Dr. Philip Chen

This is the sixth interview in a series on the career of Dr. Philip Chen. It was conducted on March 28, 2001, in his office on the first floor of Building 1, National Institutes of Health, Bethesda, Maryland. The Interviewer is Dr. Buhm Soon Park.

Park: Thank you very much again.

Today I'd like to start our discussion about great intellectual challenges here at NIH during the 1980s and 1990s. Two things: one is AIDS research and the other one is the Human Genome Project, both of which NIH took a great leadership from the first phases.

And first I'd like to talk about AIDS research and, after the outbreak of AIDS, how NIH responded to this issue, especially intramural research. At this point I'm not very much interested in the outside research, but intramural research and especially the management of resources to focus on the AIDS research. Was there any great change or shift of resources towards that research?

Chen: Well, I don't have detailed information on what was done within each of the institutes, but I know that there did come to pass a separate AIDS budget, which now, you know, the NIH budget is shown as non-AIDS and then AIDS, so there's two parts to the NIH budget, and the Office of AIDS Research coordinates a lot of the activities that are in the AIDS part of the budget.

Well, we do know that there was a lot of intramural research activity devoted to AIDS, such as the fact that the intramural program was in a position to be able to rapidly modify some of its research directions to work on the AIDS problem. For example, Robert Gallo had long been doing research on retroviruses, viruses that had reverse transcriptase and could take information that was in RNA viruses and transcribe it back into DNA. And he had discovered HTLV-1, human lymphotrophic [sp.] virus, T-cell lymphotrophic [sp.] virus, and so he was in a good position to be able to do research on the causative agent of AIDS, which I think he at first called HTLV-3, and it was later renamed HIV. But there was sort of some competition or race with Montagnier [sp.] and his researchers in France. So there finally came to be recognized as kind of a joint discovery, but I don't think that the AIDS virus would have been discovered as rapidly had not the NIH been able to devote considerable resources to this project fairly early on by people that were already working in a related field.

Now, the other thing that was a great contribution was the fact that the blood supply became protected because an AIDS test kit was developed, and that was patented by Gallo and some of his coworkers, and the test kit was patented and licensed and brings in quite a bit of royalties to the federal government.

Park: Dr. Gallo was at NCI?

Chen: He was at NCI. That's right.

Park: And was there any contributions from NIAID in the early stages, competing

with or collaborating with NCI?

Chen: Well, I think NIAID contributed a lot in the clinical observations, clinical studies relating to AIDS, because there were some early patients that had immunodeficiencies that had been admitted into the Clinical Center because of the NIAID interest in immune diseases. And I know that Cliff Lane [sp.] was one of the doctors working there that saw this patient that had a very strange, you know, very low T-cell, a certain type of T-cell count, and he had a twin brother who... And so they were able to study a person with what's now known as AIDS and his twin brother and find out something about the natural history of the fall in CD4 cells and how they could or couldn't be revived by certain types of treatment or transfusions. So, I think from the clinical standpoint, NIAID was a very active participant early on.

Now, it turned out that since AIDS patients also have Kaposi's sarcoma, that the Cancer Institute has a special interest in that malignancy.

And the other great contribution that was made by the intramural NIH program is the fact that the first FDA-approved drug for treating AIDS, called AZT, was--the safety and efficacy of that was demonstrated by Sam Broder and his colleagues in the National Cancer Institute.

Park: Oh, I see. And so the Office of AIDS Research is coordinating the research within the institute, or is it that this is above...

Chen: No. That's an office that's in the Office of the Director here, and that mainly coordinates extramural support. I'm not sure to what extent they

get involved in intramural resources. Maybe they maintain a cognizance of what's going on, but they may not disburse funds between institutes.

Park: I do understand that each institute gets its appropriation from the Congress individually.

Chen: Yes.

Park: But I'm wondering, in the planning stage, was there any competition for the resources? For example, one institute needs more research and space and personnel and money to devote on AIDS research, and at the same time similar research is being done in another institute. Was there any coordination of the resources on an institutional level?

Chen: Well, I think it was probably done by the Office of the Director, the director of the NIH, and maybe through the Office of AIDS Research. Our own Office of Intramural Research I don't think was involved too much in it. At least I wasn't.

