The American Association of Immunologists
Oral History Project

Transcript

Betty Diamond, M.D.
February 5, 2013
Manhasset, NY

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Transcription: TechniType Transcripts
Transcript copy editors: Bryan D. Peery and Elizabeth R. Walsh
Final edit by: John S. Emrich

To cite an interview, please use the following general format: [Name of interviewee], interview by [name of interviewer], [date], The American Association of Immunologists Oral History Project. http://www.aai.org/OHP (accessed [date]).

Williams: This is an interview with Dr. Betty Diamond for The American Association of Immunologists Centennial Oral History Project. Dr. Diamond is head of the Center for Autoimmune Diseases and Musculoskeletal Disorders and director of the Laboratory of Autoimmune Diseases and Musculoskeletal Disorders at The Feinstein Institute for Medical Research, North Shore-Long Island Jewish Health System. Dr. Diamond was president of the American Association of Immunologists from 2009 to 2010 and served as an AAI Council member from 2004 to 2009. We are in Dr. Diamond's office at The Feinstein Institute for Medical Research. Today is Tuesday, February 5 [2013], and I'm Brien Williams.

Dr. Diamond, let's start out with a little bit of your family background, where you come from, and maybe your ancestors a little bit.

Diamond: My ancestors. Wow. I grew up in New York City. I really have lived most of my life in New York City, with the exception of college and medical school, and I love New York City. My father, my uncle, my brother were all interested in history, and it's hard to compete against that many people in a family, so I went into science.

Williams: What areas did your brothers and uncles—

Diamond: So my father was interested in American history. My father actually began his life very politically involved and worked with the UAW and was a union organizer and the UAW historian, and then he went to graduate school. So in my early life, I actually lived in Cambridge, Mass[achusetts], and he was a history graduate student in Harvard. Then he became an American historian, and his older brother was an economic historian who worked at The World Bank. My brother became a historian and then went on to law school and does some legal history work.

Williams: I was intrigued because I noticed that you had gotten your bachelor's in art history. So tell me about that.

Diamond: I did. I majored in art history in classics, and I wrote a senior honors thesis on the iconography of Thomas à Becket from 1170 to 1220, which was a fascinating time because it was the time that art went from Romanesque to Gothic and that everything became orthodox and codified. It's a time we're sort of familiar with, I would say, from a much more free-ranging almost heretical period to a much more orthodox period.

I was interested in science in high school. I participated in a lot of afterschool and summer science programs. I went to a girls' high school. I got off to college and met all of these young men who were premeds, and it just terrified me. [laughs] The competitiveness, the amount of testosterone in the room was not what I was

used to from my high school experiences. So I took some science courses but decided I wasn't going down that route.

I got to my senior year, and I thought, "What am I going to do with a classics or art history degree? I don't want to teach. I want to do research." But actually I thought that I wasn't qualified to apply for a Ph.D. because I hadn't been a science major and I hadn't taken enough science courses. But medical schools are always looking for well-rounded individuals, so I thought, "Okay, I'll apply to medical school, and I'll get into research through the back door," and so I did.

I fell in love with clinical medicine, and so I went on and did a residency, which I wasn't planning to do. But at the end of that I decided that I really wanted to get back into doing some research. I had done one year of research in medical school, and so that's when I went off to [Albert] Einstein [College of Medicine] to work in Matthew Scharff's lab and become an immunologist.

Williams: Let's go back here just a little bit. I want you to clarify the other half of your statement about orthodoxy. Explain what you meant by that.

Diamond: Well, I think that in all aspects of life over the last several decades, we've become in some ways more polarized, less tolerant of differences in opinion, less inclusive of multiple coexisting ideas. In some ways we've become more tolerant, for sure, but in many ways we've become more insistent on a right way to do things, a right way to think about things, and that's what was happening in that era that I was studying in this transition from a Romanesque period to a Gothic period, and it was just fascinating, and it was fascinating to me to see how Thomas à Becket, how his iconography was co-opted to buttress the very forces that killed him and fought against him. It was a lot of fun. I have no regrets of studying art history and classics, but it wasn't what I wanted to spend my life doing.

Williams: Are you thinking of this movement towards orthodoxy as being particular to science or not?

Diamond: No, I think it's the sort of polarization, and "You're either for us or against us" is a much more general movement. I think there's a component of it in science, too, where people are, it seems to me, somewhat less comfortable than they were when I started out in the field, of entertaining disparate points of view or dealing with information that is inconsistent with other information. But I think of it as a more general movement, but as I say, it's only a part of the world. There's a lot of the world that's become much more inclusive and much more tolerant.

