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AN INTERVIEW WITH DR. ANDREW KANG

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KURT PIEHLER: This begins an interview with Dr. … Andrew H. Kang on August 3, 2002, in Memphis Tennessee, with Kurt Piehler …

CRYSTAL DOVER: And Crystal Dover.

PIEHLER: And I'm going to let—Crystal, I'm going to let you, you start off the questioning.

DOVER: All right, you mentioned before, in your last interview, that you were under the mentorship of Dr. Gross, was it?

ANDREW KANG: Yes, that's after I started the medical school.

DOVER: Okay, at Harvard?

KANG: Mm-hmm.

DOVER: What research—what kind of research were you doing under him?

KANG: We were studying the biochemistry and biology of a connective tissue protein known as collagen, which is a fibrous protein that makes up the majority of connective tissues. You know what the connective tissues are? They include things like [the] dermis, tendon, bone, and many—virtually all the organs in the body have … what's known as a matrix, and the fibrous protein component of that is made up of collagen. Of course, in those days we thought that all collagens were alike, and so we knew about only one collagen.

DOVER: I've sort of seen the progression in some of the papers, how it starts off with—there are now seven types and then a few … years later there are now eleven types …

KANG: Now we know of twenty-one different types …

DOVER: Wow! (Laughter) So your main interest was with collagen II at that point, or did you have …

KANG: No, in those days … all we knew about was what's now known as collagen I and … nobody even, even imagined that there would be any other kinds of collagen at that time. Very little was understood at that time actually. If I may take a step back, collagen was a matter of only interest to leather chemists, proceeding really until World War II ended. And most people who are in this business thought that collagen was a totally insoluble material, and had very little understanding of how it was synthesized and laid down in the tissue, and what controlled its formation and turnover. They almost thought of this as an inert, biologically inert material, and main interest was to make … good shoes out of it, good leather out of it, so they can make the shoes and the handbags, and so on. Many things remain in that primitive state of understanding or lack of understanding, until, I guess, now I would call him my academic grandfather, Professor

F.O. Schmit, then of Harvard and MIT, began studying the ultra structure of connective tissue. And my mentor, Jerome Gross, was a post-doctoral fellow under Professor Schmit and he discovered that there was a small, but nonetheless real fraction of collagen that can be solubilized with neutral salt saline. And a variety of studies indicated that that had many of the properties of the putative pre-courser of collagen fibers, and … he really brought the understanding of [the] biogenesis of collagen really quantum forward as a post-doctoral fellow and young trainee, and a junior faculty by the time I got to the medical school. And I was attracted to his lab for a couple of different reasons. One was, he gave a lecture in biochemistry, all of thirty minutes, but what he said was totally fascinating to me, and there's—nothing he said was in the text books then available, and they were a totally new concept to me. And the way he presented made very convincing sense to me and I decided, "hmm, that's worthy of studying."

PEIHLER: So this was in a regular sort of—your general biochemistry class …

KANG: Right, HMS 1, as we call it, yeah.

PIEHLER: And which year did you take that in medical school?

KANG: I'm sorry?

PIEHLER: Which year did you take that course?

KANG: The first year.

PIEHLER: So the very first year you …

KANG: The very first year.

PIEHLER: That one thirty-minute lecture.

KANG: Right. I guess you have to understand something about Harvard. It is an institution with an enormous faculty in relation to [the] student number, so that almost no course in the medical school is taught by … a [single] professor, or even a small number of professors. It is literally a parade of stars. So … just about every subject is taught by an "expert" in that area, taken from somewhere in, on the faculty. It's one of the strengths of that institution. It's enormous human talent. But be that as it may, for that reason, Biochemistry, too, was given by—I don't know, I can't even count—at least twenty or more different lecturers.

DOVER: So each lecture, each topic had an expert, and you got the most current research in that field, at that time.

KANG: Right, and despite the fact it was supposed to be a medical school, they really taught each basic science course as if they were teaching graduate students. It was a very highly research-oriented kind of a thing. But nonetheless, Jerry Gross's presentation was

very interesting to me. The second trigger, I guess—and I remember Professor Gross, and then at the end of the first year going into the second year, I was struck with a form of arthritis, and I was in bed for a period of probably four or five months, without being able to ambulate very well. But gradually I recovered, but I was forced to obviously lose a semester of work. So by the time I was able to even move around, and go outside of the apartment in which I was living, the first semester was virtually over, over. And I went to talk to the dean of students at that time, and he said, "It's out of the question. You can't possibly come back to the class, so why don't you take the year off and do research with somebody of your choice, and then just come back next fall as a, a second year student?" So as the fate would have it, I decided to select a young instructor of medicine, rheumatologist, a person who was [engaged] in the care of patients with arthritis. And decided to spend the rest of the second semester and the summer in his laboratory, and he happened to be interested in collagen, almost by chance. However, he was so busy. So I was put in the lab, I was given a few references and I was on my own. So I was—learned how to swim by …

PIEHLER: And you were just a one-year medical student, admittedly in a very good program but still …

KANG: I didn't know very much about how to do research or anything of that sort, yeah. But, you know, I read [a] series of papers, and naturally a lot of papers that Professor Gross wrote came to my attention, and I began doing experiments, and the first question that I was asked to ask was a very simple one. In disease states such as inflammatory arthritis, the cartilage and all of the periarticular tissues, made out of connective tissue, become destroyed. So there must be an enzyme or enzyme system that is capable of degrading collagen. Until that point, all previously known proteases, proteolytic enzymes, had no effect on collagen. So it remained a biological mystery. How does the body turn over collagen, how does the body destroy collagen under certain pathologic conditions, and as a matter of fact, as we grow we remodel. Like you break a bone, for example, we somehow heal that bone. You cut skin, that skin heals, so there must be a way of remodeling, and therefore there was a question, "What is the source and the nature of the enzyme that is responsible for doing this?" Turned out that it was a far tougher problem than it sounded.

But anyway, I started, and pretty soon, it became very evident that I simply had to go talk to great Professor Gross, because I didn't understand what I was doing, neither did my immediate preceptor, and after discussions with Doctor … Ellis Dresner, immediate supervisor, and he said, "Let's go see Dr. Gross." When the day of appointment came, "us" became "you." Me. (Laughter) So I had to go see Dr. Gross, and it was somewhat intimidating as a first year medical student to talk to what you think is a great professor, and you know, nationally known expert in this area. Fortunately, he was a very kind man, and he didn't mind my ignorance, and he taught me a few things and gave me the information I needed. And, the rest of the summer I was able to detect, actually, collagenolytic activities, and then I ran out of time before I could characterize what the nature of that was. And that summer was the remainder of the year, second year was gone, so I resumed my class work as a second year student. And then as I went along,

different introduction to different kind of disease states and progression to the medical school, I became interested in the whole disease, group of diseases related to arthritis or rheumatic diseases, in part because I suffer from it, and thought that maybe that's where I would pursue my research career.

The story gets a little convoluted as to how I ended up in Dr Gross's… laboratory. Soon [after] I graduated from the medical school and I became an intern at the Peter Bent Brigham Hospital, something fateful happened. I was then married to a second generation Korean who was a U.S. citizen, and I was still on a Korean passport, what's known as "F" visa, a student visa, that I had to renew every year. And it is a hassle because you have to renew the passport every year, and you have to renew the visa every year, and my wife felt somewhat threatened. What if something happens and they refuse to renew the passport or the visa? And she implored to me to apply for a permanent residency, [and] what's known as a green card. I did apply for the green card, and … I finally received the green card when I was an intern.

One of the side effects that I did not anticipate of becoming the holder of a green card is that under the then existing laws I was instantly eligible to selective service obligations. Great privilege of U.S. citizens. So I had to register in the selective services, and, of course, the moment I got registered in the selected services, I was eligible for draft. And remember this is 1962 or 3, the Vietnam War was beginning to pick up its pace, right, and all of the young doctors that came out of training got drafted into the service and sent to Vietnam. And the prospect of that was terrifying to me. After all, I'd left Korea in the wake of the Korean War, and all of the tragedies, and I did not look forward to having to repeat that. And there was a great confusion on the part of the U.S. selective service, because I got called in for a physical exam, and the Sarge said, "Now wait a minute, just a minute. Now usually the medical officers are drafted as first lieutenants. That means you have to be an officer. But another part of our rules, … [an] officer of the United States must be a U.S. citizen, and you're not. You're merely a permanent resident. So I have to draft you as a PFC, but then we need doctors and I don't know what to do with you. Maybe you can serve as an army doctor, as a PFC or conversely, I guess you could just fulfill the obligation by acting as a PFC and go to the trench." Well, neither prospect was particularly attractive.

And then in that setting the National Institutes of Health just came out with what they thought was a brilliant idea, okay, and that is they started a program known as a research associateship that had an appointment as an officer of the U.S. Public Health Service, which was then a branch of the armed services of the United States. And therefore I could fulfill my obligation to Selective Service if I get selected as a research associate … program of the National Institute of Health. So you can imagine how competitive that thing was, because every young man who was a "yellow beret" would rather go to the National Institute of Health than to Vietnam. But I could apply for [it], and I competed, and it so happens that I was selected into a laboratory that was a collaborator of Jerome Gross, Professor Gross. Karl Piez was the name of the lab chief. So Karl Piez became my really first post-doctoral mentor, at the NIH. And then upon completion of that training, I came back to Boston to finish my clinical training, and went to Dr. Gross,

because, of course, while I was at Dr. Piez's lab in NIH, I got to know Dr. Gross a little bit better, because they were collaborating actively. And the particular project I began to work on was a collaborative project between Dr. Gross and Dr. Piez. So the very first paper I published as a researcher contained both mentors' names on the paper as the co-authors. So it was natural, then, for me to go to Dr. Gross's laboratory. So I really count those two people as my mentors, Karl Piez and Jerome Gross.

DOVER: Under Dr. Piez, what did you do in his lab? Did you continue to search for the …

KANG: Yes. Dr. Piez was more of a biochemist, who had [used] a unique tool to be able to separate the polypeptide chains that make up collagen molecules. Nobody else could do that. And Dr. Gross had by that time characterized the first collagenase that cleaved collagen molecules, and the opportunity then existed to further elucidate the fine structure of collagen molecules using the unique collagenase that Dr. Gross had characterized, and using the separation technique that Dr. Piez had. So I was a lucky man, [at] the right place at the right time, and I made a great start as a researcher. I thought research was very easy, a piece of cake, boom, boom, everything I touched turned out to be somewhat of an opus, a magnum. And as a young man this was both exhilarating and satisfying, and gave me the false confidence that "This thing is easy, you know, I can just grind it out." (Laughter)

DOVER: So you got in on the very ground level of collagen research. I mean, did they even know the structure of it yet at this point?

KANG: They had the beginning of the understanding … that there is something known as a soluble collagen, that that becomes the collagen fiber. And that the ability to form a fiber was intrinsic to the molecule itself. In other words, it did not require any mediation other than [a] physical, chemical process. And that each molecule is composed of a three-polypeptide chain, and that they were twisted like a rope.

DOVER: They didn't know the amino acids that were involved yet?

