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Oral History Project

Transcription

Mitchell Kronenberg, Ph.D.
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Williams: This is an interview with Dr. Mitchell Kronenberg for the American Association of Immunologists Oral History Project. Dr. Kronenberg is the President and Chief Scientific Officer of the La Jolla Institute of Immunology. He served as the AAI Secretary-Treasurer from 2009 to 2015. He is a Distinguished Fellow of the AAI and was the recipient of the AAI Distinguished Service Award in 2016. We are at the IMMUNOLOGY2019™ in San Diego, California. Today is Saturday, May 11th, 2019, and I'm Brien Williams.

Dr. Kronenberg, let's start with a little bit of your family background.

Kronenberg: Well, I grew up in Queens, New York, went to public high schools. My parents didn't go to college. I guess you'd call them second generation; in other words, their parents came from Europe. We were kind of a working-class, if you will, family. My father was a small businessman, but he had a very deep love of science and nature. He enrolled during World War II in the Army and he did well on an IQ test and they made him a meteorologist, and he studied airflow and surface temperature of water and things like that. He was always explaining that stuff to me when I was a kid, so I think he had an enormous influence on me, even though his idea was that I would become a very successful lawyer and make a lot of money. [laughs] But both my parents, of course, stressed education.

I did well in school. I was a little rebellious, of course, but I'm not going to talk about that very much. I went to Columbia University as an undergraduate. My alternative was the University of Chicago. So I picked very intellectual schools. The bargain I made with my folks was I wouldn't have to live at home. They wanted me to go to an Ivy League school. They didn't know that much about the University of Chicago and how excellent it is. So I said, "Okay, I'll go to Columbia if I don't have to live at home." They agreed with that bargain, and it worked out.

It was a couple years after the major uprising, so 1968 was a big one. I was in high school then, but we had the Cambodia—we had a huge student strike in 1971. I was a little bit active. I wasn't throwing any bombs or anything, believe me, but I was active in some of the protests. But I also wanted to learn. I remember during the Cambodia strike, I went to an organic chemistry class, and we had this great synthetic chemist, George [Ed. Gilbert] Stork, a member of the National Academy, and he was saying, "I don't see why intellectual work can't go on."

I was thinking, "Yeah, but I don't know if synthetic organic chemistry's intellectual work." But anyhow, I was in the classroom. [laughs]

So after that—

Williams: Let me just back up [unclear].

Kronenberg: Yeah, sure.

Williams: What started you on the scientific line, and what do you major in at Columbia?

Kronenberg: Yeah, yeah. So I was always very good in science and math. We had a math team in high school and I was on the math team, and I also was on a golf team. So I didn't enter Columbia University as a science major. I didn't know what I wanted to do, and there was a lot of partying, as there often is, and, back in those days, some demonstrating too. I was kind of lost, and I thought, well, maybe I'll be a premed, because I figured a lot of people were premeds, and if you do that, you basically put off the decision. You can be a psychiatrist, a surgeon, a medical administrator.

I did some volunteer work at St. Luke's Hospital on 113th Street and Amsterdam Avenue. It was scary. Of course, New York City in the early 1970s was scary, period, but there was a lot of drug addiction and violence, whatever. I didn't like being in the hospital, but I realized I liked taking the premed courses and I was taking courses from eminent philosophers. I took a painting course, and I was making these big paintings that my teacher didn't like, but I thought they were good. I was doing all kinds of things. I had no direction.

But about in between the second and third year, a little late, I decided, gee, I really like—I knew I was good in science from high school, but scientists were kind of nerdy and I didn't really want to be one. But in college, it clicked and I decided, "This is really something I want to do. I want to learn and I want to discover, and I'm not going to be a premed. I'm going to go to graduate school." And that's what I decided to do, but—

Williams: Were you an only child?

Kronenberg: No, I have an older sister. She's a real bohemian, poet, and an interesting person who lives in Santa Monica now.

I did something a little unusual. After college, I took a year off—now it's more common; they call it a gap year—and I traveled around the world, mostly in Asia, including Japan, Taiwan, Hong Kong, Indonesia, Laos, which was at peace at the time, Burma, India, other countries. Yeah, I did that for a year and then I started grad school at Caltech [California Institute of Technology].

Williams: Did you come back through Europe or not?

Kronenberg: [laughs] I came back from India. I had hepatitis A and the traveling was done, and I had to recover at home for a couple weeks. By the way, to the general public, you get that from food and water, not from putting needles in your arms. I wasn't doing any of that either. But I think I contracted it in Nepal, yeah, pretty sure.

Williams: Right. So you graduate—

Kronenberg: In biochemistry. So that was the question, right? [laughs] So I majored in biochemistry eventually and did well, did fairly well, and applied to some different graduate schools. I was told by my research advisor, because I was working in a lab, that Caltech was like Mount Olympus, and I was a little surprised I got in, and I said, "Okay, I'm going there. I'm going to Caltech."

Williams: What was your notion of California at that point?

Kronenberg: Well, great question. So I had actually spent a summer in Berkeley, and the rationale was because I started my major late, I needed to take some more courses in summer school. I told my parents that I could live in the student co-op in Berkeley and take some introductory science courses and it would be cheaper, even if I stayed at home and took the subway to Columbia during that summer. And it was, in fact. They charged in-state tuition. And I hitchhiked across the country, which I didn't tell my parents. Later, they found out. [laughs] So I was able to hitchhike out there, go to school all summer, hitchhike back, and had little adventures along the way. So I knew Northern California, but I'd never been in Los Angeles.

Williams: What year, what summer, were you in Berkeley?

Kronenberg: It was 1972, yeah.

Williams: So Berkeley was somewhat quiet as compared to the sixties by then.

Kronenberg: Yeah. Well, yeah, it was still interesting, believe me, but so was the Upper West Side of Manhattan, as you might imagine. Yeah, I arrived in New York about twenty-two years old, didn't know how to drive a car. I was a little bit of a fish out of water initially, but then I never left Southern California in the last forty-five years or so.

Williams: So tell me about your experience at Caltech.

Kronenberg: Well, of course I knew that Caltech was extraordinary and a place of amazing research. Max Delbrück was still active. He originated the phage school and so on. But the atmosphere was completely different from Columbia University, because there we had the full spectrum. People would get together in the evenings and have these very hyper-intellectual discussions, and at Caltech, people would work in the lab and then go to this place where they had a little coffeehouse where they played very loud Grateful Dead music and people would read comic books. It was the precursor of what people would probably do with video games or with sci-fi movies now. So the atmosphere was really different, and that and the climate and just everything was a huge—it was a culture shock. I'm still in the United States, but I felt culture shock.

Williams: So what was it like working around LeRoy ["Lee"] Hood?

