THE CHAMBERLAIN ERA
1960–1975

Richard Hall Chamberlain—
Early Biographical Information

Richard H. Chamberlain was born in Jacksonville, Florida in 1915, and received his Bachelor of Arts Degree in 1934, when only 19 years old, from Centre College in Danville, Kentucky. He taught school for a year in rural Kentucky, then entered the University of Louisville School of Medicine in 1935. Chamberlain completed medical school four years later and following a year-long rotating internship at Louisville City Hospital came east to accept a fellowship in radiology at the Hospital of the University of Pennsylvania.

Dr. Chamberlain spent two years in the residency program, and in 1942 entered active military service as a radiologist in the U.S. Army. He was originally assigned to the 20th General Hospital in India, the unit staffed by University Hospital personnel, but eventually served as Chief of the Radiology Service at the 24th Station Hospital in Persia and Nichols General Hospital in India.¹

Richard H. Chamberlain returned to the hospital in 1946, and took over the operation of the department’s radiotherapy program. He was promoted to the rank of Professor in 1952 and assigned specific duties as Chief of the Therapeutic Division at the same time that Philip J. Hodes was assigned responsibility for the Diagnostic Division.² Chamberlain also initiated the department’s radioisotope program in the late 1940s, and worked with other associates to design new apparatus for the department.

Departmental Operations Under Chamberlain

Richard H. Chamberlain had his own style and priorities for radiologic service, and it was only natural that there were some changes in the department’s operations once he became Chairman. The department also faced new external developments at this time, particularly the increase in specialization within the discipline of radiology and continual changes in its relationship with the hospital.
Dr. Chamberlain was not especially interested in the administrative operation of the department, so he asked a friend and long-time associate, Dr. Edward M. DeYoung, if he would join the staff as administrator. Dr. DeYoung agreed, and thus became the first physician in the United States to serve as a departmental administrator. He also spent about one-third of his time reading films. 3

Edward M. DeYoung spent most of his medical career in the U.S. Army and during World War II was stationed at a regular Army hospital across the street from the 20th General Hospital. Philip J. Hodes ran the radiology service at the 20th and held weekly film reading sessions for all the nearby radiologists, so Dr. DeYoung got to know him and other members of the University Hospital staff at this time. After the war he spent a year at University Hospital taking a refresher course in radiation therapy under Richard Chamberlain, during which they became close friends. Although there were only a few familiar faces in the Department of Radiology when Dr. DeYoung returned in 1961, many of his World War II friends still worked elsewhere in the hospital. 4

Richard H. Chamberlain was interested in the increasing specialization within the discipline of radiology, and most especially the evolution of distinct specialties within diagnostic and therapeutic radiology. A staffing structure indicative of these developments would include a number of specialists with responsibility for a narrow scope of the overall operation and a small staff working under each of them. The importance of such a structure was reinforced as new discoveries and techniques continually increased the amount of knowledge required by a practicing radiologist. Dr. Chamberlain sought to implement such a staffing arrangement in his department, but a tight fiscal position prohibited the addition of a sufficient number of physicians to make this type of operation viable. 5

The senior staff was small throughout the 1960s. There were only a few diagnostic radiologists, and at the beginning of the decade they were young and fairly inexperienced. 6 None of these physicians had the type of specialized background in which Dr. Chamberlain was particularly interested, so the diagnostic operation functioned without a leader until 1972, when the responsibility was officially delegated to Wallace T. Miller. Chamberlain's appointment of Miller as Chief of Diagnosis was a step back from his philosophical position, but there were still not sufficient funds
to implement the more specialized structure. The lack of delegation of authority within the diagnostic staff, and its continued small size, were particularly frustrating to its staff members since this part of the department generated a great deal of income each year.

Dr. Chamberlain did not officially delegate authority for the therapy program either, but for several years Dr. Antolin Raventos's seniority enabled him to run the operation with a free hand. The therapy staff remained small, but Dr. Raventos was able to exert considerable influence in the decision making process. Chamberlain was equally supportive of the specialized work being done by David E. Kuhl in nuclear medicine and Mark M. Mishkin in neuroradiology; these physicians worked independently and were actively encouraged to pursue research projects.

