Silverman, Debra 2022

Dr. Debra Silverman Oral History

Download the PDF: Silverman_Debra_oral_history (256 kB)

National Cancer Institute

Division of Cancer Epidemiology & Genetics

National Institutes of Health

Oral History Project

Interview with Debra Silverman

Conducted on April 22, 2022 by Holly Werner-Thomas for

History Associates, Inc., Rockville, MD

HWT: My name is Holly Werner-Thomas and I'm an oral historian at History Associates Inc. in Rockville, Maryland. Today's date is Friday, April 22, 2022, and I am speaking with Dr. Debra Silverman for the National Institute of Cancer, Division of Cancer Epidemiology and Genetics, part of the National Institutes of Health or NIH. The NIH is undertaking this oral history project as part of an effort to gain an understanding of the National Cancer Institute's Division of Cancer Epidemiology and Genetics. This is one in a series of interviews that focus on the work of five individuals at the NCI-DCEG, including their careers before and during their time with the institute. This is a virtual interview over Zoom. I am at my home in Los Angeles while Dr. Silverman is in Washington, D.C. Before we get started, can you please state your full name and also spell it?

DS: Debra, D-E-B-R-A, T as in Tom, Silverman, S-I-L-V-E-R-M-A-N.

HWT: Thank you. Dr. Silverman is chief of the Occupational and Environmental Epidemiology Branch within the Division of Cancer, Epidemiology and Genetics, NCI. She received a Doctor of Science in Epidemiology from the Harvard School of Public Health and a Master of Science in biostatistics from the Johns Hopkins Bloomberg School of Hygiene and Public Health. She joined the NCI as a biostatistician in 1972 and has served as a cancer epidemiologist since 1983. She has received numerous awards, including the Harvard School of Public Health Alumni Award of Merit, the PHS Special Recognition Award for research on environmental determinants of bladder and other cancers, and she's an elected member of the American Epidemiological Society, and a fellow of the American College of Epidemiology.

So, let's go ahead and jump into the questions. And so, as I was saying, I always like to ask people to describe their backgrounds in relation to their career paths. What support did you have at home or at school, if any? And was there anybody in your life who influenced you when you were growing up to pursue this career?

DS: Well, actually, my interest in cancer research began as a senior in high school. I was in AP Biology in the New York area, and we went on a field trip to Sloan Kettering. And I was so impressed with the research that they were doing at Sloan Kettering that I thought to myself—that was a really appealing, inspirational career. Later on, I went on to be a math major in college. And the combination of my interest in biology with mathematics was a natural to pursue biostatistics. And the chair of the mathematics department suggested that there was a new area, a new field, where there were a lot of possibilities— that I should look into biostatistics.

At the time, Johns Hopkins had started a master's program in applied biostatistics. So, I applied to it, and I was accepted. I went there for two years. I had a U.S. Public Health Service traineeship. And when I completed my training in Baltimore, I interviewed for a number of positions at NIH. I was faced with quite a dilemma—which institute to go to. I was biased towards the cancer research. And at the time, I asked Abe Lilienfeld, who was chair of epidemiology at [Johns] Hopkins [University], what he thought. And he said, "Oh, go to cancer. That's where all the money was". This was in 1972; the [National] Cancer Act was [passed in] 1971 and the field was growing tremendously. And that's how I ended up at NCI. I've never had any other job.

HWT: I wanted to ask you just a follow-up question because, you know, at that time, as a woman, as a young woman, what were the obstacles that you faced, if any? You know, going for a career to begin with, and then particularly in the sciences, math and science.

DS: Well, when I arrived at NCI, I realized that almost everyone had a doctorate, not a Master's. There were a few others, and they were women. The men all had doctorates. Early on, I was informed (laughs) that to progress in my career, I really needed to go back for my doctorate. There were no women in leadership positions. That is, in the program I was in. I can't speak to the whole National Cancer Institute. But certainly in our program, no women were in leadership positions. Which is dramatically different from today, where it's probably greater than 50% of the leadership positions are held by women. I have to say that the very top is still male-dominated. So, we're almost there. Haven't quite gotten there yet. But almost.

HWT: Very interesting. What was NCI like in the early 1970s when you first joined? You just mentioned one specific thing. But more generally speaking.

DS: Well, when I started in 1972, NCI was just making the transition to computers. This had a dramatic impact on research, not just cancer research but throughout science; it was a transition period where computing was taking off. So when I first began, all the data collected in epidemiologic studies were being recorded on punch cards. (laughs) And I actually recall, although it was no longer being used, that there was a Xerox room with a big card sorter where they had been doing analyses with card sorters. But by the early '70s, the transition was happening. The data were still being collected on punch cards; (laughs) it seems remarkable when I look back that we accomplished anything. Because it took so much longer to accomplish anything. The technology has dramatically changed.

HWT: (*Dog barking*) Again, apologies for the noise. Friday is very difficult. So, I wanted to ask you one more question just sort of about the growing up years or early years at NCI. We can come back around, of course. But what are the resources that you had and that you wish you had had, pursuing your education? And then, you know, the early part of your career?

DS: I was extremely fortunate. So, as I mentioned, my tuition and the stipend when I was going for my master's at [Johns] Hopkins [University] were covered by a U.S. Public Health Service traineeship. After a few short years, I think it was three years at NCI, I decided to go back to school to get my doctorate. And NCI was extremely supportive. They actually sent me to Harvard for my doctorate. They paid the full tuition. They paid my full salary. And they moved me to Boston, they moved me home, and they let me work on my dissertation for four years when I came back as part of my job. So, I have been incredibly fortunate. I have had terrific resources.

