

**ARMED FORCES INSTITUTE OF PATHOLOGY
ORAL HISTORY PROGRAM**

SUBJECT: Dr. John E. Madewell
INTERVIEWER: Charles Stuart Kennedy
DATE: October 20, 1994

Q: Good morning, Dr. Madewell.

DR. MADEWELL: Good morning.

Q: Could we start this off by telling me when and where you were born and a bit about your family background, please.

DR. MADEWELL: Okay. I was born in Muskogee, Oklahoma, of Ruth and Hugh Madewell, in 1941. Grew up for the first few years in Muskogee. Have a sister; two in the family, Sue. Moved to Oklahoma City, to the suburbs, Jones, Oklahoma. My father was in an independent business, in the trucking and junk-battery business. And so I grew up in a very work-oriented-ethic background. I worked for my father when I was a little kid, doing whatever was the family business. So I grew up working like a farmer, you know, seven days a week. There was no time off other than the business. So I think that was an important cultural piece in my background. I've always enjoyed what I've done. The work has been a major part of my ego, my value in life. And I think that stemmed, really, from the family business and working with my father in that endeavor.

Q: What were Muskogee and Jones, Oklahoma, like, when you start remembering it?

DR. MADEWELL: Well, Muskogee is a small, moderately large town. I grew up in, I would say, a middle-class, lower-class area. The family was hard working, upward-mobility type of a system. Then, when we moved to Jones, it was a similar setup. This was a much more rural community. It was a very small town. A lot of farms in a town of about 600-800. So that was a very close family group. Went to school there. Then we moved to Midwest City, which is a little larger, a suburb of Oklahoma City, for high school. So I grew up in, I would say, middle America, in a lower-middle class area, with upward mobility, with a very hard work ethic in the family.

Q: In school, and also in your community, did you have any sort of connection with or knowledge of the medical profession other than getting shots and that sort of thing?

DR. MADEWELL: I had none. My family was such that no one in the family had any medical background. In fact, my father was one of the first of the family to go to college. So the educational background of the family was moderate, to say the least. My grandfather on my mother's side didn't read or write, and signed his name with an X. So

the background was very good people, hard working, but certainly not cultured, from that sense of the word. The educational piece was always something to achieve in my family, through my father and mother. So it was important for them that I go to college, achieve something better than what the parents had. And that was another motivating force. But in no way did we have any experience in medicine other than being a patient and going to see a physician.

I got interested in medicine, actually, in college. I had always done well in mathematics and sciences. So I enjoyed those areas and was probably headed towards a math career or a chemistry career. Met my friend at the college cafeteria.

Q: Which college was this?

DR. MADEWELL: This was at Central State College, in Edmond, Oklahoma. And we talked about medicine. He was interested in medicine. I was, at the time, married, had one child, was driving a truck, putting myself through college, and it sounded interesting. I knew very little about medicine. In fact, I decided to apply to medical school more for a lark, because I said, "Well, gee, it sounds like something fun to do." So I got an application form, sent it in to only one school, the University of Oklahoma, which was our State school, did not apply anywhere else, and was accepted before I graduated from college. They had an early-acceptance program at that time. And then, once accepted, I decided to go ahead and accept their acceptance of me and matriculate with them, and went to the college of medicine.

Q: You graduated from college when?

DR. MADEWELL: Well, I never graduated from college. I got out of college in three and a half years. They had an early-recruitment program at the University of Oklahoma at the time, in 1965, and I was accepted into that early-recruitment program. Had I wanted to, after medical school, I could have gone back and taken a couple of courses and completed the college degree. But I elected not to do that. I didn't see any reason to do that. I just went with my MD degree.

Q: You say "recruited." Was this part of a military...

DR. MADEWELL: No, no, no. There was no recruitment in a formal sense other than, in the mid-'60s, there was a push to have more physicians. There was a perceived physician shortage. Expenses. They felt that, if they trained more doctors, they would have more services in rural America, etc. So there was an expansion of medical schools throughout the country in the mid-'60s, not only in number, but in class size of existing medical schools. When they started expanding the class sizes and the number of medical schools, they, in essence, lowered the requirements. In some schools, you did not have to have a college degree. You had to have, I think it was, 90-some-odd hours of college credit, with certain specifics or selective areas, to apply to medical school. So I got in on

that track when they were trying to enlist more students into medicine.

Q: Did the medical school at the University of Oklahoma have sort of a specialty, or was it a fairly general one?

DR. MADEWELL: It was a very general program at that time. Specialties certainly existed, but they hadn't become as dominant as they were to become in the next decade. In fact, when I applied to medical school, since I had very little knowledge of medicine per se, other than from friends, my primary goal was to become a family physician. Of course, that's all I'd ever been exposed to, was family physicians. Did not think of a specialty area of interest at all at that time. I didn't know what a specialty was. So my direction in medical school, quite frankly, at least for the first three, three and a half years, was to go into a family-physician practice.

Q: Since your field later became radiology, what was your feeling towards radiology? Just another course?

DR. MADEWELL: Yes, it was indifference, since I had no experience with it, both before medical school and throughout the majority of that aspect of medical school. There was one gentleman, Ernest Lachman, who was the director of anatomy in our first year of medical school at the University of Oklahoma. Dr. Lachman was a radiologist from Germany, had exited before World War II and immigrated to the United States, and was the director of anatomy. A physician/radiologist, but teaching anatomy. He introduced some little vignettes called "Radiologic Anatomy" that were eventually published. Those were taking the X-rays and relating them to anatomic principles, and showing the value of the radiographic anatomy pieces. And that was exciting to me. So that would have probably been my first exposure to radiology, through the anatomy laboratory and Dr. Lachman's work on that.