Kronenberg: Well, it was like having a very permissive father, scientific father, and I had very permissive parents, in a way, who had read Dr. Spock and somehow let me wander around the country and do crazy things. Yeah, it was a very large lab. I mean, it started out, maybe there were ten, fifteen people, probably, and it grew and grew and grew over the years. Lee is incredibly smart, but he's not the kind of person who needs to prove he's the smartest person in the room at all times, so he's a very good listener and he gives you a lot of freedom. For me, I think it was the best, because I got to do a lot of things that didn't work, but not have the pressure of somebody standing over my shoulder and saying, "Why'd you do this? Why'd you do that?" So it was amazing. So I worked with him for eleven years as a graduate student and a postdoc. You're not supposed to do that, of course. You're supposed to go and move somewhere else.

Williams: And why didn't you?

Kronenberg: In part because of the partnership, I enjoyed it, and in part because I just loved living—I grew to love Southern California and Los Angeles, in fact, and social ties as well. Honestly, it probably would have been better to move on earlier than I did, but in the end, it worked out, I guess.

Williams: So you don't regret that?

Kronenberg: No, no.

Williams: Were you originating work or were you taking leadership from him or others in the department?

Kronenberg: Well, there was dialogue, but you could decide what you wanted to do and what you were going to do.

Williams: So when you arrived, did you have a sort of sense of the path ahead in terms of research areas and whatnot?

Kronenberg: Oh, no. In fact, again, my poor ability to make commitments earlier than other people, let's say, one appeal of Caltech was that you didn't have to specialize. They had neurobiology and they had plant biology and they had a division or a department of, I think, twenty-eight faculty at the time, and they covered the whole spectrum, so it was not only the eminence of the place but the breadth of it that appealed to me. And I rotated in some different labs and had some nice experiences.

I remember at one point—I'll tell you an anecdote. I went to talk to this guy Ed [Edward B.] Lewis, and he was still working in the lab. He was probably—well,

he seemed ancient—he was probably sixty. [laughs] I have to do the calculations. He had all these bottles with media and the flies and he was moving the flies around with a forceps and looking in the microscope, and I thought, "I don't want to do this. This is not going to be interesting work." He got the Nobel Prize for discovering homeobox. It was for work he did earlier, but that would have been—he was later on my thesis committee, in fact. So there were all kinds of great people that I met there. It was amazing.

Williams: So you had this smorgasbord of areas—

Kronenberg: Exactly.

Kronenberg: —that you could pursue, but you must have, at some point, narrowed it a little bit.

Kronenberg: Yeah, in the first year. First of all, I took immunology. We didn't have an immunology course at Columbia University, and I took the course that was taught by Lee Hood and others, and boy, immunology—I just thought it was amazing. It was so interesting. The diversity question back in the day was kind of a huge thing. The essence of it is that your immune system can make a protein specific to almost any foreign thing or antigen in the world. How the heck can you do that? Your genome, you don't have infinite genes. How can you make infinite recognition molecules? And there were other fascinating problems, but that was among them, and I was just hooked. I just thought, "Wow, these are fascinating questions."

The other aspect of it is that it seemed more medically related. I didn't want to necessarily do translational research. I don't think people used the word at that time. Maybe they did. But I wanted to do something where you could see some connection to human health, and there were a lot of people doing, say, developmental genetics of *Drosophila*, and I could understand that that was fundamental and eventually that might apply to human health, but not in the same way that immunology would in my lifetime, let's say. So that was part of the appeal as well.

Williams: When did Hood leave for the University of Washington? Was that before or after you—

Kronenberg: Oh, way after, a couple years—well, not way after, but some years after, yeah.

Williams: Right. So what prompted your move, quote, unquote, "across town"?

Kronenberg: Well, I was ready to leave, and I wanted to go out on my own. Yeah, I didn't look in many places. I'd published some nice papers, and I was pretty desirable in the job market at the time. I did look at Scripps Research and Salk Institute, but I wanted to be at a university. So I had job offers from those places, and UCLA [University of California, Los Angeles] came up and they offered me an assistant

professor position, and I wanted to be at a university. I like teaching and I thought that building a research program with graduate students was an easier way to start than trying to get postdocs when you've just finished your own postdoctoral fellowship.

Williams: So what were the years at UCLA like for you?

Kronenberg: Well, they were also mostly great. Now, I have to tell you, I was at UCLA from 1986 to 1997, and during that time—well, I got married in 1986. My children were born in '88, '90, and '93; three sons. During that time, we had the Northridge Earthquake—that was '94—we had the Rodney King riots, and we also had—I think it was 13 inches of rain in one day. And also we had fires in Calabasas near where I lived. So we had fire, flood, civil distress, and earthquake, and you might say, "Oh—." But we were happy. I think Hilde [Cheroutre], my wife, and I—my wife's also a scientist—we were very happy. Maybe we were too young to be bothered by anything.

Yeah, the years were good. I got to develop my own completely independent directions around certain kinds of what you would now call transitional lymphocytes in between innate and adaptive immunity, which has been one of our interest in immune system of the intestines and the other barrier surfaces, and it's still our research focus today in my research and also Hilde Cheroutre's, my spouse's, research.

So we developed our own research interests. I had some really, really great students, one who's now the director of the Cancer Center at UCLA, and others who became very eminent also in biotechnology, the chief medical officer of Celgene, a very big company. So we developed our independent direction, and I think we made some nice findings. So it wasn't the most striking period of my career. I think my career took off after moving to La Jolla, really, but I did well.

And I think we also had an impact at UCLA. For example, we instigated, and my wife ran, the first transgenic mouse facility there, and we had to really lobby for it to get a little support and a little space and so on, and that helped everybody. I think we developed some really nice collaborations there, and I'm still on a program project grant, which is, as you know, a multi-PI grant that's in its twenty-seventh year that goes back to the UCLA days. Now, and interestingly, all the investigators who were at UCLA moved to Cedars-Sinai [Medical Center]. They moved to another institution in Los Angeles. So collaborations with those investigators and friendships have continued to this day. So, looking back on it, it was quite turbulent, like many times in your life, but it was an amazing time.

Williams: What kind of a collaboration did you establish with your wife? Was she closely working with you or—

Kronenberg: Yeah, that's interesting. Hilde Cheroutre's from Belgium and she came to Caltech to do a postdoc, and that's where we met. So we were a product, an F1 product, of Lee Hood's lab, in a way. When I went to UCLA in 1986, I told Hilde, "You might want to stay with Lee Hood for a while. He'll have endless money and support, and it won't be my responsibility." She wanted to join my lab, and she finally did move in—I think it was 1988, which turned out to be a good thing, because I think he moved to Washington in 1989. John or somebody will have to look at that to see if it's correct.