HWT: So, let's move on to now some of your work. I want to ask you what inspires you? What motivates you? And sometimes people say there's a societal need that they identify and that's what motivates them. I think less likely in this case, but you never know. Maybe there's a market need or there's some combination. So, what are you curious about and what inspires you? And then on the flipside of that also, what bores you?

DS: I'm inspired by challenging scientific questions. So, when I look back over my career, my greatest achievements were on studies that were focused on answering issues that were unclear. I conducted the New England Bladder Cancer Study. That study was designed to address an excess of bladder cancer mortality that had persisted for decades in New England. The reason for the excess was unknown. This was a challenge. But we did a terrific study. And we learned that arsenical pesticides that had been used in the first half of the twentieth century persisted in the soil. And depending on the level of the water table, arsenic was seeping into private wells. A high proportion of the New England population uses private wells as their primary source of drinking water. Drinking from these shallow wells in the first half of the twentieth century was causing the excess. So I'm inspired by challenging questions.

Another study that I consider a very important achievement in my career is the study of diesel exhaust and lung cancer. And that study took 20 years to conduct. At the time that we launched that study around 1990, it looked like diesel exhaust might cause lung cancer. It was not clear, however, because many of the studies that had been done had methodologic issues. And the risk was very low. It was not clear whether diesel exhaust really caused lung cancer. So, we launched what I consider the Mercedes of studies in underground nonmetal miners. The reason we studied underground nonmetal miners was because they experienced very high levels of exposure. The walls of the mines that they were operating in, in confined spaces, were black. And they were being exposed to these high levels for many years. And we figured that if diesel causes lung cancer, that we should observe an elevated risk in these underground nonmetal miners. And we conducted a state-of-the-art exposure assessment. It took about a decade to do. The study was under attack from almost the beginning. The mines that were included in this study formed a coalition in an attempt to stop the study. The study was conducted in collaboration with NIOSH [National Institute for Occupational Safety & Health]. We went to court 13 different times. The study had Congressional oversight. And I am proud to say that when it was all said and done, diesel exhaust became a lung carcinogen according to IARC [International Agency for Research on Cancer]. And that was most gratifying. I actually like a good challenge, and I like to prevail in the end.

HWT: Who can blame you? So, what about the flipside of that? I don't know if you want to talk about that. It's kind of an interesting question to me to ask people what bores you, you know?

DS: Mediocre science bores me. And having been in this business for so many years, it also bores me to see science that gets recycled. What happens is, oftentimes I'll see a paper. And I know there was literature on that 20 years ago. And it's as if it didn't exist. Well, [it] bores me. That kind of, it displeases me, as well. But I don't like to do mediocre science. I like to pursue really exciting, challenging questions.

HWT: So, I want to ask you some process questions later. But I just want to follow up with one now. So, you mentioned exposure assessment, for example. I'm just curious about your process, which is a long question and a long answer. I'm sure there's more than one answer. But can we get into the weeds a little bit about your process?

DS: Well, different studies have different requirements. But oftentimes the assessment of the exposure that you're studying is really critical to the success of the study. If you don't do a good job of it, you may wipe out findings. In the diesel study, this was particularly difficult. We went to each mine. NIOSH monitored the exposure levels at each mine over days. And we recorded all the data. And then we took all the records that MSHA—MSHA is the regulatory agency, (Mine Safety and Health Administration)—had for each mine. They go into mines routinely for enforcement purposes. They had years of data on our mines. And we had to obtain these records and sort through them and make sense of them. And then we took the historical measurement data and the more recent data and we developed models so we could extrapolate back in time. We call it retrospective exposure assessment. And for each person who worked at these eight mines, we actually estimated their exposure over their entire work history. So an incredible amount of work goes into building the data set before you develop the estimates of risk of lung cancer. It takes years sometimes. Good epidemiologic studies can often take years. The ones I've worked on have all taken years to conduct.

HWT: I wanted to ask you, what ties your research interests together? And you know, you've already talked about, you've mentioned the diesel exhaust, the miners, the bladder cancer in New England. So, what's the bigger picture for you?

DS: Well, my expertise is mainly in bladder cancer epidemiology and the carcinogenicity of diesel exhaust. Although for a period of time in the 1990s, I did spend a great deal of time on pancreatic cancer. I began my career with my dissertation, which was on occupational bladder cancer. I started off working in that area. My dissertation was part of the National Bladder Cancer Study. It was one of the very first large-scale population-based case control studies of any disease in the United States. It was actually designed to determine whether saccharine caused bladder cancer. It was quite some time ago, but in the 1970s there was a big issue about saccharine being a food additive. And Congress gave NCI the funding to do this very large bladder cancer study. And I was fortunate to work with Bob Hoover, who led the study. Others, Tricia Hartge, Ken Cantor, Tom Mason. I kind of cut my teeth, shall we say, on one of the most impressive case-control studies of any disease of its time. Many studies followed, but this study was extraordinary. This was the study that triggered my interest in bladder cancer etiology. Not just occupational bladder cancer. I went on to conduct other bladder cancer studies. One in Spain, the Spanish Bladder Cancer Study, and the New England Bladder Cancer Study. Each of these was a major undertaking. So throughout my entire career, there's been a theme of understanding the causes bladder cancer.

The diesel exhaust actually came as an offshoot from my dissertation. Because I found that truck drivers who had exposure to diesel exhaust had an increased risk of bladder cancer. And so, I became very interested in cancer and diesel exhaust, which led to lung cancer. Which is the natural follow-up for diesel exhaust. That kind of ties it all together.