KANG: They knew the amino acid composition, but they did not know the amino acid sequence. And in fact, the first meaningful sequence of any part of collagen molecule was published by me, I guess. Again, being at the right place at the right time with the right tools.

DOVER: And this was before you came to Memphis.

KANG: Oh yes, yeah. And then after I finished my post-doctoral fellowship with Dr. Gross, I stayed on, on the faculty at [the] Massachusetts General Hospital. And I stayed at [the] Massachusetts General Hospital for a total of five years before coming to UT.

PIEHLER: I just want to go back, because it sounds—were you in your first year thinking you would go in the direction of research as a career, a medical researcher?

KANG: Yes I do. I did.

PIEHLER: Yeah even in that first year.

KANG: Oh, even before then. My uprearing, even as a child in our household, was such that—my grandfather was a very well-known scholar in Korea, and his influence essentially pervaded all grandchildren. And I had no other thought, even as a child, than to emulate this great scholar, so regardless what I became, I was going to be a scholar.

PIEHLER: But it also sounds though, then, that in some ways the area you went in was a mix of sort of very personal—like you had, rheumatic arthritis, and … that sort of getting sick at that moment, skipping a year in a sense, and ending up in that lab, your research direction might have been very different if you hadn't come down with that.

KANG: Well clearly, if I had not come down with a form of arthritis, what would I have done? Obviously that can't be answered.

PIEHLER: Yeah, but, but …

KANG: Certainly the fact that I had these personal tribulations motivated me to consider that area much more seriously.

PIEHLER: But also that there sort of was an opening in that area. That you had an initial interest, and then an opening in that area that one thing then led to another, but …

KANG: Right, right. In a sense, life is a series of serendipity, isn't it? I mean, if I think back, sometimes I think I've been more lucky at every step of the way in my career than particularly good. I would rather be lucky than good, I guess. (Laughter)

DOVER: So in those five years when you were still at Massachusetts General, were you seeing patients as well, or were you just doing the research?

KANG: I was seeing some patients, but again my main effort was channeled to research. I guess I spent about 80% of the time with research and 20% of the time seeing patients.

DOVER: What kind of work did you do with the patients? Were you able to offer them any sort of treatment at that point for their arthritis or anything? Did you have any sort of valuable treatment?

KANG: Sure. I mean, what was available then was not as many or effective as what's available now, but still, there were things that we could do for patients.

DOVER: Did you do any … case studies with any of those particular patients, or were they separate from the research?

KANG: Well, I guess some people do sort of case studies as a matter of their research interests. My orientation was more basic, rather than clinical, in that sense. So I didn't personally get engaged in that type of a case study, type of research very much, you know.

PIEHLER: This may be—because I'm not a doctor, and not as familiar with the medical setup, but in terms of being a researcher, your primary duty is research. Patients you would see at Harvard, how would you—would they be referral, was their expectation [that] you would see a certain number of patients, even if you were primarily a researcher?

KANG: Oh sure, yeah. Remember, we are MDs first, above all else. And we are internists and we are rheumatologists and therefore—there is, for example, there is nothing called a surgeon that doesn't cut, if you want to put it that way. And you are not a doctor if you don't see patients. So there was … certainly a minimum expectation that you become competent clinically in a chosen area, whether—regardless of the field you choose. There are very few exceptions to that. My Jerome Gross happens to be one. He was an MD who never acted like an MD, and but those are the exceptions.

PIEHLER: So even, even being at Mass. General at this research power-house, there was still a real notion [that] patients are a part of the responsibility.

KANG: Not only that, but while you are seeing patients, there is no other call that supercedes your responsibility to the patients. And that makes it difficult, in a sense, for young people in a way, who are all at the same time trying to be an expert physician, and at the same time learn how to do research at a cutting edge. And two don't mesh very well in terms of time. What that means, and what that meant then, the thing that suffered was my private life. I put in long hours that, to the contemporary young people, is unimaginable or stupid. There isn't a weekend, either Saturday, or Sunday or both, that I did not spend in the laboratory. There isn't a holiday that I did not spend part in the laboratory. I put in long hours.

DOVER: So in a lot of your studies they did a lot of research with rats and mice, and the collagen induced arthritis. At what point did that start to enter into the scene? I know that maybe it was like '73 when they first started.

KANG: No. That's after I came here.

DOVER: That's after you came here.

KANG: Like I said, research career is a serendipity. I didn't have a special interest in something called immunology as such, and did not think my research would go there. But a post-doctoral fellow showed up totally unexpected, rheumatology fellow, came, showed up in my office, and said, "Dr. Kang, I'd like to do some research." I said, "David why do you want to do that?" "Because I want to do research." Okay, so I said, "What would you like to do?" He said, "I'd like to study the potential possibility that

[an] immune reaction to connective tissue components may be operating as a part of [a] pathologic process," [in] a certain group of diseases that we were interested in. So I said, "Is that so, what makes you think that?" So we had a dialogue, and basically what I was trying to do is [see], how serious is this guy, and if he's serious about doing research, it's worth spending my time, and if he's on the other hand not so serious, and he wants to be somewhat of a dilettante, then I don't have time for him, and I was going to basically throw him out of my office.

He convinced me that he was serious. So I said, "Okay, let's start then somewhere, and probably the place to start is—let's just raise a series of anti-sera, antibodies, against … all five types of known collagen [at the time]." And then once you have the reference sera, then you can use them as a tool to survey patients with different rheumatic diseases. So in a sense you have to have positive control sera, so that's where we began. And several weeks later, this kid runs into my laboratory with a cage of rats in his arm, excited. "Dr. Kang! Look at this!" I said, "What have you got there?" "Look at these beasts." I said, "So where am I supposed to look?" [He said,] "Look at their paws." They were all swollen like this. [I said], "Well, what did you do that for?" He said, "Well, the thing that's interesting is that only those animals that were immunized with the protein, collagen protein, derived from the cartilage itself, [contracted] arthritis. All the other non-collagenous protein animals looked healthy." I said, "David, you must [have] fowled up somewhere. You contaminated your collagen somewhere, and it's probably bacteria or a virus or something." So I called him some less than intelligent person, "get your rear end out of here and do a little better job the next time."

So I made him go back to repurify de novo, a brand new batch of collagen, using aseptic techniques and all that. And he comes back several weeks later with the same set of observations. And I became a little more interested, and I began thinking about this, what could this mean? Well one of the hypotheses as to how rheumatoid arthritis is perpetuated is through [an] immunologic mechanism. I mean, that hypothesis was beginning to be born in the mid '70s. And in the late '70s it became recognized that there's a certain genetic background to patients with rheumatoid arthritis that tend to make them more susceptible to develop arthritis than different genetic backgrounds. And you put some things together. Well, these immune response genes are associated with rheumatoid arthritis, therefore [an] immunologic mechanism is clearly operating. What could be sustaining that reaction? Well one of the obvious to me, at least, the simplistic way of thinking about this is, it's got to be one of the components in the joint itself. Then we have to think about how many different components there are. Well, there's obviously too numerous to count, but, you know, a blind man feeling an elephant looks at what ever parts he feels, right, as the representative elephant. And I was a blind man. How many things in the joint did I know about? Well, certainly collagen was one of them, and then there's proteoglycan and so on, and so we systematically isolated all of the known components that I knew how to operate and tested the hypothesis as to whether or not provocation or evocation of immune response to these components will lead to arthritis. And lo and behold, the only thing in our hands that could do this was this type II collagen. That's the beginning of the concept that it's the auto-antigen that's sustaining this immune reaction. Subsequently this idea was picked up by other people

and found out that the components that I used to throw away, known as the proteoglycan, in fact, in some other strains of mice, animals, could provoke [an] immune response. So now, the concept that the auto-antigen in the joint structure is one of the components in this chain of immunologic reaction is … well established.

DOVER: I just want to take one step back, because we keep talking about rheumatoid arthritis, and we haven't really defined it. And so I was hoping that you could kind of give me a definition of what it is, and what some of the symptoms of it are.

KANG: It's not as simple as it might seem. (Laughter) But rheumatoid arthritis is a very common disease mainly manifested by inflammation of [the] joints, usually several joints, many joints. And it has a propensity to involve particularly joints in the hands and the feet, although it could involve any other joint in the body including, you know, knees, ankles, hips, shoulders, elbows. You name a joint, it can be involved. The cause is unknown. It affects all races, more or less, with an equal degree of prevalence. And its prevalence is estimated at somewhere between one and three percent of the population, so we are talking about a huge number of people. Disease tends to be chronic, meaning it lasts a long time, not just one, two, three weeks and ends. The cause is unknown. What triggers this … still remains a mystery.

We know several things about it now, and as I said, there is … some association with what's known as [the] MHC molecules. I don't know whether you're familiar with the concept of MHC molecules or not. It's—MHC stands for major histocompatibility complex, and it is the glycoprotein on the surface of phagocytic cells like macrophages. And the concept is that when bacteria or a foreign substance comes into your body, your body doesn't like it. And [the] macrophage, phagocytic system engulfs that bacteria or virus or whatever, foreign protein, and digests it. They use the term 'process' the antigen. And pieces of digested material react with this MHC molecule, and the MHC peptide complex goes to the surface of the phagocytes. And then T-cells, lymphocytes, that happen to have a T-cell receptor that recognizes that particular complex, will react with it. And when they react, they go wild. The lymphocyte … goes wild. All kinds of proteins get synthesized and lymphocyte, the particular lymphocyte that reacted with it, multiplies [itself] and then in turn secretes many, many different mediators, know as, as a group, [the] cytokines. That does many different things, including make antibodies that stimulate … other T-cells that are killers, and so on, okay. But the key … in the control of what particular substance is selected to go to the surface of the phagocytes so that T-cells can see, is … essentially the amino acid sequence of the MHC complex. And therefore … for that reason it's known as [the] immune response molecules or immune response genes. And that is highly variable from one person to the next person, to the next person.

Back to R.A. patients, rheumatoid arthritis patients, rheumatoid arthritis patients tend to have a given set of MHC molecules that share a high degree of identity or homology in the peptide selection groove. We now know the structure of the MHC molecules, and there is a particular part of the molecule where the peptide binding takes place, and depending on the nature of the MHC and the peptide, they may be compatible or they

may not be compatible, so that's where the selection takes place. And for that reason it's thought to determine therefore a given person's propensity to develop immune response or not to any given foreign antigen. You follow me? Okay. Therein lies the implication that R.A must be then, mediated by immunologic reaction.

DOVER: So it's a humoral reaction and a cell mediated …

KANG: No, it's a cellular reaction, yeah. Now, it's the first step, and after that, because of this proliferation and synthesis of many different cytokines, [a] humoral reaction may enter into it as a second expansion of the initial event. But be that as it may, the concept was born and evolved through the '70s and more or less became established by perhaps [the] late '70s or early '80s. And our observation fit right into that concept, because it turns out that not all mice and not all rats are susceptible to collagen arthritis, and by the time the experiments were over, done and over with, again only two strains of mice could process collagen and provoke an immune response that culminates in arthritis. So we know a lot about the genetics of it now.