Q: How about pathology as a course?

DR. MADEWELL: Well, the source of pathology came about really through the Armed Forces Institute of Pathology, the AFIP. When I was in residency training at Walter Reed Army Medical Center in diagnostic radiology, there was an elective created, and I spent a little bit of time working with Dr. Theros and some of the pathologists at the AFIP. I enjoyed that. I always enjoyed teaching files, trying to understand why the X-ray looked the way it did. And when I was exposed to morphology, in the form of abnormal anatomy in the form of pathology, it was very exciting to me. I enjoyed it. I'd worked on a couple of case reports through the radiologic pathology department here at the AFIP, which again furthered my interest in pathology and radiology. And then an opening became available through Dr. Theros and Mo Reeder, who was the director of radiology at Walter Reed Army Medical Center at the time, to develop a one-year fellowship at the AFIP in this morphologic science.

Q: I want to take you back a bit, and then we'll come back to this. You graduated from the University of Oklahoma in 1969, and then what did you do?

DR. MADEWELL: Just before graduation from medical school, we had two children, my wife Teddy and I. So we were like all medical students: poor. I think that's almost a given. We needed money, so we decided to join the early-enlistment program of the Army. We joined that in our fourth year and paid a stipend--\$300 or so per month--for that last year. We had an obligation to go into the service at the completion of the fourth year of medical school, so we looked around at service opportunities and decided to actually go to the West Coast, to Madigan General Hospital.

My first year out of medical school, I did an internal medicine, a straight internship in medicine. In fact, I thought I was going to go into medicine; that would have been one of my choices. I made that selection prior to having a fourth-year elective at the University of Oklahoma, where we went out into the community and spent three months in a small community hospital.

This elective (or externship, as they used to call it) I spent in Sapulpa, Oklahoma, which is just south of Tulsa. A small community hospital. I lived there for three months, lived in the hospital, worked in the hospital, went to the physicians' offices.

And what impressed me in Sapulpa was that the radiologists were very interested in their practice. These were senior radiologists who had been out in their community and practicing for 15, 20 years, but were still excited about medicine, the care of patients, and how their specialty related to the care of the patients. That impressed me, because I saw the other physicians, in their office practices, really more concerned with the financial pieces. They seemed to be frustrated with medicine. But the radiologists were still very idealistic, enjoyed it, and were excited by it.

One of the things that I was always looking for in my future employment was something that I could relate to as a person and be part of my ethnic background growing up as a son in a family business. So, when that came along, it really impressed me. I enjoyed radiology, and then decided to go into radiology my last year of medical school. But we went through the internship prior to that.

Q: So we're talking about '68, '69, when you were working on that. What was the state of radiology then?

DR. MADEWELL: Well, compared to today, it was very limited. As a fourth-year medical student, what was available certainly was plain-film radiography. (Next year, 1995, will be the centennial of Roentgen's discovery.) So they had plain film. They had fluoroscopic radiology. Nuclear medicine was very limited and crude, but available. Special procedures had not really taken off. And then we introduced contrast media into the GI tract, barium studies, to study the alimentary systems, the tracheal/bronchial tree, the larynx, different areas. So it was, I would say, limited, fundamental, compared to the broad array of services that exist today.

Q: You were at Madigan General Hospital, an Army hospital at Fort Lewis, Washington, from '69 to '70. What were you doing there?

DR. MADEWELL: I was a straight intern in medicine. I had 12 months on medical rotations, and did some pediatric rotations as part of that medicine rotation. I think I did one month of radiology elective at Madigan General Hospital. They had residency training programs in medicine, pediatrics, and, I think, general surgery. They had predominantly general internships at that time. Specialty internships had just started. So I was one of the first specialty interns, doing an exclusively medicine internship. The majority of the interns in my class were general interns, where they had to take three months of this, three months of that, throughout the broad spectrum of medicine.

Q: When you say a "medicine" internship, what do you mean by that?

DR. MADEWELL: The general internship was usually a combination of medicine, surgery, obstetrics, gynecology, the basic fundamentals of the practice, equally distributed. A straight internship in medicine was where you did 12 months of medicine. You had some electives, say, one, two, three months, where you could do one month of surgery, one month of something else, etc. But it was dominated by a medicine rotation; at least eight to nine months of it would be medicine. Whereas in the traditional rotating internship, medicine may only occupy four or five months of that rotation.

Q: You finished there in 1970, and then, still in the Army, you went on to Walter Reed. Is that right?

DR. MADEWELL: Right. There was an application process, out of internship, to apply to the Army radiology programs. I think there were four or five at that time. I looked at San Antonio, Brooke Army Medical Center; Fitzsimmons, which is in Denver, Colorado; and Walter Reed. I ranked those in that order, Walter Reed being the number-one choice, and was accepted to the Walter Reed program.

Q: You were at Walter Reed from '70 to '73. What was the thrust of what you were doing in this program?

DR. MADEWELL: Well, there was an interesting shift occurring at that time in radiology. I was accepted into the three-year program in what we called a general radiology residency. But, during the latter part of my first year and just starting into my second year, there was a choice offered to the general radiologists to decide whether they wanted to stay in general radiology or go into a straight diagnostic radiology training program.