My work on pancreatic cancer was not really tied to this research. But at the time which we're talking about, the late 1980s, pancreatic cancer was a pretty big mystery. We didn't even know that smoking caused pancreatic cancer. It turned out that again, many of the studies had a methodologic flaw in that they were dominated by next-of-kin interviews. Because people were so sick with pancreatic cancer that early epidemiologic studies did not attempt to interview them. Unfortunately, you don't get the highest quality data from next of kin. It can be okay. But it left something to be desired. So we did probably the first case-control study of pancreatic cancer based on direct interviews. And that study showed what we suspected for some time, that smoking caused pancreatic cancer. In fact, I was interviewed by [journalist] Tom Brokaw on the NBC Nightly News when that study came out. That was quite exciting, especially back in 1994 – I was pretty young at the time.

And I went on to write a number of other papers from that study that were also very important. It was one of the first studies to suggest that obesity was a risk factor for pancreatic cancer. And that diabetes, longstanding diabetes, was also a risk factor.

But as the years went on, I ended up focusing on bladder cancer and diesel exhaust. I had to cut back. Can't do everything. So, I did not follow up that study in later years.

HWT: Thank you for that. Super important. So, you mentioned a little bit about how you came to work for NCI. I don't know if there's anything you want to add there. But I'd like to ask you what you felt that your initial goals were. Just, you know, brand new, coming into the working world. You said that the Cancer Act had passed in 1971. There was a lot of money for cancer. But what questions were you yourself asking? And what did you feel like you needed to know?

DS: When I first started at NCI, I was in a group that analyzed survival from cancer. It was called the End Results Section. (*laughs*) And we would put out reports on cancer survival by type. That is actually the very first area of research that I did. And I was a master's level investigator, so I was working with someone who had a doctorate. I was running programs, generating results. But I realized that what I really wanted to do was to come up with my own hypotheses and conduct my own studies. That's what an epidemiologist does. It's a different role from a biostatistician. So, in the very first years, I was kind of clueless. And what I did was realize that I wanted to become an epidemiologist. Which is what I then went on to do.

HWT: And just a couple of questions. So one, I was going to ask you actually, so you began at the NCI as a cancer epidemiologist in 1983. So, I wanted to ask you what that meant to you. But also, and you are addressing this, but to talk about your evolution from the time you started in 1972 and then 1983. As well as the evolution of the field.

DS: Well, yes. As I mentioned, the field was evolving rapidly at the time. To be a part of the National Bladder Cancer Study, such a cutting-edge study, was really a tremendous opportunity. And I was fortunate to be able to analyze data and write papers from that study. The study design—this is pretty esoteric probably for you—but the study design, the population-based case- control study design, was underused until then. It actually evolved during that timeframe that you're asking about. It came into its own in the 1970s. And then in later years, it kind of dropped back, where a lot of focus shifted to the cohort study design. These are two basic study designs in epidemiology. So, I saw an evolution from—it's kind of the rise and fall of the case-control study, so to speak, which is interesting to me as an epidemiologist. Cohort and case-control studies both have their strengths and weaknesses. And they both are very important, and it's not either/or. So that was big, in my mind, significant.

HWT: And then I also wanted to ask you what it meant to you more personally. Maybe define for a layman's audience the difference between, obviously there are differences, a biostatistician and an epidemiologist first. And then what that meant to you with your own evolution.

DS: Well, a biostatistician analyzes the data that an epidemiologist collects. So, the statistician plays a very important role. And I actually liked the analytic part. That's why I started off in biostatistics. But when you look at research questions as a whole, there's much more to it. It's coming up with the important hypotheses that need to be pursued to determine what studies need to be done, to learn about, have the judgment to choose what to study and when to study it. An epidemiologist does it all. So to me, it was the bigger picture. It wasn't just the analysis. And that's why I transitioned from a biostatistician to an epidemiologist.

HWT: And then, can you take me through an average day if there was such a thing? First in the 1970s, and then starting after 1983, in the 1980s?

DS: That's a real tough one because looking back, the big thing, which I've mentioned already, is technology and what it took to turn the data that we were collecting into an analyzable form. We spent so much time at the front end of preparing the data for analysis. Whereas today, we do interviews directly on the computer. We're operating in a different world. An average day back in the '70s, you spent a lot of time on kind of drudge work, so to speak, that we don't have today.

HWT: And, you know, I want to just ask you, I'm pushing it a little bit because it's super interesting to think about how people went to work at a certain time and place. So give us an example of a day when you're still using punch cards. How did you go about your day, in other words?

DS: I spent a lot of my day as a biostatistician in the early 1970s making up tables by hand. We would have pads of tabular paper. And I would work in pencil and extract the information and make the tables up by hand. I was counting and putting the numbers in the cells. Today the computer does all of that. So when I say drudge work, I mean the work was tedious. You have to be really careful. You have to double and triple check everything. But it is drudge work. The computers do it for us now. That is by far the biggest difference.

HWT: So are there other technologies that have influenced the field over the years? And if so, what are those?

DS: Well, there's so much in the field of genetics research. But I'm primarily a classical epidemiologist. I conduct studies of environmental factors and how they interact with genes. It's a big part of our work now. Studies back in the '70s and the '80s didn't include biologic components. We didn't collect biologic samples. Now when we conduct studies, we collect blood or buccal cells. We do all kinds of things that we didn't do back then. We didn't have the technology. And the technology started by the mid '80s. Things were changing. But it takes a while before it really gets a foothold.

HWT: Is there anything you want to add about your work after 1983 in a general sense? Your evolution, in other words, going forward?