The more recent testing of this hypothesis was—"It's okay, but what does that have to do with human rheumatoid arthritis?" [Would] … human MHC gene [associated with the R.A.] respond in a way that causes arthritis to collagen? So, to do that we had to make transgenic animals, where human R.A. susceptibility. MHC molecule was transferred to the mouse as a transgene. So now we have a mouse that [bears] a human MHC … molecule. And those mice were used to test the hypothesis. And it turned out that, yes, [the] human R.A. associated molecules can in fact process type II collagen and cause arthritis in the recipient animal. Now, I started from defining what is rheumatoid arthritis and ended up somewhere else, but anyway. It's a very common disease manifested primarily as a chronic inflammation of joints, and chronic inflammation in turn leads to destruction of the joints, and [the] patient ends up with a crippling—and therefore the disability. So that's what rheumatoid arthritis is: a very vexing disorder in the sense that it's unrelenting, it's chronic. It's not the worst pain in the world, but goodness gracious, you have this every day, every hour of the day you are awake. Every time you try to use your involved joint it reminds you it hurts. It's a miserable disease.

DOVER: So, when you started out with the—working with the collagen induced arthritis in the mice, that turned out to be a really good animal model that you could work with. And then, eventually you started working with monkeys, I believe.

KANG: We didn't start working with the monkeys—we were essentially asking the same question: is this a unique property of a particular strain of mouse and rat, or is [it] perhaps generalizable to all other mammalian species? And the closest thing we could come to, short of a human being, is monkeys. And monkeys are expensive. It's not very easy to study [them] in depth over long term, for no other reason than they are not inbred, so their genetic background is highly variable, one monkey's to another monkey. Secondly, they are difficult animals to keep in the laboratories, and they are expensive. So, we simply wanted to prove the biological principle, and beyond that we just could not pursue it. There were a couple of people who were able to pursue this much further than

we [could]—one was a group in Japan, but they had a Japanese government infusion of money, they, the Japanese government maintained the monkey … colony for them. So he had an easy access to [the] monkey colony. There was another group in Holland, [a] Dutch group, and I don't know [the] exact circumstances as to why they were able to, but they carried on for a while, but I think even they, too, now have given up because of the shortage of monkey supplies, international control over this, and …

DOVER: One of the things that I found puzzling was that there's a study that talks about the denatured collagen, and it couldn't induce disease, but it would induce a cell-mediated response.

KANG: Okay, you need to go into a little—I need to go into a little deeper than that, okay. It's a species specific phenomenon. In rats, for some reason, denatured collagen does not evoke [a] sufficient immune response against the native type collagen, so that there's a cross reactivity. Whereas [in another] animal—mice, for whatever reason, God made it that way, I guess, even if you use denatured collagen as an antigen, they are capable of developing cross reactive antibody that cross reacts with the native collagen. So in mice, yes, denatured collagen will induce disease.

DOVER: Okay.

KANG: Whereas in rats, denatured collagen does not. And it has to do [with] the species differences in the nature of [the] immune response. In other words the mice are somewhat promiscuous in terms of [the] immune response to not only denatured collagen, but also to native collagen, whereas there is a higher degree of structural fidelity in [the] immune response in rats.

DOVER: Okay. And then there's another thing that, that puzzled me: in 1983 there was a study that they were injecting soluble type II collagen into the rats before, or just after they immunized them, and they found that it was depressing the onset of arthritis.

KANG: Yes. That's—what you're talking about is what's known as immune tolerance. Immunology is a—(laughs)—a marvelous thing and also a very complicated subject. Depending on how the antigen or foreign protein is introduced to a host, the response of the host to that antigen is different. Okay, so if you take an identical protein and give it into skin, they may develop an immune response to that protein with a synthesis of antibody and proliferation of T-cells that are specific for that particular antigen. And the T-cells in turn will make pro-inflammatory kind of cytokines. Now you take the same antigen and give it by a different route, such as, for example, intravenously, or intranasally, or into the stomach by feeding, they develop an opposite reaction. That's the mystery of immunology. What they seem to do is develop a subpopulation of T-cells that secrete [a] different set of cytokines that are anti-inflammatory, so that, [as a] consequence of that exposure, … the host does not respond to the next challenge.

DOVER: So this may be a little too late for somebody who's already suffering with rheumatoid arthritis, to try to give them a, you know, an injection of collagen?

KANG: Nobody knows the answer to that, because it may very well be that the stimulating event is not a single event, but maybe [an] ongoing event, and to the extent that you can suppress the ongoing event, you might benefit the patient. And the clinical trial was done, has been done by different centers including us, to induce tolerance to—immunologic tolerance—to type II collagen, by administering type II collagen in a tolerogenic manner. Like everything in human diseases, the answers gotten by different laboratories are conflicting. (Laughter) There is a set of laboratories that have reported favorable results, but at the same time, seemingly, identical sort of a study done in another laboratory does not show a beneficial effect. Now, how to sort that out is something that will take time. The studies are complicated by the fact that unlike mice or rats, we can't control the conditions of human beings, in terms of what kind of food they eat, in terms of what kind of medicines they take, and how much medicines they take, do you follow me? Okay, so if people are taking all kinds of different medicine, it may—and many of the medicines that are being used in the treatment of rheumatoid arthritis [are] cytotoxic drugs. And it's therefore immunologically active drugs, and [they] alter the immune response and then they introduce a variable that we can not control. As much as we like to try to induce tolerogenic immune response, [the] patient is already taking cytotoxic drug and under those circumstances, [and the] patient may not be able to respond anyway. Are you following? So there are a lot of confounding variables. Now in rats, it's easy enough for us to withhold whatever drug we want to, and give them the same food, right. In humans we can't do that, yeah. So, that certainly is one, one of the areas that are still under active consideration and investigation, and answers are conflicting so far.

DOVER: I that is a, sort of a speculative question, but where do you see the rest of the, where do you see research going in ten years? Do you think the disease etiology of rheumatoid arthritis will be closer, the research will be closer to understanding it?

KANG: In an optimistic moment I would like to be able to say yes. Having … thought every ten years, ever since I entered the research, I have to be a realist and say I don't know. I think we'll know more than we do now. Whether we will get to the point of completely understanding, let me put it this way, I kinda doubt it.

----------END OF TAPE ONE, SIDE ONE----------

PIEHLER: Okay, go—why don't you re-ask the question?

DOVER: Okay, I just asked if the efforts with the human genome project and the efforts to discover the DNA codes and everything is a help to your research.

KANG: Without a doubt, theoretically that will be a very, very powerful tool. But again, you got to be a realist. The good news is that we have now the tools. The bad news is that it is an enormously expensive tool for the following reason. If you analyze human genes from a patient that does not have a given disease, as compared to a patient that has a particular disease, a disease such as rheumatoid arthritis or any other disease, and then

simply study all of the genes and the question you're asking is, what are the differences between the two? And the problem is we come up with a lot of differences. Okay, there are probably ten thousand things that are different between the two disease conditions or a normal one versus the disease. The genius is to figure out which one of those ten thousand is the really relevant difference, or which ones are the relevant differences. And that becomes a very time consuming kind of a research. And says, "Yes, the techniques are very powerful, it has the potential to solve the problem," but is it going to be easy? No. It's going to take a lot of work and, which means also a lot of money. So, yes, we are, in a sense, theoretically at the threshold of a very quantum jump in our understanding, but [it] still remains theoretical, for practical reasons.

DOVER: Well one—since we're talking about DNA, part of what I wanted to accomplish with my project was to sort of talk about the evolution of scientific thought and medicine in general, and one of the biggest … parts of that was the discovery of the structure of DNA. And I know that you were still at Wofford at that point, but I didn't know if you had learned anything about it at that time, or knew of the impact when it was all happening.

KANG: When I was an undergraduate student at Wofford College, although I was a premed student, I did not take a biochemistry course. I only took organic chemistry. And therefore my knowledge of so-called nucleic acid biochemistry was really minimal until I got to the medical school. And this is one of the great things about an institution like Harvard. Guess who gave the lecture on DNA? James Watson.

DOVER: Oh goodness.

PIEHLER: So you were hearing this when it was brand new.

DOVER: So Watson himself gave you the lecture.

KANG: Right.

DOVER: Wow.

KANG: Now what he said may be no more coherent or no more true or no less true than what the next fellow might have said, but the aura of a Nobelist coming into the lecture to give a lecture to a lowly medical student is something that leaves an impression on you. And similarly, … there were a couple of other Nobel Laureates then, I mean, there was a virologist by the name of John Enders, who won a Nobel Prize on the basis of his work on polio vaccine development. In contrast to James Watson, who was a very erudite lecturer, John Enders was a horrible lecturer. (Laughter) He had one of those—so horrific voices, and within five minutes, you know, everybody was on a plane—one anesthesia with the lights turned off. But the students came to that lecture, every one of them, because they're listening to a great scientist. It's a privilege. Either we were fools or the era was—the ethos of our generation was different. We all went to class, by the way, as an—first year medical student with ties and a jacket. We would never think of

going to a class without tie and a jacket, even as a first year student. But, those were the ethos of that era.

DOVER: Did you know at the time, did anybody know at the time how, how that discovery would impact later research and doors that it would open?

KANG: I don't know that anybody really appreciated how powerful a thing it could be. The evolution of molecular biology had—this is a second wave—actually had a first wave in… the sixties, taking off from the understanding of a genome, DNA, and gene coding, and so on. But the tools available, different kinds of restriction enzymes and so on, so on, [were] limited, and therefore it sort of died. Well, I shouldn't say died; it sort of went underneath. And, and every—not every, but the preponderance of the scientific effort was directed at understanding the proteins and their role in biological processes. And that … really lasted through the '70s. And then as we went into the '80s, sort of a second messenger system, cell signaling became the focus of attention among the scientific world. And then as we went into the later part of '80s, the tools for molecular biology had become much more plentiful so that you could, in fact, the number of restriction enzymes, the ability to do sequencing, the ability to synthesize oligonucleotides and what-not became much easier. So now we are seeing a flower period.

DOVER: Much more time efficient, too …

KANG: Oh, immensely more so, immensely more so. If you want to, sort of digress for a moment and hear a history of medicine, and science indeed, it's interesting, very interesting. To determine amino acid composition of a protein prior to the discovery or invention of amino acid analyzer, was an ordeal that lasted a year, because each individual amino acid had to be chemically assayed using different techniques. And by the time one is finished with analyses of twenty different amino acids from a pound of a protein you started out with, the errors that are associated with one assay versus next assay were so large that you weren't sure how close to composition really was. After the introduction of amino acid analyzer, it only took six hours, to determine the …

PIEHLER: So you did it the first way for a full year.

KANG: No.

PIEHLER: No, that was after …

KANG: That was before my days.

PIEHLER: But it was still close enough in memory, it sounds like people, you would hear stories about …

KANG: Oh yes. When I went to Dr. Piez's lab in 1964 at the NIH, he had … one of the ten machines that were produced by Beckman Instruments in, in the country, okay. And he was just delighted: "I can do an amino composition in six hours." Six hours, right.