General radiology at that time was two years of diagnostic radiology, which is plain film, fluoroscopy, angiography, interventional, those types of radiologic

examination. The other year was in therapeutic radiology, or what is now called radiation oncology, where they use the X-ray beam as a therapeutic modality in treating neoplasms.

My first year was in diagnostic radiology. The Army had made a choice to offer diagnostic training programs during that year. That was offered to me, and I elected to switch from a general radiology training program, which would have been two and one, to a straight, or diagnostic, radiology training program, which was three years of diagnostic radiology and no radiation oncology.

That was occurring across the country. Those two areas are still in the general field of radiology, but they are two separate specialties: one in radiation oncology, or therapeutic radiology; the other in diagnostic radiology.

Q: On this, and I'm speaking as a layman, was there concern about the normal X-ray as far as its adverse effects on the patient? As I recall, at one time, doctors seemed to be a little more prone to use this, without as many safeguards as they have now.

DR. MADEWELL: Well, that was really not in my era. When I was starting in radiology, in 1970, the carcinogenic effects, the harmful pieces of radiation exposure, had really been studied, had been well documented, and the whole area of health physics had developed, from the standpoint of radiation protection. Part of our training program was, in essence, radiation protection, not only protection of the patient from overexposure, but also protection of the radiation workers, the people that were in the area--the physicians, the technologists, the nurses, the paramedical group of people. So that was a well-established discipline when I started residency.

But, prior to that, when radiographs were first discovered and started in the early '20s and '30s, there certainly were issues of radiation exposure, and a lot of difficulty coming out of that from carcinogenesis.

Q: When you came to Walter Reed, and even prior to that, what had you heard about the AFIP?

DR. MADEWELL: Prior to Walter Reed, I had heard nothing about the AFIP. I didn't know it existed, in fact, until I came to Walter Reed.

On my arrival at Walter Reed, Lee Theros was the chairman and registrar of the department of radiologic pathology at the AFIP. He was certainly a well-known figure even at that early time. After my first year, Mo Reeder became the chief of Walter Reed.

He had been one of the first Army faculty assigned to the Armed Forces Institute of Pathology, and he certainly talked about and was very laudatory of the AFIP.

Also, there was a geographic connection: the AFIP was on the same campus as the hospital.

I also, in my second year, worked with a physician named Johnny Montgomery, at Walter Reed Army Medical Center, who was interested in publishing and writing about the scholastic aspects of radiology. I was also interested in that, so Johnny and I worked together and found an avenue, through the AFIP, to publish interesting case material,

stressing not only radiology, but differential diagnosis, which was published as case reports in radiology. And that went on for several years.

So that's how I discovered the AFIP: people living at Walter Reed; geography; and then the interest in writing up some interesting case material.

Q: Did you find, working at Walter Reed, that the spectrum of the type of people you were seeing was somewhat limited? I'm thinking about your dealing with the military community. For the most part, they're healthy, as a group. It's not really the same as working out in a community.

DR. MADEWELL: Well, no, I disagree with that. In fact, the military environment, certainly at a secondary- or tertiary-care hospital like Walter Reed, is identical to an academic health-care center. They had all of the features going on, of cancer, trauma. It may not have been as acute trauma (most of it was air-evacked in), but I found the case mix and the material at Walter Reed really to be exceptional. I think it was an exceptional wealth of interesting patients, managing them as well as their disease processes. And I think the case material at Walter Reed would really be second to none.

That image that you portray is one that I think is shared by a lot of people, but it is in fact not true in the major medical centers of any of the services. If you're on a small post where there's a large basic-training contingent, then I think that that may be more applicable, in that your patient population is a lot of healthy 18-, 22-year-old individuals and you may not see the diversity of diseases. But that is not the case in the second- and third-line hospitals in any of the services. So that application would probably only be appropriate in the line units in some of these basic-training groups.

Q: At Walter Reed, you must have been dealing with cases for immediate referral, where somebody is in a bed and they need diagnosis. It's different than working, say, at the AFIP. In other words, it's patient care.

DR. MADEWELL: Yes, certainly, Walter Reed is direct-patient care. The person has an immediate problem, either one of diagnostic difficulty (what is the abnormality?) or one of knowing the abnormality and trying to treat the abnormality, and the third area would be handling complications of a disease state. So it is much more direct and immediate in its patient-care services.

Whereas, although the AFIP has many functions, one of its major functions is as a repository of historical information, so that you can go back and look at abnormalities that may have occurred during the Civil War. And some of those cases, from the Civil War or the time after that, can contribute understanding and knowledge to current abnormalities. So that repository of tissue, records, pathologic material, radiologic material, is important because it's a sample of the past that can help the future. So the archive piece of the AFIP is different; it's not acute-patient care.

A second function of the AFIP is one of indirect consultation, where someone has material, either a radiograph or tissue, from an outside institution, and they would like an

expert or a professional opinion. They don't see many of these. They say, "Well, could it be this? Could it be that? Can you help me?" So the AFIP provides a consultation area.

And the third area in one of teaching, taking this information from direct consultation to the past history medical records that are stored at the AFIP, assimilating them, and applying them to educating the physicians of tomorrow, whether they be pathologists, clinicians, or radiologists.

So, certainly, the AFIP mission is much different than an acute-care hospital complex like the Walter Reed Army Medical Center.

Q: You had your connections, because of propinquity, with Dr. Theros and others. When you had a case where you had to come up with a reading rather quickly, could you run across the street to the AFIP and get quick help?