Hilde came to my lab, and she's very adept at surgeries and she wanted to set up the transgenic mouse facility and then work with me on things we were interested in together, including the barrier immune system and these—I'll call them innate-like lymphocytes. 1988, we had our first child. She was going to work in my lab, not have her own lab, and that's what she did between '88 and '97. She became the person who ran the transgenic mouse facility, gave her somewhat independent identity, and she ran some projects in my lab. But mostly—well, with three children, if you think of 1997, we had a nine-year-old, a six-year-old, and a four-year-old, boys, the kind that walk into a room and start breaking everything immediately. So her work, if she injected 150 mouse eggs and transplanted them, she could go home. She didn't have the stress of running a lab.

When I interviewed at the La Jolla Institute with Howard Grey, who was the president at the time, that was 1996. I was talking to Howard and I handed Howard Hilde's CV and I said, "Howard, if I'm going to move," and they wanted to recruit me, "you'll have to find a position for Hilde. Maybe she can run a transgenic mouse facility."

He looked at the CV and he said, "Oh, I think she should be an assistant professor," because she was continuing to publish with me and even in the last author position in some cases.

I said, "Oh. Well, I have to ask her if she wants to take on that kind of responsibility raising money and running a lab."

So I went home the next day, I drove home, and, typical clueless husband, I said, "Hilde, do you want to run your own lab?"

She said, "Oh, yes," right like that [claps hands] immediately. [laughs]

So I didn't get it that it was a little stifling to be doing this very technical work over and over again. I didn't see it clearly enough, but she did.

So she came to the institute with me in '97 as a junior member. She's now a full professor and division head and adjunct at UCSD [University of California, San Diego] and whatever. It's worked out very well for her during the last, what,

twenty-two years or so. And we have joint projects and a joint lab meeting every week, but we also have separate projects.

Williams: I want to ask this question. Do you remember when you first set eyes on Hilde?

Kronenberg: Kind of, yeah. I'm not sure if it was the very first time, but, yes.

Williams: And what went through your mind?

Kronenberg: Well, she's very beautiful, in my unbiased opinion. Actually—when was it?—I think she had been to this—may not have been the first time, but she had been on this vacation in Hawaii, I think, and came back just like you look like when you come back from Hawaii. You're tan and you're just radiant. Yeah, I remember that.

Williams: And a French or a Flemish accent?

Kronenberg: Ah, the northern part of Belgium, so *ze spreekt zeer goed Vlaams* [Ed. "she speaks very good Flemish"]. Well, it's her native tongue—*moedertaal*. Her native tongue is Flemish, but a French name, though.

Williams: So when did your relationship move beyond admiring her pulchritude?

Kronenberg: [laughs] Right. Yeah, we occasionally spoke at Caltech, but the lab, by that point, Lee's lab was—people say 100. I think it was 60, but it was still rather large, and we were across a whole floor of this building and she was at the opposite end, so we just had occasional interactions. But people would go out, go to the movies together and things like that, in groups, and I think somehow it just clicked.

But at first, we tried to not let anyone know within the lab and whatever, and, actually, it gets complicated, but I was in another relationship at the time and Hilde's former boyfriend had been in the lab and had gone back to Belgium. So no one wants to be the object of gossip, so we tried to keep it quiet for a long time, but after about, I don't know, three, four, six months, whatever it was, everybody knew. Then it was okay. I mean, Hilde's ex was back in Belgium and he had gone on with his life, and my relationship wasn't the right one, so it was all good. I'm still on my first marriage after thirty-three years. [laughs]

Williams: While we're talking family, what kind of careers have your three sons followed?

Kronenberg: Yeah, really interesting. So my eldest is a resident in urology at UC San Diego. He's married and lives in a beautiful little apartment with his wife downtown. My middle son, he's single. He's a corporate lawyer in Los Angeles, works in one of those big towers in Century City and lives in Marina Del Rey. My youngest son, Benjamin, who's twenty-six, he's a free thinker and kind of a latter-day hipster, now in the current parlance, and he works in a garden where they grow amazing

vegetables for a spa, so it's a culinary garden up in northern San Diego County. He and his fiancée live in our house for now. They're getting married in September, and they're fun roommates, but I think at some point, they'll need to move out and figure out their future.

Williams: There was one thing that you haven't mentioned and might be nothing to say, but you were involved with the Jonsson [Comprehensive] Cancer Center at UCLA. What was that?

Kronenberg: Well, it was a source of collaboration and support. There were many organizations like that. They did give me an award one year. I wasn't really doing what you would call cancer research. It was basic immunology research. I was grateful for that. They actually supported building that transgenic mouse facility. I had to explain several times why it would be useful and important to genetically engineer strains of mice to study the immune system and other systems. So they were great supporters, and, as I said, kind of what goes around comes around, perhaps. One of my first graduate students is now the director of the Jonsson Cancer Center.

Williams: While you were at UCLA, were you monitoring what was going on down at La Jolla Institute or—

Kronenberg: Oh, not so much the La Jolla Institute, but the scientific community in San Diego, I believe it's exceptional, and—

Williams: Explain.

Kronenberg: Well, a lot of collaboration and interactions, and not everybody's in the same organization, which I think is helpful. What I mean by that is—well, UCSD is the biggest organization, of course, but then you have the Scripps Institute [Scripps Research, La Jolla] and you have what used to be called La Jolla Cancer Research. It's now Sanford Burnham Prebys [Medical Discovery Institute]. The Salk Institute, of course, is very famous. And there's some smaller ones that haven't really—there was the Medical Biology Institute. It's no longer in existence, but it was there. In fact, I had a collaboration with someone there. So any number of times, I had gone down there to give seminars. And it's so gorgeous, and life there just seemed so much easier than dealing with the traffic and congestion and the issues of living in L.A., and where do you send your kids to school and issues of that kind. So in many ways, it seemed almost idyllic compared to—even though we were happy in Los Angeles.

I was invited to the La Jolla Immunology Conference one or two times, so I got to see how people interacted. It was a very big immunology community, but spread out over the different places, and it seemed really wonderful. Right before La Jolla Institute for Allergy and Immunology, it was called then, came up, I had interviewed at UCSD. I had interviewed there twice, and they were interested and

perhaps going to make me an offer. It was moving a bit slowly. They were much less welcoming to my spouse than Howard Grey was. It was sort of like, "Well, we have a transgenic facility. What are you going to do here?" and made her feel pretty awkward, frankly. But that was still a possibility. So the community of San Diego was more attractive than the institute itself. However, when I visited the institute and learned more about how it worked, I thought it was really impressive and attractive.

Williams: So talk about the founding of the institute and its history even before you came.

