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Dr. Louise Brinton Oral History

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National Cancer Institute

Division of Cancer Epidemiology & Genetics

National Institutes of Health

Oral History Project

Interview with Dr. Louise Brinton

Conducted on September 14, 2022 by Holly Werner-Thomas for

History Associates, Inc., Rockville, MD

HWT: My name is Holly Werner-Thomas, and I am an oral historian at History Associates, Inc. in Rockville, Maryland. Today's date is Wednesday, September 14, 2022. And I am speaking with Dr. Louise Brinton for the National Institute of Cancer, Division of Cancer, Epidemiology and Genetics (DCEG), 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 DCEG. This is one in a series of interviews that focus on the work of five plus 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. Brinton is in Sedona, Arizona. Before we get started, could you please say your full name and also spell it?

LB: Louise Annette Brinton. L-O-U-I-S-E A-N-N-E-T-T-E B-R-I-N-T-O-N.

HWT: Thank you. And before we get started, first I want to ask you two questions. Shall I call you Dr. Brinton or Louise?

LB: Louise.

HWT: That's fine. Okay. And when you retired in 2017, what was your final title there? Your role.

LB: My final title was Scientific Advisor for International Activities.

HWT: Okay. I'm going to jump into the bio: In a productive research career spanning four decades, Dr. Louise Brinton made contributions to advance the health of women in the United States and around the world. She began working at NCI in what is now the DCEG as a predoctoral fellow in 1976 and retired in late April 2017 as the Scientific Advisor for International Activities. Throughout her career, Dr. Brinton practiced and taught hands-on epidemiology, leading field investigations on nearly every continent, from Latin American to West Africa to China and to multiple U.S. locales. She began her graduate work in anthropology, but quickly switched to epidemiology and earned an MPH in epidemiology at the University of North Carolina at Chapel Hill, followed by a PhD from the subject at the Johns Hopkins School of Hygiene and Public Health in 1979. She then conducted postdoctoral research at Oxford University before returning to NCI. In 1984, she was appointed acting chief of the Environmental Studies Section. And in 1996 became chief of the Environmental Epidemiology Branch, later renamed the Hormonal and Reproductive Epidemiology Branch, or HREB. In 2016 she was named DCEG's first scientific advisor for international activities. Dr. Brinton initiated and conducted seminal research studies to identify etiologic factors responsible for breast cancer and other gynecological malignancies, including a body of work that is represented in over 600 peer-reviewed scientific manuscripts she authored and dozens of book chapters, the majority of which focus on the etiology of breast, endometrial, and rare gynecological cancers, as well as male breast cancer and hormonal factors influencing those malignancies. Dr. Brinton has also served as a senior editor for *Cancer Epidemiology, Biomarkers and Prevention*, and on the editorial board of the *Journal of the National Cancer Institute*, *Breast Cancer Research* and *The International Journal of Epidemiology*. Among her many awards and honors, Dr. Brinton was elected president of the Society for Epidemiological Research in 1990, received the NIH Director's Award for innovative leadership in women's health research in 1994, won the American College of Epidemiology Abraham Lilienfeld Award in 2009 and became an inductee of the Johns Hopkins Society of Scholars in 2020.

I hope all that sounds about right. And I know that's not everything. Okay, so let's go ahead and jump in. I always like to begin by asking people to take their time and think back about their whole lives in relation to their careers. So, if you could take a moment to describe your family background, who influenced you, if you had mentors. I know for example your father was a chemist and professor. So, talk about your family and your influences when you were young.

LB: Okay. Well, you mentioned that I grew up in an academic family. And that certainly had a major influence. I think I never doubted that I would go to college and then probably on to graduate school. But my father was a major influence in my life. He was a real adventurer. He was a mountain climber. Made some first ascents of many mountains in the Sierras. And he also loved to travel. So, we spent a lot of time traveling, both in the United States and abroad. I lived abroad in several locales while he was on sabbatical. So, I think that instilled in me an appreciation for the diversity of the world and probably led me to pursue anthropology when I first went to college.

HWT: And I have a follow-up question about that a little bit later. Did you have any other supports at home or at school that you want to talk about? Probably STEM programs were not as defined. But it's potentially there. Or teachers. Was there anybody that stands out?

LB: Well, there certainly were a number of significant mentors during my professional career. I don't know whether you want to get into that now or later. But they had a major influence on the direction of my career.

HWT: I think we'll get into that a little bit later. So, let's move on from the early years. How did being a woman affect your choices or your experiences or your plans in terms of early career path?

LB: I don't think that it really influenced me, to a large extent. I didn't get married and have my child until later in life, so I was able to focus on my career for many years before I was challenged by having to deal with motherhood. But I don't really see that being a woman influenced me in any particular way.

HWT: So, on that note about anthropology, I'm wondering why you switched from anthropology to epidemiology and why you waited until graduate school to do so.

LB: Well, I have to admit that I floundered a fair amount during my undergraduate years in trying to define what my true interests were. And toward the end of my undergraduate career, I decided that I wanted to focus on anthropology because I love different cultures. And I knew I wanted to do something in the medical field, but I wasn't quite certain what I wanted to do. And so medical anthropology sounded like a good buzzword. And so, I actually went to Chapel Hill to pursue a master's degree in medical anthropology. But when I got there, I found that they were teaching it in a different way than I defined it. It was much more sociologically, culturally oriented than biologically oriented. And fortunately, I had a roommate at that time who was at the School of Public Health. And I didn't even know that schools of public health existed. And somehow, I learned about epidemiology and really didn't know what it was, but it sounded better than medical anthropology as I was learning it.