At the beginning of the decade operational procedures in the department remained at a status quo position: private and ward patients were physically separated in the department, senior staff members performed procedures on private patients and read their films, while residents performed procedures on ward patients and read ward films, which were later checked by senior physicians. Fairly soon, however, the department began to mix private and ward patients, and the department's residents were given increasing responsibility for day-to-day operations. The increased responsibility vested in the residents meant that many patients lost contact with their primary care physician, and the department lost a number of patients due to this nonpersonalized service.

The department also provided therapy treatment for patients from Children's Hospital, and departmental residents were responsible for training residents from Children's Hospital in diagnostic procedures.

A tight fiscal situation within the department, and the lack of a strong commitment from the hospital, hindered the acquisition of replacements for standard pieces of apparatus. Much of it had deteriorated from continual usage, and no provisions were made to update the equipment. The department's fluoroscopic apparatus was converted to image-intensified pieces during these years, but some pieces of equipment, such as a pluri-directional unit, were acquired several years after they became standard apparatus elsewhere.

The department was more successful, however, in acquiring specialized or experimental pieces of apparatus. A six-million-electron-volt linear accelerator was dedicated in June, 1965; it was
RADIOLOGY AT THE UNIVERSITY OF PENNSYLVANIA

the first such piece in Philadelphia and one of fewer than fifty units nationwide. It was designed to focus the full intensity of its supervoltage X-ray beam in the treatment of cancer.\textsuperscript{15} Three years later special magnification apparatus was added to facilitate angiographic procedures.\textsuperscript{16}

Richard H. Chamberlain and his associates continued to design and construct apparatus for use in the department, and in 1970 they were able to begin the clinical evaluation of the multiplane, orbital "superfluoroscope" which they had built. This unit, which was absolutely unique, could be used to view a patient from any angle at any space orientation. It was particularly useful to examine the spinal cord, gall bladder, and stomach.\textsuperscript{17}

The improvement and modernization of clinical facilities was an ongoing, though low-key, activity, and in 1973 plans were finalized to add a multidirectional tomographic unit and ultrasonic capabilities to the department's diagnostic operation.\textsuperscript{18} In December, 1974 the department received its EMI Scanner, a unit based on many of the principles developed by David E. Kuhl in his nuclear medicine research and first developed in England three-and-one-half years earlier. This apparatus was so sophisticated, and designed to record so many different views nearly simultaneously, that the equations collected as data were solved by a computer to create the image which was later interpreted by the radiologist.\textsuperscript{19}

The department's long standing commitment to radiological research was greatly enhanced in 1961, when the announcement was formally made of the Matthew J. Wilson Professorship in Research Radiology. The endowed chair, named for a distinguished Philadelphia physician and civic leader, was made possible by a series of gifts from his children, Matthew J. Wilson, Jr. and Mrs. Fred C. Newcombe. The young Wilson had been a patient of Dr. Pendergrass's some twenty-five years earlier, and was so impressed with the department that he had sent the Chairman a generous contribution. Additional gifts from him and his sister were equally substantial, and Dr. Pendergrass felt obligated to ask for their input on the use of this money. Both were pleased at the suggestion of an endowed chair in memory of their father, and once their gifts exceeded the sum of $500,000 an announcement was officially made. Most appropriately, Eugene P. Pendergrass was the first physician appointed to hold this chair.\textsuperscript{20}

Staff members continued to work on a variety of research projects during these years. Diagnostic research included such
THE CHAMBERLAIN ERA

diverse topics as urethral tumors, retroperitoneal fibrosis, and renal trauma, while a study of pericardial effusions compared the values of ultrasound, radioisotope scanning, and cinefluorographic methods. There was also ongoing investigation of the merits of conventional versus high kilovoltage chest techniques.21

A cooperative research program was begun in the early 1970s with the School of Veterinary Medicine in its excellent research facilities, which enabled residents and staff members to improve their clinical technique for procedures such as catheterization in angiography.22 At the Veterans Administration Hospital, joint research in diagnostic radiology and nuclear medicine centered on cardiac visualization.23

Research projects in therapeutic radiology included the application of computers to calculate radiation dosage for external beam therapy machines and the interstitial and intracavity implants of radioactive materials. Work continued with the application of high LET radiation to treat malignant disease. Dr. James Brennan, holder of the department's endowed chair in Research Radiology, continued his work with the therapeutic potential of fast neutron treatment. The successful development of a neutron generator target, after considerable work, enabled him and his colleagues to consider the construction of a practical clinical unit to use in the treatment of human cancer.24