Kronenberg: So the institute has been operating for thirty years, and it was the brainchild of a man named Dr. Makoto Nonaka. He had the idea that a Japanese company would support an academic research institute so that they could have access to the international scientific community that works in the United States. I won't say America because, of course, they're not all American. In the 1980s, it was going to be the Japanese century, and Japan's still a great country, of course, but they were going to buy everything in the United States, if you remember that time. So he actually sold this idea to three companies. They were interested. Kirin Brewery was perhaps the most interested. So Kirin makes beer and they have other businesses related to hospitality, but they had gotten into pharmaceuticals and they had invested very early on in Amgen when Amgen was struggling to get started, and that developed into a partnership where they had the right to sell Amgen products in Japan, like Erythroport and G-CSF, things that stimulate blood cells, particularly for cancer immunotherapy patients. So, actually, it was a very clever move, because Kirin, or Kirin later became Kirin Pharma, was very successful due to this investment rather than initially, at least, through anything they developed themselves.

So Kirin was interested, and what really sealed the deal was that Mako, who I still am friends with, and he's in San Diego, he convinced the late Dr. [Kimishige] "Kimi" Ishizaka, who was, I think, about to retire from Johns Hopkins, to come to the La Jolla Institute and be the first scientific director. So Mako was president, Kimi was scientific director, and Kirin was 80, 90 percent, whatever it was, of the budget. It was a small place and the money flowed in, and people had a lot of freedom to do all kinds of risky things or whatever they chose to do.

By the time I came, it was still, in many ways, a shrine to Kimi, although Kimi had retired a few years earlier, and they were about 50 percent of the budget, so that the dean of the medical school at UCLA could say to me, "Mitch, why are you going to work for a beer company?"

Dr. Shine, Ken Shine was—"It's not a beer company."

But it's interesting, because we've maintained this corporate-academic relationship over thirty years. They're still our partners. The relationship has changed. It's business-oriented, and they get to license our intellectual property.

They have forty people who work in California side-by-side with us. They built the building that we work in now, which is on UCSD land, so we really have two very important partners currently. We have a contract that goes through the end of 2021, a three-year contract, and I'm hopeful and fairly confident they'll renew it at least for another three years. They have projects from us that are in clinical development.

Williams: So do you take orders from them in any degree?

Kronenberg: No, no, not at all. So, they give us $6 million a year. They were giving us $6 million a year in 1997 when it was 50 percent of the budget and when it was real money, so to speak. So now they're about 9 percent of our budget, and as a consequence, a lot of that's discretionary money. It's very important for us and we want to help them with their projects, which we do, and they have the right to license a portion of our discoveries, which is mostly at our discretion. It's a very complex relationship and I won't go through all the details, but most of what we offer them for their first right to negotiate for a license is at our discretion, and, actually, we work with many other companies. Currently, we're close to about five million a year in sponsored research agreements with other companies and six million in discretionary money from Kirin, so we're by no means particularly beholden to them, but they are great partners.

Williams: Describe the relationship you've established with UCSD.

Kronenberg: Well, that's longstanding but also evolving. Steve [Stephen M.] Hedrick, who's also one of the first class of Distinguished AAI Fellows, has been a friend of mine for many years, and I think he was a mover behind the effort to recruit me to UCSD, which we never got to the "yes" or "no" point, and he helped me to get an adjunct appointment when I moved to La Jolla Institute so I could continue to teach, which I enjoy doing, and have graduate students. That relationship, other members of our faculty have adjunct appointments, so there was always a relationship.

But I was looking for a partner to stabilize the institute. The institute is very successful in many ways. As I said, we have about approximately twenty-three laboratories that are independent, a 63-million-dollar budget, 450 employees. We have no reserves, really. We don't have an endowment. If all the money were to go away, we have about three months' running money in the bank, so I was looking for more financial security, and I was talking to some big players, like USC [University of Southern California], City of Hope, and some others. They were difficult discussions. And, actually, Scripps had difficult discussions with USC as well. UCSD stepped forward and they said, "Look, we're your natural partner. You're on our land." And they don't want USC or City of Hope sitting on their property. I agreed with that, and they've given us an allocation over a twelve-year period to stabilize us, but to help us build a joint immunology program with UCSD, which Steve Hedrick and I are now leading to do.

So a lot of the money goes to, actually, recruitment. The intent is not to use it as an endowment, but I think it's been a very good partnership. I think that what Steve and I are doing with others is to elevate the profile of the university in immunology, which has excellent faculty, but hasn't had any unity or any way to—people can name a few people, but they don't realize how deep and how great the number of people doing immunology is at UCSD. So I think what Steve and I are doing is very important.

It created some bad feelings between the two organizations, because immunology at UCSD had been grossly undervalued and under-recognized, and here the Chancellor and the Vice Chancellor for Health are bestowing funding, if you will, at the La Jolla Institute, an affiliated organization. I think we've moved beyond that and I think everyone realizes that we were a little too unstable. I was concerned that Kirin would leave, and it doesn't look like they'll leave now, at least until 2024, if not beyond that. I was concerned that we would be in big trouble financially.

Williams: Talk a little bit about the facilities that you've developed, because in doing the research, I saw in several addresses that you had over the years, isn't that right?

Kronenberg: Yeah. Well, the most recent building is the one on the UCSD campus. So I moved to the second building of the three. There was one up by the Torrey Pines Golf Course. I'm not really sure exactly where it was, even. The second building was nice, but it was in more kind of a commercial area where there were a lot of Pfizer buildings.

Being on the university campus is very important for identity. We're in what's called the Science Research Park, so it's a part of the East Campus of UCSD that's devoted to affiliated organizations. There has to be an academic reason. It can't just be a commercial development. The university's not a developer in that sense. In fact, our building opened in 2006. It's a 140,000-square-foot building. It's very beautiful, has a nice atrium and very functional labs. It's only now, thirteen years later, that the second building is about to open in the Science Research Park. The problem is economic competition. There's plenty of buildings on the Torrey Pines Mesa, as we call the local area.

The second building is going to be an incubator for new companies on the first two floors and cancer immunotherapy UCSD and La Jolla Institute investigators on the third floor. It's going to be a very interesting hybrid. It's 100 feet from our building. So we're looking forward to having a direct neighbor. And the whole campus on the east side of Interstate 5, this big artery, is developing now. UCSD Hospital opened about two years ago, new research buildings, and a whole graduate student village right near our building is opening up. The development of this place is fantastic, because for many years, we were surrounded by mostly

empty lots and the UCSD Cancer Center nearby, but otherwise, it was underdeveloped, if you will, so we're very happy about how that's changed.