Williams: So did you go directly then from your B.A. into—

Diamond: Into medical school? I did.

Williams: And it was a tribute to your mastery of things general that Harvard accepted you. Was that—

Diamond: Well, you know, it was during the time of the Vietnam War, and there were some young faculty members who were politically involved, and they wanted more women in the medical school class and more minority students in the medical school class. I had the advantage of being interviewed by two of them. I actually was one of four women in the class, so it wasn't that they were so powerful, but I had the sense that every woman or minority candidate that they interviewed got accepted.

Williams: Your modesty is showing through here.

Diamond: But, you know, over the course of the next two or three years, that number went from four to about thirty and then was half the class very quickly. It really was the beginning of a big transition.

Williams: Did you feel any particular pressure or anything stand out for you, being a woman at the time when you came in when there were only four of you?

Diamond: I think that there are always particular incidents you can look at and think that that only happened because I was a woman, that wouldn't have happened if I hadn't been a woman, and there's some that are perhaps not so nice and some that are nice. I think that I'm a great advocate for women in science and women in medicine, and there still are barriers that need to come down for women, but for myself I think I've had a pretty gratifying career.

I should just say one thing, because I had a wonderful postdoctoral mentor, and I came into his lab after finishing my residency really deficient in my basic science background, and he would routinely tell me that he thought that women made the best scientists. I don't for a moment believe that he really thought that or thinks that, but there was nothing so reinforcing as having somebody have a great confidence in your abilities that way. It's a lesson that people need positive reinforcement.

Williams: And that mentor's name?

Diamond: "Matty" Scharff.

Williams: Do you want to say anything else about him?

Diamond: Oh, he's a wonderful scientist. I hope that he's being interviewed in this project. I think he is, actually. He has been involved in immunology research for half a century.

Williams: Was he steering you away from clinical towards research, or what was the balance after you got your degree?

Diamond: I went full-time into a laboratory, except I did some moonlighting doing clinical work, and I then had another wonderful person at Einstein, also an immunologist, Don Marcus, who invited me to come to a clinic a week, a rheumatology clinic once a week. So that's how I became a rheumatologist. I never did a formal rheumatology fellowship. I just started going to clinic. I've always enjoyed seeing patients and it's a very different pace from bench research, it's very different gratifications from bench research, so doing both has always been fun.

Williams: And you have continued to do both. What's to say about your residency at Columbia Presbyterian? What was that like?

Diamond: I was with a great group of residents. That residency, I'm sure, still is, but at that time perhaps especially was a very intense experience, because there weren't the rules that now exist of how many hours you could be in the hospital, so basically you were in the hospital many, many, many hours and you worked very intensely with a reasonably small group of people, and the situations that you confronted were important. You were dealing with people's health, and so there was great happiness, great sadness, great frustration, and it was just a very intense time. And I think I got a great clinical education at Columbia and worked with wonderful people.

Williams: So I'm interested in sites where people have worked, as communities and culture and whatnot. What was Einstein like, and then what were your roles there as time went on?

Diamond: Well, I think I was just very lucky in my career. I was always in the right place at the right time. Harvard Medical School was a great place to be a student. Harvard loved its students. I think Columbia was a great place to be a resident because Columbia loved its residents. So at Harvard the residents did all the work and the students got all the love, and at Columbia the students did all the work and the residents got all the love. And I just happened to be lucky and be at the right institution for the right phase of my career.

Einstein was a great place to be a young faculty member. They really loved their young faculty. It was not a place where senior faculty had huge laboratories. They really funneled resources to young faculty. They were very interested in mentoring young faculty, and it was a wonderful place to be. I was maybe five years into being a faculty member there when I became head of the M.D./Ph.D. program there, and that was something I liked enormously, and I ran that program there for about eighteen years. I liked the programmatic aspect of it, of thinking about curriculum and how you trained somebody for the particular ecologic niche of being a physician scientist. I loved the students. I think one draws great energy from students.

I more reluctantly took on being head of Rheumatology there, but it was an opportunity to again develop a program of research in rheumatologic diseases, and that interested me. I recruited some faculty and was involved in their early career who then moved with me from Einstein to Columbia and from Columbia to The Feinstein Institute. So we've been, I think, an effective and compatible, loyal group of physician scientists, and that's been fun.

Williams: About how many people did you bring here with you?

Diamond: Well, including students and postdocs, it probably came to about forty, but it was maybe six faculty.