And so, I went over to the school to see if I could get into that program. And at that time, they were only really admitting nurses and doctors into the field of epidemiology. And they were concerned about my not having a medical background and said that they would only admit me if I focused on a particular area. Because they thought that epidemiology was a tool rather than a discipline in itself. And so, they wanted me to focus on population dynamics, which was a hot area at that time.

So, they admitted me into the program. And I think I was the first non-nurse, non-medical doctor admitted into the epidemiology program at UNC. And so that's what I focused on for my master's degree. And I found that I loved it.

HWT: That's fascinating. So, you're talking about sort of the early to mid-1970 when you say that period of time?

LB: Yes. It was early 1970s.

HWT: And so, epidemiology was not considered really a discipline yet. Is that what you, am I understanding that?

LB: It was considered more of a tool. And you needed a focus to apply that tool to. And at that time, it was primarily focusing on infectious diseases. But it was the beginning where they were starting to branch out and apply it to other fields, like the population field.

HWT: And I'm wondering also, so epidemiology led you to cancer research. Can you talk about that process a little bit further?

LB: Well, after I got my master's degree, I moved to Boston for a short period of time. And I had a job doing health services research. Which I hated. And I decided that I wanted to go back to school and get my doctorate in epidemiology. And decided that I would focus on genetic epidemiology, because that sounded like it was a fascinating field. But when I got to Hopkins, I found that it wasn't a good fit for me. So, I was struggling with trying to decide what my future focus was going to be. And I just by happenstance got a job at the National Cancer Institute as a summer job and found my niche.

HWT: Okay. So, let's get into weeds just a little bit there, because I wanted to actually ask you what brought you to the NIH. And you said that you happened to get a job at NCI one summer. So, can you talk about that process a little bit? How did you hear about that? I mean, probably that's an obvious question. But was there somebody guiding you? Or did you hear about a particular program? What was it that brought you to the NCI?

LB: I wish I had a more elegant story. But it was actually a boyfriend who recommended that I pursue a position at the NCI because he knew they had positions. And they gave me the name of Marvin Schneiderman, who was the director of what was the predecessor of DCEG. And so, I called up Dr. Schneiderman to see if I could get an interview. And he told me that I needed to call young Joe Fraumeni and talk to him. And of course, this was many years ago. So, I set up an interview with Dr. Fraumeni, who actually turned out not to be available on the day I went for the interview. So, I ended up interviewing with Drs. Blot, Mason, and Hoover. And it just seemed like a fascinating place. And I still was struggling for quite a long time in trying to figure out what they did there and how I could fit in. But during the course of my summer position, where I primarily worked with Dr. Blot, it became clear that that was what I wanted to focus my career on.

HWT: And just two brief follow-up questions. You mentioned that you were doing health services research but didn't really care for it, and also genetic epi [demology], which I'm curious about. So, can you address both of those, beginning with health services research? Can you tell us what that is, or what it was, and why you didn't like it?

LB: Well, that's a tough one. I just, perhaps it was not the right setting for me, or it wasn't the right study. I was only there for less than a year's time. So, I really can't begin to describe what the entire field encompasses. But it could have also been that I was just struggling with what my future career was going to involve. And I think at that point I knew I wanted to go back to school. And so, I was frustrated in having a job that didn't have a future ahead of it.

And then in terms of genetic epidemiology, frankly I found it very challenging. And it wasn't that I wasn't interested in the field, but it just didn't come naturally to me. And this was of course at a time when the field was much, much less advanced than it is today.

HWT: In fact, I was just going to mention that. What did that even look like in the 1970s? Very, very different.

LB: Yeah. It was pretty biologic and not as statistical as it is now. But in fact, I think neither genetic epidemiology, then or now, is a good fit for me. I was much more interested in kind of the anthropologic orientation of epidemiology. So even though I switched from anthropology to epidemiology, I always kept my interest in anthropology.

HWT: You also mention that populations, so the study of populations, was something that was very current at the time. Do you want to talk about that a little bit? Why was that? Was it a new focus?

LB: It was a new focus. What I focused on for my master's thesis was on how long breastfeeding delays the resumption of ovulation. And then after I got my master's degree, I started working for an organization called the International Fertility Research Program, which I believe is now Family Health International. And I did a lot of research on abortion worldwide.

HWT: We can come back around to that. Obviously, we'll be talking more specifically about your research. But can you first talk about how would you describe the NIH when you first arrived? Obviously, things have changed. So, can you describe the NIH or the NCI when you were first there?

LB: Well, of course, it was a lot smaller when I was there. DCEG, which it wasn't DCEG then, but we probably had 30, 35 people in the predecessor to the division, so it was a very intimate place. You got to know all your coworkers. There were a lot of social activities because we were fairly small. It was a very nurturing environment. I had more opportunities to go on campus and to meet people on campus. It wasn't as huge and as complicated a place as it is now. It was a very exciting place. So, I really enjoyed my initial years there.

HWT: And I know this is broad, but, and we'll talk about this throughout. But how would you say NCI has evolved over time? Obviously, it's bigger. We know that. Anything else that you want to add?

LB: Well, I think administratively it's become much more complex. A lot more rules. A lot more hoops to jump through. It was less complicated in the initial years. And just easier to navigate your way around.

HWT: I've heard that before, actually. Can you talk about the mission of the DCEG? And also, more specifically, your own roles there? We're going to get into all of those. But again, in kind of broad brush strokes, you know, describing your roles within the mission of the DCEG.