DR. MADEWELL: Yes. There were different levels of access. Since we knew people over here, and this was true in radiology and in pathology, the physicians on campus, Walter Reed, Bethesda Naval Hospital, other people that were closer, and even the civilian community, because they knew of the situation, could have more of a direct access to this consultative service. But the availability of it is worldwide, through the mailing system. So, yes, we did utilize the system, in that if I had an interesting case, I could bring it over to Dr. Theros to Dr. Lint Johnson, who was a pathologist, or to Sam Rosen, who was also very instrumental in developing the registry of radiology, as a pulmonary pathologist. So that connection and availability of expert consultation was certainly used.

And that also created more interest, because when I was a resident and coming over under those circumstances, I usually did it with the faculty, and there was a certain amount of mystique with what I saw at the AFIP, and the reverence and the position in which the faculty put these individuals; they respected their opinion.

Q: So you ended your three-year residency at Walter Reed in '73. Then you moved over to what was to be a major part of your career, to the AFIP itself.

DR. MADEWELL: Yes, I was one of the first one-year fellows, and that was '73 to '74. I worked directly with Dr. Theros. Dr. Mo Reeder was able to initiate that fellowship with Dr. Theros.

My mission was not necessarily radiology, but to look at the morphologic sciences--pathologic anatomy, in essence. And so a lot of my time during that 12-month fellowship was spent in integrating radiologic material from Dr. Theros' and my own discovery in review of the file with the pathologic material and the understanding of gross pathology and microscopic pathology from Dr. Lint Johnson, and then Dr. Don Sweet, who came after him as one of his faculty members and then replacing him, as well as Dr. Mostofi and Dr. Charles Davis. So those are four pathologists that I worked very closely with in both orthopedic pathology and in renal/genital urinary pathology during that time period. But I was interested in a lot of things. I worked with the GI pathologists. I

worked with a lot of different groups at that time. But those were the two predominant areas of interest.

Q: You were working as a radiologist with these people?

DR. MADEWELL: Correct.

Q: I have the feeling (and again I'm speaking as a layman, so please correct me if I'm wrong) that a radiologist gets to cover a much broader area than, say, somebody who is concentrating on the GI or one of the other areas, because you have to be on call for everybody, don't you?

DR. MADEWELL: Yes, the radiologists at the AFIP were basically general radiologists, where the pathologists were specialty pathologists. That was true in the early days, when we had limited faculty, but even when we had two or three faculty, each person would have an area of more expertise in radiology. Lee Theros' areas of expertise were in bone and chest. So he did a lot of activity in those, in working with the pathology. My area of interest, since I had come from a residency training program with a broad-based educational process, was much more diffuse, because I hadn't settled on a particular topic at that time.

But it became very obvious to me that the morphologic sciences had grown significantly in the orthopedic area. And that's why I became very interested in that, because of the bones, the joints, the soft tissues and how they can be demonstrated, in plain-film radiography and the gross pathology, which are called the dinner-plate sections or macroscopic sections, that Dr. Johnson had done a lot of work with. And there was a wealth of archive material that one could use to go back and look at the X-ray image, look at the gross specimen, look at the macroscopic slide, and make a one-to-one correlation of the margins, the matrix, and the reactive patterns in soft tissue and periosteum. So that was an important challenge to me, to try to tie those three together. And each one contributed to the overall knowledge of the understanding of the problems, specifically bone tumors, which is what they had a large collection of. So I enjoyed working as a radiologic representative to the pathologists and having them teach me some radiology, but also being able to bring in some of my experiences in radiology to them in their ability to make the histologic diagnosis.

Q: One of the great values of the AFIP is the fact that, as you say, it started in 1862, and it's kept its files going, so you can go back. Were you using early X-rays, and were they of use?

DR. MADEWELL: Oh, absolutely. I can remember going back and looking at some of the Civil War specimens, where they would have trauma, mini-ball injuries, frequently there was a secondary infection, and a lot of those extremities would be amputated. Those amputated specimens would still be available at the AFIP, in tissue form, then

there'd be an historical document, a paper record, and then there would be radiographic information that could be obtained, since we were looking at soft tissue and bone. I can remember one of my first topics was looking at infection of bone, osteomyelitis. And I still, today, use material that was actually gleaned from the Civil War, which shows beautifully some of the radiographic imagery and the pathologic material, the gross pathology and microscopic pathology. That is really irreplaceable. It's a national treasure to be able to have this type of material in an archive form where it can be shared with the present and the future. So, yes, I think those pieces of material certainly were used by me. They enriched my experience, and then they allowed me to enrich other people's experience by teaching them from this material.

Q: Please enlighten me about the history of radiology. This came essentially came from Roentgen. When did this start?

DR. MADEWELL: Wilhelm Conrad Roentgen, in Würzburg, Germany, discovered the X-ray in 1895. Next year is 1995 and will be the centennial of radiology, the Roentgen discovery. There is a national awareness in educating the public about the value of radiologic imaging, using certainly ionizing radiation, but specifically the X-ray, in that ionizing radiation or X-ray modality.

Shortly after the discovery in 1895, the medical applications of the X-ray that Roentgen discovered were applied almost immediately. In fact, his wife's hand was one of the first X-rays ever produced, and that's an historical document that is still, today, shown in duplicate copies. It was started very early in the use of trauma, localizing bullets. I don't know the exact year, but I think it was around 1901 or something, the first X-ray obtained in Washington, D.C., was obtained at the Army Medical Museum.

Q: Which was the predecessor of the AFIP.