PIEHLER: Because he was telling you stories …

DOVER: So the technology has definitely been a big factor in, in how fast things can be done.

KANG: Oh sure, yeah, yeah. Without tools, it's much more difficult to make progress. It takes a lot more time and effort, obviously. With tools, things are a little bit easier. But the tool isn't the only answer, because you know that tool, requires a human hand and a human brain.

DOVER: Right. Well, I …

PIEHLER: I wanted to sort of back up a little bit about Harvard. And one of the things you said in your first interview was, you had sort of academically been a big man on, at Wofford. It was a very small campus and you worked very hard, and you had a knack for it, and you were very good at it. And then you said you got to Harvard and you were, it was rather intimidating. In your earlier interview you said, one, you're weren't the brightest person anymore, you know, it was, there were a lot of bright people just as bright as you, and maybe in some cases, maybe a little brighter. And you also commented how intimidating the exams were at first. You got used to them. Could you, could you maybe talk a little bit more about your first year at Harvard? You've already alluded to sort of the dress, and really hearing some very prominent—I mean, you know, the people who write the books or the key articles.

KANG: Right. You know, I can go back to the first day I arrived at, at the dormitory. And the dormitory happened to be right across from Harvard quadrangle, that's—they're known as, in other words, the science buildings. And the whole ambience to me was almost intoxicating. Finally I made it to this great institution. And I was both awed and pleased. And then I—as the next several days, students began, more and more students began arriving, and as I got to know them and to talk to them, and my English at that time wasn't all that good either, and I was acutely conscious that I did not speak the language very well, and what would these guys think of me, sort of a timidity, I guess, was still with me. But be all that as it may, it was really both awe inspiring and intimidating because as I got to know these kids, they were from name schools. They were from Princeton, they were from Harvard, they were from Yale, and "Where the hell did you go to school? Wofford? Where is that?" They didn't mean [it] in any mean sort of way, but virtually they'd never heard of this place. I mean, you know, they've heard of Amherst and Marshall Franklin, and whatnot. But if you're not from northeastern great Ivy League schools, you were sort of a—"Where did you go?" And whether that was done consciously or not, that was quite intimidating or degrading, denigrating.

And then as the class began, and we began studying, I suddenly realized that, "I'm not in control anymore." You see, in undergraduate schools, I thought that I could learn everything that could be reasonably expected of you, regardless what the course was. The amount of knowledge that I thought that I could learn was more or less finite, and if I learned that, I would know at least enough so that I would have no problem making A+, okay. I never got that sensation. It was just totally overwhelming and, you know, quantitatively. And there was no hope that I could even master a single course. And the speed at which they were going at multiple courses was so fast, that all I could do was do the best I could and then let the chip fall where it might. But that acceptance was slow in coming, and at the same time very unsettling and anxietogenic. And I had never been in that situation up to that point, and I guess there was a little consolation involved in all of this, because it's evident that all the guys that I thought were smart as a whip were having the same problems that I was having, okay. So, that was a small consolation. In a sense, Harvard made it very easy for us in retrospect, although it didn't seem that way at the time. They did not have any exams at all until the end of the term.

PIEHLER: And in the end that was a better system, because initially you were shocked by it, you'd said earlier.

KANG: Right. In a—in … colleges, in high school, they give you pop tests, and you know, every two, three, four weeks you get some sort of quiz. And therefore as the semester wore along, each student, including I, had no idea where one stood in relation to what we should be doing, because we had no feedback as to whether you're flunking or doing well or anything of that sort. And the only, again, the only consolation we had from upper classmen, was from upper classmen, and—"Oh, don't worry, it's just a—you'll see that the final exam is an impossible exam anyway. And there's no way you can study for it, and you do the best you can." (Laughter) And by and large, nobody flunks out of Harvard. I mean, the administration would regard it as, it would be a disfame on their face if any student ever flunked, so don't worry, I mean, they will do everything possible for you to pass. Well, that's a … small consolation, all right. But it was intimidating, but all at the same time in retrospect, that was wonderful, because in fact when I walked into the first semester final exam, that's what it was. You are given three hours and you are given a choice of—I forgot—answer three out of the following ten questions, and each question was so broad that you had to be a really, totally irresponsible student for you not to be able to spend an hour to write something sensible. And that gave me somewhat of a confidence and consolation. It became, a little later, anxietogenic for different reasons, and that is the next level beyond medical school, is to look for an internship, right. And of course there are internships, and there are internships, and there are really competitive internships. And my wife was in training in Boston in pediatrics, and therefore I had to stay in Boston.

PIEHLER: Which narrowed the schools.

KANG: Which narrowed the schools, and, of course, Boston has three schools, but in the eyes of Harvard faculty and Harvard students, they only [had] one medical school, right. So you had to make it, okay. And as we became a third year student, towards the end of

the third year, student, I had zero idea where I stood vis-à-vis the, the whole class. "Am I in the bottom third, am I in the bottom ten percent, am I in the top half?" I mean, there was zero idea because having taken the exams, they don't give you a grade. In fact, the grade was a top secret. You couldn't get a grade, even if you went to see the Dean.

PIEHLER: So you really didn't know how you were doing …

KANG: I didn't know.

PIEHLER: … except that you, you were still at Harvard.

KANG: Right.

DOVER: So did this, sort of help to ease the competition among students, though, since you didn't know necessarily that you were doing better than somebody or not doing better?

KANG: I, suppose in a way that's true, yeah. In a way that's true. Because nobody knew where they stood, yeah. And that was anxietogentic because I didn't know where to apply to, and can I get to stay in Boston, all right. So as a fourth year student, just before, in the process of applying for internships, I met with a so-called intern advisor who was, paradoxically, totally ignorant of my record anyway. He didn't have my grades either. (Laughter) But he was going on as to how I should—"These are the great internships and you should apply for those." "Well I knew that before you told me, by reputation. The question is, is there a reality to this, am I competitive." He said, "I don't know, because I don't know what your grades are." (Laughter) And the only reason why I had an inkling was because one of the people who wrote a letter of recommendation happened to be the Dean of Students. And I went to see him, in a moment of anxiety. I said, "I cannot simply stop applying to Harvard internships and face the ignominious outcome of going unmatched. So I have to have a backup." So I asked Dr.Gardella to please send another letter of recommendation to what I thought was a backup position, known as Stanford University. And that provoked a twenty-minute lecture as to why Stanford was not worthy of your application. And the only thing I could deduce is that he knew my grades, and therefore he thought—he was confident that I would probably match at Harvard.

PIEHLER: Because Stanford is not necessarily, not the boon docks, I mean it's not like you were …

KANG: But you don't understand the Harvardian arrogance. (Laughter)

PIEHLER: No, no I know. It's a great story about the Harvardian—yeah, I know, I mean …

KANG: You know, to them, Worcester is the end of the world, or at least you can see the end of the world from Worcester. (Laughter) Anyway, that's the only inkling I had as to

where I stood. But it did provide a—really, to me, an ideal, almost an ideal educational environment because, rightly or wrongly, I had this great respect for the institution that gave me a sense of responsibility that if I become a member of this institution, I have to fulfill that responsibility, that burden of being a student at Harvard. I have to prove myself worthy. It is sort of a peculiar feeling that the environment provided for me. Now, it may be that I was the only one so infected because I was so totally foreign to them and I was full of anxiety as to my language capability, to—I was only one of three non-Caucasian students in the entire school.

PIEHLER: Who were the other two? Did you know them?

KANG: Well actually the other two happened to be Orientals, and that was the first time they admitted as many as one—three Asians. There was only one other Asian, two classes ahead of me, and there was one black student from Nigeria.

PIEHLER: And no African Americans from the United States. So it is a very homogeneous group, in terms of …

DOVER: What about—females weren't there at that time yet?

KANG: There were eight students in our class.

PIEHLER: A class of how many?

KANG: Of 114.

DOVER: Wow, and now it's a … pretty equal mix now.

KANG: Yes, it is. In fact, it's threatening to overtake men now, as a percentage. (Laughter) But be that as it may, it was a different era, and that additionally provided a sense of, "I'm different, and therefore I gotta do better than the next fellow." I don't know whether that was a component or not, but there, certainly I was conscious of that and I really had a great education, really.

PIEHLER: Could you, your first year, does any course, well, you've given some wonderful stories about sort of—how intimidating it is of hearing Nobel Laureates—you sort of got an inkling of what it, your research by the top person in the field, gave the lecture. Does that—in terms of the first year courses, what course did you enjoy the most, and what were you—not disappointed … [but] thought, "Oh, I'm taking this course, but I'm not, this is not an area I'm ever going into."

KANG: Well I enjoyed both physiology and biochemistry. I did not care for gross anatomy, dissection. I was not cut out to be a surgeon.

PIEHLER: You learned that from gross anatomy.

KANG: Right. And I detested having to dissect a cadaver, but we had to. We were given one cadaver per team of four students. Two students dissected the right side, two students dissected the left side of the body, yeah.

DOVER: Well you had a lot of mice, mouse dissections to do, didn't you? When …

KANG: A little bit, but …

DOVER: Not the same really …

KANG: Not quite the same as learning gross anatomy and [the] human cadaver.

DOVER: Right. Did they have the same licensing procedures, in those days, with the USMLE—is that right, USMLE board exam?

KANG: National Board in those days, yeah.

DOVER: Did they do like, after your second year you take the first test and then you keep going?

KANG: Right. It was a requirement, actually, that we take board exam at the end of the second year, but it was kind of a remarkable thing. I didn't worry about it really, until …

DOVER: You felt prepared, from Harvard.

KANG: This is … the mystery to me, you know, attractions of [a] Harvard education. Beyond my first year, particularly the first semester, first year nervousness of what this was about, by the time I accommodated to that ambience and accepted the horrible reality, "I'm not the smartest kid anymore, and that's okay with me, and I'm just gonna do the best I can." Once I got into that mode, it really was a smooth sailing. I did not worry all that much about [the] final exam, or National Board, even. And we had one week off, I think, between the end of the second year classes and [the] final exam, and the National Board, and I didn't sweat it. The confidence was—I don't know where the confidence came from, I just knew …

DOVER: You started to adopt the Harvard attitude.

KANG: Yeah, this is going to be a piece of cake, yeah.

DOVER: So did you ever find out where you stood in the class?

KANG: I did, on the day of graduation.

DOVER: Were you pleased with, with how it had turned out?

KANG: Very pleased. I, in fact, I was astounded. Imagine the class exercise day, this is the final, you know, formal ceremony of medical school, right. Your family is all there, and all the families are all there. And they said, "Well, here are the M.D. degrees given with honors, and first the list of M.D cum laude." And alphabetically starts from Aaronson and passes 'K' and I said, I said, "Oh, shit, I didn't even make a cum laude." (Laughter)

PIEHLER: So you thought you were out of the running already.

KANG: Well, I was a little surprised because by that time the intern match had come out and I had matched at the Peter Bent Brigham hospital and the thought occurred to me, "Maybe I did better than cum laude," but I was disappointed. My first reaction was, "They passed by me." And then at the end of that, say, "Here's a list of," you know, "M.D. magna cum laude." And they mentioned my name…. And I said, "Ah." I felt great. [It] was one of, one of the moments of a high, I guess, yeah. There were four students given, given magna cum laude in my class. No, there were three. But there were no summa cum laude in our class. So I figured, I still don't know the class ranking, I figure I had to be one of the top three.