Park: What about the Human Genome Project? In the beginning stages, there was no intramural program in the HGP, but these days NIH has a small intramural program. But I'm wondering if, although that institute has its own intramural program at the beginning stages, was there any contribution from other researchers, scientists, in the intramural program? Obviously, the person who established Celera Company...

Chen: Celera?

Park: Yeah. I forgot the name.

Chen: Craig Venter [sp.].

Park: Yeah, Craig Venter [sp.]. Craig Venter [sp.] was a researcher at NIH, and NIH was certainly engaged in sequencing DNA from the early stages.

Chen: Well, Craig Venter [sp.] was an intramural scientist in the Neurology Institute, NINDS, and as I remember, he was working on these STS's, STS tag, you know, sequence tag.

Park: Right. _____.

Chen: Let's see. I forget what STS stands for... Well, you'll have to look up what that stands for. But it sort of expressed ESTs, expressed sequence tags.

Now, the genome idea really originated mainly, not at NIH, but through the Department of Energy, as I recall. And there was a fellow named Charles Delissi [sp.] who spent some time just down the hall on this floor. He was on detail, I think, from the Department of Energy or from some academic institution. So some of the conceptual framework for the Genome Project came from the outside people.

I think that once it was decided to collaborate with the Department of Energy, so NIH became a partner with the Los Alamos National Laboratory, and so the NIH and the Department of Energy became partners, then the program gradually grew. And you might say it started out really as an extramural program. And Dr. Gottesman [sp.], who's the head of our office, deputy director of intramural research, actually was one of the early acting directors of the Genome Center, later acting scientific director of the Genome Center, before he came to Building 1.

Now, I think the intramural program grew rather slowly, and a few people from other intramural programs at NIH joined. But the large impetus really came from outside, and Francis Collins [sp.] and Jeff Trent [sp.], they brought a lot of people from Michigan when they came, and then other people were recruited. And as I understand it now, the Genome Institute has close to 500 people in it, so it's a substantial sized institute, and, of course, a lot of space was created for them. Building 49 accommodated many of the Genome Institute researchers.

Park: Besides the Human Genome Project, were there any big issues and concerns or problems in the 1990s, especially the things that you and your office were involved in?

Chen: Well, towards the end of the '80s and early '90s, we were very much involved in getting the Technology Transfer Office up and running. The Federal Technology Transfer Act of 1986 was the impetus for this. The biotechnology industry in the United States was, the industries were growing and policies had to be developed on how to deal with these industries, how our scientists would relate to them, how CRADAs [sp.] might be negotiated between NIH scientists and industry scientists. So the culture of biomedical research was changing during this period towards greater and greater emphasis on commercialization and exploitation of inventions and discoveries made in the laboratories, application to therapeutic modalities, and instrumentation and so on.

Then, as you mentioned, there's great growth in the human genome

effort, which has really mushroomed and is sort of a dominating thing today. We have the genomics, proteomics, bioinformatics, computerization of miniaturization, greater application of imaging and nanotechnology. Now we've got a new Institute of Bioimaging and Bioengineering. So there's more emphasis now on the physical sciences again. It's kind of gone through cycles over the years.

But I think the biomedical research today is different from what it was 10, 20, 30 years ago, and when Dr. Shannon was a renal physiologist, and that was a very big thing back then, well, today that's a very minor kind of science.

Park: Do you think that, then, the biomedical research going towards big science, from a small laboratory setting to the big instrument-dependent research and many researchers involved around instrument...

Chen: Well, I think there are some aspects of big science now in biomedicine. But, on the other hand, it's not all that, and there's still a place for the smaller research units because they can draw upon technologies that are available to small groups. So not everybody has to be part of or supported by huge, big science. So I think right now there's opportunities for a mix of both big science and medium science and small science.

Park: I see. Was there any discussion about the balance of scientific disciplines being pursued at NIH, like in the university, each department represents one discipline and fields of research? And it's going on. But here, the scientific discipline means little as compared in the university. Is that a

correct understanding?

Chen: We've had to distinguish in our budgets and in talking to people between basic science, clinical science, and research, between research and development, and between different disciplines or categories, so fairly early on, when NIGMS was created, there was within NIGMS support for certain areas of science, like there was a biomedical engineering program, there was a radiological, radiology program, there was a clinical sciences program, there was a pharmacology program, there was a genetics program. So in that sense, NIGMS did have an orientation towards certain departments in a medical school or university.