DR. MADEWELL: It was the predecessor of the AFIP, correct. And it was to locate a bullet after a gunshot injury in Washington. So, immediately, plain-film radiography, or X-rays, started to be used in diagnosing all different types of features, therapy, as well as diagnostic, procedures. And it's rapidly grown over the years since that time.

And then, of course, recently, there's been an extension of other electromagnetic energy waves producing images, certainly ultrasound, nuclear medicine is a fairly old area, applying computer tomography, the MRI (magnetic resonance imaging) features of the specialty. So the imaging, that's why some people are calling radiology today imaging rather than just the X-ray, because it's much broader than what it originally started as in 1895.

Q: When you arrived at the AFIP in 1973, what was the type of equipment that you were able to work with at that time?

DR. MADEWELL: The AFIP did not have a radiology department, in the traditional

sense of the word. In other words, the only X-rays we took at the AFIP were specimen X-rays, and that was usually in the pathology division. So the department of radiologic pathology at the AFIP didn't own an X-ray machine. What it owned was an accumulation of radiographs, all the different imaging pieces, through its pathologic consultations, where X-ray images would come in, or radiographs would come in, or through the class. The educational part of the radiologic pathology department had students coming four, five, six times a year, and they would bring with them two to three interesting cases. Those interesting cases would have pathologic material, historical material, gross morphology, and radiologic morphology. So those imaging studies became the nidus for the radiologic collection at the AFIP. So, when I was a faculty at the AFIP, I didn't take X-rays. We reviewed X-rays from other people, as an educational point, looked at the pathology, and tried to understand the diseases processes that were being studied.

To keep active, I went to other areas, specifically the military hospitals in the community, mostly Walter Reed, and was a radiologist helping at those sites. So that's how I kept my technical interest alive and well.

But the AFIP itself does not own a traditional radiographic machine.

Q: So a basic question. You were well into the field of radiology. Is there something in the mental process, the personality process, the eye or brain structure, that makes for a radiologist? In other words, can you look at one of these pictures and see things that maybe other people wouldn't see?

DR. MADEWELL: Well, I've had a couple of personal experiences with friends of mine who convinced me that there is a skill. I can't put my finger on it, but I've had very good friends of mine who went into radiology who don't have the eye, so to speak. They can look at an X-ray image or any other radiographic image, and it takes them longer to understand the concept, or sometimes it's almost like a blind area. They can't understand, nor can they see as well as other people see.

I don't know of any way to really test that skill. But I do think there is an ability in looking at imaging to put it in a three-dimensional concept (because we're looking at two-dimensional images the vast majority of time), to apply or overlay the normal anatomy, the normal features, to a pathologic abnormality, and then to decipher or to pick out the abnormality in the sea of normality. That's really the challenge of radiology, to find the abnormality in the sea of normal features.

And to do that, you have to have an exquisite knowledge and experience of what normal radiographic anatomy is and imaging anatomy. If you don't, then you cannot appreciate abnormal anatomy or abnormal physiology.

I think it is a learnable skill, but some people take a little bit longer to learn it. I think other people are naturals for it. They fall into it, and it seems to come very quickly to them. So I think there is a skill that is unique in radiology. I do think it's a learnable skill, though. I don't think it's something that you're born with, necessarily. But there certainly are traits that enhance that learning curve.

Q: Is it a bit like being a ballerina or something, where you've really got to keep doing it or it goes? Did you find, working here at the AFIP, that it was good practice and enhancing to go over to Walter Reed, which is a workaday hospital, to keep up with this?

DR. MADEWELL: Yes, I did. In fact, there are at least two comments I'd like to make on that. One is, the eye is only as smart as what the brain can perceive. To accumulate that experience and skill level, you need to look at a lot of normal radiologic imaging. You also have to understand the normal anatomy and the normal physiology, to create that normal image. That's the foundation.

The second piece of that is you have to understand normal variants, and then abnormal or pathologic conditions. And the more experiences you have in radiology, the better knowledge base you have. You have a broader picture image in your brain and your understanding to make a value judgment on whether this case is normal, abnormal, or I don't know, we need some other type of study, clinical input, other imaging modality to make that decision process.

So I think it is critical that the radiologist keeps his/her footing in the normal study group, because a lot of what we do in medicine is study normal people to make sure that they don't have an abnormality. The best news to a patient is: "What you have is normal" or "It's insignificant." The worst news is: "What you have is a disease. We're going to try to do something about it, and it may cause fatal consequences." A lot of medicine is the practice of screening or detecting subtle abnormalities. So that normality base is a very important piece for the radiologist.

But also you have to see a lot of abnormal pieces. One of the real advantages I think the AFIP provided me and other people who have been there, as well as students who have come through the program, is the ability to sit down and look at thousands of carcinomas of the lung, or any entity you want to talk about. You can sit down and accumulate a life experience in a matter of four hours. Whereas if you were to look at, say, an osteosarcoma in the normal practice of medicine, it would take you a lifetime to gain that experience. At the AFIP, it's focused, concentrated observations of pathology, and that is also a very valuable experience to go through.

Q: What about training, then? I would think the AFIP or a teaching university would be able to accumulate these various images, to pass on to students. Did you find teaching was a major part of your work?

DR. MADEWELL: Yes, teaching at the AFIP is the major piece of the daily effort and daily work.