Williams: I've heard others say the same thing about moving from one institution to another and bringing many people with them. That's just accepted in the field. In other words, Einstein didn't feel bereft?

Diamond: Well, you'd have to ask them if they felt bereft of not. [laughs] You know, I think that sometimes it happens that way, and sometimes just one person leaves with their laboratory, their students, and postdocs. For me, it kept a very effective working group together and was very good that way. For Einstein, perhaps it gave them an opportunity to build an area from scratch and rethink what they wanted to do in that area.

Williams: How did you go about announcing to them that this was about to happen?

Diamond: I don't think it was a surprise. These things are never surprises. I moved from Einstein to Columbia not because I didn't like Einstein, because it was a wonderful place to work and I still have many, many friends on the faculty there, and I certainly didn't leave because I felt driven away in any way. Einstein at that time was not a place where a lot of clinical research was going on, and I had been studying lupus and had moved more into mouse studies because it's often easier to do work in mice than in humans for lots of reasons. But I had come to the point where I felt as if I wanted to take some of what we had been working on in the mouse and see if it was true in patients as well, and Einstein just wasn't set up, didn't have the infrastructure for that kind of work then, and that's why I moved to Columbia.

Williams: So describe the atmosphere at Columbia. What was that like as a culture?

Diamond: The science at Columbia is phenomenal, and the scientists were great fun. I honestly think I became a better scientist during my time at Columbia. It was, I guess, administratively a little more complicated than Einstein was, where Einstein, you know, you could always go speak to the dean, and it had a much more of a village atmosphere, and Columbia was much more bureaucratic.

But, again, I left Columbia because The Feinstein Institute afforded a better opportunity to move basic science into clinical trials and to actually apply what one learned, develop drugs, and start thinking about using them in patients, and that was something I wanted to do. So these were moves based on opportunities and changes in what I felt I wanted to accomplish at that point in my career.

Williams: I briefly lost your train of thought. Are you describing Columbia or the move from Columbia to—

Diamond: I was saying that Columbia was more bureaucratic, but the reason I left was because of opportunities here.

Williams: Here. So what have you created here?

Diamond: Well, I think, a lot. We have a number of clinical trials going. We have developed a small molecule that we think has therapeutic potential in lupus. This is attractive to me because it's not immunosuppressive, so it's a treatment for lupus that doesn't rely on bludgeoning the immune system so you're exposed to infection, and it's potentially cheap because it's a small molecule one can synthesize. I'm sure that most people are aware that biologic therapies can be very effective, but they're very expensive, and they certainly don't translate easily into underserved populations or parts of the world where there isn't a budget for healthcare equivalent to what we have. So it's exciting to me to think that we may actually be able to move this small molecule into clinical trials.

Williams: So on that note, talk about—well, let me ask this question. I get the impression that as you moved through graduate school and all the subsequent steps, that you were focusing on certain things at certain points, and can you kind of talk about that trajectory a little bit, what was capturing your interest?

Diamond: I'm interested in the autoimmune disease lupus, which is a disease primarily of young women, and I became interested in it in medical school. We actually had, I think, six immunology lectures in medical school by a man named Kurt Bloch, and they were riveting. Autoimmunity was especially riveting at the time, I think. It had a Pogo-ish quality of "We've met the enemy and it is us." And I was reading lots of southern women authors at the time, and Flannery O'Connor and Carson McCullers had lupus. I did an elective in a hospital that no longer exists in the same way as it was then in Boston, the Robert Brigham Hospital, which was for patients with sort of chronic disease, and there were lots of young women with lupus.

I became very interested in it, and that got me interested in B cell biology, because lupus is a disease characterized by autoantibodies, and I just followed opportunities to learn more of the basic biology, to then move and study more of what's happening in patients and then to actually think about therapeutics. I can't imagine anything more gratifying than actually having gone from thinking about

disease mechanisms to designing a therapeutic that might actually work, and that would be fun.

Williams: In layman's terms, talk about what lupus is and how you're attacking it.

Diamond: So lupus is a disease where you make antibodies against some of your own cellular constituents in your own tissues, and it's a disease where you make very many different autoantibodies, but antibodies to DNA are the most common. As far as we know, wherever there is organ system involvement in lupus, it is initiated by these autoantibodies. So the autoantibodies are very important in at least triggering the disease.