Dr. Mortimer Mendelsohn continued his research in radiobiology. Specific projects undertaken by him and his associates included the investigation of better methods to create images of human chromosomes, the study of tumor kinetics, and the measurement of cell death.25 Prior to his departure for California in the fall of 1972, he and his colleagues were able to use their techniques for image analysis to measure the DNA content of human chromosome sets with sufficient resolution to identify twenty chromosome types, and in some cases to isolate individual chromosomes rather than homologous pairs.26

The department continued to use the control room, where residents checked films prior to a patient's departure, through 1975, although by 1970 the patient load was too great for it to operate effectively because there were too many films to keep organized.27 A continued increase in the patient load also precipitated some modifications of the department's physical layout: examination rooms for brief procedures were relocated near the entrance, and more lengthy procedures moved further back in the department.28 The opening of the Ravdin Courtyard facility in
the fall of 1972 provided additional waiting room and office space, facilitating the department’s overall operation. At the same time, the introduction of computer technology assisted with the handling of routine appointments and patient data.29

Richard H. Chamberlain was able to retain the department’s independent status throughout most of his chairmanship, although such a position became increasingly difficult to maintain. There were almost yearly changes in the specific details of his arrangements with the hospital, but he was successful in negotiating a better fee schedule than that under which Dr. Pendergrass had operated.30 The continuation of departmental autonomy clearly had advantages, but it also minimized the commitment felt by the hospital toward the department’s operation, physical plant, and equipment.31

In general, the department paid the hospital one-half of all fees collected from in-patients and kept all fees collected from private out-patients. No charge was made by the department for clinic out-patients, and the hospital was supposed to earmark any fees which it collected from these patients for the Radiology Fund. Continued difficulties with insurance reimbursement for radiological procedures (hospital versus physicians’ services and Blue Cross versus Blue Shield), and complications added by the Medicare program, eventually caused the department to turn over the entire collection process to the hospital.32

Dr. Chamberlain and the hospital administration agreed to make equal contributions toward equipment purchase, although all apparatus was to become the property of the hospital.33 This arrangement proved particularly frustrating, however, because the hospital was never willing to contribute more than $50,000 in any given year; Dr. Chamberlain would have willingly contributed three times that much. At this time a budget of $100,000 did not permit the purchase of very much apparatus, and the department was not able to replace much of its standard equipment, or to keep pace with all the advances in radiological technology.34

Dr. Chamberlain continued to pay the salaries of the department’s technical and support staff during most of his chairmanship, although there was increasing pressure for them to become hospital employees. In later years he was contracted by the hospital to be its “employment agent,” and he paid these salaries from a lump sum given him by the hospital. There was also some pressure for the physicians to become hospital employees during
the 1960s, but their salaries continued to be paid by the Chairman. Dr. Chamberlain continued the practice of contributing a portion of their salaries to the University to qualify them for its pension and benefit programs. When an individual was included in a University-sponsored funding grant, Dr. Chamberlain had only to pay the difference between the funding and the base salary figure. The department also benefited directly from a number of outside funding sources: the American Cancer Society, the American Medical Association, the Atomic Energy Commission, the National Institutes of Health, the United States Public Health Service, the Picker Foundation, the Fred C. and Charlotte Wilson Newcombe Memorial Trust, and the Matthew J. and Anne C. Wilson Trust Fund.

The staff of the Department of Radiology continued to provide the best service it could throughout these years. There were some frustrations: a small staff, well-used apparatus, and insufficient funds for major new purchases, but the department’s advance in neuroradiology and nuclear medicine, and its special apparatus designed in-house, helped to balance these difficulties.

The Establishment of a Special Studies Section

Procedures in neuroradiology and angiography were begun at the Hospital of the University of Pennsylvania during the 1950s, but they were performed by physicians from the Neurology Department. The Department of Radiology provided equipment and technical assistance and interpreted the films, but it was not until the early 1960s that a radiologist actually became involved in the performance of the procedures.