And, you're right, academic health-care centers and radiology departments in those centers have teaching files. The American College of Radiology has an exquisite teaching file. But, in those files, you get five or six or ten of something. And they are selective; these are ten cases that illustrate the example of a disease process. That is very helpful, and I think that is certainly available throughout the country. But I think the person who really wants to understand in depth, to look at the raw material, not selective

material that someone else says here's the way osteosarcoma or bronchogenic carcinoma should look like, should go to the database and look at a thousand of them. And there may be new perceptions in there that the person who has selected those cases to go in the teaching file may not have understood at that time. I don't think all institutions have to have this raw database. But I really feel, as a society, we need to have at least one of these medical databases, so that we can accumulate this wealth of material, both in longevity, going back to the Civil War, and also in the breadth of the process in numbers. Because it's only in numbers that we can see the occasional or the less-common expressions of disease states.

Q: How does this translate? I can understand, you're sitting here at the AFIP with this wonderful database, but in the long run, you want to get it out to the practicing radiologist. How do you get this experience out to him or her?

DR. MADEWELL: Well, you do it predominantly through the educational mode. The AFIP radiology department has five or six classes. I think the majority, if not all, of the residents in the United States, and even some abroad, come to this program. So, one, you educate the students during their radiology residency training program.

Two, you educate the practitioners of radiology. There are many courses put on by the AFIP targeted at the practitioner of radiology after the residency training, or post-graduate education, where they will take this information and show them, illustrate them, and teach on those. Some of them are even participatory types of educational processes, where they'll use a group of cases and work with people on some of these ideas.

The third is traditionally the academic publication piece. That is, faculty that are at the AFIP review a large series of diagnoses and then report that experience through the medical literature, and communicate that information to both the academic, the student, as well as the practitioners of radiology. So those are certainly three traditional methods.

A fourth method, which has grown significantly in the last several years at the AFIP, is visiting scientists, distinguished scholars, other people coming in to the institution for shorter periods of time. Rather than a four-year assignment, which is the traditional military assignment, they may be here for a year, six months, two months, even as short as six weeks or a month, where they can come in with a focused activity and look at the experience of the AFIP, and not look at the wealth of the material, but maybe focus on one particular disease problem, or one abnormality feature. Then they can take that back to their institution and write a paper about it. They can distribute that to the public at large, through the vehicles of publication and education.

Q: Back to when you got to the AFIP in 1973, and you were here until 1982. What was your impression of how the Institute fit together? I'm speaking more from the administrative side. I think it was Col. Morrissey, about that time, who left rather unhappily, feeling that, as an organization, it didn't fit well together, that you had almost your little dukedoms. And here you were, you were skipping around throughout all of

them. What was your impression of the organization?

DR. MADEWELL: The AFIP had two major wings. It had a military directorate, which was a leading force, and then military assignments throughout the different departments and divisions. It also had the American Registry of Pathology (ARP), which was started, I think, around 1922, with the ophthalmology division as the first registry. It had a chairperson of the American Registry of Pathology, and that represented more of the civilian wing.

There were conflicts of interest, because the military might look at one thing as important; the civilian might look at something else as important. And it's not right or wrong, it just depends on what your priorities are and where your missions are headed. There certainly are conflicts around that. There will always be some conflicts or differences of opinion on that area.

The civilian side did perceive that there were more and more issues occurring where they were not being represented. There was legislation passed by Senator Kennedy establishing a formal distinguished-scientist program, which was very well received by the directorate. And that was a step in the direction of trying to integrate the military/civilian concept, so that they could look at things together and join their missions, so to speak.

Q: This was 1976, I believe.

DR. MADEWELL: Correct, correct.

Now the American Registry of Pathology has been very successful since that time period. It has a directorate. It is putting on more and more of the educational pieces. It's going out into the research community, trying to get grant and contract dollars through that wing, as well as going back to the medical societies and working with them in supporting the medical societies of all the different registries in the institution, to support the registries, to enhance the registries, to be meaningful instruments, not only for the military, but for the broader picture, the civilian community. I think the ARP has been very successful and will continue to grow in that bridging process to the communities at large, not only to pathologists, but clinical-physician societies. Certainly radiology is one of those groups. So the people who can take advantage of this registry, the AFIP, are certainly military types, but also general physicians, special physicians, in all the different registries.

So I think that is something that has changed a lot since I was here in the early and mid-'70s, and has improved significantly over the years.

Q: By the way, during this period, you changed hats, didn't you?

DR. MADEWELL: When I came here in '73 as a fellow, I was in the service. I stayed in the Army, became a light colonel, both as a fellow and then on faculty at the AFIP. I stayed on after I changed my hat, so to speak. I became a federal civilian, a government-

service employee, in 1977. So my tenure at the AFIP was about half in the uniform and about half as a federal civilian.

Q: Did you find there was any difference in your outlook or how things were during this period?

DR. MADEWELL: No. One day, I wore a uniform, and the next day, I didn't wear a uniform. I did not perceive any difference on my own part, nor did I perceive any differences from the community at large in the AFIP, when I had a uniform on or when I didn't have a uniform on.

When we look at a person to do a job, whether it's a military or a civilian person, I really think we should look at the best person. And whether they're in a uniform or not in a uniform, the search should look for the best individual for that opportunity.

Q: What about equipment? As you said, the AFIP does not do X-rays, imaging and all that. There were major changes, weren't there, in this particular period we're talking about, from '73 until '82, in just basic equipment in your field. How did you keep up with this, you and your fellows?