LB: Well, I'm not sure what the official mission is. And it has changed over time. Initially, it was much more on just identifying etiologic risk factors. During the early years that I was there, there was an emphasis on trying to incorporate the risk factors identified through interviews with biologic markers to understand mechanisms. And so, it's become much more mechanistically oriented. And then, of course, there have been a tremendous number of technological advances, which have allowed high through-put techniques, so that you can deal with larger and larger populations.

I have to say that when I first joined the NCI, we did not have computers. So that really challenged us in terms of doing the statistical analyses that we wanted to do.

HWT: Can you take a moment to describe that that looked like? So, you know, sort of a day in the life; it's pre-computer. What was the process for you, therefore?

LB: It was very burdensome. It was very tedious to calculate odds ratios. We did it on calculators. Tricia Hartge and I actually spent a fair amount of time developing a program so that we could get Mantel-Haenszel odds ratios in a more efficient way. I typed my thesis on a predecessor to a computer. It was a word processing type of device. That was pretty tedious. So there have been a lot of advances that have been quite valuable.

HWT: What were your initial goals when you first joined in 1976 as a pre-doctor fellow?

LB: Well, you have to remember that I was just one year out in my doctoral studies. And my primary focus when I went there was to get a summer job and to get some spending money. I really didn't see it as something that would lead to a career. And that really didn't solidify until after the end of the summer when I was actually presented with a thesis topic. And it was something that excited me and something that led to my dissertation, and then really opened up the whole career for me.

HWT: And did you have mentors? You've mentioned already Dr. Fraumeni. Were there mentors for you that first summer?

LB: I mean that was one of the reasons that I stayed as long as I did at the NCI. There were so many mentors and so many generous people who were willing to share their knowledge. I think probably the most important mentor for me was Bob Hoover, who approached me at the end of the summer and told me about a resource that he was trying to develop, and he thought it would be a good thesis topic for me. It was a mammography screening program that was all over the United States. And he suggested that we would be able to incorporate a case control study within this screening project in order to look at the relationship of exogenous hormones to breast cancer risk. And that sounded like a very exciting project to me. Bob was a very, very generous mentor. He spent many hours with me in the early phases of my career. And I know that I would not have been half as successful if it hadn't been for his mentorship.

HWT: I'm going to ask this question. I have a feeling I know this answer because we've already mentioned it. But at any point in those – I asked you originally how did being a woman affect your plans and experiences? Once you were there at NCI was that at all, in the 1970s, something that you thought about? Or what was the atmosphere like for women?

LB: Well, again I'll come back to Bob's mentorship. Bob was always very supportive of women, whether it was dealing with childcare issues or other issues, he was always trying to promote women within the division. I never felt that I was a second-class citizen. My pay was always entirely fair, if not more than fair. So I really never felt persecuted as a woman. If anything, I would say that I had more problems with other women within the division. I was very intent on promoting my career. I worked exceedingly hard in those early years, probably seven days a week. And there was, I think, some jealousy on the part of other women that I was getting ahead. But it was not because of any sort of favoritism. I worked really hard in those early years.

HWT: I'm wondering also, you know, about your story going to Oxford. So you leave the NCI for a period of time. You conduct research at Oxford University. You worked under the tutelage of Richard Doll.

LB: Mm hmm.

HWT: Can you talk about your experience at Oxford? Why you went there, why you worked with Richard Doll and what the process was of even going.

LB: I'm not sure what the instigation was for my going there. I just got the idea that it would be a fascinating experience to go to Oxford and learn epidemiology from a different point of view. I have to say that my mentors at NCI were not particularly supportive of my going. They didn't feel that it was the right phase of my career to be going abroad. But they were accepting of it and certainly welcomed me back after the year that I was in Oxford. I'm not even certain that Sir Richard Doll knew that they were not supportive. I think when I applied he thought that it was with their prompting that I had applied. (*Laughs*) And so I think that I got accepted by him because of his assumption that I was being recommended by Joe Fraumeni and Bob Hoover.

It was interesting in Oxford. Sir Richard Doll lived in the Regius Professor of Medicine home that was provided by the university. And there were three apartments that were attached to the home. And I was lucky enough to live in one of those apartments. So, I not only worked with Sir Richard Doll, but I also lived in his house in a separate apartment.

HWT: And talk a little bit more about that experience and what you focused on in terms of your research and what you accomplished there, felt like you accomplished there.

LB: Yeah. Even though Sir Richard Doll was my official mentor, I really didn't have that much interaction with him. My main mentor there was Martin Vessey. And Martin was a wonderful mentor as well. I started working on a study of cervical cancer when I first got there and had primarily focused on breast cancer when I'd been at the NCI. So this was a new area of research for me and one that I found just fascinating. And when I returned to the NCI, I kept that interest and promoted that area of research in my section and subsequent branch. So primarily I was focusing on cervical cancer and benign breast disease studies when I was at Oxford working with primarily Martin Vessey.

HWT: This is a question that will recur as we speak about your research and all of your work. But beginning with Oxford, how did you run the studies that you were conducting?

LB: Well, I think it was very hands-on. I went out to the field a lot. My real love in epidemiology was the field studies. And I particularly liked challenging field studies. I conducted many multi-center studies which brought another level of complexity to the studies. And then as we've mentioned, I did a lot of international work. So I was very hands-on. Fortunately, we had some good contractors who helped us with the day-to-day logistics of conducting studies. But my style was to get down and dirty and to make certain that everything was operating as it should. Not to trust anything. And it was very important to make frequent site visits and to assure that the studies were being conducted as we had designed them.