DOVER: Wow.

KANG: From that, yeah.

PIEHLER: … What strikes me in the sciences and medicine is—and … I've come to learn this, particularly, doing oral history interviews, it's very different from the training I got. And some of that is because in humanities, whereas historians—I was given money to live on. But I can sort of write a book without a … huge lab or tons of graduate assistants. I mean, … some support is helpful. Whereas what's striking is in science, as is in medicine, to do research … you need a lot of money. And it's both very competitive, because you're competing for grants, … just like we're competing for publications, … but it's also much more collaborative than we are. That there is a real collaborative structure. Could you maybe talk a little bit about that, because it's striking to me. Harvard wanted to partly encourage something of a collaborative spirit among students because you didn't know your grades. You weren't—you know, if you helped someone, you didn't know you're helping the guy who's number one in the class, and you know, you're making it more difficult for yourself to get a higher ranking.

KANG: First of all, throughout the four years of education, medical education, they [had] preached and inculcated that the only career, or I should say, the highest career that you can go into … upon graduation from the medical school is to go into research, and to go into a teaching career so that you can teach the next generation of physicians. So, that idea was indoctrinated again and again at all levels of [the] medical school curriculum.

PIEHLER: Which reinforced your earlier …

KANG: Sure, reinforced. And for example, 25% of my class went into an academic career. That's an astounding percentage. Another thing that medical education does, particularly as one goes into the clinical years, is to try to get you to think on your feet, make a decision, and be responsible for that decision. This is the nature of patient care. They force you to become an independent thinker. That's really what the medical process, education process does. So in a sense, we sort of get out of school to think on our two feet, to be independent, and to make a decision and be responsible for making that decision. And that attitude, to some extent, carries into research. We have to make a choice, what line of research we do. Obviously that's dictated to some extent by one's interest. But having said that "This is [the] area I want to go into," there are many different ways of approaching that. But we have to make a choice, and accept the consequences. And to me, this is maybe personal to me, it never bothered me to collaborate with anybody if that collaboration enabled me to do things better or faster, or do things that I would not have been able to do. The fact that I have to share the credit with a collaborator, it was not a factor in my thinking, okay. Therefore, I personally have collaborated very openly, willingly, and freely. There are people who do not necessarily feel that way. They jealously guard their prerogatives and their credit, their senior authorship, and so on and so on. I never sort of got into that mode, for whatever reason, and that, in a sense, my attitude and philosophy about it has been very helpful in my view, because I've been able to attain things that I probably would not have been able to if I were working alone.

PIEHLER: … You mentioned clinical training, and Dr. Grillo, when we interviewed him, had a great story of the first time he did a physical with … one of his friends. They did one of the professional patients, and how the professional patient sort of, they were feeling very high of themselves and the professional patient sort of said something at the end that made them realize, "we're still … second year medical students." Could you talk a little bit about learning how to, you know, interact with patients and, particularly as a medical student and then as an intern.

KANG: (Laughs) Well, the most difficult exposure is the very first exposure as a medical student, as a physical diagnosis student. We barely knew, or learned, how to use a stethoscope and how to use an ophthalmoscope, how to even talk to the patient. And what the meaning of patient's complaint might be. I mean, we didn't have a sufficient knowledge base to understand when somebody says that "I'm here because I have … chest pain…." [The] medical meaning of that wasn't necessarily completely understood by a student. And in a setting in which I was still struggling from this consciousness that I speak funny English, not only—it's not just the spoken English and the broken English, also the cultural adaptation was incomplete. After all, by the time I became a second year student, that was a sort of a fourth or fifth year after I entered to this country, so my assimilation of Western, American culture was less than complete, so, and I was aware of that. So I had a great deal of timidity in approaching the first patient that I was supposed to take a history [from] and to do a limited physical examination [on].

This instructor, Dr. Gardella, who happened to be Dean of Students, told us to introduce yourself as, "I am Dr. so-and-so-and-so," and go on from there. So I was given a name

and a place of the patient to interview. So I went to the ward at Mass. General, introduced myself as Dr. Kang, and "I'm here to take a history and do a physical." Well, it so happened that this [was] a patient that had been there many times before and therefore had seen many medical students. She was grandmotherly type. She said, "It's okay Mr. Kang, I know you're a medical student, so lets go from there." (Laughter) I don't know whether that was her intimidating or consoling. I was demolished, obviously, because my facade was instantaneously destroyed. (Laughter) So that was a very traumatic sort of a first exposure, and you overcome that, and you begin to talk to patients, and as your knowledge base increases the patient's history becomes more meaningful. And then your technique also develops for examining patients.

So gradually, it got better. But it's not quite the same as now being a doctor, that is independent, because as a medical student although you have what's known as a sub-internship, where you take the first crack at patients and determine what a patient might have, what you might do to verify that that's what patient has, and what you might do to treat that patient, okay. But still, you know that two minutes after you finish, the intern is going to come around and the resident is gonna come around, and if I write anything stupid in the way of order it'll be caught within five minutes or less, and no great harm will be done, and I was already—even the nurses would detect something that is stupid and not do things that are outlandish.

But to be an intern is a different story, because now you're it. Your order is gonna carry, be carried out. And I recall the first night I was on call, which was June 23, of … 1962. It so happened that I was on call the first night I showed up, showed up as an intern. And in those days, hospitals did not have a supporting system. Laboratories shut down, there were no EKG technicians, there were no X-ray technicians. You were it as the intern. You were the slave. You had to do everything. In the middle of the night I get a call from a nurse saying, "This patient, so-and-so, is experiencing chest pain. Come down and see her." So I came down and saw her. And I needed to take an electrocardiogram, and I didn't know how to take an electrocardiogram. So I called the resident. Well, he was a little bit annoyed, saying, "What kind of idiot are you? You don't know how to take EKG, even for a … first day intern? Where did you go to medical school, why didn't you learn this." (Laughter) Well, grumblingly he came down and showed me how to do it. That was my introduction, traumatically, to internship.

PIEHLER: Now, your internship at Brigham, what specialty were you, or, in the internship.

KANG: Internal medicine.

PIEHLER: Internal medicine. So you did a—I mean, that was a, it's a pretty broad area of medicine.

KANG: Right, right.

PIEHLER: So you had a sort of full range of cases—what were some of the cases that you were—you mentioned EKG, but could you …

KANG: Well, the very first patient, … officially as an intern, that I worked up, as we say, was a young woman who had a thrombcytopenia and bleeding disorder. And it was [an] easy, relatively easy introduction because [the] patient was young, history was short and simple, and she was a college student, articulate, and could answer all the questions. So that was a little bit easy as compared to the next guy who got a patient who was… suffered from a stroke and couldn't answer the question, you know, this sort of thing.

PIEHLER: Even though you knew in your internship, you were going to become a researcher, what did—I mean, I guess the internship, how did you, your first responsibility then was treating patients.

KANG: Oh, without a doubt.

PIEHLER: I mean you were really learning how to be a *doctor* doctor. How did that, looking back on it, how did that influence your, your career as a researcher, because patients, you'd always see patients, but they'd become—your research is the dominant thing, in a sense, when you're not seeing patients you're really trying to do research.

KANG: There are some classmates of mine who upon receipt of M.D. went into the research lab directly and became a researcher the rest of their lives. In fact, my mentor, Jerome Gross, was one such example. Those were in the minority. I don't know how to phrase this, but for the lack of a better word, let me use the word PhD scientist, who has never had a clinical training. PhD scientists who [have] an interest in rheumatic disease or immunologic disorders I'm interested in—as compared to an M.D. rheumatologist, interested in same area, have a slightly different understanding and different approaches to the problem. This comes from the fact that the PhD's lack a knowledge of what the disease is. So I guess the best way I can [differentiate] is that being a physician gives you a purview of what the biology of this disease is, not just the particular biochemical or immunological aspect of that disease.

PIEHLER: And in a sense, how it affects patients, that it's not a—I mean, I think for PhD or MD who just goes into research, you know what treat—I mean, theoretically you know it involved medicine and patients, but … it's a more distant thing. I mean, you don't have a first hand contact with a patient ever in your, your sort of background, whereas I get a sense, both because you had had the disease, but also that you had treated patients, that, you know …

KANG: Right, no. Being a physician gives you a purview that is a little different from a researcher who has not taken care of patients. Now, that's the advantage. The disadvantage that [an] M.D. researcher typically has is that he lacks the experience that graduate schools give in [a] particularly research setting. But that can be overcome by appropriate postdoctoral training.

PIEHLER: So it sounds like NIH was very crucial in that, would that be, in terms of that postdoctoral …

KANG: Right.

DOVER: I wanted to ask you if you if you had had any other, or any previous contact with patients before you started medical school. I know that now it's almost unheard of that somebody not have, you know, some sort of patient contact before they even apply, like, you know, the med schools will frown at you, but, had you had any contact?

KANG: Oh yes, I did, because my father was a practicing internist …

DOVER: Right.

KANG: And two of my maternal uncles were physicians, one [an] internist, the other [a] pediatrician.

DOVER: And that clinic was actually part of the house too, so I guess you …

KANG: Right, yeah.

DOVER: … see patients coming in and out all, quite a lot.

KANG: Oh yeah.

DOVER: So then you weren't—I mean, I can remember my first—I worked in a hospital for a while and I can remember the first experience with patients. I mean, it wasn't even in a, you know, in any kind of authoritative position but it was just sort of a little—it took, it took getting used to.

KANG: Mm hmm. No, I had no problem getting used to—I mean, to me, I sort of grew up with it, so to me it was natural.

DOVER: Did that help you out then, when you were at, in the situations in med school?

KANG: It's difficult to know. I mean, as I told you, the first patient encounter that I had to act like a somewhat of a doctor was a total disaster anyway, and it was very anxietogenic. (Laughs)

PIEHLER: When did you … either spend enough time in the states or figure it didn't matter—you'd learned enough, in terms—you said you were very uncomfortable culturally, but … when did you increasingly start feeling comfortable? Was there a, certain year or a certain moment, or that it didn't matter?

KANG: It's difficult to say. It happens, it's a slow process. And it's difficult for me to put a finger on. Certainly, I would say, it's a gradual process. I think somewhere I began

dreaming and thinking in English rather than Korean, and that more or less marks the time frame in which I felt more American.

DOVER: And I guess your children too, when they started to grow up and they were, that maybe would have helped you.

KANG: Right.

PIEHLER: It's interesting, my mother said the same thing about when she came over from Germany after the war, that she realized she was becoming—she was learning English when her dreams were in English. I've heard that before.

KANG: There's a price to be paid. What that means is I began forgetting Korean now, so twenty-five years after I came here I went back to Korea. I couldn't understand half of what they were saying, especially in a formal setting, the TV news announcer, god, he might as well have been speaking some other language. And I was both chagrinned and astounded. And that still remains, to go back to some of the notes that I took as an undergraduate student at Wofford, or even in the first year of medical school, it's mixed Korean and English, and I cannot understand the Korean part.