So we are leasing some space in this adjacent building called the Center for Novel Therapeutics, and we also share a space with others in what's called the Sanford Consortium for Regenerative Medicine, which is officially a "collaboratory." It's a made-up word, but involves investigators from Scripps, Sanford Burnham Prebys, Salk, our organization, and UCSD. Anything related to cell therapy and stem cells can go in that building, and we have a small footprint there, but I think that's part of the collaboration and sharing that goes on in that region.

Williams: That's the word that comes to mind as you describe the whole community down here, that there is a high degree of collaboration.

Kronenberg: Yeah, I think there is. Part of it, people can talk about climate or Southern California. People here work very hard, of course, but I think also it's this idea that we're not all funneled up to some chancellor or dean. Yes, UCSD is, by far, the biggest player. There's no question about that. But the fact that there are independent organizations that can make their own decisions that are, let's call them, coequal partners reduces the stress or internal competition, to some extent. That may be part of it. I don't know, you could say the same might be true in the Longwood Area [Boston], different hospitals in the Harvard umbrella might have their own—but I don't know if it works the same way. I usually hear the opposite.

Williams: Really? [laughs]

Kronenberg: Yeah, so it's probably not so true today. It used to have that reputation.

Williams: This is a small detail, but did you say that you continue to occupy your current building and then also taking on the third floor of this other building?

Kronenberg: Part of the third floor, yeah, with UCSD. So it really has an academic theme, which is cancer immune therapy.

Williams: Mm-hmm, right. So in '03, you took over as director of the organization.

Kronenberg: That's right.

Williams: And when you did that, what did you see as sort of—what was going to be your administration and what were your goals going to be?

Kronenberg: Well, there were only two goals, and to be clear, when I moved in '97, it wasn't to look for a bigger title; it was to have more research support and to have this new community. But I thought about it. I mean, it was a process, and obviously I didn't take on the responsibility lightly. I knew I would have to work a little harder to maintain my research career. There were really only two goals. Make

the science even better, of course. To make amazing discoveries that can help people. That's got to be the ultimate goal. But the other supporting goal was to stabilize the institute financially. Still working on it, but, luckily, we're not so dependent on Kirin, which is now Kyowa Hakko Kirin after merging with another company. We enjoy our partnership, but to be 50 percent dependent on a for-profit entity that has to make its own decisions, across the ocean, for reasons that are opaque to the academic investigators, that's not a long-term strategy.

So I really put an emphasis on business development, licensing, getting contract research agreements with other companies where it was appropriate, where it didn't conflict with our agreements with Kyowa Kirin, and to try to raise money philanthropically. Put a fair amount of effort into that. It's tough for a research institute. Nobody walked into our institute and got cured of a disease directly, but we've gotten multimillion-dollar donations. It just hasn't been at the level that has transformed our reserves. It's allowed us to expand. We've gone from about fourteen labs to twenty-three, and we can afford to go to twenty-five or -six, but, yeah, we haven't reached the point yet where I'm satisfied that we're as financially secure as we need to be.

Williams: How easy was it to take on the businessman's hat?

Kronenberg: Well, I think I've always had good help, good support, and I guess I like learning anything that's technical. I'm probably not selective enough. So I do enjoy learning about how accounting is done or how certain other things—I'm no expert, believe me, but I don't mind getting into the details. But I always make it clear that my first ability is to be a scientific leader, and, of course, we have great people who run our facilities and who can tell you how many times the air changes and can get things fixed very quickly or who can do financial projections or who can do all the very detailed kinds of things that are way, way beyond me. But I have a group. I have an executive leadership team, all the department heads, meet with them every eight weeks or so for a couple hours to go over things, and then I have a couple of key people. I have an executive VP COO who's critical for running the place and really, really getting into the details.

Williams: Talk about—you mentioned licensing and philanthropy, so how do those two elements work into your scheme?

Kronenberg: Well, we're always licensing first. We're marketing what we have. So the landscape has changed. Years ago, if you had a target, that was something you could patent and protect the patent and even license it in some cases. Now people want more than that. They want a composition of matter. They want something that they can actually try to develop through toxicology and so on.

So to actually get royalties, you need a product, but what we can do very effectively based on our research is get support for research projects that faculty want to do, which could be in the vaccine area, could be in the cancer area, and so

on. And as I said, we deal with many different companies, and it amounts to roughly, let's say, $5 million a year. Unlike NIH [National Institutes of Health] grants, those are very short term. You get money for a year. There are milestones, and it might continue, it might not, so there's a lot of churning that goes on. Of course, the scientists have to drive that at some level, but then we have people to negotiate or to make those deals work.

Philanthropy's completely different. Philanthropy is telling people why studying the immune system is really important not only for developing important knowledge but for the future of human health, and it could be in the area of global health, could be in the area of cancer or heart disease, and you have to develop a language for talking about that and then you have to cultivate—the fundraisers use that word—you have to cultivate relationships, and we do that.

We built a board. When I became president, we had a Board of Directors of seven. They did no fundraising. They were paid an honorarium. For a nonprofit, it's very unusual. They mostly brought scientific expertise, and they were great, but I had to convince them, "You're not the right people." [laughs] They're my boss, right. And it wasn't easy, but I had to convince them that we needed a more fundraising-oriented board, we needed business leaders, and we needed some with scientific expertise, of course, too, and we had to make the board larger so that those individuals and their connections could support the institute in the way we needed it to be supported.

Williams: Have others around the country adapted that approach and maybe used you as a model?

Kronenberg: Not to a great extent. I would say the inverse. I would say we were kind of unusual in being so dependent on one company and in not having a fundraising board. So many of the research institutes around the world, biomedical, at least in the United States, were founded by philanthropists. There's the Buck Institute [for Research on Aging] in Marin County dedicated to aging, the Gladstone Institutes. It's Davy Gladstone's foundation. He was a real estate developer, ran shopping centers in L.A. The Sanford Burnham Prebys didn't start out that way, but Malin Burnham's donation—he's still very active in San Diego; I know Malin—and an anonymous partner really stabilized that organization. The Morgridge Institute [for Research] at the University of Wisconsin. I could go on and on. So we had generous support from a company which was based more on prestige, almost, but that certainly wasn't sustainable, so we had to revert, if you will, back to what others had done.

What hasn't been copied is our commercial relationship, the length of it and the interdependence, because we're in the same building, forty of us. Forty Kirin employees work in our building, and I don't know why there haven't been more examples like that. I think it's been very successful, but I can't say. Scripps had

corporate relationships over the years that had some similarities, but those haven't continued.

Williams: What is the nature of the work of those Kirin employees?

Kronenberg: It's in inflammatory diseases, asthma. Kirin Pharma, broadly, is interested in neurologic diseases and kidney diseases, but the group that works in our building is interested in immunologic diseases primarily.

Williams: So they're not involved in developing new IPAs?

Kronenberg: IPAs?