HWT: And can you describe one of those site visits, for example? When you say you love field research, tell us a little bit more about what that looked like at that point.

LB: Well, we would go out into the field. Like for instance with my Latin American cervical cancer study which we were doing in four different countries, we would go out in jeeps. Oftentimes for several days at a time under fairly harsh conditions, trying to track down study respondents. I would watch the interviews. I would make certain that the interviewers were not leading the subjects in terms of responses. I would watch how biologic specimens were being collected. I would look at how things were being recorded. Really looking at every step of the process to make certain that it was being done according to protocol. And we would have very detailed study manuals that we developed, and we would train all of our field personnel in intensive training sessions. I participated in all those training sessions. So, it was just making certain that all of the I's were dotted and T's crossed, and everything was being done according to protocol.

HWT: Thank you for that. It sounds honestly a bit anthropological in approach.

LB: Mm hmm. Very much so. Yeah. No, I really feel like I came full circle. Even though I left anthropology, I always had a love for it. And I really did come full circle in terms of being able to incorporate what I loved about anthropology, but with a bit more of a quantitative focus. And that was epidemiology.

HWT: What were the four countries in Latin America, by the way?

LB: They were Mexico, Costa Rica, Panama, and Colombia. Those studies were not without hardships. We endured an earthquake in Mexico City. We had floods. We had a volcano erupting in Colombia. It was a fairly challenging study.

HWT: So, in 2017 when you were asked which study you were most proud of by the NIH, you said the invasive cervical cancer study in Latin America where women experience some of the highest rates of cervical cancer in the world. So, can you elaborate? You've told us where in Latin America you were.

LB: Sure. Well, a reason for wanting to do the study was to try to understand why the rates were so high. Normally cervical cancer is a disease that's associated with women having early first intercourse and multiple sexual partners. And we knew that that was not the case with most of these women who were developing the disease. So we wanted to focus on the male factor. Because the behavior of women in Latin America, the sexual behavior of women, is quite different than the sexual behavior of men. So, we designed a study so that we could ask both men and women about their different lifestyle practices and try to relate those practices to the incidence of cervical cancer as it was occurring in those countries.

And I think the reason that I'm most proud of that study is that it was a very complex study working in four different countries and collecting information, very sensitive information, from both men and women. We were collecting not only interview information but also biologic specimens.

And the other thing that I'm proud of is that it was a study that was not highly supported by my mentors at NCI. They said this was a study that we could never do. We wouldn't get good response rates; we wouldn't get accurate response rates when we asked about these sensitive topics. And in fact, we got exceedingly high response rates both to the interviews and to the collection of biologic samples. And that information is still being used at NCI to clarify risks related to cervical cancer.

HWT: So then how did you go about proceeding to do the study without the institutional support that normally would have helped you?

LB: Well, you know, when I say they were not highly enthusiastic, they were still supportive. Fortunately, I had a very good co-collaborator, an American who was living in Panama and working at the Gorgas Memorial Institute. And I would not have been able to do the study if it hadn't been for his support. That was William Reeves, who unfortunately is no longer with us. But he was a real powerhouse. And he really contributed to making the study a success.

HWT: And before we move on from this particular study, is there anything you want to add, in terms of anything at all? Because we have focused on it somewhat, but I'm sure there are many more stories, including some of the natural disasters that you mention.

LB: I mean, I've talked about the collection of sensitive information. And I think one of the reasons we were successful, contrary to people thinking we wouldn't be successful, is that the medical profession is so revered in Latin American countries. And so even though we were approaching people out in the field and asking them to provide us with some exceedingly sensitive information, they were willing to do that because of their reverence for the medical profession. And we did have our interviewers show up in white coats. And they approached it very professionally. But the people also felt grateful that we were allowing them an opportunity to participate in our studies. Because they did recognize that it was a serious condition, and it was affecting a lot of women in those countries.

HWT: Were there partnerships with – local partnerships? And obviously there was a language barrier, so I imagine translators?

LB: All of the interviews were conducted in Spanish. We had partners in each of the countries, major institutions that were our co-collaborators. I was the one who needed help with the translation. But everything else was primarily in Spanish.

HWT: So, going back now, we've talked about this. You were at Oxford, and I know in 1984 you were appointed acting chief of the Environmental Studies Section. But before we talk about that, can you talk about the interim time there? You've come back from Oxford. Were you already then employed by NCI? Or did you need to apply, and what were you doing?

LB: I believe that I was already employed. I think I took a year's leave of absence to go to Oxford. And I had many different positions over the course of my 40-some odd years at the NCI. At that point I was probably, well, I started out as the research assistant. And then when I came back from Oxford, I believe I was appointed as a staff fellow, and then a senior staff fellow. And then achieved tenure. And then was appointed as the chief of the Environmental Studies Section.

HWT: So, what is the Environmental Studies Section? And can you also talk about your role as acting chief?

LB: Well, it was a section that I took over from Bob Hoover when he became a branch chief. It was his old section. And it was one of the original sections in the, what was then the predecessor to the division. And at that point in time, it had a focus on lots of, clarifying lots of environmental factors as they related to the etiology of different cancers. But I think under my leadership, we developed more of a focus on the reproductive and hormonal cancers. Which is why we subsequently decided to change the name. Initially it was appropriate for it to be called the Environmental Studies Section because it was a lot of environmental factors as we think of environmental factors that were being studied. But it changed over time.

HWT: So my understanding is that the focus on environmental factors and the link with cancer really began in the 1970s. Is that correct?