Mark M. Mishkin became interested in neuroradiology while a departmental resident between 1957 and 1960, and during his residency he was able to spend some time in New York studying these procedures. At Dr. Pendergrass’s suggestion he applied for and received a National Institutes of Health fellowship to study abroad and following completion of his residency spent a year studying neuroradiology at the National Hospital, Queen Square, London. Prior to his return home he also had the opportunity to meet the most prominent specialists in neuroradiology in Scandinavia.
Dr. Mishkin returned to Philadelphia and established a Special Studies Section in the Department of Radiology to perform neuroradiological procedures; the Hospital of the University of Pennsylvania thus became the first hospital in the United States where radiologists performed all of these procedures. Such an operational change had to be handled with special care because, in addition to the matter of professional pride, the neurosurgeons received an estimated $50,000 annually by performing these services. Drs. Pendergrass and Chamberlain took great pains to convince their own and other departments of the importance of this change while Mishkin was in Europe, however, and after only six months of operation had the department's program achieved total acceptance among the hospital's referring physicians.

Mark Mishkin brought the best trained nurse at Queen Square back to Philadelphia with him, and the two of them, with the aid of a technician, ran the entire Special Studies Section. The group designed its own facilities and purchased as much equipment as possible. There were not sufficient funds to purchase all of the apparatus desired, and there was close to a twelve month wait for an image intensifier. Fortunately, they were eventually able to purchase one of the very first portable image intensifiers designed particularly for special procedures in the nation. Dr. Chamberlain was very enthusiastic about this project from its inception, and Dr. Mishkin was given the title of Chief, Special Studies Section, when he returned from abroad.

For the first two years Mishkin concentrated all his efforts in neuroradiology, and his heavy workload precluded much contact with the rest of the department. He continued to be the only staff physician involved with these procedures, but interest among the residents eventually provided him with some additional assistance. The first Fellow specifically assigned to the section, Harry Press, came during the 1964-65 academic year, and in that same year Mishkin began to work in angiography in cooperation with an eminent radiologist, Stanley Baum, who was on the staff at Graduate Hospital.

Demand for these special procedures had increased substantially by 1968, and the decision was made to divide the responsibilities for neuroradiology and angiography. Dr. Mishkin continued as the department's neuroradiologist, and Dr. Arnold Chait, a radiologist at Presbyterian Hospital, came to take over the department's angiography procedures. The Special Studies Section was operated by these two physicians throughout the
remainder of Dr. Chamberlain's chairmanship, and Mishkin re­tained responsibility for neuroradiological procedures at the Hos­pital of the University of Pennsylvania and Veterans Hospital, as well as at Graduate Hospital, from 1972 to 1975 when he served as Chief of the Department of Radiology at Graduate. 38

**Growth in the Nuclear Medicine Section**

David E. Kuhl became a fully-affiliated member of the hospital and University staffs, and Chief of the Nuclear Medicine Section, when he completed his residency program in 1963. At this time the section began to receive grants from the Atomic Energy Com­mission and the United States Public Health Service to fund special research projects. This established a tradition of substan­tive outside funding which eventually grew to support the de­partment's machine shop and most of the shop employees. Public Health Service money often included training stipends, which usually provided the section with a postgraduate radiologist or internist to work on its staff. This radiological specialization achieved rapid professional acceptance, and following early ac­creditation by the American Medical Association its importance quickly reached the point that nuclear medicine facilities, or, in the case of small hospitals, cooperative arrangements with nearby institutions, became a requirement for hospital accreditation by the A.M.A.

David E. Kuhl had pioneered work in nuclear medicine in the 1950s, and in the 1960s he and his staff continued to lead the field. In 1965 they designed and built the first apparatus to perform body section tomography with radionucleotides; tomography it­self was a standard procedure, but the utilization of emitted radio­nucleotides, as opposed to X-rays, was new and proved particu­larly effective for some diagnostic examinations.