Williams: Indian Pale Ale.

Kronenberg: Oh. [laughter] I was thinking of IPOs.

Williams: No.

Kronenberg: No. There is an apocryphal story about beer from Doug Green, one of our former faculty, but I'm not sure it's true, so I won't repeat it. It'd be appropriate, it's just I'm not sure it's true.

Williams: Okay. At this point, I want to ask you what you want the public to know about the scientific developments that you have produced.

Kronenberg: From my own lab?

Williams: From your own and your own work, yes, and without going into intimate detail, but just what does a layman need to know about your work and how does it affect them.

Kronenberg: Well, one aspect of the work has been about defining white blood cell populations that have special ways of detecting infection that are very, very rapid and important parts of the immune response. The other great thing about this population—and they're called natural killer T cells, so they have an interesting name. The other great thing about these cells is that my natural killer T cells can go in your body and not cause graft rejection while most T cells would do that, so they're now being developed as a platform for engineering a cell that can be used in cancer therapy, because the kind of cells that people are using now, one of the things they will do is cause a graft-versus-host reaction. These cells won't. So we've discovered a lot of things about how these cells work, how they develop, how they act, but particularly why they're useful, because they're found in all mammals, essentially, and we think it's because of the way they respond to infection very rapidly. So that's one area of research.

Then the other area, speaking broadly, is about what I would call barrier immunity. So immunologists have mostly studied the immune cells in your blood, if they're using human material, or in the spleen if it's a mouse, because they're easy to get to, basically, and they're very, very important. [laughs] I don't want to say they're not. But a lot of the immune cells in your body reside in what we call barrier tissues, so particularly the intestine, but also skin and lung. This area of research is called mucosal immunology. I got involved in this, and Hilde Cheroutre also, we got involved in it in the eighties, when it was considered a backwater—why would you study that. Now it's very important, considered very important.

I think various discoveries we've made in that area as to how that system works—and that system has to work differently, and it's very simple to explain. The cells in your blood or in spleen or the lymph node, the thing that your mom squeezed here when you got sick, they're little way stations for the white blood cells that are circulating, they're living mostly in a sterile environment, but the white blood cells that live in the intestine or the skin or the lung are exposed to the outer world, and they have to have a kind of a peace or a détente, if you will, with the outside world. They have to know when to respond, they have to know when it's dangerous, but they also have to know when to hold back, and when they can't, then you get autoimmune diseases like inflammatory bowel disease or it could be atopic dermatitis. There's lung diseases, including aggressive forms of asthma and so on.

So the rules for those cells are somewhat different, and I think our contributions, along with many, many others, have been important in figuring out molecular pathways that govern the separate rules for barrier immunity. We've looked at various cytokines, which are immune messenger molecules. We've looked at metabolites like retinoic acid. We've looked at various kinds of cell-surface receptors.

To give you one example, there's a receptor called HVEM [herpes virus entry mediator], and people studied it in white blood cells, in lymphocytes, but we found it plays a really critical role in the epithelial cells, the cells that line the lung and line the intestine, and it's very important for acute, innate, rapid immune responses in those areas lining the intestine. So we've defined roles for these molecules there where it was unexpected that they would be playing a role.

So, yeah, I think those have been, broadly speaking, areas where we've made contributions.

Williams: What about translational consequences?

Kronenberg: The translational consequences are there, I believe. Probably the closest one is coming back to the natural killer T cells. So because we all have the same natural killer T cells, if we can find a way to manipulate them to benefit human health,

that wouldn't be restricted by who you are. Most of your T cells, which are a major form of white blood cell in adaptive immunity, they work in you and they won't work in somebody else, and that's because of, in a sense, what they have to do is sense your tissue type as well as responding to, say, a foreign virus or bacteria. But these natural killer T cells [(NKT)], and there are some other populations like that—there's another one called mucosal associated invariant T cells, or MAIT [mucosal-associated invariant T] cells, which really are more like the NKT cells, they work in everyone. So the question is how can we use them and manipulate them in a way to benefit people.

So there are two areas where I'm most excited about now. One is NKT cells for cancer immune therapy. So if we use those cells, for example, if we can activate them in vivo with the right compounds in a human being or if we can use them, engineer them to fight cancer through this chimeric antigen receptor technology where you tell the cell, "You have your own specificity, but we're going to tell you how to fight cancer too," they could be useful. There's actually two clinical trials for NKT cells in cancer immune therapy, and I consult for the company that's doing one of them. I'm very hopeful. There's some very encouraging early data that I can't talk about. We have very few patients.

The other area relates to a sister population that I just mentioned called mucosal associated invariant T cells, or MAIT. Everybody calls them MAIT cells, not M-A-T-E, but M-A-I-T. It's interesting, because they're very abundant in humans. They're not so abundant in mice, so they were ignored for many years, because immunology, as a whole, is still a bit mouse-centric, although it's migrating. MAIT cells are a booming area of research in some ways, and MAIT cells like to go to tissues, including the lung, and potentially they could be very useful as part of an immunotherapy for *Mycobacterium tuberculosis*, for tuberculosis, one of the leading killers in the world.

I became involved through a collaboration, of course, with some investigators at Oregon Health Sciences University, David [M.] Lewinsohn, and we've gotten some [The Bill & Melinda] Gates [Foundation] funding to develop compounds or ways to stimulate MAIT cells to fight tuberculosis. When you work with Gates, you're often working in a very, "Where's the deliverable?" So we don't have the deliverable yet. We have some candidates and we're looking at some other ways to activate MAIT cells to fight tuberculosis. It's not as far along as the NKT cells for cancer immune therapy, but, actually, I'm more involved in that. For the cancer immune therapy, good friends of mine are working on it and I'm the cheerleader and a consultant at times, but for the tuberculosis vaccine, we're actively involved.

Williams: Let's turn to the American Association of Immunologists for a few minutes. You joined in '84.

Kronenberg: Right. That's right.

Williams: And what was your motivation to do that?

Kronenberg: I'm not sure. I think what you had to do was apply. I was still a trainee, I was still a postdoc then, and—ah, I remember now. I think it was Ray Owen. I think Ray Owen said I should join and I should apply. I had first-authored papers and it was time to become part of this organization. It was a very important organization, and it was also considered an honor. I think Ray understood something about science, that it is a social enterprise, and I think scientists, at some point in their life, they have this idea that it's a tournament and you get to the top, you win the Nobel Prize, you're the winner of the tournament. Of course, that's nice, but it's also, in many ways, a social enterprise. We're collaborating, we're working together, we're trying to achieve collective ends, and I think Ray understood that very well. So it may have been Ray who—I know he also encouraged me to join Sigma Xi[, The Scientific Research Honor Society], which is a scientific society, and I think that may have been part of it, or it may have been just the fact that it was an honor. You applied, you were judged. They said, okay, you could be a member. It felt like an honor, and Ray's influence, perhaps, and the idea that it was an honor to join.