LB: Probably, yeah, I think that's correct. Because when I first came to NCI, they had just developed the cancer atlas. And they were using that as the primary means of deriving etiologic leads. And that led to a focus on a lot of environmental factors, like shipbuilding in Maine and its relationship to lung cancer. And mines in Montana, and things like that.

HWT: So can you focus a little bit more on the evolution? I know that in 1996, you became chief of the Environmental Epidemiology Branch at NCI which then, as you mentioned, was later renamed the Hormonal and Reproductive Epidemiology Branch or HREB. But that's a significant period of time, 12 years. So can you talk about your evolution there, and also the evolution of the branches?

LB: Well, I think my focus during those early years of being a section chief was on recruitment and trying to recruit good people who could focus on the cancers that I wanted to see become the focus of our section, and then our subsequent branches' research activities. So, when I came back from Oxford, I knew that I wanted to see more research on cervical cancer. And I was fortunate enough to be able to recruit some very good people to lead our research activities on cervical cancer. Specifically, Mark Schiffman and Allan Hildesheim. And this has grown into a huge area of research in DCEG.

And then I was able to recruit some good people for breast cancer, Montserrat Garcia Closas, some people to work on lesser-studied hormonal cancers. Like liver cancer. I was able to recruit Katherine McGlynn. And so, my focus during those early years was just to identify good people and to develop our research program on cancers that I wanted to become the focus of our research in the section and then branch.

HWT: I was going to ask you about your initial goals, but you've answered that question. But then how did those evolve over time? Because then you did hire those people and have that in place, and they were focusing on those particular cancers. So, what became the priorities, or how did everything evolve for you in terms of your own goals?

LB: Well, a lot of what transpired, really, was the brain power of the people that I recruited. They would have ideas. We would float the ideas in different section and branch meetings. We would try to identify resources for them. We'd talk about the best ways to tackle the studies. And it just kind of grew organically.

Epidemiology is a very collaborative field. And so, I also tried to emphasize good collaborative skills among my people. We had a lot of studies that involved extensive teamwork, so that was also very important to try to develop that good teamwork approaches.

HWT: And as a leader, how did you go about developing teamwork and encouraging collaboration?

LB: Trying to put people together who I thought could work well together. And trying to separate those people who didn't seem to work well together. And it wasn't always a success story. We did have some friction within the section and branch. Because there were some very intelligent people who were not the easiest to work with. But just trying to pair up people who could work well together.

HWT: And then just building on the idea of collaboration a little and work inside of NCI, but also outside, because you were made president of the Society of the Epidemiologic Research in 1990. For example, there were many roles that you have played. But that one in particular intrigued me. Can you describe your goals and accomplishments in that role? And I'm also wondering what other positions outside of NCI have been most meaningful to you. It could be the editorial roles or anything else.

LB: So I think when I was president of SER, I made it a mandate to try to focus on how we could improve field studies. Because that was really my passion. And at that point in time, we were beginning to experience a challenge in epidemiologic studies where we were starting to see decreasing response rates. And this kind of went along with people being bombarded with robocalls. It became harder and harder to get good response rates. And it was also an era where we were beginning to increase our efforts to collect biologic samples. And that was even more challenging. So when we put together a poor response rate to an interview with a poor response rate to the collection of biologic samples, we were really challenged in terms of the representativeness of the material that we were dealing with. And so my mandate, I think, if I had any during my time as president was to try to focus on how we could improve our field studies.

HWT: And what about other roles? Whether editorial or any other leadership positions outside of NCI over time that you want to talk about?

LB: Yeah. I enjoyed my work on various editorial, as an editor on various journals. Particularly my role as a senior editor for *Cancer Epidemiology Biomarkers & Prevention*. I have always loved to write. And I appreciate well-written articles. So it was a lot of fun to have some influence over the types of articles that were being accepted and to try to enhance their quality.

HWT: So then, as I mentioned before, in 1996 you became chief of the Environmental Epidemiology Branch and it became HREB. Is there anything else that you want to mention between 1984 and 1996 in terms of what you were doing, how you grew the branch, the people you were hiring, the work that you were doing?

LB: Well, I guess the most significant thing that happened during that period of time was that I had a child. And I think that that instilled in me a softer approach to leadership. If I could do things over again, I probably would have more empathy toward working mothers. It took me a long time to get to the point where I was a mother. And I didn't appreciate how hard it is to combine motherhood with a career.

HWT: That is an ongoing topic. Do you want to talk about, and it's fine either way, anything specific there in terms of your own working style? Or you had mentioned, I think, Bob Hoover, who was very supportive of you. Was that still a factor after you had your child? Bob Hoover and his support of what you needed to do as a mother? A working mother?

LB: Definitely. Definitely. He continued to be supportive. And I tried to follow suit, but I don't think I was as successful as Bob was.

HWT: So, you were in that role, correct me if I'm wrong, from 1996 to 2016. So, 20 years. Is that correct?

LB: That sounds correct. Yes.

HWT: Okay. So can you talk about, first of all, again, in broad brush strokes, over that 20 years, your initial goals and what you set out to accomplish and how everything continued to evolve for you.

LB: Well, during that time, we saw a tremendous growth in the division. And we saw a lot of technological changes, including more of a focus on genomics. So that was a major change that transpired during that time. We saw less opportunities for doing field studies and more challenges associated with doing field studies. So it kind of shifted over time from most of us being involved in conducting field studies to lesser and lesser people doing the field studies and more of an emphasis on trying to maximize the use of samples that had been collected in previous field studies.