The section's next contribution was in transaxial computed tomography, the very principles which were employed several years later in the development of the EMI Scanner. Kuhl's unit was the first which could record views at various axes; his scanner relied on radionucleotide emissions to create an image, whereas some later apparatus, including the EMI Scanner, relied on trans­mitted X-ray beams. 39 An even more advanced unit, the Mark IV
Scanner, was installed next to the department’s EMI Scanner in 1975, and both units were used in the detailed evaluation of acutely head-injured patients. The Nuclear Medicine Section concentrated major research efforts on the human brain, and participated in a number of interdisciplinary projects with the hospital’s neurologists and neurosurgeons, as well as with independent bodies like the Institute for Neurological Research. The Department of Health, Education and Welfare supported a particularly interesting Head Injury Research Project in an effort to gather substantial amounts of data about patients with this type of injury, especially children, and develop criteria for increasing the accuracy of diagnosis. The project was coordinated by the Office of the Vice President for Medical Affairs, and other institutions were encouraged to send their patients who suffered from head trauma to the department for examination. Other important work in the section involved the body’s metabolism, particularly that of the brain. The department’s formal tie-in with the Brookhaven Laboratory kept it abreast of the latest work with radioactive compounds and enabled it to utilize new compounds shortly after they became available. Work with new computers and algorithms helped to improve scanning techniques and image construction.

This extensive research program, plus ongoing diagnostic work, was carried out in increasingly cramped facilities, and by the end of Dr. Chamberlain’s chairmanship much additional space was needed by the section. Happily, David E. Kuhl’s outstanding contributions to nuclear medicine were appropriately recognized when he was honored in the spring of 1976 with the Nuclear Pioneer Citation from the Society of Nuclear Medicine.

Operation of the Departments of Radiology at the Veterans Administration Hospital and Graduate Hospital

The proximity of the University of Pennsylvania School of Medicine to a number of large, metropolitan hospitals greatly increased the variety of clinical rotations available to its students. Similarly, area hospitals which needed additional staffing and
expertise often called upon the School of Medicine for assistance. Such was the case when the Veterans Administration Hospital became an affiliated teaching hospital in the early 1960s.

Unlike most of the specialty departments at the V.A. at this time, however, their Department of Radiology was self-sustaining and fully operative, so it was entirely inappropriate for the staff at the Hospital of the University of Pennsylvania and the School of Medicine to interfere in the operation. Its position deteriorated considerably throughout the decade, however, and in May, 1969, against Dr. Chamberlain's wishes, he became responsible for the entire operation.43

The facilities at the V.A. were old and outdated, so the first priority was an extensive remodeling and re-equipping of the hospital's diagnostic facilities. The hospital had its own radiotherapy apparatus, and with the installation of a new cobalt therapy unit shortly after the reorganization its therapy case load began to show a healthy increase.44 An entirely new neuroradiology suite was also installed.45 In addition to its own staff, physicians from the Hospital of the University of Pennsylvania rotated through the V.A. Its status as a teaching institution permitted the rotation of residents through the department and gave the undergraduate medical students the opportunity to observe and study.46

Graduate Hospital, on the other hand, was wholly owned by the University of Pennsylvania (it was originally the teaching hospital for the Graduate School of Medicine), and many of its staff radiologists were members of the faculty of the School of Medicine, as were the staff radiologists at the Hospital of the University of Pennsylvania. The existence of these two separate Departments of Radiology within the School of Medicine was somewhat further complicated by faculty representation from two other affiliated teaching hospitals, Presbyterian-University of Pennsylvania Medical Center and Pennsylvania Hospital.

In October, 1972, during a period of University and community concern about the future of Graduate Hospital, Dr. Chamberlain was named Director of its Department of Radiology. In many respects this produced benefits for the School of Medicine: there was now a single department, and the opportunities to share staff expertise, materials, and services, and thereby improve teaching, research, and patient care, were markedly enhanced. There were also enormous administrative difficulties, particularly
in view of Dr. Chamberlain’s complex financial arrangements with the hospital and University.

Dr. Chamberlain appointed Mark M. Mishkin as Chief of the department at Graduate, but Mishkin also retained his responsibility for the neuroradiology program at HUP and the V.A. The department at Graduate operated as a subdivision of the department at HUP; patients were charged on the same fee schedules, and residents served regular rotations there. This rotation proved particularly valuable because it exposed the residents to a nonacademic setting, and the staff at Graduate was stimulated by its contact with these young physicians.

As at the V.A., one of the first priorities for the operation at Graduate was a detailed plan for the total remodeling of its facilities. Included were examination and special procedure rooms, as well as facilities for nuclear medicine. Therapeutic consultations were done at Graduate, but patients were referred to HUP for their actual treatment.