The disease is nine times more common in women than in men. It's clearly, in part, hormonally regulated, because before puberty it's a three-to-one incidence, after puberty it's a nine-to-one incidence, and after menopause it goes back to the much closer ratio of men to women getting lupus, but by that time very few people get lupus. So the age of onset is primarily twenties and thirties. Any organ system can be involved. It can affect your kidneys; it can affect your heart; it can affect your lungs; it can affect your skin. It can affect, really, any organ system. About a third of lupus patients die of kidney disease, about a third die of infection because of the immunosuppressive therapies used to treat the disease, and about a third die of accelerated atherosclerosis, which is probably contributed to in large part by the chronic inflammation that's part of the disease.

Williams: So maybe you don't want to talk in much detail about how you are currently attacking it, but do you want to go into that a little bit more?

Diamond: So the lab started off studying the origins of these anti-DNA antibodies, which we knew at the time contributed to kidney disease and were the major autoantibody present in lupus patients. We actually went against the orthodoxy of the time, and we showed that these antibodies arose by B cells that had matured through a germinal center reaction and had mutated to acquire reactivity with DNA. At the time, the prevailing wisdom was that antibodies arise with some autoreactivity present in their structure and that they mutate to lose autoreactivity, and here we were showing that in a disease they could actually mutate to acquire pathogenic autoreactivity.

We've gone on to show that a subset of these anti-DNA antibodies can actually target the brain, which is affected in about 80 percent of lupus patients, and there really was no understanding of what causes the brain disease in lupus. We showed that these antibodies can cross-react with a particular receptor on neurons called the NMDA receptor, and this receptor is critically important in learning and memory. We've gone on to show how these antibodies affect the NMDA receptor. We've modeled this in mice, and we've shown that this is consistent with what we see in humans with the memory disorder that is especially prevalent in people who have these antibodies.

We've devised a small molecule with a collaborator at The Feinstein Institute, Yousef Al-Abed, that actually binds to these antibodies and so prevents them from causing kidney disease or brain disease. We are now trying to develop a metric for neuroprotection, so that we can take them to a clinical trial and show that this small molecule will protect the brain against these lupus antibodies. We showed that these antibodies could cross the placenta in a mouse model and alter fetal brain development by binding to this receptor on neurons and that this is consistent with the literature that women with lupus have a higher incidence of children with learning disorders. So, I mean, the modeling between the mouse and what happens in patients is very close with these antibodies we're studying and the way that we've been inducing brain disease.

So I think it's really opened up central nervous system lupus, neuropsychiatric lupus to investigation. It used to be thought of as a black box that we know too little about to study, and I think it's really opened up the whole field of antibodies and acquired changes in behavior and cognition and in congenital alterations in brain development. So it's been very exciting.

Williams: You must have had a few discussions in your mind with Charles Darwin about why the body is subject to these kinds of diseases. I mean, do you ever think about how it is that mice and humans and whatnot—

Diamond: Well, you know, evolution or survival depends on reproduction, so once you've reproduced, whether you're sick or not sick isn't of terribly great importance to the species anymore. So I guess to me it's amazing that there isn't more autoimmunity than there is, not that there is any autoimmune disease. But in recent years, there's a fascinating literature that's come about showing that some of the genes and some of the pathways leading to lupus actually protect against malaria, so that the way the immune system may have evolved to protect against really a devastating infection that can kill you and is most likely to kill you early in life before your reproductive years may skew the immune system so that later in life you may get autoimmune disease. It's a pretty good payoff as far as Darwin and a theory of evolution is concerned.

Williams: So this has been the sort of through line in your medical research. Are there other paths that you've explored as well, or not?

Diamond: Well, we've gotten involved more recently in the role of antibodies and maternal antibodies in autism spectrum disorder, and that's become an exciting area in the laboratory. We've been involved in how hormones regulate B cell development, because I mentioned that the disease has a much higher male-to-female predominance between puberty and menarche or old age.

For my own career, I think one of the areas that's been of interest to me has been training programs and mentoring, and that's always been part of what I've done.

Whether through running an M.D./Ph.D. program or through running a clinical division or one-on-one or through establishing an organization of women scientists at The Feinstein, I think that that's a theme that continues through my career also.

Williams: What are the activities of that group?

Diamond: Well, it's modeled differently than a lot of such groups. We're mainly involved in helping each other, either through reading grants, reading papers, talking about particular issues, nominating people to society membership, whatever, with the notion that the increased productivity and visibility of the women scientists at the Institute is good for the women scientists themselves and is good for the Institute generally, and it's not a group that is adversarial. I think it's been a tremendously empowering group for the women scientists here, and it's been fun to watch.

Williams: Is it modeled on other such institutes elsewhere?