HWT: Can you take a moment to explain why field studies became more challenging to do?

LB: Funding, for one thing. They became much more expensive. Response rates. I think those were the two issues. But then also, a lot of people became much more interested in doing the genomic analyses and less interested in being out in the field.

HWT: That's a real shift.

LB: I was not one of those. I still always had a passion for doing the field studies.

HWT: I wanted to ask you about technological advances and how they changed the field. Obviously, you've mentioned a very big one. I noticed in just 2015 you co-published an article in *Nature Genetics* which stated genome-wide association analysis of more than 120,000 individuals identifies 15 new susceptibility loci for breast cancer. So, just incredible the kind of statistical analysis. Can you elaborate on that a little bit? Was this technology-driven, or a way to analyze data, for example.

LB: Well, I think it was both. But what I want to clarify is that I was one of many, many co-authors on that article. I certainly was not responsible for it. My contribution was primarily in providing samples that could be used for the genomic analyses. And others really took the lead in analyzing the data. So. And that is definitely not my forte, either, the genomic analyses or the statistical analyses that are involved.

HWT: What about other technological advances? Are there others that you would like to mention? I mean, we talked about the 1970s, we didn't even have computers yet. And we've talked about genomics. Anything else you want to talk about in terms of influences on the field?

LB: Well, one of the big influences was a laboratory that we established to help us do hormonal analyses. Because so many of our studies wanted to measure with accuracy the effects of various hormones like estrogens and testosterone. And so, we partnered with people on campus and used some high through-put techniques which could accurately give us measures of a variety of different metabolites. And so that really opened up a lot of avenues for research in the branch and other branches as well.

HWT: When was that and who did you partner with?

LB: The person who developed the technique was Xia Xu. And he really developed some incredible techniques for allowing us to evaluate metabolites for a number of different hormones. And we used those techniques extensively, not only for what you think of classic hormonally related cancers, but also for cancers like liver cancer and pancreatic cancer. They've been used extensively by people in the division.

HWT: And again, when did that all begin, that kind of focus? When was the lab created?

LB: Probably it's been around for 20 years, I would guess.

HWT: And then of course in 2016 you were named DCEG's first scientific advisor for international activities. Can you talk about that position, especially in light of your international experience?

LB: Well, I only was in that position for a year's time before I retired. As I said, there was less and less of an emphasis on field studies. So I was involved in advising on some international studies. But there became less of a need for somebody to advise on international studies, as I saw it. Which was one of the reasons that I decided to retire.

HWT: What do you think the field loses with less emphasis on field studies?

LB: Well, I think at some point in time, they're going to run out of samples. And they're going to need to replenish those samples. And of course, you want to collect samples from an unbiased population. And so, you do require the tools to set up good field approaches where there's representativeness. And I think also the lack of field studies crimps our style in terms of looking at the role of environmental factors, which I believe are still very, very important in terms of cancer etiology.

HWT: So, tell us a little bit more about your international work, since we're on the topic. We've talked about Latin America, but I've read that you also worked in West Africa, in China, of course throughout the United States. What is important to know, and why are international cohort efforts important to NCI and to scientific discovery more generally?

LB: Well, I think there are several reasons for doing international studies. One is you can take advantage of unusual cancer rates that occur in different countries. You can also look at some unusual exposures. It's almost always less expensive to do studies in those countries, and you tend to get higher response rates. And there are also a number of unique issues that need to be looked at through international studies. Like for instance, the study of breast cancer that I did in Ghana was stimulated by the fact that even though breast cancer is not of exceedingly high incidence in West Africa, many of the women present with advanced cancers that are not treatable. And so what we wanted to find out in the study that we launched was why the women are delaying coming in for diagnosis. What are some of the factors that are leading to their rates of cancer? And that included not only environmental factors but also genetic factors. And how could we change some of the behaviors to lead to earlier diagnoses that were more amenable to treatment?

HWT: Can you talk about your effort to change behaviors?

LB: Well, I worked with some very good people in Ghana. And their efforts really are on trying to increase knowledge. The lack of knowledge about breast cancer in Africa is pretty abysmal. And so trying to educate women as to why it's important to get yearly screens and why it's important to come to a doctor, to an established medical center, when you see any adverse signs, rather than going to traditional healers, which tend just to delay the diagnosis even further. So it's really, education is a primary component of how you can prevent cancer.

HWT: And on the back end, so to speak, can you elaborate a little bit on how you became involved with that work in Ghana with the local agencies to begin with? Did they approach the NIH? Or was there an ongoing relationship?

LB: Yeah. One of my staff members was actually doing a study of prostate cancer in Ghana. And I always thought that it would make sense to also be doing a study of breast cancer. And we were approached by two people from Ghana when they were visiting to talk about I believe the prostate cancer study in Ghana. So, I broached the idea of whether it would be possible to expand that study to also include breast cancer. As it turned out, there were different players. And so, it wasn't as easy as just expanding that study. We really needed to work with different partners. But we were able to work in the same hospital and we could use some of the same administrative staff. And we learned a lot from our prostate cancer study in terms of transport of specimens from Ghana to the States. Which was always a challenge with international studies is trying to figure out how to get the specimens back to the States in pristine condition when they could be valuable to us.

HWT: And then I want to re-ask that question, the sort of general question about why are international cohort efforts important to NCI and to scientific discovery more generally?