The formal combination of radiologic operations at these three hospitals was particularly valuable for the Nuclear Medicine Section, because it was able to expand its range of services in each institution through the sharing of staff. A joint radiopharmaceutical laboratory was established to distribute short-lived radionucleotides to each hospital each morning; such an operation increased efficiency while lowering the cost. As the section added more procedures, additional equipment was installed at each institution.

After many years of discussion, the University Trustees and Graduate Hospital established an independent Board of Managers at Graduate, and the radiology services were separated in July, 1975. Dr. Arnold Chait, a radiologist at HUP, was eventually chosen to head the Department of Radiology at Graduate Hospital.

Throughout this period the relationship between the Departments of Radiology at the Hospital of the University of Pennsylvania and the Veterans Administration Hospital remained the same, and the final phase of the overall expansion at the V.A. was completed by the construction of a research building. New fluoroscopic rooms came about as a result of the research building construction, and in 1975 an angiography unit and a unit for body section radiology were installed. Following the termination of the University’s teaching arrangement with the University of Saigon, Dr. James T. Lambeth, the radiologist who had run the program
in Vietnam, came to Philadelphia to head up the department at the Veterans Administration Hospital.52

Changes in the Residency Program

The residency program was four years long in 1961. Three years were devoted to diagnostic radiology, including a three month concentration on neuroradiology and angiography. Nine months were devoted to therapeutic radiology, and three months to nuclear medicine. During these rotations, and particularly while they were studying general diagnostic radiology, residents were given considerable responsibility for decision making and general department operation. Instruction was often informal; this was possible because there was a small staff and a small group of residents studying in the department each year. Residents were responsible for “walking the floor”: speaking to patients, deciding which views to take, following-up on patients as they moved through the department, and checking films for technical accuracy in the control room.53

As the number of residents and the workload increased, however, it became impossible for each resident to review all the cases each day. Residents still dictated reports on ward patients, which were checked by senior physicians the following day, but it was necessary to eliminate much of the time formerly spent by residents in joint case review with senior staff members. Many junior residents learned a great deal of fluoroscopy by observing the more senior members of their ranks. By 1970, specialization within radiology had increased so greatly that the department created separate diagnostic and therapeutic residencies and reduced the period of study to three years.54

With the increased specialization in the residency training program, the physicians were less willing to learn by observing senior staff members or senior residents, and before they were given responsibility for handling various procedures they wanted formal instruction, lectures, and conferences. This increased emphasis on formal instruction, particularly in personalized instruction for various procedures, was accompanied by greater exposure to pathology. Residents were given less responsibility for decision making. They read films with senior physicians, but did not have
the opportunity to read them beforehand and benefit later from the comments and critique of senior staff members. Only at the Veterans Administration Hospital did the residents continue to function fairly independently.  

Residents in the diagnostic program took formal courses in the Graduate School of Medicine during their first and third years, and also participated in daily teaching and clinical conferences and weekly specialty conferences which highlighted a specific field, such as neuroradiology or abdominal angiography. They attended a special four week course in nuclear medicine and were also given instruction in radiophysics and radiobiology. Residents in the therapy program participated in joint hospital conferences with physicians from the Departments of Medicine, Surgery, Gynecology, and Otorhinolaryngology. They were also given formal instruction in areas of special interest in advanced radiotherapy, but received most of their fundamental instruction by working with senior physicians and patients.  

For many years the Department of Radiology at HUP had operated its own residency program, while the departments at Presbyterian and Graduate operated a joint program. The realignment in the School of Medicine necessitated a change in this organization, however, and the American Medical Association approved a combined program, for HUP, Graduate, and the V.A. as of July 1, 1973, and the establishment of an independent residency at Presbyterian-University of Pennsylvania Medical Center.  

The increasing specialization within the discipline of radiology was clearly seen in the creation of two separate residency programs at the Hospital of the University of Pennsylvania and its affiliated institutions. It is also apparent in the insistence by residents that they receive formal instruction in the various aspects of their specializations.