Now, with time, I think some of this is becoming blurred or integrated, so that now we talk about neuroscience rather than about neuroanatomy and neuropathology and neurology and so on. You kind of group them together. Or you talk about the behavioral and social sciences. Well, we don't have departments at the NIH like in a medical school because there are things like biochemistry going on in many institutes. So the way that we've kind of hoped to promote or bring together scientists that think similarly or work in similar disciplines is to have what we call special interest groups, and now there are about 90 such special interest groups. Some of them are what we call the major interest group, like immunology or clinical science or cell biology, but there are very focused groups that are like the Oxygen Club or some group, Nitric Oxide Club, or a group working on certain kinds of, maybe a mouse club or transgenic mouse club. I can't

think of the names of all of them, but there are these what you might call faculty aggregations.

Park: Is there, is the Office of the Director monitoring that kind of activities?

Chen: Well, we keep a list of all these. These groups are kind of self-generated, and they develop their own agenda, they have their own meetings. We do solicit from them nominations for things like Wednesday afternoon lectures. Sometimes when we're recruiting, we'll try to get names of, you know, capable names of people to be on search committees, or they can also--they have the privilege of nominating Fogarty scholars from the new Fogarty Scholars Program. So they do have certain privileges and an ability to make themselves heard. But they don't have great power in and of themselves. You know, they don't have a great budget. There's no budget for the immunology interest group.

Park: One of the strengths of NIH, I was told, is that the collaboration across the institutes can happen quite easily, and the people here, the scientists here, are feeling some kind of obligation to respond to some kind of questions raised from others, so that they start collaborative work quite easily than the universities.

Chen: Yeah. Well, for one thing, each independent investigator does have resources that they could devote. If they want to collaborate, they can use some of their own resources. But there are also carrots that are used as inducements to allow collaboration. So, certain scientific directors have said, "I'm setting aside a pot of money. If you guys will collaborate, I'll

give you some extra money above and beyond the budgets that you otherwise would have."

One thing I should mention, though, about the AIDS research that did stimulate work on things like an AIDS therapy, and that is what we call the IATAPs. I think it's called the Inter-Institute AIDS Anti-Viral Program. So these are special monies that are competed for by scientists in the institutes, and they can apply for this, so that that money that comes from a central pool that will stimulate additional AIDS research.

Park: Is that the money in the director's discretionary fund?

Chen: I think so, yeah. You might look into exactly where it came from. It might have been pooled together from the different institutes and put into a pool, but it's something that's above and beyond what scientists would have gotten normally.

Park: I see. One day I came across an interesting article in *The Catalyst*, featuring, describing some complaints in the mid-1990s made by so-called medicinal chemists about the kind of dominance of microbiology studies here and the weakening support of the medicinal chemistry. I understand that medicinal chemistry is organic chemistry for medical purposes. And the American Chemical Society's president wrote a letter and some kind of correspondence between the NIH and ACS. Could you comment on that?

Chen: Well, I think periodically, the NIH does get complaints from various people, various organizations, various disciplines, feeling that they're not as well supported as they should be. And certainly basic chemistry, organic

chemistry, synthetic organic chemistry, medicinal chemistry, might have been a bigger fraction of the NIH at one time, and it was prominent. At one time, there was a lot of work on opiates or synthetic analgesics, synthetic morphine-type compounds. Carbohydrate chemistry was well supported. In fact, Lyndon Small was called the professor of chemistry at NIH, one of the few professors we ever had. But over the years, as emphasis goes into pharmacology or goes into genetics or into other fields, then maybe the chemists felt that they were not being fully exploited or supported, and so periodically, a group like the chemists will even prepare their own report showing how they could make greater contributions to biomedical science, why the NIH should give them greater attention, and so on.

When this happens, the NIH listens, we let them present their case, we try to get them to discuss their concerns with different groups at the NIH, and sometimes this results in increased activity. You know, maybe there are certain ideas that they present that should be exploited and that we can exploit that can attract more support from the institutes. And I think that's what happened in this case, that we tried to get more seminars given here by chemists and we tried to develop more collaborations, and maybe some more money was actually put into the grants area for chemistry. I don't know. Did you see the report that they prepared about chemistry and the great opportunities for chemistry?

Park: No.