DS: Well, I guess my research has evolved from just exposure-oriented work to exposure/gene interaction work. That has definitely become a big part of what we do today. The other part of my work that has evolved is that my research on diesel exhaust led me to become more interested in air pollution and cancer (lung cancer and other cancers). And I'm currently engaged in the study of ultrafine particles and lung cancer in L.A. [Los Angeles], where you are. (*laughs*) I've gotten more engaged in the environmental epidemiology. Whereas in the early years, not as much. Particularly air pollution. But also, some of my more recent work is on bladder cancer risk and disinfection byproducts and nitrates in drinking water. My work has evolved in that direction.

HWT: Is the environmental work a growing area?

DS: It's a growing area in our branch. I've been branch chief for, let's see, it's about fourteen years. When I became branch chief, occupational cancer research dominated the branch's research portfolio. And today, environment and occupation are just about equal. So that really has changed. There are a number of factors that actually contribute to the change in that it's difficult to conduct occupational cancer studies in the United States. Much of my branch's occupational cancer research is being conducted in Asia in recent years. When we collaborate with NIOSH, they have the right of access to facilities in the United States. National Cancer Institute does not have the right of access. So the Diesel Study, for example, was a collaborative study with NIOSH, and NIOSH had the right of access. Getting access in the United States to conduct occupational cancer studies has become very difficult. So, it is a challenge. We still do it. The environmental studies, although they are challenging in different ways, they're also appealing because they're easier to conduct. There's no problem in doing air pollution studies or studying water contaminants and cancer. The data are there. They're available. EPA has a wealth of data. So we have the resources to do these studies.

HWT: You mentioned that it was difficult to conduct studies in the United States. What are the reasons for that?

DS: Mm hmm. Well, because say there's an occupational exposure that we think is suggestive, that might cause cancer. And we go to the companies who make it. And the companies don't say, "Come on in, (*laughs*) we'll give you our records and we'll let you do what you want." They don't cooperate, generally. I'm not saying every last company is like that. But they know that it sets up a liability for them. And that makes them reluctant. You know, once a causal association was established between asbestos and mesothelioma, and Manville went out of business, things changed. It had a great impact on industry's attitude towards research because they saw what their liabilities were. It's significant.[1]

HWT: What makes it easier when, you know, if you focus on a place like China? For me, that's a little surprising as well, that it would be actually easier access. Is that correct?

DS: Yes. We've done some really important work in China. I don't know the future, what that will hold. But I have to say that when we look at our achievements and what we've learned, some extremely important work has come out of China. For example, we've conducted studies in Xuanwei. This is not my personal research. But Qing Lan and Nat Rothman have conducted studies in Xuanwei where the women cook with smoky coal. It is a certain type of coal. We call it smoky coal. It's particularly carcinogenic to the women. And they cook indoors without ventilation. And they have some of the highest rates of lung cancer in the world. We've done a considerable amount of research in Xuanwei, with full cooperation. But as I say, it's not clear what the future holds. (*laughs*) Though we've been successful in the past.

HWT: Are there Chinese partners you want to mention? Official organizations?

DS: I don't want to be selective because there's a long list of them. And if I pick one or two, that would be biased. There are many groups that we've collaborated with and continue to collaborate with. China CDC is one. But there are others.

HWT: I'd like to talk a little bit about DCEG's trans-disciplinary approach. Because it seems to work across divisions, across institutes and across, you know, obviously the broader population to study risk factors, among other things. Is there anything you want to talk about with that question? Or is that relevant to you?

DS: The trans-disciplinary approach is critical to our research. It makes our work very strong. There's expertise across the Division in all the key disciplines. And it makes for great team science. We often collaborate across branches. And the synergy of bringing the various disciplines together like that is often extraordinary. It's one of the greatest strengths of DCEG.

HWT: Is there an example that comes to mind?

DS: Well, there are so many. There is no study that we do that really isn't trans-disciplinary, to be honest with you. I'd have to think hard about what we aren't doing. It's that pervasive.

HWT: And just to go back before we go forward, I wrote a note. You had said something about gene interaction work. Do I have that right?

DS: Yes. It's environment, well, it's really a simple notion. And it's integrated in the name of the division. So, it's really about how a particular exposure, like smoking, causes a disease like lung cancer; are there people with certain genetic mutations that put them at higher risk? It's a whole field. It's complex. And I'm not the person who will tell you all about it. The person is [Stephen Chanock]. But it's how they interact, the genes and the environmental exposures, that's so important.

HWT: So why have you decided to spend your career at the NIH?

DS: Besides the fact that NCI has treated me extremely well over many years, which I actually should mention. I'll get to that in a minute. NCI is a world-class operation. In terms of the epidemiology of cancer, in my mind, there's no better place to do it. With the best resources. And terrific scientists. There was never any desire to leave because there was never a better place to be. So I stayed. And they wanted me there. So, they wanted me, and I wanted them, and it was a win/win. I've never really thought of leaving—I've had offers to go, oftentimes to university positions. I never seriously entertained them. I've always been happy at NCI.

And there is this other piece that I haven't mentioned. When I began in the 1970s and in the 1980s, we had no telework. We had no flexi-place. There were no programs in place. I was young starting out and I wanted to raise a family. And I actually, although I've been at NCI for nearly 50 years, believe it or not, for about 16 years I worked part-time because there was no option to work at home part of the time. If you weren't in the office, then you weren't working. And although I had to work extra hours to keep up, because science is a rapidly changing area, they did allow me to do it. It wasn't easy. But Joe Fraumeni was a pioneer in allowing me, Sheila Zahm, and Tricia Hartge—the three of us worked part time to raise our children. And then I went back to full-time. Today, fortunately, women don't have to make that choice. So that was a profound difference between then and now. In other parts of NIH, I don't think it was that simple for an intramural scientist to work part-time. And I was able to raise my two daughters that way. And then I went back full-time. The fact that they allowed it was actually groundbreaking.