Diamond: It's modeled on failure. It's modeled on doing something different from what's failed. So actually I was flying home from a meeting where a colleague had told me about her own experience chairing a Committee on the Status of Women in a particular medical school and making a report every year on promotions, salaries, all of those issues that one knows about, and how at the end of five years the situation was worse than it was five years before, and she had resigned from the committee. And I thought, well, that doesn't work. Let's just take this into our own hands and do something for ourselves. You can only do that in an environment that's permissive, but this environment has been very permissive and has, in fact, embraced our activities, and I think it's been useful and fun.

Williams: Is it fairly unique in your field?

Diamond: I think it's pretty unique. I'm not sure that I've done any systematic surveys of how medical schools in particular or academic organizations more generally deal with the issue of the status of women, but I think it has been a pretty unique approach, and I think as opposed to being frustrating and making people angry, we've actually had a lot of fun with it, and I think we've felt very empowered by it and as if it's been very useful for us. I'm not sure it translates to every institution.

Williams: And there haven't been panels at the AAI meetings about—

Diamond: Oh, absolutely. Absolutely, the AAI has a Committee on the Status of Women. The AAI has roundtables for mentoring women. There's a Committee on Status of Minorities. These are issues that I think every reasonable organization—and the AAI is more than a reasonable organization—is concerned about and knows that a better job has to be done. So the AAI absolutely has been involved. What

the AAI can do is very different than what a group within an institution can do, so the AAI's approach to these issues has been different.

Williams: What are these issues?

Diamond: The issues are that despite the fact that women have been 50 percent of a medical school class and a graduate school class for the last many decades, they're still under 20 percent of faculty of professorial rank, and I think that that's the issue for women. The issue for minorities is not enough are entering the sciences and that there's not enough support for those who do. I think that there's an enormous amount of data that says that every group, whatever the metric it uses to assess itself, does better with a more diverse representation.

Williams: What has been the reaction of your male colleagues here?

Diamond: They want to join. [laughs] I think they've embraced it. I'm not sure what the terminology one should use is, but I think it's been fine, and I think that that's been part of the success of it, that it hasn't been threatening, it hasn't made them feel bad about themselves. It's increased awareness, and that's always a good thing. But it's increased awareness by just moving ourselves forward and just everything good that has happened to women here has been good for the institution generally.

Williams: Before we leave the science area, I've been asking people what about big disappointments and dead-ends in your research. Have you experienced that, and how do you address it if it has occurred?

Diamond: Well, certainly I think the hardest thing is to give up on a line of inquiry that you're committed to where you have a hypothesis you think is right and either the methodology doesn't exist to prove it or it doesn't look like you really are right. But I think what you do is just sort of store those thoughts in the back of your head, and methodology advances and sort of the knowledge base gets filled in, and you figure out what you were thinking about, how it fits in, you know, a decade later and come back to it. I actually feel very lucky with my career. Of course there are disappointments, there are always disappointments, but overall I have had a great deal of fun. I've met great people. I've worked with great people. I'm still having a great deal of fun, and I think we've made real contributions.

Williams: Talk about your clinical underprivileged activities. I was struck by that.

Diamond: The people I've worked with, we've always done our clinical work in city hospital clinics or clinics for the underserved. Lupus actually is a disease that occurs two to three times more often in black and Hispanic populations, Asian as well, so in New York City it's been pretty easy to wed our research interest with service to medically underserved individuals. I think one of the things that we've

brought is a commitment to include minority patients and indigent patients in clinical research and clinical trials. As you look through the literature, you'll see the statement come up more than once that it's hard to include minority patients in clinical trials because of a distrust of the majority establishment and whether one is being used as a guinea pig or not. We've never encountered that.

We have primarily minority patients in our practice, and of our lupus patients, almost 100 percent are in some kind of clinical research, and a very large percent in clinical trials, and that feels great to say that this is not a general statement, that clinical advances are always a partnership between scientists, clinicians, and patients, and the patients are an integral part of that partnership. If there's trust and transparency and respect, you can involve all patients in advancing an agenda of improving clinical practice. So that's a lot of fun too.

Williams: And you actually opened up clinics in a variety of areas around here.

Diamond: We do. We do. We have clinics. We have a lupus clinic at Jamaica Hospital in Queens, and we have a clinic at Harlem Hospital and a clinic at Bronx Lebanon Hospital and a clinic where we see uninsured and Medicaid patients at Lenox Hill Hospital in Manhattan. I think we've been very fortunate that the health system and The Feinstein Institute has supported us in this, and so we just go out and open up more lupus clinics wherever we can. I think that kind of outreach is important for clinical care and it's also important for learning more about the disease.