PIEHLER: Oh, interesting, very interesting.

DOVER: It's sort of good then that you got your training here. I know that a lot of people who get their medical training in a different country and come here, and then they've got the challenge of trying to translate medical thoughts and trying to learn the medicine and trying to get the language down.

KANG: Yeah it's …

DOVER: Sometimes it's a hard translation.

KANG: Very. It's more than language. It's also the culture and the manner in which people interact with each other. Those are the nuances that cannot be taught very easily and can probably [be] learned only by doing it and experiencing it.

PIEHLER: One of the things that Dr. Grillo really emphasized, and … I really get a sense, particularly from him, it's not just rhetoric, is—and you alluded to this that, even as a researcher the patient comes first when you're dealing with a patient….. And you've already alluded to time, that you work weekends as a result, you work a lot of holidays, I get a sense you stay late. Could you maybe talk a little bit more of that, sort of, that tension there between—you're sort of judged on your research, but don't neglect your patients, in fact they're your first priority.

KANG: It's one of the paradoxes of academic medicine. A physician who does not feel that [the] patient comes first ought not to take care of patients. If there's any doubt, regardless what I am doing, if a patient demands my attention, I have to drop everything.

And my commitment or responsibility to that patient supersedes all other consideration regardless of what, period. And that's deeply inculcated in any well-trained physician. And I say "paradox" because both, all at the same time, when it comes to academic, promotion, and whatnot, those intangibles are not quantifiable. They're not self-evident. What's visible is, "What have you published, what grants have you got," and so on, so on, okay. And yet, if the first … condition prevails, namely your commitment to patient comes first, obviously its impact is going to be on your research.

DOVER: You're living a double life.

KANG: Right. Well this is a paradox, and this is a conflict, and it's a very difficult one for MD investigators. PhD investigators do not have this problem because they don't have patients who can sidetrack their research at any given time. And this is handicap that [the] MD investigator has to live with, and I don't know of any way of avoiding it.

DOVER: Something that's interesting about what you do, there's a lot of programs now that offer an MD, PhD combined program. And it seems almost like that's sort of almost what you do, you sort of culminate the idea of MD, PhD. So, somebody that was going to do the same track that you're on right now, would probably benefit from going that path.

KANG: That is the common belief, and that's why the so-called formal MD, PhD program was devised and is being sold. And that certainly is a way of accomplishing the training of MD's in research. But it is not the only pathway. One can go through the postdoctoral training after MD training rigorous enough to get you to be an effective researcher.

DOVER: Without the actual PhD.

KANG: Without the actual PhD. So to me, it doesn't impress me as to whether the given individual applicant for this or that comes with an MD, PhD or MD or PhD alone, in terms of my evaluation of what the potential of this individual would be. Now, that's me, however. To the review committees of NIH and other funding agencies, a young MD, PhD … gets the benefit of the doubt that MD or PhD alone, PhD alone might not.

PIEHLER: I'm gonna, I'm gonna flip this …

----------END OF TAPE ONE, SIDE TWO----------

PIEHLER: This continues an interview with Dr. Andrew H. Kang on August 3, 2002 in Memphis, Tennessee with Kurt Piehler.

DOVER: And Crystal Dover.

PIEHLER: And I want to ask you, another sort of tension I see, and we sort of have a tension, I mean in humanities, because, in some ways, we're expected to teach, and there

is some evaluation to that, but if you really want to build a career it's you research and your writing…. And service is nice, but—in the end it's your research. I'm struck in medicine also, the tension, the way the American system is structured, that we don't have universal medical care, so we have that, the big picture, and then we sort of fund research—it's funding by the … NIH, in part, and some other sources, and it's competitive. And at the same time, though, a lot of research hospitals are really in either, in urban areas and designed to serve underserved communities. And in a sense, it's sort of an indirect way to meet that large societal need…. I just often look at the finances of medical school and hospitals, and they seem almost like a shell game, that … the funding is really coming from the federal government, from the NIH, from these grants, and they're funding a whole lot of things that are not directly, you know—there's a lot of administrators who are, you know, are being employed on NIH, indirect cost, and a lot of charity care is being given. And it seems like a very tense, and very …

KANG: Well let, let me comment on that for …

PIEHLER: Yeah.

KANG: … somewhat of a historical purview. We are—we meaning American medicine, medical care system—in crisis now, and something has to happen, and I'm not sure what's going to happen. But how do we get to where we are? Well, let's go back to, let's say, [the] pre-Flexner era, 1900. Physicians were not very highly regarded. They were sort of like drug salesman, right. Nor did they have really the training to provide much of a help, by and large, okay. I mean, a patient who went to see a doctor, let's say in 1900 stood probably 50/50 chance of getting helped or being hurt by that encounter. The development of science and redoing of a medical education structure through the so-called Flexner report of 1910 introduced more of a formal curriculum. Basic science first, before they went into an apprenticeship. So, at least there was some scientific basis for practicing medicine [that] was being laid. Well in those days, typical medical schools had a few lecturers or professors in each of the basic science departments, and by and large, its clinical medicine was taught just like your apprenticeship, by volunteer teachers.

Not much science was there, really, until after the World War II ended, and a couple of things happened. One is, obviously, the gradual accumulation of scientific knowledge, but the other thing that happened was, not only the American government, but most developed countries' governments, took a deep sigh of relief from this horrendous decades of World War I and World War II, and finally we had peace. We have [the] United Nations guarantee to avoid all the wars. We are going to devote ourselves to social welfare. So one manifestation of that was that [the] NIH was given a tremendous boost. And so NIH began granting large sums of money, and in those days it was just a piece of cake to write a grant and obtain an NIH grant. So what did the medical schools do? Took advantage of this, okay. And essentially, in the name of conducting research, they supported faculty salary from NIH grants. So when I was a medical student at the Massachusetts General Hospital—no, no, a little later—when I was on the faculty at [the] Massachusetts General Hospital, in the year, mid '60s, there were three hundred assistant

professors in the department of medicine alone. And do you know how many people we have in the department of medicine here now? Less that a hundred. And then, this is only [the] Mass. General, and then they had a Brigham hospital and Beth-Israel Hospital and a Boston City Hospital. Well, how did they support three hundred assistant professors? Well, they didn't. They didn't pay a nickel towards their salary. They all earned their own income through NIH grants. And therefore, research-intensive institutions could prosper by having any number of young people who want to do research, write a grant, and indirectly, medical education was paid for. And it was construed among assistant professors that for you to be appointed to be an attending physician for one month on the Bullfinch teaching service is a privilege. So, since every one of them were a hard-driving, upwardly mobile person, they vied for that opportunity to prove they're good doctors and good teachers. So medical education was cheap. Tuition at Harvard was a thousand dollars a year.

PIEHLER: And that wasn't even a bad price in terms of, you know, that was still a good price even then, I mean, that was …

KANG: And then NIH grant … began to go down as a percentage of funding, okay. And that source dried up, or began to dry up. So what did the medical schools do? Well, fortuitously Johnson's administration had passed [the] Great Society, or whatever bill, that included among other things, Medicare. And remember the bill of goods he sold? Well, senior citizens deserved the dignity of not having to worry about medical care costs. And this is not … socialized medicine. It is simply—we are going to reimburse physicians, and we'll have continuously a system in which the patients can choose their doctors, all right. So what happened? Medical schools found out that we can bill for services rendered by the faculty to Medicare and to other insurance companies. Insurance companies, by and large, followed what Medicare did. So patient services became a major source of income. As NIH began cutting down on their faculty salary, increasing proportion of faculty salary and medical school budget came from the so-called practice income. That was then. You know what the Medicare's first, several years budget was annually?

PIEHLER: Oh it was, it was …

KANG: I don't know the exact number …

PIEHLER: But it was, no, I know …

KANG: Small number of billions, okay. Do you know what it is now? It's … hundreds of billions. So as … medical care became more and more expensive to the government and to society, they had to try to find means of containing the rising costs. And oddly enough, [the] Reagan administration was a first that took the action. And he began introducing the so-called DRG concept. So we are not gonna pay for—anymore—the services rendered, but rather, we're gonna pay … according to the diagnosis you are given, because [a] patient with a diagnosis of, let's say for example, pneumonia, let's say on the average it should not cost more than two thousand dollars…. If you treat a

thousand such patients, we'll just give you two thousand multiplied by a thousand. That's what you get. And if you happen to be smart enough and good enough to save money and find [a] more economic way of doing it, then we will allow you to keep whatever profit you may make, okay. It's the beginning of government control, right? And [they] soon found out that that didn't work to contain the expanding medical care costs. So, the introduction of managed care, okay. Regardless how you slice it now, the income to the faculty or the doctor is beginning to diminish, and the medical school gets squeezed. And because they can no longer subsidize the faculty from practice income, NIH hasn't recovered, now the faculty income is going down, what is the medical school, schools going to do? Well, one of the things they began doing is … increasing the tuition. University of Tennessee is a state school. I hate to tell you what the medical school tuition is now. It's well over $11,000 now, and maybe even more than that. I've sort of stopped watching it after I stopped being a chairman, so I haven't kept up with the latest. But I wouldn't be surprised if it is more in [the] low teens, now, a year.

DOVER: Just recently they passed, I think, like a twenty-two percent increase, for the medical school.

KANG: Right, so this maybe …

PIEHLER: It doesn't hurt—it hurts also to be in Tennessee, which …

KANG: That's one thing that happened. The other thing that began happening was, who is going to pick up the slack from monies that are not coming from NIH, and monies that are not coming from practice income? So state supported institutions began turning to states to appropriate more and more money, and various states did variable amounts of appropriating additional monies. Well, I won't comment on what the state legislature of Tennessee did, but, be that as it may, that's what's happened. So the problem that we are facing now is that NIH has recovered a little bit. It went through the nadir; it's a little bit better, but in no sense of the term is it as good as it was in 1960s. Patient care dollar is increasingly becoming more difficult to get, as more and more governmental and regulatory intervention is made, because it drives up our overhead now, right. There's a lot more paperwork to collect the ten bucks. Not only that, in the particular case of [the] state of Tennessee, Medicaid was converted to TennCare. With the same amount of a total Medicaid money, they enrolled fifty percent more patients. Now, you don't have to be a genius to figure out that there's gonna be less money left over for the doctors or the hospitals. If you have to take care of … fifty percent more patients, for the same amount of money, there ain't gonna be enough money regardless how you cut it. So we have a, even more of a problem than the next state without the TennCare problem. But be that as it may, there is no medical school that's not experiencing some form of problems from the fact that we came to be where we are, as I explained, from borrowing money to, you know, rob Peter to pay for Paul. And now we sort of came to a place where there is nowhere to turn.

PIEHLER: Now, it's interesting you say that, because that's my sense, that's my reading of it as someone looking on the outside, and I started getting an inkling of this from my

friends who were in the sciences and they would describe how science is funded, and I said how, this is like a, something of a shell game. You mean your advisor, he has to raise his salary, I mean, you know, he has, you know, he has to pay for everything. I mean what does he get from the University? And I was sort of a—it was eye opening because I would assume, well, if he was at the University, he can get these things from the University.