Williams: So beyond joining, you became really active in the organization and served on a number of the committees and then eventually became the head of the Finance Committee and secretary-treasurer.

Kronenberg: That's right.

Williams: And what was that like?

Kronenberg: Well, I guess I've continued a little bit in the Ray Owen vein, because, to come back to Ray for a moment, he also thought it was very important to be on study sections, to give back to NIH, and so on. So, yeah, whenever I was asked to do something, I agreed, and, again, I felt like I was selected, I felt, and I wanted to help in any way that I could, so I was very willing to do that. I did actually run twice for president—I was asked—and I wasn't elected. I was a little disappointed, but—and also I felt that Kimi Ishizaka, who had been the founding scientific director and later president, he was an AAI president (1984–85), so I felt like this was a—and Frank Dixon, who had been chair of our board when I became the—he had been an AAI president (1971–72), so I thought this was something somehow associated with La Jolla Institute. So I think there were people—I didn't know exactly who they were—who wanted to have me on the Council, so they said, "Okay, we'll have you run for secretary-treasurer," and I was elected. Then you're a councilmember for six years.

Well, the organization is extraordinary. It's very well run, and they have a very dedicated and helpful staff. I actually went and had an orientation when I joined the Council and became secretary-treasurer. Michele Hogan is a force of nature.

She's amazing, and she just does an incredible job of fostering this organization. It's her child in some ways, although, of course, the Council is very important. We've had great people elected to the Council, and people have a sense that it is a terrific organization. The courses, I've taught in the course twice, and every interaction I've had has been really positive, and I think it just has that reputation.

Financially, it's been very successful, and it's just been amazing, because some of the organizations—I know FASEB [Federation of American Societies for Experimental Biology] or whatever—there may have been others that have struggled at times. Even AAI is not secure, because we're highly dependent upon *The Journal of Immunology*, and the uncertainties in publishing do give some cause for concern.

But one of the things that happened when I was on Council, along with others, is we were so successful financially that we realized we have an opportunity, and we can give a lot more back to the members than we were doing. The growth in the awards has been like this [demonstrates], and I think it's given the organization even a further invigoration in terms of membership and participation, gratitude, whatever, because you have to sell it, right, in a way. Not everybody has this Ray Owen idea, and that's understandable, right? We all have to survive in a hyper-competitive environment, get our grants, whatever. So not everybody understands how we're connected. We're not a huge organization, but I think we do some fairly effective education in Congress and in the public about why immunology's important.

Williams: The term struck me as I was looking through your background and whatnot that you became, for a while, sort of the financial guru of the organization. Would that be correct?

Kronenberg: No, that's— [laughs]

Williams: No?

Kronenberg: I'm overrated in that department. Well, as secretary-treasurer, of course, you deal with the CFO of the organization and you deal with the audit group and you have conversations with them. The organization's so well run. I think I was one of those who was pushing this idea of giving back more in that sense, but along with others, and I think Michele is now leading the charge.

When Michele took over, the organization financially was also in bad straits, and her management really, really changed things. Then we went through this 2008 crunch, and some of what—this organization—by "this," I mean AAI—they have admirable reserves. It's terrific, but a lot money was lost. So it was hard to find what's the right balance in terms of how you give back, but also how you stabilize in a world where publishing's so uncertain. Publishing, of course, is driving the ability to have the awards and to do certain other things that wouldn't be possible.

Williams: I guess this is the first time I've really heard about the financial importance of the journal.

Kronenberg: Yeah, yeah, it is, it is. If you look at the activities, what are the main activities? There's the meeting, there's the courses, there's the journal, and there's many other things. I mean, those are some of the big bucket. Yeah, most of them, or some of those activities are just not self-supporting. Then the awards, the awards aren't only to come to the meeting. There are other awards as well. There are travel awards to the international meeting and so on. That's driven by gains in other areas.

Williams: Talking international, you were, at some point, the AAI delegate to the International Union of Immunological Societies [(IUIS)].

Kronenberg: That's true.

Williams: Did that have any significance to you?

Kronenberg: Not a lot. The IUIS, I attended some meetings and I missed one. [laughs] Well, in Italy, in 2013, I had the opportunity to stay at a friend's house in Tuscany, so I missed one meeting. [laughter] I wasn't exceptionally active in that group. It's a very large group, and sometimes we had to make judgments about, of course, where a meeting would be held, and it's only every three years, or whether this or that society could join. It didn't seem like we were making very important decisions a lot of the time.

Williams: In what other ways have you had opportunities to interact internationally with immunologists?

Kronenberg: Oh, well, it's continual, if you will. I was on a Japan-U.S. Cooperative Medical Board for Immunology. We would have joint meetings every year. That was a rotating position. I had that position for four or five years. Some very eminent people have been on that board, including Bruce Beutler, a Noble laureate. He was on at the time I was, and others. And, of course, I've been to some of the international meetings, Japan Society of Immunology [Ed. Japanese Society for Immunology], Netherlands Society of Immunology [Ed. Dutch Society for Immunology], an invited speaker to various meetings. Next year, I'm going to the Latin American Immunology Society [Ed. Latin American Association of Immunology] meeting as an invited speaker. I once had a grant, a multi-institutional grant, which involved people from Japan and Italy. It was supposed to involve more senior and younger investigators. But it could go on and on.

Actually, Hilde Cheroutre has a position, a formal faculty position, at RIKEN, Yokohoma [Japan]. It's now called the Center for Integrated Medicine. It used to be Allergy and Immunology. So she has a faculty position there and has a postdoc

who works for her there, Kiyokazu Kakugawa, and he and I collaborate. So I have somebody in Japan who's done some really important experiments for us, actually. And other kinds of collaborations as well. Science is international, of course.

Williams: Of course. So what does the future look like in terms of immunology, looking forward?

Kronenberg: Well, I think it looks great in many ways. The tools keep getting better. I think some of the things we've learned about manipulating the immune response to cancer in people, that's only going to improve, and those technologies will be translated to other conditions, to autoimmunity and so on. Some of them will be translatable. Sequencing and informatics are giving us a better handle on coping with human diversity, which is shocking.

We have a project in our institute in which I play a very small part, but it's a database in which we've profiled, in detail, at the genomic level, DNA and RNA in ninety-one individuals, very purified immune cell types, and we find enormous amounts of heterogeneity and immunity, but that's cell-type specific. So you'll see a difference in a gene, subtle difference in a gene, and it affects expression of certain genes in B cells only, or another example would be in monocytes only, so a high degree of individual specificity that you wouldn't see in peripheral blood lymphocytes or peripheral blood mononuclear cells. You have to drill down to the cell type to see how genetic diversity is affecting the immune response. We have tools that will allow us to do that.