Williams: Have you undertaken the administrative chores of these clinics, too, or not?

Diamond: You know, somehow we keep those administrative chores pretty low. I'm not sure how much you want to know about the operations of these things, but we're salaried and we stay salaried, and so we don't get paid for this. That has great advantages because it means that we're a pretty welcome addition to anybody's clinical enterprise because we're free. And I understand that that bottle is not one that everybody wants to espouse or that translates to every situation, but for us, it's been great.

Williams: Michele Hogan told me that during the nineties you were sort of a frontline person with the "breast implant-lupus connection," quote, unquote. So talk a little bit about that.

Diamond: [laughs] This is a funny story. So I got a call one day from a friend who said she had had a horrible dream the previous night, that she had phoned me and she had asked whether my husband and I wanted to go traveling in Italy with her and her husband, and I said, "Oh, that sounds wonderful, but I can't. I'm writing a grant."

And in this dream she said to me, "Betty, you're seventy-five years old and still writing grants." And I thought, oh, my god, am I going to be seventy-five years

old and still writing grants? And I'm not there yet, but the probability, I hope, I *will* be seventy-five years old and still writing grants. But I thought to myself, I wonder what else there is to do in life?

A day later I got a call from Samuel Pointer, or somebody from his office, that the federal judiciary was putting together a panel on silicone breast implants, and it was actually a very interesting panel. So the panel was to advise the judge as to what was reasonable testimony so you couldn't, for instance, stand up in the courtroom and say the world is flat when we know the world is round. So this was to provide sort of a scientific framework for what was reasonable testimony. So we weren't arguing for breast implants or against breast implants, we were merely saying, yes, the data says this; no, the data doesn't say this; or, yes, that's a reasonable interpretation; or, no, that's an impossible interpretation of data.

So I went on this panel because I thought I have to find out what I can do when I turn seventy-five, and it was fascinating. One of the things I liked best about it is it was just at the time when all the airlines had stopped having nonstops to every city in the United States. So you couldn't fly from New York to Birmingham directly anymore, which was where Judge Pointer's court was. I had to fly to Atlanta first. So I'd fly New York to Atlanta, and then when you fly from Atlanta to Birmingham, you arrive before you leave, and somehow that never ceased to entertain me.

But it was fascinating. It was absolutely fascinating. We ended up issuing a report that set out all of the data and what we thought could be concluded from the data. We did it at the same time that the Institute of Medicine was doing a report on it, and I think the conclusions of all of these reports is that there is no compelling data that silicone breast implants cause autoimmune disease. They cause a lot of local inflammatory problems. Clearly lots of women weren't told of what kinds of problems they might cause, but autoimmune disease, there's no evidence for that. That doesn't mean in some women it might not have done it. We don't know the environmental triggers for most autoimmune disease. We know sun exposure can be a trigger for lupus. We know smoking can be a trigger for rheumatoid arthritis, but there's lots of triggers we don't know. But based on the data available, there was just no evidence for this.

Williams: Have you been drawn into any of the autism debates, or no?

Diamond: Well, I served on an Institute of Medicine panel on vaccine safety, and it's hard to discuss vaccine safety without coming up against the autism debates. That report came out, as I think most scientific reports come out, saying there's no evidence for the vaccinations that we were studying in that report contributing to autism. The report was on the safety of individual vaccines and what kind of post-vaccination sequelae might be attributable to the vaccines. But there was a very strong endorsement at the beginning of the report about the role of vaccines in

public health generally, and vaccines are one of the great triumphs of biomedical research.

Williams: Let's turn to your year as president of the American Association of Immunologists. What memories stand out in your mind from that year of being president of the organization?

Diamond: Well, the year goes by very quickly, and you're sort of ending it, it seems like, minutes after you start it. I think for me what was really a surprise and wonderful is at the annual meeting you announce a lot of the major awards, and I think seeing how moved people were by being the recipient of these awards was very lovely. It humanized everybody, and it also, I think, said how important the AAI is and how important recognition by one's peers is to people. There were just some very sweet moments in that process.

Williams: Now, you were president when the great recession struck. How did that feel?

Diamond: I wasn't responsible. [laughs] Nor was AAI.

Williams: But you must have had a role in responding to it.

Diamond: Well, you know, one of the great things that AAI does is their public affairs commitment and advocacy and transmittal of information, and that whole public affairs program at AAI is very, very important. So, of course, AAI at that time and since then has been very involved in trying to make the case for the importance of biomedical research, make the case for continuing biomedical education programs. Probably people have said this for a while, but it's really reaching crisis proportions, and I think AAI's advocacy is really important.