KANG: Well, let me put it this way. Less than half of my total income comes from the University. In fact, far less than that. (Laughter) So, yeah, in a sense there's a shell game involved, although it's a different kind than what you mean.

PIEHLER: Yeah and I, I mean I just using sort of—I know it's more complicated than that.... In many ways your career, you even said you'd [benefited from] serendipity and particularly some very early success, but … could you maybe reflect on some of the dead ends that … looked promising, or research things you changed because of other people's research, and in terms of the process of learning what works and doesn't work. And I think, both for someone like Crystal, who will hopefully be in medical research, but also for someone who's not familiar with medicine and science, because I think the lay people think, "Well, why can't they figure this out?"

KANG: Well, I'll tell you one of the greatest failures in my career was to try to change the character and flavor of the Department of Medicine and College of Medicine to [become] much more, in my view, research-oriented and intellectually rigorous, as its chairman. And I gave my very best attempt for ten years, and I could not do it. And in the end, I had to admit to myself I was unable to do it, and a better thing to do is, instead of failing, give somebody who is more able the opportunity to change it. This place, this department wasn't much better after my ten years, as I would liked it to have been. That was perhaps my greatest frustration.

PIEHLER: Because you came here and you thought there was need for more research.

KANG: I came here only as a temporary place.

PIEHLER: I remember, you said that, this wasn't a place you were going to camp out permanently.

KANG: Simply to prove that "I can do independent research away from this, my great master, by being able to publish and carry on. And once I prove that, I'll be [a] much more salable academic commodity to any other institution, hopefully to Harvard," okay. So, such was my thought. And for a variety of different reasons, I never left, because things were going well personally for me in Memphis, and I'm not sure, incidentally, I might have done any better research-wise had I gone to anywhere else. So I'm not critical of my own career, and …

PIEHLER: Yeah, because you said in your interview, … in the end, in terms of your own research, this was a great place to be.

KANG: Right. The—my frustration has to do with the fact that this is not a research-intensive university, although we talk about the administrative—maybe I should turn that off …

(Tape paused)

PIEHLER: So you—one of the things you had said off the record, I guess I can put on that, in many ways, while UT Memphis has some strength, on the other hand in terms of research dollars, it really—it still has a long way to go…. And in terms of ranking, that it's a good state school, but when you compare it to all medical schools, it's a long way to go with the research.

KANG: I would agree with that. Yes, there's a lot of room for improvement, and I am ambitious and anxious to improve the UT's ranking in the research world, yeah. And I was somewhat encouraged by the preceding president's decision to make research excellence his mission. And one concrete or tangible consequence of that was the creation of [the] so-called research centers of excellence. Unfortunately, that was a useful step forward, but the president is gone, and the state legislature has not kept its share of the bargain. So I'm really not sure what its future is. I would like to believe that [the] new President, Dr. Shumaker, will follow through on that. He, when he was interviewing as a candidate, I was impressed that he, in fact, would not only follow through, but expand on it. But what he's able to do in the face of the legislative actions or inactions, I really don't know. But I still retain my ambition for the University of Tennessee to become a better and better institution.

DOVER: I've gotten sort of the sense, though, that your department, especially with the, you know, rheumatoid diseases, was pretty good. I didn't know—are some of the other departments as well developed as that one is? I mean, that one seems to be—you know, you talked about all the grants you had gotten, and competed with top level schools, and been able to get these grants. I didn't know if any of the other departments were as prominent as that one.

KANG: There are a few that are nationally rankable or competitive, yeah. Certainly rheumatology is, in my prejudiced opinion, probably one of the top ten … units in the country. But there are several, a few other programs …

PIEHLER: And you don't have to name names in that …

DOVER: Right, but yours is definitely one of the top ones here. You get a lot of the students interested in rheumatology. This is some, somewhere they definitely want to consider.

KANG: Oh, I would think so, yeah.

PIEHLER: I—you married a doctor, and the little I know about Korean culture, particularly traditional Korean culture, women don't really have careers outside of the household, traditionally.

KANG: That, traditionally …

PIEHLER: Elite women particularly, and I guess my sense of culture is … very mixed, at least on—it also gets complicated because women sort of run the household is my understanding, so it gets, the male may be the head. But still males are sort of the head and women really, in traditional, women stay home. And … you described in your last interview how you met your wife, and she, you've already alluded, you know, you had to be in, it had to be Boston, or pretty close for your internship. Could you maybe talk about that in terms of growing up in a Korean culture and then coming to America, and also in a time, also when it was unusual for women to be doctors. I mean your wife was something of a …

DOVER: Anomaly.

PIEHLER: Yeah, pioneer, I mean still, much more, and now it's very uncommon.

KANG: Well, you are correct with your comment that traditionally in Korea women play a role of a housewife and men play the role of a bread earner. And it was very much a men oriented, patriarchal society. I might add, however, that custom has changed, is changing and has changed quite considerably.

PIEHLER: Oh yeah, Korea today …

KANG: So that now, marriage is no longer arranged, and in fact if you suggest that to young people they would take a great offense at that. So, but … Korea had changed, but certainly that was the case, and I grew up in a traditional household. But you know, young men are young men. You come to this country, you see different culture, and obviously I liked it, or else I would not have lasted as long, and what can you do, I fell in love, okay. So at that point I did what I thought was best to do, and I married for love really, not because she was a doctor or she was anything else, not because necessarily she was even a second generation Korean, although that made it a little bit easier. And then, I guess, the adjustment after marriage was a very interesting one because here I had overrated in my mind, as I was calling, her "Koreanness." She was anything but Korean. I mean, she could have been just another person like you, or anyone else that grew up in this country. So her cultural appreciation, or I should say acceptance, was counterintuitive to her. I mean this is, just everything that I said or thought in a Korean way was total anathema to her. Similarly, she overrated, I guess, my … assimilation of American culture during the courtship, I guess. So as a result, she, too, was astounded. (Laughter)

PIEHLER: There was still more Korean in you.

KANG: Right, at the gap. And we had to work diligently, and really hard over the years to narrow that gap. And I'm not sure that gap is closed yet, but at least much more so than when we were newly married. So there [were] some interesting moments living through that. Now, the other thing, I guess, aspect that made it difficult was that she had her career that she wanted …

PIEHLER: That was my question.

KANG: … she wanted to pursue, which was okay with me. I didn't have a philosophical problem with that. Indeed, I encouraged her to do that. The problem was we were in abject poverty, and how to pull that off, that may sound contradictory, unbelievable to you. How can two married physicians be so poor? Well, I'll tell you why. In those days, my salary as an intern was twenty-five bucks a month. That's why we were so poor. (Laughs) They didn't pay interns like they do now. So we were poor, and therefore had a very difficult time. Getting her to pursue more training, as an academic physician would entail, even as I was ambitiously pursuing my academic training. So we had to go through some very deep debts, as well as pure poverty. I don't know how else to describe that other than pure poverty.

PIEHLER: I remember you alluded that you were in the money when you got the NIH, NIH position, you know, when you were in NIH, that you felt this was—you never felt in your life that you had so much money.

KANG: Yeah, this is a—for the first time I had a salary equivalent to a Lieutenant Commander, an Army Major. It was all of something like twelve, thirteen thousand a year, but that felt, compared to the preceding years, like heaven. I mean, I could afford to buy a pair of shoes for myself. I even …

DOVER: And that's even after coming here. You, initially you … really had to build from nothing, but it was like a culmination of years and years of building and building from, from wondering if you were going to be able to afford to apply to medical school.

KANG: Oh, you mean back when I was a student?

DOVER: Back, way back, and you just had been building and building and building, and finally …

KANG: I don't know at what point you're going back to, when I was …

DOVER: When you were first getting here and had been at Wofford.

KANG: Oh, yes. I was despondent. I was despondent. I came here under the false understanding that I was being admitted to a premedical portion of a medical school. That is the system in Korea. That, obviously, was never the system in this country. And when I realized that I was on my own, for medical education, I panicked. I really wanted to go back to Korea, because there I had a position in a premed. Two reasons … I didn't

go back. One was I didn't have a return fare. The second reason was, my benefactor, friend, mentor, Frank Logan, Dean Logan later, he was a religious man, very religious man. He persuaded me that, "Andy, I don't know how it's going to happen, but I have faith that if you try your best, that something will happen and somehow you will make it. Don't think of any stupid things like going back to Korea now. Finish your education. Right now your duty and your job is do as well as you can at Wofford College, and then we will worry about the medical school when we come to that bridge." I don't think he had any particular tricks up his sleeve. He was working on the faith that something would happen. So, yeah, that was … the status. So I knew some poverty at that point. (Laughter) But it continued after the medical school.

PIEHLER: … One of the things I told Crystal and about this project, what I learned about medicine, and I think that some of the popular images of doctors, … I was just sort of stung when I started interviewing doctors back in World War II era. And they would describe, you know, I interviewed people who—residents didn't get paid anything; they got room and board. And they, you know, and just—if you went into private practice, you know, trying to get a practice going was an extremely difficult thing, it was not very remunerative, you know. Even by these, the first doctors I interviewed, two doctors that went to York, Pennsylvania, they were sort of lured there. I mean, they were even, sort of recruited, and they picked it up, and he said the first year he lost money. He didn't make any money as a doctor, and some desperate things that I would have viewed desperate, like riding with the police for emergency calls, to make extra money. And I think a lot of people of Crystal's generation don't realize that, that the structure was very different in terms of remuneration in the beginning of your career.

KANG: Yeah. I wouldn't know that very well, although it seemed to me, by the time I came here, I befriended a family, known as George Dean Johnson, practicing pediatrician in Spartanburg, South Carolina, and on the surface of it, he lived a lifestyle that was reasonably affluent, I thought. So by that time, I think physicians in practice were making a very decent income.

PIEHLER: Yeah. I mean, once you're established, but, but getting to that point, I've always been—I'm increasingly being struck, that that was a lot more difficult, particularly earlier, you know, and I think it got a lot better by the sixties, but … before that, … it wasn't always as smooth as I used to think, "Well, you're a doctor. You must be making a really good salary, right away, as soon as they gave you the diploma."

DOVER: You know, there was one last question, and it's sort of a—particularly interests me now because of where I am with my applications and whatnot, but I was wondering about the … admissions process when you were going to Harvard, because I know that now it truly is a process, you know. It's a multi-step … process, and what was it like then?