DR. MADEWELL: I think that's a very appropriate question, because, in fact, radiology changed significantly from when I arrived at the AFIP in '73 to when I left in '82. A lot of new modalities. The way the AFIP faculty kept up was, one, working with predominantly their military counterparts, mostly at Navy and Army, but also some at Air Force, hospitals. We worked a lot with the Uniformed Services University of the Health Sciences in looking at that aspect of it. We read or we kept up in that arena from the science part of it, the background. And what was more important, as those new modalities came online, the imaging part of them started to show up and be sent in. We encouraged the residents, who brought in two to three cases per resident, to bring in CT examinations, more sophisticated ultrasound imaging, magnetic resonance imaging, when it came online. So we encouraged the students to bring in that type of material. And then we incorporated the newer modalities into the understanding... [end side A]. ...keep up by this information coming in from that direction, as well as keeping up on understanding the science side, from the literature. But you had to have a little bit of practical experience, by doing work in a community or a hospital setting. You didn't have to do that fulltime, but you had to have that piece to get an understanding or a judgement value.

Q: So almost all of you in this field also had connections to one of the...

DR. MADEWELL: Correct.

Q: There's Georgetown, there's Walter Reed, there's...

DR. MADEWELL: There's the Navy Hospital.

Q: Bethesda, and on and on and on.

DR. MADEWELL: The NIH. I had connections with the National Institutes of Health Clinical Center.

Q: So you're not left by yourself.

DR. MADEWELL: No, no. No, the AFIP doesn't intrinsically have that practical piece. For the pathologist, it's not quite the same. But for the radiologist, that's an important piece, to be able to keep his other input into those more practical areas of technical radiology.

Q: Did you find, as a radiologist, during this nine-year period, that the role of the radiologist was changing at all as far as moving from branch to branch, basically giving your expertise to the various branches?

DR. MADEWELL: Well, I think it was changing. If you looked at it in the late '60s, very early '70s, there was much more of a generalist approach. That is, I, as a radiologist, would give a lecture on the chest, on renal tumors, on the GI tract, on spinal abnormalities, on bone tumors, in orthopedics, etc. I functioned as much more of a general diagnostic radiologist. And when I went to the pathologists, I also carried that same general approach.

But as radiology became more sophisticated, as the faculty grew at the AFIP Radiology Department, then there became more and more subspecialization. So you would be a diagnostic radiologist, but your focus would be in chest, your focus would be in the GU tract, the genital/urinary system, neurosciences, orthopedics, pediatrics, etc. So, with the increase in faculty staff, then subspecialization, I think appropriately so, became much more the trend than the generalist radiologist.

Q: Did you have any field that you became more and more concentrated on?

DR. MADEWELL: Myself?

Q: Yes.

DR. MADEWELL: Oh, yes, in the mid- to the late-'70s, I did a lot more general features. In other words, I wrote articles on renal tumors, on GI-tract abnormalities, and certainly on musculo/skeletal. I even wrote articles on chest disease. Today, pulmonary radiology, orthopedic radiology, genital/urinary radiology, and GI radiology are subspecialties within diagnostic radiology.

So, if you looked at my early work, it was much more at a general base. Then, towards the end of my tenure at the AFIP, I started to focus much more into orthopedic

radiology. And the reason for that is, the other faculty members focused in chest, GI, GU, that type of thing. So, yes, I was here when that generalist-to-specialization practice actually occurred.

Q: Did you see any changes because of the environment? In other words, too many people smoking, or pesticides, solar holes, all these things happening in the world today. Were you seeing any changes in the general problems of, at least, Americans?

DR. MADEWELL: We at the institution got involved in Legionnaires, the early detection, trying to decipher that particular problem.

Q: This is called Legionnaires' Disease. Would you explain why it's called that.

DR. MADEWELL: I think it was at a Legionnaires' convention in one of the hotels in Philadelphia where the disease was first discovered. The question was: "There was an epidemic outbreak in a geographic area in Philadelphia related to a hotel. It sure sounded like an infectious agent. What was it?" And so there was a national push to discover that. The AFIP was very important and critical in that discovery process of what Legionnaire's pneumonia was.

I think the compromised-host problems, whether it be Acquired Immune Deficiency Disease, or, prior to that, whether it be related to chemotherapy related to tumor treatment. So the compromised-host issues came up, something that was not necessarily a factor in the '60s and some of the early '70s.

So diseases did start to change, based on social environments.

I think trauma. We don't see much trauma at the AFIP, because you don't usually biopsy trauma. But that certainly had some impact in our community.

I know some of the pathologists were involved in environmental--Agent Orange, etc. But that really didn't have much of an effect in the Radiology Department. The diseases that were being looked at were not specific. There was nothing in the radiograph where you could say, "Hey, that's a particular disease process." So the discovery of those abnormalities and processes were mostly on the pathology side, not on the radiology side.

Q: When you were here, did the museum play any part? At one point, the museum was a very important element, for training Americans and exposing Americans. This is when it was down on the Mall.

DR. MADEWELL: Can I interrupt one second? I would like to make one other, before we go to the museum, because I think that's a separate subject. One thing I did notice is the makeup of the resident class over my tenure at the AFIP. When I first started, it was predominantly a male-oriented resident group. And I think that was fairly traditional throughout the country at that time. When I left the AFIP in '82, there was a significant increase in female residents in the group. So that reflects the change in gender pieces that is occurring throughout the country. I know, if you look at my home institution, Penn

State, right now, 50 percent of our medical-school class are females. So education in medical school was changing, and we saw that same piece occurring--the acceptance, male versus female--in the diagnostic radiology training programs in the country.

So I'd like to go on to your Army Medical Museum question.

Q: Yes, did your work involve the museum at all, or was this just a separate thing?