Williams: And you get the sense that they are fairly successful in advocating?

Diamond: Well, it's not a controlled experiment, so it's hard to know. The truth is there's less money than there used to be, or there's less spending potential than there used to be. I think that most of us believe that if there weren't the advocacy efforts that exist, there would be less money now than there even is. Have the efforts been as successful as we would like? No, but I think it's an important area that AAI remain very active in.

Williams: You were around as vice president and then as president as the administration changed from George W. Bush to Barack Obama. Did you see any shift there that was promising, or the opposite?

Diamond: I think that there's no question that the Obama administration believes in science, sees the value of science, and sees both the economic value of science as well as the movement away from fossil fuel, the increased health outcomes, all of that, that the era of funding was terrific and was a great boon to science. It's a funny

kind of funding that comes in for two years and then disappears when, in fact, it's not as if one can transfer the bills to something other than the government. It doesn't work that way in science so easily. So, yes, there's a great difference. The idea that there's some truth to be had in science and real value in science is wonderful. There actually has to be more commitment to science.

Williams: Is the NIH also sort of in the public affairs realm or can they not—

Diamond: It can't be.

Williams: It can't be.

Diamond: Cannot be. It is the government. [laughs]

Williams: Right. That's right. Just a couple of minor issues, in a way, but I notice in reading a lot of presidential messages to the AAI that the CRS—CSR was an issue or how they administrated reviewing grants and whatnot. Has that still remained a problematic area or not?

Diamond: I think it is a problematic area. The truth is that when you're funding as small a percentage of grants as the NIH is funding now, you can't make good decisions, or you are not funding very good grants. So I think it would be very hard to be pleased with any process now, because too many outstanding grants are not getting funded. I have my issues with the way that the review of grants has changed, as it changed during that time. I'm very much in favor of the shorter grants that also came into play at that time, but I don't like the review process, but the review process is the least of it. If one were funding 20 percent of grants, the review process wouldn't be the same issue that it is now, and there's no review process that would make it palatable to be funding under 10 percent of grants.

Williams: Are you saying that some of the grants that are given are not good?

Diamond: No, I'm saying that there are too many good grants that should be funded that can't be funded with the amount of money that's there, and that it's easy to complain about the review process, but there's no review process that can correct that problem, because there just isn't the money to fund all of the good grants.

Williams: Talk about the Common Fund that the NIH introduced and its results.

Diamond: You know, these are hard things, too, because it's not a controlled experiment, so you don't know what you would have gotten for the buck if it had been spent through a different funding mechanism. There are lots of very smart people. There's lots of very good science. There's lots of very good work that's being done. It would be hard to say that good work hasn't come out of that. I think good work has come out of that. How much does one want to take away from some of the other mechanisms? I have never seen any data-driven analysis of

how much money should go into each pot. It would be nice to see something like that.

Williams: What was the Common Fund mechanism? Just define it.

Diamond: It was different kinds of grants, different kinds of grants that were sort of where each institute gave up some money to go to the director's office to fund different kinds of grants. I think that's a good idea. I think especially some of the—what is it? Young Innovator Awards, I don't even remember if that's exactly the name. That's a good mechanism. It's hard to know whether it's better than other mechanisms or not.

Williams: You also wrote in one of your messages that you wanted to make immunologists a global community. I think I know what you mean by that, but has that been happening?

Diamond: I think it's happening more and more and more. I think there are lots more projects that are done binationally, multinationally. I think there's lots more collaboration. I think there continue to be students going back and forth from country to country. Yes.

Williams: Certainly the annual meetings seemed to have a very international flavor to them too.

Diamond: There's still parts of the world where there isn't the infrastructure or whatever for that to happen, but there are more and more countries coming on board.

Williams: Talk about the mission of the Clinical Immunology Committee of the AAI. You served on it.

Diamond: I did. I think it's very important that AAI include that component within it because there have been amazing medical advances that have been made over the last couple decades based on very basic biology and very basic immunology. I think that it's very important to keep in mind that this basic biology really has the potential to change medical care and to sort of celebrate the ways in which it has, and also to give legitimacy to those people who are committed to studying patients, studying people, which up until very recently has been much, much harder than studying mice. It's still hard, and it's still harder, but there are many more tools available now for studying human immunology than were available. So I think it's been important that AAI recognize that, that aspect of immunology research.

Williams: You feel that they are?

Diamond: I do.

Williams: Explain the somewhat Shakespearian statement you made.