Chen: I might be able to find the report here. That's a book that tells about

opportunities. Let me just see what _____. This came out in 1996, and the cover letter came from Ronald Breslow [sp.], president of the American Chemical Society, and Paul Anderson, president-elect of the American Chemical Society. And this book was a committee to survey opportunities in the chemical sciences, so a lot of prominent chemists told about ways in which chemistry could contribute to the human good. So we took this seriously and this has resulted in greater linkages, you might say, between NIH scientists and chemists, wherever they are.

But the chemists here do get... There are some prominent chemists here. In fact, the most cited chemist in the world is actually a nuclear magnetic resonance person, but that's Ed Bax [sp.] in the NIDDK, who's said to be the most highly cited chemist in the world.

Park: Besides chemistry, were there any askings [sic] or complaints from the physics part, biophysics or...

Chen: Well, I think the physicists maybe are more represented now in the BECON, the Biomedical Engineering Consortium of the bioengineering area. I don't think theoretical physicists so much have approached NIH, although we have had some theoretical physicists and physical scientists in the intramural program. Some of them have been fairly prominent in the past. But that's not as great a pressure as chemistry.

Park: Now, the first gene therapy was first developed at NIH, French Anderson [sp.] and other people.

Chen: Yup. I'll just get you a book on that. Let's see if I can find... I have a

notebook about the French Anderson [sp.] gene therapy stuff here somewhere. I don't know if I can find it. There was a notebook that I got from French Anderson [sp.].

Park: His research notebook?

Chen: No. It's a book about the first gene therapy approvals.

Park: Oh, I see.

Chen: ...someone who was one of the very early proponents of gene therapy, and he did get some approvals to do some experiments here.

Park: And why did he leave? Do you know?

Chen: Well, I think he probably good a very good offer in the University of Southern California, and, also, his wife was a surgeon at Children's Hospital, and I think she got a very good job offer out there, which was better than the job she had here. So it was a combined decision probably, both husband and wife.

Park: I see. And after his departure, the research on gene therapy was still going on at NIH, or...

Chen: Well, I don't think there's so much going on now. I can't tell you exactly who's doing what. But several of the people that had been doing it have left, and it hasn't really worked out in as promising a way as people thought initially. So it's probably being pursued in many places now.

Park: From outsider's perspective, NIH is taking a leadership in the biomedical research, not only in the federal laboratories, but also in the industry and academia, and the current strength of American biotech industry is in some

part credited to NIH and its early support for that thing. Could you comment on that a little more, how, as you mentioned, the technology transfer was an issue at NIH in trying to help the research being applied to the industrial application? And could you say a little bit more about the NIH's role in that area?

Chen: Well, I think NIH's main role was early; that is, it supported a lot of the basic research before biotechnology became a word. We supported all these extramural grants out in the universities that were supporting people that did work that became recombinant DNA. So once these early researchers got going and then saw the potential for industrial application, you could say that NIH research was the foundation that then the biotechnology industry was built on. Once things started going out there, though, and these companies raised private capital, venture capital, they're supporting a lot of their own research, so NIH support is not as important a factor today, and we're really not aimed at commercialization. Through CRADAs [sp.], we do participate in some of these activities, but I think we laid the foundation, but now that structure of the biotechnology industry is being fostered by private, outside monies.

Park: And some part of NIH grant goes to industry, Industrial Research Institute.

Chen: It's not been too many years ago that industry became eligible for grants. Before some date, I think, in the 1970s, we did not give grants to industry.

Park: That portion is big?

Chen: It's small.

Park: It's very small.

Chen: We still give contracts to industry, but a contract is money for a service or a supply. It's something we're buying. Whereas a grant is something that we give to aid in research, and we don't fully fund grant-supported research. There always has to be some contribution by the grantee himself or herself.

Park: So, for example, Merck or Genentech or other big companies have their own research laboratories.

Chen: Yeah.

Park: And they are not getting much money from NIH.

Chen: No, probably very little.

Park: And what about small business?

Chen: Okay. Small businesses might be getting some grants, yeah. Those are special types of grants that are intended for commercialization. So there, NIH could be a significant player in helping small businesses.

Park: But the policy of NIH is not get involved in commercialization too much.

Chen: Well, we do through licensing, but we don't go into partnerships, we don't own stock in companies. Many universities will own stock in a company, so they have a stake in what's going to happen, whereas the NIH would never own stock. We would only license for a royalty fee.

