangle Park in North Carolina. Three fabulous grandsons. And they are there: Colin, Ian, and Aiden. And so I love to spend time with the grandkids, and they love to hike and I love to hike and love

to climb mountains. If you look right up there, that is . . . this is my son and I, and that was taken three years ago at the top of Mount Kilimanjaro . . .

LIND: Oh, very cool.

MELDRUM: In Africa. That mountain is 19,341 feet tall.

This is a winter ascent of the Pfeifferhorn. This is the Hound's Tooth Spire in the Bugaboos in the Canadian Rockies. And I've also had the pleasure of climbing Mount Fuji in Japan, Ben Nevis, which is the highest mountain in Great Britain. So both my son and I love to climb mountains, love to hike, love the outdoors. This was our summer vacation this year. So that's up in the Canadian Rockies and fortunately . . .

LIND: This looks like my happy wall.

MELDRUM: Yeah. Fortunately, my wife loves the outdoors with me. And directly behind you, that's . . . that was taken this summer too. That's Kathy up at about eleven thousand feet in the Canadian Rockies.

LIND: Do you rotate the pictures on your wall every so often?

MELDRUM: I do these. These, I add a couple of new ones, but those I keep because some of those are older, so those I keep. The one on the far end, that's skiing in St. Anton in Austria. We do a lot of kayaking particularly up around Alaska and a lot of canoeing. We love to canoe the Snake River, which is pretty exciting because the Snake River has some class II/III rapids where we canoe. A canoe is a whole different than a rubber raft in terms of stability.

LIND: I haven't canoed, but I have rafted the Salmon, the Middle Fork, and the Main.

MELDRUM: Oh, okay. Well, on a raft you're probably class IV, class V rapids. Big stuff. Canoe you don't do that sort of stuff. Kayak you could. But on the Snake River we've canoed the entire Snake River from Lake Jackson to the town of Wilson—not all in one day but in segments **<T: 120 min>** because . . . usually twenty-mile segments. And there's a particular segment of the Snake River called The Maze that goes from Dead Man's Bar to the town of Moose, and there are some class III rapids in The Maze and we went through one set of what we call whoop-de-doos, and it's a series of haystack-like standing waves, and you go up one and down the other and up the other. And Kathy's in the front, and I'm in the back to steer and we

went down and then going up the whoop-de-doo the canoe . . . well, it looked vertical—it wasn't vertical—but I'm looking up there and Kathy's like way up there and then we go down the other side. So we love the outdoors and we love hiking. We love traveling, and so on the horse there, that's in Petra.

LIND: Oh, I went there. It's so cool.

MELDRUM: I love it.

LIND: Did you take the . . . did you go up to the Prophet Aaron's tomb?

MELDRUM: We did not. We went to . . . we went into Petra, and we hiked into Petra and we hiked sort of the length of it and saw the treasury, of course, and a lot of the things, but then we went on about a two-mile hike—and I'm trying to think of what it's called—to the . . .

LIND: The sacrificial thing? No?

MELDRUM: I don't think it was the sacrificial thing, but it was, kind of, a big tomb.

LIND: There's the one that's kind of far away is the monastery.

MELDRUM: We went to the monastery.

LIND: Yes, yes.

MELDRUM: So we hiked to the monastery and then back, and then we were pretty tired at that point, so we rode a camel from the . . . where you start the hike to the monastery to the treasury.

LIND: Which is not as relaxing as you might think.

MELDRUM: No, but it's amazing how soft their feet are. You can't hear them. So we rode a camel to there, and then we hiked partway out of Petra, and then they had horses, and I'd always

seen the Indiana Jones movie, and you can see I've got my Indiana Jones hat on. [laughter] So I wanted to ride a horse out of out of Petra, so that was . . . we love traveling and have traveled most of Europe and South America and Asia.

LIND: Is there a particular mountain on your wish list?

MELDRUM: We've done a lot. I think some of the places I'd go back to is the South Island of New Zealand. We love the South Island of New Zealand. The Southern Alps, Mount Cook, Fox Glacier, Franz Josef Glacier. Again, for scenery, South Island of New Zealand is absolutely fabulous. But, yeah, we mostly like new stuff. Had an opportunity . . . we were in China—and this was many years ago, and I don't think you could do it now—and we wanted to see the Great Wall, but we wanted to avoid the crowds. So we got up really early like at four in the morning, took a cab right out to the Great Wall, got there at about six, and it wasn't open, but you could walk onto it. And so we walked onto the Great Wall, and we hiked along the Great Wall for probably close to two miles, and we were the only people there and we saw the sun rise. And it was fabulous. Then we turned around and came back and there's this wall of, mass of humanity. [laughter]

LIND: Fighting upstream.

MELDRUM: But seeing the Great Wall without the crowds was almost a religious experience.

LIND: Wow, that's great. So I always like to ask one final question, which is if you were to give advice to people interested in entering the biotech or venture capital for biotech or biotech business, what would you tell them? What have . . . looking back over your career, what's the advice you would give?

MELDRUM: Well, first of all, I'd encourage them to enter the industry because it's absolutely fascinating science, and you not only hopefully will be successful in your career, but you'll do a lot of good. At Myriad what's neat about our employees—and all 1,500 of them—is they're fascinated with the science like I am, they love the work they're doing, they get stock options in the company, and they want to be financially successful. **<T: 125 min>** But the most important thing at Myriad always is the patient, and they genuinely care about the patient, they genuinely want to help the patient survive their cancer or get better treatment for cancer, and so it's . . . Myriad is really a patient-centric, patient-focused company.

But it's neat to go home at night and be in an industry where you know you're doing a lot of good and so, again, it's fun to be successful in a career, but it's also I think really important to know that you're saving lives and improving quality of life of patients. So I would

encourage people to go into the healthcare industry in both diagnostic, biotech, pharmaceutical, and then I would encourage people to be curious because there are lots and lots of discoveries yet to be made, and curiosity . . . when we hire a Myriad scientist, we want somebody that's smart, and we want somebody that's a team player, we'd like somebody that is both verbal- and written-articulate, good writer, but curiosity is an important aspect that we value and look for in Myriad employees. And then the last thing is, you know, don't be afraid to get into things that you don't know a lot about. Because again, I go back to the founding of Myriad. If I knew today . . . if I knew then what I knew today, I would've realized we couldn't have discovered the BRCA2 gene, we couldn't have built a company because the obstacles were just too kind of insurmountable, and so sometimes that naïveté works to your advantage because common sense would say you can't do it, but if you're committed and dedicated to doing it and don't really understand how hard it is, many times you can be successful where others . . . other more knowledgeable, more sophisticated people would say, "No, no, you can't ever be successful there." And then a lot of it is just luck. So you've got to be lucky.

LIND: Is there anything else you'd like to tell us?

MELDRUM: I don't think so.

LIND: All right.

MELDRUM: I think you've exhausted me. [laughter]

[END OF AUDIO, FILE 1.1]

[END OF INTERVIEW]