HWT: Talk about the process of that a little bit, in terms of gaining permission and asking. How did you go about that?

DS: The process was simple. You request that you want to change in your tour—it's the government, so there are forms and whatever. Your supervisor, in this case, because it was so unusual, it was the division director who decided, Joe Fraumeni, that he would permit it. But it was almost unheard of at that time. It would be hard to believe now that that was unheard of. And as I say, it makes me feel really good to know that women today are not forced to go part-time to raise their families, that they can telework, they can do other things and make it a lot easier.

HWT: Are you talking about the 1970s? Is that right?

DS: It's actually the '80s. My children, my first daughter was born in 1986. So I'm talking about the second half of the '80s into the early '90s.

HWT: Which is, you know, kind of surprising, in a way. I assumed it was the '70s because it's a while ago. So, there has been a shift. Although things are far from perfect. But there's a real shift.

DS: Yes. Well, the introduction of what they call flexi-place, which I guess was the forerunner of teleworking, that made a difference. And I'm not sure exactly when that happened. I guess it happened sometime in the '90s, I'm not sure. But certainly in the '80s, there was nothing like that.

HWT: And the number of women working at the agency, that's changed over time. And the number of women you mentioned in leadership roles.

DS: Leadership roles. And the number of professionals. The number of women epidemiologists in our division, it's dramatically shifted. But [the lack] of women in leadership roles was particularly conspicuous, because there were no women in leadership roles in 1972. And I remember that. I remember because I was in the section called, as I mentioned, the End Results Section, doing the survival work. And the assistant section head was a woman. But she was an assistant. And she wouldn't be permitted to go on work trips because her husband wouldn't allow it. It was such a different world. You can't even imagine.

HWT: That does sound a little dated, I have to say. (*laughs*) Goodness.

DS: She was older, and she came from a different era. But that was the era when I started working. That was the environment.

HWT: How did that make you feel about your own potential for leadership and growth?

DS: Well, for my potential. Now I'm kind of near the end of my career. (*laughs*)

HWT: No, but when you first started and there were no women leaders.

DS: I wondered about it. I wondered about the male dominance in the leadership. You know, I was young just starting out. I had my mind set on becoming an epidemiologist. I wasn't really obsessed about it. But it was noteworthy. It wasn't inspirational, to tell you the truth. And it wasn't clear that it was going to change. It did change over time—but it took a long time to change.

HWT: So you've been in your current role you said 14 years.

DS: Mm hmm.

HWT: So, can we talk about that, as well? If there's anything you want to add, I mean, it's a long stretch, but we've talked about your work in different ways over time. But between the 1980s, 1983 and then the 1990s, up until the early 2000s, when you became the leader. So, anything else that you want to add? And then we can talk about that specific role.

DS: Well, as branch chief, I consider it one of my primary responsibilities to guide the branch's research portfolio. What studies we should be doing that we're not doing, what areas need to be researched. I believe it's really key to what I do. I spend most of my time on guiding the branch rather than on my own personal research, because my branch is fairly large, about 35 people, with 12 principal investigators. And it's a very broad research portfolio covering both occupational and environmental exposures. So, I also think it's critical that our research is timely, that we can do cutting edge work. And I consider the most important things I do, actually, are guiding the branch and mentoring. And I mentor junior scientists and I mentor senior scientists. Because everybody needs mentoring. It's not just the junior people. So those two areas are what I spend most of my time doing.

HWT: Can you talk about your—so you've given me the overview—but a sort of a specific story over the last fourteen years, in terms of guidance, for example. We'll talk about mentoring a little later. But in terms of guidance.

DS: Yes, I can give you an example. So, I don't know if you know what PFAS (Perfluoroalkyl and Polyfluoroalkyl Substances) is. It's a class of chemicals. PFOA [Perfluorooctanoic Acid] is one member of that class. It's used in many things from the Teflon pots from a long time ago to the nonstick pots that were prevalent, well, they're still prevalent today, but they're not made with PFOA anymore. And it's used in even things including fast food packaging, such as microwavable pizzas. It's really everywhere. And the prevalence in the U.S. population of elevated PFOA, detectable PFOA levels in the blood, is extremely high. So, this is a widespread exposure. PFOA in particular has been linked to a number of adverse health outcomes, including cancer. And this is a really important area because the exposure is so widespread in this country. And in other countries. It's not just the United States.

So, a number of years ago, perhaps around 2017-ish, we realized that this was a really important area because it's a widespread exposure and because it may be linked to cancer. And so, we started to launch studies of PFOA and cancer. Right now, we have about a dozen studies ongoing. I was the motivating force to ensure that we could address the cancer issue. There were other health outcomes being addressed in a variety of places. But it's become one of the top priorities of federal agencies to evaluate PFAS and adverse health outcomes.

And so, guiding that whole process, launching studies to address to address the concern, is what I find most gratifying. And I chair the NCI task force on PFAS. This is an example of how we quickly saw that there was a need and were able to step in and get studies initiated that will be very informative in terms of various cancers and PFOA and other PFAS, critical work in that area.

HWT: Thank you for that example. Again, I realize you've been talking about this all along the way. But can you talk about the impact of your work?

DS: Well, as I told you before, the Diesel Study was critical to IARC, the International Agency for Research on Cancer, in classifying diesel exhaust a human carcinogen. That was one of my most important accomplishments in terms of public health impact. In northern New England a number of states (Maine, New Hampshire, Vermont), because of the findings from the New England Bladder Cancer Study, launched campaigns to encourage people to go get their well water tested. Well water is not regulated like public supply water. The results of our study were appearing on billboards. They were on television. And they made national news as well. So, raising the level of awareness in the New England population to this danger was another example of the public health impact of my research.