Park: And in comparison with the appropriation from the Congress, that royalty or the license fee a big part or a very small part?

Chen: A small part, yeah. It's the biggest recipient of royalty funds in the

government, but I think it's still only around $40 million or so.

Park: Forty million dollars.

Chen: Yeah. It's small compared to the NIH budget. We could never use it to replace money from Congress.

Park: And could you comment on specifically the work of this office and how this office grew from the '70s when you came here first, and the '80s and '90s, and what kind of jobs you had to deal with and how the personnel grew? You mentioned that before, but could you say that again a bit?

Chen: Yeah. When I first came here, we had about five or six people in the office. There was the deputy director for science and myself. We had another person, so there were three professionals and two secretaries. And we dealt with the semi-monthly meetings of the scientific directors and we handled personnel actions, visas, dealt with space. It was the usual interface between the intramural scientific directors and the Office of the Director at NIH.

Over the years, the office started to grow slowly in the sense that, when Dr. Stetten left and Dr. Goldberger [sp.] came, we might have added one or two people, and Goldberger [sp.] brought a person as his assistant. There were still three professionals. Later, the retiring scientific director of the Mental Health Institute came as a senior advisor, so you could say there were one, two, three, four professionals. And we did all the necessary attendance at meetings and service on committees and signing of papers, signing of outside work requests, and approval of foreign scientists,

appointments, all the papers dealing with commissioned officers, and so on.

I would say that it was really not until Drs. Varmus and Gottesman [sp.] came that the office started growing really rapidly.

The Office of Technology Transfer had come along back in the late '80s, so we did have to add some people for that.

Park: So it's kind of splitting from...

Chen: These were like additions to the office. And then there was an Office of Education that became part of our operation. That happened during Dr. Rawl's [sp.] tenure. So, gradually, there were pieces being grafted on, and so there was a little growth here, a little growth there. Once the Marx-Cassell [sp.] committee report was accepted and became implemented, then there was a consolidation and large growth in the office. The Office of Education became much larger, and we've added an Office of Graduate Partnerships. There was the Office of Loan Repayment and Scholarship that was added. There was...

Now, along the way, there had been a couple scientific attachments. One was the Protein Expression Laboratory, which was a group of intramural scientists that were going to synthesize proteins of interest to the AIDS and other programs. And then there was the Laboratory of Diagnostic Radiology Research, LDRR. Now, these operations, while they were under the deputy director for intramural research, in time were spun off. The Protein Expression Laboratory went to the NIAMS, and the Laboratory of Diagnostic Radiology Research went over to the Clinical

Center. So we've both grown and shrunk, but mainly grown. The Office of Tech Transfer now is 50 people or so. Then there's the Office of Animal Care and the Office of Human Subjects Research. So I don't say that... You know, like many organizations, we've grown at different rates over the years, but mainly it's accelerated in the last 10 years.

Park: Many scientists I've found here at NIH didn't call NIH as a federal agency. It's an institute. They insisted that it's an institute like a research institute on campus, which reflects that the less bureaucratization of the federal agency here at NIH. But do you think that in the 1990s the growing offices, the strengthening of managerial things, worked toward that direction or is kind of the increasing number of so-called mid-managers rather than direct contacts between scientists and the directors?

Chen: Well, there has been a change in the structure of institutes, so that the institute directors have become stronger figures as leaders, and the director of NIH has a larger orchestra today, I mean, the orchestra being his institute directors. There have been more and more institutes created. They've grown, become more complex. So I think managing the NIH today is a fairly, is an increasingly complex job, and there are all these forces that want to be heard. You know, they want more emphasis on AIDS research, more emphasis on this...

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Chen: ...not easy for one person, the director of NIH, really to conduct this orchestra with everybody playing a tune. So there may have to be some

restructuring of the administration of the NIH. In fact, Dr. Varmus himself has recently asked for this or called for it in an article he wrote that you may have seen, where he thinks that there should be fewer institutes or fewer groupings, maybe group the institutes together into a few super-institutes, and the director would orchestrate these few super-institutes and they in turn would administer their sub-components. So it's a changing environment.

And, of course, this happens in all the other government departments, too, you know. The Defense Department today is a lot different from what it used to be, the separate services and separate secretaries.