So looking at it from a societal point of view, the future's great. It's still way, way, way too hard for young investigators to build their careers, of course, and we have to find a way to have modest or, let's say, reasonable—I don't want to say modest; scratch from the record—reasonable but sustainable growth in funding, not the swings back and forth with—I mean, it was very difficult between 2003 and about 2016. We lost 23 percent of the buying power of the NIH budget. So in total dollars, it stayed about the same, but over a thirteen-year period, you lose enormously. Then the other thing that we probably did, that I don't know how to correct it, is institutions decided, "Oh, NIH is doubling between '97 and 2003. Let's build more buildings. Let's build more programs. Let's expand." So supply has expanded too much as well, supply of investigators, if you will. But I think the supply of money is problem number one.

Supply of investigators is problem number two, and we have to find some way of creating a more, I don't know, sustainable course for the very talented people who want to go into this field who are in their twenties and thirties. I see that as a big problem. The old folks, like me, are hanging on, and I'm part of the problem. I have four NIH grants currently. None of them expire before 2021, so I am sidling up to the trough and drinking as much as I can. So I feel like, well, I'm

competitive. I'm doing things that people who are mostly much younger than me are saying, "Yeah, that's good. We want to fund that."

On the other hand, I'm trying to figure out how we manage this, a situation where you have more people with grants in their seventies—I'm not there yet—than in their thirties. That's just not right. So increasing the money will help, but also having some way of also having careers for people who don't want to be a PI, but have advanced degrees and want to work continuously in science, and, frankly, getting institutions to invest more. I think it's almost immoral, in a way, for institutions not to support a major part of the salary of their investigators, as they do in other countries—and as we do. We pay 75 percent, average, of the total compensation of our faculty, and that's why we haven't grown to have fifty faculty. We couldn't afford it, and we're not going to give up on that model. But the way some places have expanded on a soft-money model, it's tulips, right? It's not sustainable.

Williams: So what do you tell people in their twenties who aspire to a career in immunology?

Kronenberg: I say great, but I say if you want to do a career in academic research, that's wonderful, but you have to—it's not an easy career, so you have to think, "This is the only thing I really want to do." I mean, you can hedge your bets. You can be an MD/PhD and say, "Well, if the research doesn't work out, I'll be a dermatologist or I'll be a rheumatologist," and that's one way to proceed. But that training is very difficult because you have to have two careers.

I'd encourage people to do it, but you have to say, realistically, of your cohort, maybe 10 percent will get a tenure-track academic job in the United States, and if you're okay with working in industry, which is great, by the way—the majority of my former trainees are in industry. They're mostly very happy. Often they work in teams. Often they have a higher degree of mobility in terms of jobs and projects. I know very few who are unhappy with the direction their lives have taken. So the opportunities in industry are still very great, and that's one way to solve the problem, if you will.

Williams: So as a distinguished scientist, what do you say in an age of [Donald J.] Trump?

Kronenberg: In an age of Trump. [laughs] That's a great question. Well, one thing I can say is that all things pass. [laughs] But what does worry me is the extent to which the political climate is antiscientific. We'll have other presidents, but I think the deeper concern is what percent of the population doesn't respect scientific findings in terms of either evolution or global warming or what percent of the population doesn't understand the risks and benefits of scientific progress. For example, what is the real danger of genetically modified food? Do people understand if you have a tomato plant or whatever and it has one gene from a fish that prevents the tomato from freezing, it's still a tomato? And, by the way, we've

been doing genetic engineering of our food plants for thousands of years, we just didn't know what we were doing, right?

So I don't know how—well, I think it is important to try to advance scientific understanding. Our institute perhaps could do more. We do give public lectures every other month. We invite people to come in and learn about Zika or learn about vaccines and why they're not dangerous or learn about cancer or whatever, lay-oriented lectures. We've done a little bit in terms of talking in middle schools and things like that. I know we haven't done enough.

Williams: You received, what, the CEO of the Year Award for San Diego?

Kronenberg: Well, yeah, I did. It was in a category of mid-sized or large nonprofits. So isn't that a great thing to have on your résumé? But it's not as good as it sounds. So there's a *San Diego Business Journal* and they do this kind of thing; they have this award they give out. They have eight or nine different categories and they have people who judge it. I was happy to get the award. I know a lot of people in San Diego.

One of the things I have to do is be able to get in front of the public and talk about science or about immunology in a way that can be understood and that can appeal to people, and I'm a sociable person, so I like talking to people. So I know people, and whether they know I'm a better CEO than the next person, they have no idea. But I got the award, so I have a little wall in my office. You have to do that if you're a CEO so people think you're important, and one of the plaques up there says I was Most Admired CEO, and in small print, it says "Large Nonprofit." [laughs] That's okay.

Williams: What does Mitchell Kronenberg do to have fun outside of the lab and in other aspects of your life?

Kronenberg: I do a fair number of things to keep fit, actually. So I do jog a couple times a week, not when I have a cold like I do today, but I also work out one or two days a week with weights, and my wife and I play squash. Sometimes when we haven't had any exercise during the day, we'll just go for a very rapid walk in the evening, even at nighttime. So being physically active is very important.

Then I really do enjoy traveling, so even with all the traveling I do for work, I love to travel also for fun and different unusual kinds of trips. So my wife and I, we love architecture, and Hilde's very talented at designing, actually, and remodeling structures, amateur, of course. So last summer, we did a Frank Lloyd Wright tour and we actually rented a Frank—there were a few Frank Lloyd Wright houses you could rent, and we were all over different places in Wisconsin, where I'd never been, of course. I've been to Japan twenty times, but all over Wisconsin and Chicago visiting Frank Lloyd Wright houses or buildings, Johnson Wax and his Taliesin and so on. The chair of our board, he's in the

communications and electronics industries, but he had renovated a complex of Frank Lloyd Wright buildings on a lake in Wisconsin and we got a private tour of that. But traveling, Hilde and I have been all over Europe and to Brazil and other places and Hawaii many times. That's a good release or relief, if you will.

Williams: Right, good. What about Fallingwater, did you get there?

Kronenberg: No, but she's been there, and she gave a seminar at Philadelphia somewhere and drove hours to see it. I'll get there.

Williams: You'll get there.

Kronenberg: Yeah, that's an amazing place.

Williams: Yeah. Great. Anything else you want to say?

Kronenberg: No. I think—

Williams: Think we've covered it?

Kronenberg: I think we've covered a lot.

Williams: I agree. Thank you so much.

Kronenberg: Thank you. Appreciate it.

[End of interview]