I'm hopeful that the PFOA work, and the other PFAS work, too, will have a tremendous impact. The work we do leads to regulation. I know that, for example, California EPA is putting in place goals for the levels of PFOA in the water supply. And the driving force behind that is the work we did with kidney cancer and PFOA. So, seeing it translate into regulation where people are protected, that's the public health impact.

HWT: Wonderful. So, in a way I've asked what you are most proud of. I don't know if there's anything else you want to add. Because there's so many things. There's the work itself. We'll talk about mentoring. Is there anything you wanted to add?

DS: As I've already told you, I'm very proud of the Diesel Study and the accomplishment of prevailing despite 20 years of obstacles provided by the motor vehicle manufacturers of the world. I consider that a tremendous accomplishment. And the New England Bladder Cancer Study as well, with the arsenic in the well water.

HWT: And then I always like to ask the other side, too, in terms of disappointments or setbacks. Is there something that stands out? And was it a learning experience for you?

DS: My disappointments were when I was doing the part-time stint for 16 years, my career slowed down. And it was self-imposed. But nonetheless, I kind of stayed in place. It didn't feel like my career was progressing. But I knew that one day I would go back, and I would make up for lost time, so I was lucky that I could make up for lost time. Not everyone can. But I guess the lesson to be learned when you feel like that is to just keep going. And if you want something, you keep working at it until you get what you want.

HWT: So, you've received a long list of awards, and we're not going to list them all here. But starting in 1966, you won a New York State Regents Scholarship. And as recently as 2020, you received both the DCEG Tech Transfer Award and the EPICOH Lifetime Achievement Award. So what awards—and you know, I know it might be difficult to pinpoint—but I'm wondering what awards or professional acknowledgements you've received have been meaningful to you, or the most meaningful to you, and why.

DS: Well, several of them have been very meaningful to me. I received the NIH Director's Award after the Diesel Study came out. So that was around 2013. And we were all in the auditorium at NIH for the awards ceremony. And every other group, everyone else that got the award [received] a group award, for team science. I was the only person up there that got an individual award. That really was meaningful. Harold Varmus and Francis Collins gave it to me. So that was a touching moment. And they told me I really deserved it. Whispered it in my ear.

HWT: Lovely.

DS: The Harvard Alumni Award was also very meaningful. To go back to Harvard and to receive the recognition was very special. There are many stellar alumni from Harvard, as you know. So it was touching to be singled out in that way.

HWT: What does it mean to you to be an elected member of the American Epidemiological Society, and a fellow of the American College of Epidemiology?

DS: Well, so the American Epidemiologic Society is particularly meaningful, because it's an elite group of American epidemiologists. That is what it is. You have to be sponsored by others to be accepted. You don't join it. They invite you. I've been in that society for quite a few years. And it's an honor to be a part of that society. Many epidemiologists in that society are in the infectious disease world. There aren't that many cancer epidemiologists, there are some. But people like [Anthony] Tony Fauci [Director NIH-NIAID], they're all in that society. So, it's an honor to be a part of it.

HWT: And then I wanted to ask you, you know, when you first started—sort of going back and looking at your whole career—what your work has been built upon, specific to both biostatistics and epidemiology. You talked about the technology in the early days, for example. But what about the work itself? We talked about 1971, the Cancer Act passed, and there was money. But do you have a notion of what you sort of, you know, people are always building on work that's happened, and then upon that and upon that. Are there people who you think about, historical figures? Or what was your work built upon, in other words?

DS: Well, in epidemiology, oftentimes each finding leads to the next study. So, you build upon your own research, as I said, for example, on bladder cancer, starting with the National Bladder Cancer Study. Then I conducted the Spanish Bladder Cancer Study. Then I did the New England Bladder Cancer Study. They were all designed to learn more about what causes bladder cancer. And findings in one study need to be replicated in a different study population. So, you do studies in different places and see if you replicate your own findings. So it's really part of the process. That's how epidemiologists do research. In the same way, the diesel work led to my interest in air pollution and conducting the study of ultrafine particles in southern California and lung cancer.

HWT: Building on that a little bit, what were the other bladder cancer studies, for example, that came before yours? Were there any that were of interest to you that influenced your work, in other words?

DS: I've been doing it for so many decades that you're asking me to reach back into ancient history. Sure. There was work done initially in bladder cancer by an epidemiologist who was at Harvard, was one of my professors at the time, Phil Cole. And Bob Hoover was his student. Bob Hoover was my mentor. Phil Cole had come up with the notion that we should not be studying what occupation people work in and its relation to cancer, but rather the specific exposures that workers had and evaluate the cancer risks of those exposures. He introduced this idea of exposure orientation. I believe I'm crediting him accurately. It was his idea. And Bob Hoover actually collaborated with Bob on this initial work. It was not his dissertation. I became a doctoral student while Bob Hoover was finishing up his dissertation. So yes, that work had a profound influence. Phil Cole's idea of focusing on the exposure. That' s what's causing the cancer, not a person's job title. For example, it's not that a person is a truck driver. But what is it? Is it that he's being exposed to diesel exhaust? Is it something else? That idea had a profound influence on my later research.

HWT: Thank you for that. Anything at all that you want to add? I have some questions about other areas of your career in terms of teaching. I have a couple of questions, and some other questions about mentoring. But do you have anything to add in terms of your career over time or any specific moment? Any research study? We've talked about several. Anything at all.

DS: Well, when I was talking about the awards, I didn't mention how important receiving the EPICOH [Scientific Committee on Epidemiology in Occupational Health] Lifetime Achievement Award was. That was also a great honor. And I certainly didn't mean to skip over it.