LB: Well, when you say "cohort," in epidemiology when we say cohort studies, that's a very distinct type of approach where you're starting from an exposure and then following the people over time until they develop cancer. So those are considered the probably the best types of studies to conduct. But they're quite difficult to do in developing countries because you don't have an adequate infrastructure to follow the people. So, most of the studies that I was involved with were case control studies where you are taking people with a group of cancers and a comparison group, and then retrospectively trying to identify exposures that might have led to the development of cancer.

So there are kind of a couple of issues mixed in here. One is why are cohort studies important? Because they're the best type of study. But in terms of international work, I think it's just the diversity of cancer trends, exposures, biologic samples. And they do tend to be more cost-effective to do studies internationally than in the States.

HWT: Is there anything you want to mention about your work in China before we move on?

LB: Well, my work in China was back in the early 1980s. And I was in China in 1982, 1984, 1986 and 1988. And over that time period, I saw a major change in how the Chinese wanted to approach doing studies with us. Initially, it was very rewarding. But I found over those six years that I was involved that things changed, and it became much more challenging to work with the Chinese. And that's why I started working in other areas.

HWT: What were the six years that you were working there?

LB: From 1982 to 1988.

HWT: And you saw a real change during that time in the 1980s. Okay. So it sounds like it's very specific to the study that you're doing, of course. But one question I had was why you chose the places that you chose. Again, so China, what was the relationship there? Were you asked to come in and work together?

LB: Well, the division already had some studies that were established in China. In Linxian, which was an effort to look at risk factors for esophageal cancer. And I was invited on that trip. And my first study that I launched in China was on choriocarcinoma, which is a pregnancy-related cancer. And then I also was involved with a study of penile cancer. And we were told that we should launch a study of penile cancer because it was quite common. Well, it turned out not to be common. And we put a lot of effort into that study. It was probably my least successful study. So, we put a lot of effort into collecting biologic samples. We had a lot of problems with the quality of the samples that were collected, and a lot of problems with the interview information that we obtained. And again, I became a little bit less than enthusiastic about working further in China. But the division does have a number of very successful studies in China. So I think it really depends on who your partners are and where you're working. But I just had fairly bad luck in China.

HWT: Who were your partners? Or do you want to mention that now?

LB: I can't even really remember their names, and I don't think it would be appropriate to mention their names.

HWT: And so you found out something quite unexpected. I sometimes like to ask if people have, we talk a lot about successes when we talk about careers. But setbacks are also really interesting. Would you consider this a setback? And if so, what did you learn from that?

LB: Yeah, I think that you need to go into these studies with a certain amount of skepticism. And this wasn't the first instance where we were told that something was very common and that we should study it. And then once we launched the study, all of the cases disappeared. It used to be a big joke that we would cure the cancer once we started to study it. But you need to do your homework. And that was a lesson, a hard lesson learned.

HWT: What would you have done differently?

LB: I wouldn't have done the study.

HWT: Of course. But in terms of doing your homework to know that you wouldn't have done the study, was there something that you could have done?

LB: You know, in retrospect, I'm not sure there was. There was such a language barrier and a cultural barrier. And that's one of the challenges of working internationally is dealing with those things. It's very good if you have a partner that you trust. And identifying the right partners is critical to your success. So I think I learned from that lesson to be very cautious in the partners that I sought out for future international studies. And fortunately, my subsequent studies didn't have those problems because I had good partners.

HWT: That's a very important lesson learned, it sounds like. So can you talk a little bit more broadly now just over the course of your career, I know it's broad, but how your responsibilities changed and how you met those responsibilities. The whole time, you know, you're basically in leadership positions.

LB: Yeah, you know, I talked earlier about recruitment and the importance of recruiting good people. So I think the way my career changed was once I was able to recruit good people and I had faith that they were competent to do their work was to let them have more independence and to trust them that they were doing the right thing. Not to continually be looking over their shoulder. And fortunately, I was able to recruit some really good people and they made the field what it is. They made the branch what it is or was.

HWT: We talked earlier about mentoring. Can you describe the role mentors play in science and epidemiology more specifically? And also, your own role as a mentor.

LB: Well, I think it should be obvious that I had some excellent mentors over my career. And they were critical to educating me and allowing me the independence that I needed, whether it was independence to be successful, or independence to learn from my mistakes. So, I'm grateful to the many wonderful mentors that I had over my career. Looking back on my own mentoring style, I think I probably was a little harsher than I needed to be. And if I had it to do over again, I probably would take a softer approach. But it was kind of how I was raised, and you know, you learn things in hindsight.

HWT: I wanted to know also what you feel are the awards and honors you have received that have been the most meaningful to you.

LB: Well, I think two that I really appreciate having received are from my, the two academic institutions. One was from the University of North Carolina at Chapel Hill where I got the Tyroler Alumni Award. And then I also was recently inducted into Hopkins Society of Scholars. So, I was very honored by both of those awards. I also was honored by the American College of Epidemiology Lilienfeld Award, which meant something to me because Abe Lilienfeld was the instructor who I first took an epidemiology class from at Hopkins when I was there. And then I think the final one that really meant something to me, a lot to me, was the career award that I received from the Society for Epidemiologic Research. Because that society was one that I really identified with, and I was an active participant in for years.

HWT: And why do you say that you really identified with it?

LB: I just thought that it was an important organization for bringing epidemiologists together. And I thought that it was a very well-run society. A lot of interesting talks at the meetings. They had a lot of interesting mandates. So for me, it was a very valuable support organization over the years that I was associated with it.

HWT: I wanted to ask you how you knew it was the right time to retire. Of course, you've already mentioned a shift. Is there anything that you would like to add?