KANG: Probably is very, not very much different. We had to, obviously, write an application that was unique to each medical school, so if you applied to ten medical schools, you put in ten different forms, by hand—remember, it was before the days of a

computer—and write an individual statement as to why you want to be a doctor. And certainly the elements that enter into the medical school's consideration in those days were—they were much more rigid about the residency requirement, meaning if you are not a citizen of the State of Tennessee or State of South Carolina, period, they won't even send you the application form. So that was one of the first things I had to overcome, so as a consequence, it forced me to have to apply to only the private medical schools. So I started from Harvard, to Cornell, to Hopkins, to Duke, and picked off private schools, Emory, Tulane, Baylor, and so on. But be that as it may, those are—certainly, you had to that. You had to take [the] MCAT and you had to be interviewed. And therein lies a luck factor. School, GPA, is nothing you can do about it; it's done, okay. MCAT score, there's nothing you can do about it; it's done, all right. Letters of recommendation, there's nothing you can do about it. You probably chose the two most favorable ones anyway, right, so you put your best foot forward. Now comes the—somewhat of a luck determining step, which is the interview. Now you can get all different kinds of interviews, interviewers, and unfortunately, interviews carry [an] inordinate amount of weight in the deliberation of at least the borderline situations. And by nature, it is a subjective one. And as long as it's a subjective one, there's a luck factor involved in terms of whether there's a personality match to a given interviewer and interviewee. And I'm not sure how we eliminate that chance factor. And I've seen both [the] good part of it, and I've seen also the unfortunate part of that process. I was lucky, because I was interviewed by a very, very benign—not only benign, but almost fatherly interviewer, who, for reasons totally beyond me, from the first moment, probably even before I got there, decided he was going to like me anyway. But on the other hand, there are people who were interviewed by some malignant interviewer or very stressful interviewer. In fact, in different schools I've run into a, some stress interview techniques, and it's—one, the first one I ran into this was at Tulane Medical school, one of the first medical schools that I, in fact, the first medical school that I went for an interview. First interviewer was chairman of [the] Department of Anatomy, an elderly gentleman. So I found his office, got there at an appointed time, and he greeted me good morning. He verified that I was Andrew Kang from Wofford College, and he sat down. And he didn't say one word, not one word, for the seeming eternity. And I began wondering whether I should volunteer, ask questions, make statements. It was the most stressful moment, and I didn't know what to do. I didn't say anything. And then about, [what] seemed like after an eternity, a few minutes I guess, he simply said, "When is your next appointment?" So I told him. "And who is that with?" And I told him. And he says, "Oh, he's in Charity Hospital, so you're free to go."

PIEHLER: That was it?

KANG: That was it. And I found that the most stressful interview. Now obviously, according to his technique, he was assessing various, various factors, how does a candidate respond to a stressful situation. Is reaction appropriate or inappropriate, and so on. But there's a luck factor involved in it. And my wife, in fact, served on [an] admissions committee for five years here, and she says it's a luck factor, because she would see a pair—usually a student is interviewed by two interviewers. And sometime, most of the times they'll tend to sort of agree in a general sort of way, but once in a

while, they encounter a situation where they end up with a diametrically opposed point of view.

PIEHLER: I've been in some group interviewing situations, and it's striking, your reaction to the candidates. Yeah there is a really subjective …

KANG: Yeah. So there's nothing you can do about it, so don't even worry about it. It's beyond your control. (Laughter)

DOVER: Well the last thing that I wanted to ask you was, I know that you think very highly of Harvard, and I know that, you know, you had three daughters that went to medical school. Do you think that Harvard is still sort of the … powerhouse of medical schools, that it was? I mean, would you still think that that would be the pinnacle of where you could go?

KANG: By all objective criteria, yeah. It's a unique institution. There are very few, if any, like them, in the country. Now you can get just as good an education at another institution. This is not to say that that's the only place, but certainly it … remains the top dog, as an … academic institution, yeah.

PIEHLER: I just—how many people from your medical school class do you stay in touch with over the years? Do you …

KANG: Relatively, surprisingly few. I have a classmate here on the faculty in the Department of Pathology, and even then, you know, we may run into each other every so many months in a faculty meeting or whatever, and a few others that I kept up with a correspondence and communications.

PIEHLER: What about Wofford College? Did you stay in touch with anyone, any of you classmates?

KANG: Again, only handful of people, one of my ex-roommates, but not as much as I might have liked or I might have thought, yeah.

PIEHLER: Have you gone back to reunions, either at Wofford, or at Harvard Medical School?

KANG: I've gone to only one class reunion. That may be part of the reason why I don't have that connection. But it's interesting that I watched my daughter, daughters. One of them in fact is married to a classmate of hers. Somehow or other, they have never been to their class reunions, medical school class reunions, although from the behavior of the students, their behavior on the day of graduation, I might have predicted that, "This is a very small class." Brown has all of either fifty or sixty students, and they knew everybody and they were all friends. I would have thought that they would probably keep up with them. But it's interesting. Despite the fact that they have been in better

financial circumstances than I was after graduation, my graduation from medical school, they have not gone back to their class reunion.

PIEHLER: And you mentioned going back to Korea, and … the language, you were having a hard time understanding some of it. What was it like to come back to Korea so successful? I mean, you had come from a very prominent family, but you had horrible experiences during the war, and keeping together on shoestrings for a number of years, now you came back and were honored. What was that—what kind of emotions did you have?

KANG: Obviously, that was a very emotionally moving, moving experience. It's difficult to sort of capsulize the emotion that I felt all at the same time. I felt in a way satisfied and happy, but also sad, and [felt] like, in a way, I betrayed the country for my own personal ambitions, and that I owe, not only the country, but also the remainder of my siblings, a great deal that I failed to do, that I perhaps should have done. So, it's a complicated emotion, but certainly, considering the alternative of going in there as a failure, obviously everybody else, everybody was also happy to have me come back as a successful brother or a successful relative, yeah.

PIEHLER: I know for some Korean Veterans—there was particularly one we had come out and speak at Celebrate Freedom…. He eventually worked for the Defense Department and he had been a Korean War Veteran. And then he came back and worked in Korea for two years. And in some ways, it made his experiences as a Veteran in the Korean War … much more meaningful, because he came back to a Korea that was incredibly prosperous. He went to Seoul, and he couldn't recognize any landmarks except for the old Parliament building. Everything else, it was like if he was blindfolded and dropped there, he would have no idea where he was because it was so different. What was your sense of going back to this Korea you had been away [from] for a number of years?

KANG: The first time I went back was twenty-five years after I left. And I was absolutely astounded as to the difference between the day I left and the day I arrived there. And it almost—not almost—the tears welled in my eyes for the difference. I left in '55, two years after the cease-fire. Seoul was still in ruins, demolished. Bombed buildings weren't completely cleared out. Nothing was working. Nothing was working. There wasn't enough … electric supplies; they were rationed to two hours, or whatever. The only thing you could do is turn a light on if you're lucky, and get whatever you need to do. And light would go off. Certainly there people were hungry, people were cold, they weren't dressed right. It was really traumatic. Gross national product that year, per capita income, was seventy-two dollars. The economic reporters of the world, newspapers, voted South Korea as the least likely country to succeed economically. They were rated below African, sub-Saharan African countries.

PIEHLER: Well you mentioned even Afganistan, in your last interview, was rated higher than Korea, South Korea.

KANG: Right. So it was a tragic situation. And then on top of that, there was a political chaos, that then the President Syngman Rhee was increasingly showing the sign of a—not sign—becoming a dictator, despite that fact that he lived in the United States for thirty-six years. He was a Princeton grad, but that didn't alter the fact that he became a dictator. (Laughter) Partly, I'm sure, it's the stress of the war, and he had to control. But be that as it may, he became a dictator, and a political chaos—people were rebelling, students were demonstrating. And then soon there after he went into a totally French style Parliamentary government in a nation that [had] no tradition of democracy. And it was even worse chaos. I mean at least in the day of a dictatorship there was a power, somebody. And it really did not get back to a sense of normalcy until, forgive me for saying this, a military dictator took over and, fellow named Park. This was in—I want to say early '60s, '61, '62 range. And he was apparently totally merciless in rooting out bribery, and in rooting out any behavior he thought was contrary to the national interest. But he started the country on the road of economic recovery, systematically. So they [paid] the price of a ruthless military dictator. On the other hand, the … country was beginning to recover. But this, to me, reading from America is a newspaper story. The reality is not there.

PIEHLER: Your image is still of this Korea that, that you left.

KANG: Right. Not until when I returned in 1980—"This is not the same city I left. [It's] totally different," yeah. And then it's even, in a sense, even more astounding is the difference between 1980 and the year 2002. I was just there for FIFA. Not for FIFA, but happened to be there when the FIFA game was going on. And Korea was in chaos. I mean, they were in madness, because, first of all, it's the first time any Asian country hosted a World Cup series, number one. Number two, Korean team did better than anybody ever … (Laughter)

PIEHLER: I know, it was remarkable.

KANG: … expected, so they were just in [a] frenzy. But be that as it may, if I think back what it was like in 1980, and obviously I have been going back frequently since that time, saw the gradual changes, but if I had stayed away twenty years and went back in 2002, I would have been equally shocked at the difference.

PIEHLER: Well, no, now Korea has both economic success and a democracy.

KANG: It has a better working democracy …

PIEHLER: Yeah, yeah, I mean it may not be perfect, but it's not a dictatorship, in the …

KANG: Not in the sense of the previous fellows, yeah.

PIEHLER: Well I guess one final—I partly wanted Crystal to do this because she knew some of the science, but I … figured she'd learn some things by interviewing doctors about the things they don't teach you in books about medicine and medical career. But

what, what sort of advice, in a general sense, would you give to people contemplating a career in medicine, either as someone who might be a … medical researcher, but also just medicine in general, someone who might want to be a surgeon or family practitioner?

KANG: I think they have to know why they want to be a doctor. They want to—they must want to work with people and help people, either directly or indirectly. If there is no such commitment, firm commitment, then he'll become a mercenary, and that is the worst possible reason that I can think of, [for] a person that comes into medical school. And in fact, that is the worst possible kind of doctor, that I would like to see eliminated from existence.

PIEHLER: The mercenary, who …

KANG: Avarice. If you have [a] sense of a social good, at whatever level, whether it be research, individual services, or whatnot, I can't think of a profession that is more satisfying than becoming a physician and living as a physician. It's indeed a privilege. And I mind you, this is not uniformly true of all physicians in other countries. This still—[the] United States remains one of the few countries where physicians are honored as much as they are, although their respect is diminishing a little bit.

PIEHLER: But you think that social ethos is an important one. I mean, that's something … you think is important as a physician, as an educator, medical educator, as a medical researcher.

KANG: If I were interviewing a student, evaluating a student, and smelled that the student has any other motive other than social commitment, and commitment to humanity, I would not accept such a student. Obviously those are sometimes very difficult to ferret out. And one of the most, saddest things that I witnessed is doctors who [are] acting like mercenaries. I almost want to, I almost …

----------END OF TAPE TWO, SIDE ONE----------

PIEHLER: Well, I just want to ask you—is there anything we forgot to ask you, or you want to say? I mean, we really appreciate you doing a follow-up, and …

KANG: Well, I can't think of anything more I can say. (Laughter)

PIEHLER: You know, well we really …

DOVER: Thank you very much.

PIEHLER: Thank you very much, it's been a—and thank you particularly for coming in on a … very hot Saturday afternoon in August in Memphis …

KANG: Well it's my …

PIEHLER: And coming to the medical school.

KANG: Well it's my pleasure, yeah. Much easier on Saturday than weekdays, I assure you. (Laughter)

----------END OF INTERVIEW----------

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