Diamond: Oh, god.

Williams: "I have been much advantaged by my relationship with AAI."

Diamond: I think I have. I think that it's always nice to feel part of a community and to feel part of something larger than oneself and one's daily activities, and I think that AAI has really done that for me. It's made one look at the whole of immunology much more broadly, both in terms of the science that's done and the individuals doing it and the places it gets done. I think that that is invigorating and humbling. I think it's lots of fun to be a scientist and to do science, but citizenship is a responsibility and fun also. There's national citizenship and voting and doing what else, but there's also professional citizenship, and AAI has been a great organization in which to be a professional citizen because they're an effective organization. They are a responsible, decent, good organization. I should say we are, not they are. [laughs]

Williams: You used the term the "biomedical toolkit" in one of your statements, and I was wondering if that is sort of a new concept, or it sort of indicates the promise that things are more and more getting into things that really get done.

Diamond: Well, I think there are amazing technologies, and those technologies have not been brought to every condition, situation where they could be informative. So the can-be-realized potential to learn an immense amount more is there. Sometimes there's a lot you know you don't know, but you don't know how to gain access to that information. I think there's a lot of information where we have the tools to gain access to it, and we need time, money, committed individuals, whatever it is.

Williams: But you foresee a very positive future for the field?

Diamond: Absolutely. Absolutely. Surely you've not encountered anybody who is pessimistic about what biomedical research has to offer at this point. It's not possible.

Williams: If you had your career to this point to do over again, would you have taken other turns at certain points or is—pretty happy with your path?

Diamond: I don't think so. I think I'm pretty happy with the choices I made, with the mix of mentoring and program development and bench research and very basic research versus more disease-related research. I think it's been fun.

Williams: What do you say to trainees at the present moment about the future for them?

Diamond: Follow your passion until you can't, and then be pragmatic. [laughs] I think it's easy. You do what you want to do as long as you can do it, and then you have to rethink and figure out a strategy to continue to do lots of what you want to do and maybe something that wasn't as high on your list but will pay the bills or will give you the entrée that you need to whatever it is that you're looking for.

Williams: How do you balance family life with the scientific life? How have you managed that?

Diamond: Well, I have a wonderful husband and two wonderful daughters. My older daughter, who was about seven or eight when the Delany sisters wrote their book *Doing it Our Way*, and they both were in their hundreds, and they were the children of former slaves, and one of them had become a teacher and one had become a dentist, and they had written in the book how they had had beaus—their word—but they had never gotten married because they were committed to their careers, and my older daughter who was, as I said, about eight at the time, wrote a letter to them asking whether they still believed that you couldn't have a family and a career, and then she had mapped out a set of scenarios that she thought would work, which was working at night, working part-time, and she had five or six things that were none of them what I do. [laughs]

I think there are always moments when you feel as if you're not juggling things quite right, and there's nothing that you do and care about that you don't also feel you couldn't put more time and energy and thought into and maybe do it better. So I'm sure that I could have been a better scientist. I'm quite sure that I could have been a better mother. But I think I've been a good enough wife, and maybe the bar is lower there. [laughs] But, you know, I wouldn't give up having a family. Nothing's easy. It's all hard and it's all fun and it's all worthwhile.

Williams: What about fun? What recreational activities or things do you do, or maybe you don't?

Diamond: You mean am I strictly a couch potato when I'm not at work?

Williams: You're a bench potato?

Diamond: I love traveling. I love going to museums. I love going to the theater. I'm not such an outdoor sportsperson, but I've rarely met a beach I don't like.

Williams: Good. Are we leaving anything unsaid today that you'd like to contribute to the—

Diamond: No. I've probably said more than I should have.

Williams: I don't think that's true. Just sort of some general thoughts on the importance of immunology in our world today?

Diamond: This is going to sound very grandiose on the part of the immune system, but I think that the immune system, we're learning, has incredible connections to the brain and we're going to learn more and more about the relationship between the immune system and the brain, the brain governing immune activation, and the immune system, in turn, governing aspects of brain function. So I think that we're just scratching the surface of how the immune system works in the body, and as we sort of leave the test tube and go back to physiology and whole organisms, we're going to learn things we never dreamed about that the immune system is involved in, from the brain to metabolism. It's very exciting. So I think it offers us the advantage of having some fairly accessible cells to look at and models of ways to intervene that still have enormous potential for making people healthier and, I guess, live longer. I'm not sure living endlessly is one of the goals of existence, but certainly living healthier. So I think immunology is a great field to be in.

Williams: Thank you.

[End of interview]