HWT: Yeah, that often happens. Understandable. So, you were an adjunct faculty member at Georgetown Medical School for, my understanding is about 16 years in the Department of Community and Family Medicine. Can you talk about your experience as a professor, why you became one, what teaching means to you?

DS: Well, I was an adjunct professor. I would give lectures on methodology, actually on control selection. So early on in my career, one of the other areas that I worked on was selecting controls, how to select controls for case-control studies. And I would give guest lectures at Georgetown for a number of years in that area. I enjoyed teaching. Mentoring is teaching, too. So, I feel like that area is addressed in my mentoring at NIH. I find it very rewarding, teaching. I didn't continue. I mean, I haven't really done anything formally like that. I do give guest lectures at times at various places like Yale and such. I get invitations to do that. I like working with students. It's very satisfying.

HWT: Can you give me an example as to why? What is it that is satisfying about working with students? And does anybody stand out to you?

DS: Oh, gosh, (*laughs*) I'm not going to name names. You can't get me to do that. Well, it's really teaching. It's being the person who communicates these complex ideas to the student for the first time, probably. They're like sponges. And they're sopping it all up and they're enthusiastic. That's a very gratifying feeling to be able to give them that knowledge. It's profound.

HWT: I think it's important, so—

DS: It's very important.

HWT: Yes. So, I have some Covid questions for you. And you'll tell me to what extent these are relevant to your experience. But I wanted to ask you what the response to Covid-19 has been at the NCI.

DS: Ah. Well, it generated a great deal of research at NCI that our branch has not really been engaged in. Most of what we do is not applicable to Covid. However, the impact of the pandemic on our research program has been profound. Just like it's been throughout science and throughout other areas. There was a long transition to teleworking, to 100 percent teleworking. Plus, the stresses experienced by many people and their families is significant. And being able to keep things going was a challenge. Things slowed down dramatically in a way that I had never seen. And it's only recently that it's picked up. Maybe in the last year, maybe six months. It's hard to say. You know, we finally got it. How to telework effectively. And everyone adapted to it. And now that we've gone back to the office, we've gone back just last week in a hybrid schedule, it's a whole new transition. Once we got it going with telework, now we've got to adjust to a hybrid schedule. Each time, it's a big transition for people. And it impacts the research, and the pace of the research is really what it impacts.

In our studies in China, we haven't been able to go there physically for over two years. And it's really important when you're conducting studies to be able to monitor them. Now fortunately with the ability to have virtual meetings, we keep things going. But it's not the same. So, it's had a big impact on, call it a big slowdown.

HWT: And I know it sounds obvious, but I'd like you to explain why it has affected the pace so much. Why the slowdown?

DS: Well, there's an adjustment process. People were just so distracted with Covid. In their families, how their home lives were affected. Their kids were at home. A lot of people have children. They needed attention. They needed help with the computer, to do their online classes. All of that is a distraction. People would work at nights and on weekends to make up for it. But it's not the same.

Now as time went on and kids went back to the classroom, which I think helped a lot, people have more free time during the day, when they weren't exhausted, to do their teleworking. And I think things really have improved. But it slowed things down. There's no question about it.

HWT: Can you take a moment to describe the first month or two during shutdown? It was about this time two years ago was March. Now we're only in April. What was that first sort of month to two months like?

DS: You know, I have to say, I'm going to pass on this. Because I don't remember it that distinctly. I just remember that everyone was very concerned about Covid. And preoccupied. And there was a lot of that and it went on for a long time. We were fortunate in that we got online easily, and we were doing virtual meetings, and all of that happened pretty fast. It was almost a seamless transition in terms of technology. The NCI computer support was excellent. So, we had the ability to work, telework, instantaneously. But people's minds and their fears were somewhere else, it was a huge distraction. That's the word that comes to mind. A huge distraction.

HWT: Of course, in those early months, we didn't know whether or not it was transmitted by touching a doorknob, or was more airborne, or both. And so, things really halted in that sense, as well. I remember. (*laughs*)

DS: Yeah, people were really afraid. Even outside, I remember we didn't know how close you could be to someone, breathing the aerosol. It was a worrisome time.

HWT: Is there anything else about Covid that you want to add? In terms of, we talked about the pace or not being able to go to China. And the work itself in terms of the pace, of course, and also the fact of the distraction that is Covid. Anything else in terms of the process, the research process, or anything else you want to add?

DS: Well, when you're dealing with complex issues on the study, it's hard to work through them on the screen. It's easier when you're sitting in a room across from each other. The interactions, the flow, it just it works better. There's a synergy that is difficult to achieve on the screen. It's achievable. But it's harder. So challenging aspects of our work were made more challenging by the virtual environment.

HWT: And then finally with Covid, and I'm not sure this is exactly the right question for you, but you'll tell me. Obviously Covid has had a disproportionate impact on already marginalized communities. African American communities, poor communities everywhere. Could you take a moment to talk about health equity?

DS: We're just beginning to really study that in our branch. We are launching some projects that are aimed to learn more of that health disparities for cancer. But we don't have any findings. We're just initiating, and the work is ongoing. So, I'm going to have to hold off talking specifics. But we're concerned about this whole area. And it has been an understudied area. And we hope to make great strides in that area in the next few years.

HWT: People are talking more and more about, obviously, everything to do with the environment and environmental justice. And I imagine that that plays into this quite a lot.

DS: Yes. It is certainly true that there are all kinds of disparities in the exposures of potential carcinogens. Racial disparities. And we're taking a systematic approach to it. And we think this research is very important.