LB: Well, I'd been a branch chief for a long period of time. And with our new director, he decided he wanted to merge my branch with another branch, with the Nutritional Epidemiology Branch. And that was turned into the Metabolic Epidemiology Branch. And they identified new leadership for that branch, that combined branch. And then when I was appointed as the scientific advisor for international activities, it was, it sounded good on paper. But it was not the position that I thought it was going to be. And it just seemed like there wasn't a lot of area for growth. And the other factor was that my husband had already moved to Sedona. And trying to make the commute across country was challenging.

HWT: I understand. What advice would you give to encourage young scientists and epidemiologists to continue to pursue their goals? Even to seek out necessary resources, even despite setbacks or barriers that they might face?

LB: Well, I think it's important to seek out good mentors. And I say mentors. I always encouraged my people to have more than one mentor, because you learn from every person that you work with. And you get different points of view. I think it's important that people listen to their mentors. I saw with a younger generation of epidemiologists that a lot of them seemed to think they knew everything and didn't really want to put in a lot of hard work. So I would just encourage people to identify good mentors, to work really hard, to listen to the mentors, and to be appreciative for the advice that they get from their mentors.

HWT: Just a side question. Was that some sort of shift that you witnessed? This sort of attitude about knowing everything. Is that new? Or what do you, how do you account for that?

LB: Yeah, I think that a lot of people, a lot of the younger investigators expect things to be handed to them. And they don't appreciate all of the hard work that's gone into what they're being given. And I'm sounding like an old curmudgeon. But you need to appreciate that there are generations that have gone before you, and to appreciate what is being provided. And that wasn't always the case with some of the younger investigators that I worked with, where they didn't want to put in the hard work, or they didn't want to acknowledge the people whose shoulders they were standing on.

HWT: I wonder why. It seems odd.

LB: I think it's a generational thing.

HWT: Why did you decide to spend your career at the NIH?

LB: It really was just happenstance. I didn't set out to decide to be there for a long period of time. I didn't think that I would end up being there for 40 years. But it just was a tremendously fun place to be. There were so many smart people that I could interact with. The resources were great. You know, we never had to worry about getting funding if it was a good idea. And I also liked it being a federal organization. That gave it some clout in terms of doing the international work that I wanted to do. So, it was the perfect combination of things for me.

HWT: So what do you see as the future of research in cancer epidemiology at the DCEG?

LB: You know, I haven't followed very well what's gone on in the five years that I've been gone. You know, I am worried that there's such an emphasis on genomic research, and I hope that that's not going to overpower an emphasis on defining the role of environmental factors, because I do feel that that's exceedingly important to continue that emphasis. You know, there are distinct challenges in terms of doing field studies, including costs and response rates. So, I'm worried, a little bit worried about what the future is in terms of doing the types of studies that I did. And I'm not saying that that's how things should be done now. But I do see a need for future field studies of some sort, just to continue collecting biologic specimens and looking at environmental factors. And there not being a sole focus on doing the laboratory research, which I don't really consider epidemiology.

HWT: Can you take a moment to talk about health disparities and equity, which is a lot in the news today. Including in terms of environmental justice, which you know is related in terms of environmental factors, say. Is there anything that you see happening now or in your time before you retired, or for the future, with regard to health equity and disparities in that you would like to see?

LB: Well, I think we still have a dearth of studies that are focusing on minorities. And that is recognized as a major challenge. And there are a lot of mandates to try to get more minorities into studies of all sorts, including clinical trials. So, it's recognized now as a problem. But there are still challenges in overcoming those problems. And one of the ways that you can overcome that challenge is to do international studies. So. And that was, one of the advantages of working in West Africa was that a lot of what we learned there might be applicable to minority women here in the States.

HWT: Fascinating. And one more question regarding the United States, because we did focus a lot on your international work. Are there studies you want to talk about focused on the United States that you think are important here?

LB: Studies that I did? Well, two of the studies that were probably the most challenging for me that I conducted in the United States were a follow-up study of infertile women. And then another study was a follow-up study of women with breast implants. Both of those were exceedingly challenging studies to conduct. And I'm not suggesting that we repeat the experience with breast implants. But I think that there still is a need for further clarifying the long-term effects of fertility medications and fertility treatments.

HWT: When did you conduct those studies, by the way?

LB: Those were probably in the 1990s.

HWT: And what made them so challenging?

LB: Sensitivity issues. Threats of lawsuits. Response rates. You know, they were both exceedingly sensitive topics. And the infertility one, I didn't really appreciate the sensitivities till I was in the thick of it. But now in retrospect it's quite obvious why women would be so sensitive. But our goal was to try to clarify the long-term effects of fertility treatments that they had received. But instead, a lot of the women felt like we were rubbing salt in the wound. Particularly the women who had not been successful in getting pregnant. And those were both fairly sizable studies. You know, in the thousands. I think one was 12,000 women and the other one was similar size. So, they were just challenging in terms of keeping track of people and identifying events of interest.

HWT: Fascinating. Is there anything that we haven't talked about that you would like to add in terms of of course your own work specifically, but also the NCI more generally?

LB: Not that I can think of. You know, as far as I'm concerned, it was a wonderful place to work. It's changed a lot over the years. But I can only speak to the years that I was there. It was such a supportive environment and tremendous resources. And I wouldn't give it up for anything. It's amazing how the 40 years flew by.

HWT: Indeed. Okay, well I thank you for your time. I really appreciate it. It's been a pleasure.

LB: It's been a pleasure as well. Thank you.

[End Interview.]