DR. MADEWELL: We were involved in the museum in looking at X-ray tubes, and in collecting some X-ray tubes as a historical piece. The Army Medical Museum, or the Armed Forces Institute of Pathology Medical Museum, had a fairly large collection of X-ray tubes, anyway. We had worked with a gentleman by the name of Bill Shehadi and collected some of those. Eventually, those tubes were transported to Johns Hopkins and are on display over there. (I think they're still there.) So we worked with the medical museum in looking at some unique technologies, specifically the development of the X-ray tube, and putting that on display at the medical museum. Because that's a piece of medical history that can be easily displayed. It's very graphic. The observer can see it, look at some interesting colors, some interesting designs, devices, techniques, etc., and walk away with a very meaningful experience.

So that was our predominant input with the medical museum, other than trying to get collections of things donated to the AFIP Department of Radiology. One of those was a large collection of pneumoencephalograms that were collected at Walter Reed over a 20-, 30-year period of time. Pneumoencephalography is a study that, with the advent of CT, and certainly MRI, we don't see pneumoencephalography any more.

Q: CT is...

DR. MADEWELL: Computed axial tomography.

Q: It's called a CAT scan.

DR. MADEWELL: CAT scan, yes.

Q: You left the AFIP in 1982 and went to, what, Baylor?

DR. MADEWELL: I went to Baylor College of Medicine and ran the residency training program. In my tenure at Baylor, I started a private practice in radiology there, worked at the VA hospital, worked extensively in a city-county hospital, Harris County Hospital, and then in some of the private-practice hospitals there. I predominantly was in the academic program at Baylor College of Medicine.

Q: Did you find it a change from the AFIP?

DR. MADEWELL: Yes. When I made the transition from military to civilian in 1977,

at that time I was going to stay and retire from the AFIP. That was my desire, wish, and my intention.

From '77 to '82, I think I changed. And how I changed is, I enjoyed the AFIP, I enjoyed teaching, I enjoyed the radiologic/pathologic correlations and the academic publications that were possible from those studies. What I missed was a broader leadership piece. In other words, I came to the decision that I wanted to become a chairperson of a department of radiology, with all of its pieces: personnel issues, interrelationship with other clinical physicians, purchasing equipment, managing large-dollar budgets, the whole piece of running an academic health center department of radiology.

Once I decided I wanted to do something else like that, the AFIP was really not the vehicle for me to learn those skills. So, with that decision, I had to leave the AFIP.

And I chose to go in a practice such as Baylor, where it had city-county government relationships, Baylor College of Medicine, private relationships, VA hospital, research, academics, teaching, clinical service, so I could learn better the skills of the administrative chief that would be necessary in running an academic department of radiology.

So, once I made that decision, then I decided to leave the AFIP and seek other opportunities.

Q: And then, from 1987 on, what have you been doing?

DR. MADEWELL: From Baylor, with the five, six years of experience, I knew I wanted to become a chairperson. I enjoyed those activities; I felt I had something to offer in administrative and leadership skills. So I looked for chair positions, looked at several throughout the country, and then was offered and decided to accept the chair position at Penn State University Hershey Medical Center. And I went there in December of 1987.

Since that time, we've been in a building project, probably \$250 million of capital equipment, building space, developing new techniques, organizations in the radiology department, expanding its clinical load, services, its teaching load as well as its academic experiences. Recently, with the new changes in health care that are occurring throughout the country, we've been looking at network satellite development, how radiology fits, and the next decade of the academic health care center are the new paradigms that are occurring in medicine in our country today. So I've seen that as an ongoing challenge, an ongoing growth, and something that I've enjoyed doing.

Q: Well, to close this off, doctor, this is an historical document, what do you see as being the most exciting things on the edge of radiology? In fact, radiology doesn't trip well on one's tongue anymore, because it seems to be a limited term. I think imaging may be a better term. What do you see in the future; where is it going?

DR. MADEWELL: I think some of the challenges that are facing radiology are quite similar to the challenges that are facing all of medicine. What we need to do is maintain

the quality of our practices, but do it in a more cost-efficient manner. And that will require some culture changes in medicine, specifically in radiology. We need to look at some outcome studies and really ask some very difficult questions about some of our techniques and imaging modalities and services. Does it offer benefit or value-added pieces to patient care? And if it doesn't, we need to be able to say that, and then go on to other services, other advantages to the practice.

So I think the tremendous challenge in medicine, but particularly in radiology, is how it fits in the detection of disease, whether it be a screening process or whether it be a study of a symptom complex, and the treatment and the management of the disease. And I think, quite frankly, radiology (which I prefer over imaging, because radiology does not necessarily imply the X-ray source of imaging, but all aspects of radiant energy and its application to imaging) can be and will be on one of the cutting edges of how we can deliver better and better care and services to our patient population, much more out of the hospital, into the less-acute-care facility, even into the outpatient practice, and hopefully even into the home-health-care environment. It's those types of shifts that will pose challenges as well as opportunities to all medicine, specifically radiology, as to how to handle them. Because our society is insisting on much more efficient health care. But what we as physicians have got to maintain is that we don't sacrifice quality. And there are a lot of things that we can do differently tomorrow, compared to what we do today, that will save dollars and can maintain and can even enhance the quality of medicine. It's the physician that needs to be involved in those decision making processes, working with the administrator, who knows the business side. But the physician has got to stand for quality in the changes that are occurring in our health care services area.

Q: Well, doctor, I want to thank you very much. This has been most illuminating. Thank you.

DR. MADEWELL: Well, Stuart, I've enjoyed it very much, and thank you very much for having me.