HWT: So, I just have a few questions about mentoring and sort of medicine and society. And of course, public health in general is concerned with protecting the health of entire populations. I always like to ask this question because I know it's not specific to the era that we're living in, but we do seem to be living in a very anti-science sort of era. You've got anti-vaxxers and you have climate change deniers and people refusing to wear masks. So, I'm just wondering what should your role really be in society? What should that communication look like? You talked about the communication in New England and getting the word out and affecting that population. At the same time, a lot of science communication seems to be left up to broadcast reporters who don't have any special expertise. So, what is your role? What should it be? How do you communicate with the public?

DS: Well, our role is very important and should be separate from politics. I really believe in the separation of science and politics. Scientists need to do their science in the best possible way. As far as epidemiologic findings, the role of the media is extremely important because they're the ones who report the findings to the public. So, I think it's the responsibility of each scientist to be able to communicate to reporters in a way that they can understand the findings so that they can then accurately report them to the public. That's critical. And oftentimes for findings from studies that we put out, not just press releases, we develop talking points of critical language to use to explain our findings to the reporters, because it's so important. And my experience has been very positive. They want to get it right, the reporters. They don't want to get it wrong. And lots of times they'll even let you see the draft of the report. Of course, you can't do that with taping on television. But nonetheless, it's part of our responsibility to be able to communicate our findings to the public through the media. So, it's very important.

HWT: You've talked about mentoring. You mentioned Bob Hoover. And early on you mentioned somebody named Abe Lilienfeld.

DS: Abe Lilienfeld.

HWT: So, I wanted to ask you first about your own mentor. You've mentioned some. If you want to add anything about either Bob Hoover or Abe Lilienfeld and how you felt mentored. But I also want to ask you about your role as a mentor and your personal style. Obviously, you've mentored a long list of people over the years.

DS: Well, in terms of my mentors, as I mentioned, Bob Hoover was clearly my primary mentor over the many years at NCI. But there have been others. I didn't mention Alan Morrison. He was my mentor. Abe Lilienfeld didn't mentor me. He gave me advice on what job to take, which led to my career at NCI. Not quite the same. And there have been many other people over the years. But Bob Hoover certainly stands out. Joe Fraumeni as well.

And in terms of my style of mentoring, it's actually a lot different from Bob Hoover's. Bob's style was always to be pretty hands off. And people learned from their mistakes. I'm more directive than that. But it depends on who the mentee is. Some people need more direction than others. It is not one size fits all. When they are going in the wrong direction, I like to pull them back. And I will say what I think. Because I think they need to hear it. So, I know Bob wouldn't have done that. (*laughs*) He'd let you go astray. And learn it the hard way. I'm not quite that tough.

HWT: More generally, can you talk about the role mentors play in science?

DS: Oh, God. It's critical. I learned so much by being mentored. When you get your degree, you come to the job with a certain skillset. But working on projects, you learn so much that the original skillset is a fraction, a small fraction, of what you know by the end of your career. And different studies, different issues, they all contribute to your knowledge. You pick up so much from different people and different settings. It's cumulative. I look back now at how much I knew then and how much I today. It's a function of great mentoring. And work. And experience. Experience also plays a big role.

HWT: What advice would you give to encourage young scientists to continue pursuing their goals or to seek out necessary resources, even in spite of any setbacks or barriers that they might face?

DS: Well, I've always believed that if you have certain goals, that you shouldn't let setbacks discourage you. And most of the time, you should work hard and keep working for what you want and persevere. Perseverance has worked well for me. I know that in the Diesel Study, for example, in the mid-1990s, there was no one at NCI who believed that the study would ever have reached completion because the resistance by industry groups. But I believed we could prevail. And I just stuck to it. And it took a long time. And maybe if I had done other studies in that space of time and I had abandoned it, I might have had more papers on my CV. But to be perfectly frank, the importance of the papers from the Diesel Study outweighs what I would have done in that space. So, I really believe that you need to pursue what your goals are and not get offtrack with setbacks. Unless, of course, they become overwhelming. But luckily, I was never faced with that.

HWT: And then in terms of the DCEG more generally, I read that there's a strategic plan from 2020 to 2025, and that among the major goals include developing and implementing strategies for workforce equity. Of course, we've talked about women and the changes over time. But women and people of color are typically underrepresented in science in general. Are you involved in that effort? Can you comment on that?

DS: Well, I'm on a search committee for the division. It's actually an experiment to bring on tenured scientists. Which is unusual. We usually bring on people before they reach tenure. And they get tenure at NIH based on their work at NIH. But we're trying to bring in one or two tenured scientists each year whose research is really focused on studying health disparities in cancer. And I'm part of that search committee. So, I'm directly involved. We've recently hired someone. And this is kind of an experiment that's going on at a number of institutes. To see if this will help address the inequities in the workforce. It's difficult to find people, but there are good people out there. It's just, it's hard to do. Not impossible.

HWT: So, is there anything we haven't covered that you would like to add? Anything that I haven't asked that you feel is important in any area?

DS: No, I think we've covered quite a bit.

HWT: Hopefully not too much for you.

DS: No, no, it's fine.

HWT: Okay. Good. And you're comfortable with everything, and the conversation that we had, hopefully.

DS: Yes.

HWT: Okay. Good. I appreciate your time. Thank you. Have a great day.

DS: You, too. Thank you.

HWT: Okay. Bye.

[End Interview.]

[1] Johns Manville is an American company based in Denver, Colorado, that manufactures insulation, roofing materials, and engineered products. For much of the 20th century, the then-titled Johns-Manville Corporation was the global leader in the manufacture of asbestos-containing products, including asbestos pipe insulation, asbestos shingles, asbestos roofing materials and asbestos cement pipe. See Justia US Law, https://law.justia.com/cases/federal/appellate-courts/F3/7/32/479329/