Park: One of the interesting arguments here is the argument of critical mass, and the people used to say that, well, we have to reach the critical mass to make it strong and make it effective and make it good in terms of communication and collaboration. And I heard that argument from time to time in the past. But the size of the critical mass is always dependent upon the personal ideas and political situations and the natural growth of the institute. But certainly NIH these days have advantages in terms of having a lot of scientists here, but I'm wondering whether, was there a critical- mass theory here or...

Chen: Well, critical mass can be different for different endeavors, so certainly if you have maybe a couple chemists working in isolation, they're not going to be able to be as productive as if you had a grouping of chemists all

helping each other. You know, you have physical chemists, organic chemists, and so on, analytical chemists. So when you talk about a critical mass, I think it depends on what it is that they're doing or trying to accomplish. We would certainly say that we do have critical masses for many things that we do, you know, plenty of cell biologists around, there's... We're adding people that we think are necessary to have a critical mass in *in vivo* imaging or in, let's say, positron emission tomography research or in development of an AIDS vaccine. So what each of these organizations tries to do is to achieve a critical mass in what they're trying to do, see. And at one time, people used to say, "Well, out at Frederick, there aren't enough scientists to be really happy and productive and to have a critical mass there," but if we add people from different institutes or add contractor staff, that critical mass does gather, and now people are happier. They feel that there's more interactions and they're able to have seminars that everyone can go to. They don't have to travel all the way to Bethesda to hear something interesting.

Park: And these days, NIH has its own momentum going into the direction, some direction. How do you think that the NIH directors can change or shape the direction of some areas? For example, Dr. Weingarten [sp.] left in 1989 and Dr. Healey [sp.] came in '91, and there was a little bit of a gap, and Dr. Healey [sp.] left earlier than she might have thought, and Dr. Varmus came in, and still we have an acting director, but it's still going on. So, I'm wondering whether the leadership change or the style or aim of the

leaders can have... Was there any limit or...

Chen: Well, I think there could be a very dramatic change if you get a good, strong NIH leader and that leader brings in strong support staff. So it's possible that the organization and direction of NIH, the quality, everything could change with the NIH director. On the other hand, if you have a weak NIH director or an acting NIH director that hangs on for a long time, it could be that things will not change much from the way they've been for some period of time. So I think that it really entirely depends on who is brought in as the NIH leader and, perhaps, what that individual is instructed by his or her higher-ups. You know, the secretary of HHS could have a great influence on what happens at NIH. If they say, "I'm going to hire you as NIH director, and I want you to do this," so, you know, they could improve the morale of NIH, they could diminish the morale of NIH. It all depends on who's there. It's like in any organization. Leadership is the key to success, to happiness, to productivity, to how people regard themselves as employees, who may be happy under such-and-such a leader and very unhappy under another one.

Park: And was there any particular reason that, between '89 and '91, there was only an acting director?

Chen: That's not in our control. See, that's where leadership from higher up influences that. If somebody, if there's a vacuum, if nobody downtown appoints someone, if they just leave an acting director here, usually the acting directors don't do much. They just let things go the way they've

been going. They don't make any marked changes. They don't make any big decisions. They could, but they don't.

Park: You have spent at NIH for more than 30 years, 35 or something like that?

Chen: Almost 37.

Park: Could you comment on your life at NIH?

Chen: Well, I've been pleased to have been here. I've enjoyed working here. I've had some very good supervisors and bosses. I enjoy working with the staff here and, in general, they're very dedicated and they feel that what they do can make a difference as well as being something enjoyable for them to do. It's like Dr. Stetten told me that he once had a lawyer friend or a lawyer neighbor, and they used to cut their hedges together, you know. They had a common hedge, and so they'd meet each other and kind of cut the hedge. And I think Stetten probably knew what the lawyer did for a living, but the lawyer didn't know what Dr. Stetten did, so Dr. Stetten was trying to explain. "What is it that you do, Dr. Stetten?" So he explained to the lawyer in great detail what it was he did. I'm not sure the lawyer really understood this. But he finally said, "And they pay you to do that?" So it may be that people that don't understand biomedical science, biomedical research, don't really know what we do. But we who are in it and supporting it enjoy what we do and, besides, we're getting paid to do it.

Park: Right, right. Well, it seems to me that you have spent so many years at NIH when the biomedical research really took off and NIH got a lot of credit for that, and your job is a tremendous contribution that I can _____.

And thank you very much _____.

Chen: You're very welcome. Thank you.

Park: Thank you.

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