Changes in the School of Medicine Curriculum

Radiology course offerings gradually increased in number in the School of Medicine, another clear indication of specialization within the discipline. Richard Chamberlain insisted that a basic course in radiology be required as part of the medical school
THE CHAMBERLAIN ERA

curriculum, and despite some arguments from other members of the faculty, a requirement was instituted. The course was offered near the end of the first year of course work, after the students had had a minimum of exposure to radiology in their anatomy, pathology, medicine, and surgery courses, and was designed to expose students to the fundamental concepts of diagnostic and therapeutic radiology and nuclear medicine through lectures, demonstrations, and small group conferences. 59

The expansion of course offerings was spearheaded by Wallace T. Miller, a departmental Fellow during the late 1950s, who returned to the hospital following his military service as one of the small staff of diagnosticians. His informal case reviews were an ever popular offering, and his enthusiasm for and commitment to undergraduate medical education were reflected by his receipt of the Lindback Award for Distinguished Teaching in 1968, the Student Government Teaching Award in 1972, and the dedication of the 1971 medical school yearbook to Miller and three other physicians.

Adele K. Friedman, another diagnostic radiologist, accepted specific responsibility for the expanded general radiology elective, 60 and it grew to become so popular that seventy-five percent of the medical students took it sometime during their four years in school. 61 The course was taught as a preceptorship with daily interpretive film conferences as well as lectures, demonstrations, and joint conferences with other specialties. Fluoroscopy, special studies, and nuclear medicine were included in the curriculum, with special attention to the use of radionuclides. 62

The expanded list of advanced course offerings included pediatric radiology, clinical diagnosis, gastrointestinal radiology, and two courses in radiological physics. 63 A four week clinical nuclear medicine course, taught each January, was particularly popular. Exposure to radiotherapy for the undergraduate medical student was confined primarily to information in the introductory courses and a single course in therapeutic radiology. 64

Advances in diagnostic and therapeutic radiology increased its value to other specialists considerably during these years. The importance of an understanding of the capabilities of radiologic techniques was stressed to students in the School of Medicine, and the expanded offerings enabled the interested student to receive more in-depth exposure to one or more facets of the radiological program.
In addition to his responsibilities as Chairman of the Department of Radiology, Richard Chamberlain was appointed to a number of international committees, was active in radiological and medical organizations, and developed a number of projects which involved the department outside the hospital. Among the most extensive of these were teaching assistance to the University of Saigon and creation of the Radiation Management Corporation.

Chamberlain was a recognized expert on radiation units and measurements, and served on a number of international commissions charged with the analysis of exposure to radiation and its effect. He served on the World Health Organization’s Expert Advisory Panel on Radiation for ten years, lectured for that organization on radiation health in the eastern Mediterranean, western Pacific, and southeast Asia, and served as a member of several other of its committees. During his trips to southeast Asia, he became acutely conscious of the lack of a strong radiological teaching program in that part of the world. His interest in this problem prompted him to enter into a contract with the American Medical Association and the United States Agency for International Development to maintain an interdepartmental relationship with the Department of Radiology at the University of Saigon.

After a preliminary visit in 1969, Dr. Chamberlain was able to outline a number of problems at three teaching hospitals in Saigon: deficiencies in the number of professional and technical personnel, inappropriate selection and poor maintenance of equipment, and lack of understanding of—or attention to—quality control in radiograph production. He visited the departments in Saigon once or twice a year to observe their progress, but chose Dr. James T. Lambeth, a radiologist from the University of California, to supervise the on-site operation. Lambeth oversaw the residency in radiology, presented lectures on diagnostic radiology to medical students, and planned a training program for technicians. The latter was designed to familiarize them with up-to-date apparatus prior to their being sent to district health units, but, as with other planned programs, political instability often intervened. Each of the Chiefs of Radiology at the teaching hospitals came to Philadelphia to complete an advanced course of study at the Hospital of the University of Pennsylvania,
as did other Vietnamese physicians: thirty-one completed one year of specialized training and six completed two years of specialized training.68

Once Vietnamese personnel were properly trained, however, they still faced difficulties with the apparatus available for their use. Richard Chamberlain was particularly conscious of the need for a manageable, streamlined diagnostic system which could operate under primitive conditions in rural areas, and which could be used effectively by technical personnel without extensive training. To meet these needs he developed the Technamatic Radiology System, a battery-operated unit which offered a limited number of exposure settings and body positions and used special film, to compensate for the area’s high humidity, which was processed inside the unit.69 The system was marketed by the General Electric Company and created worldwide interest because its cost was reasonable, it assured high quality films, and it reduced the technician’s responsibility for decision making.70

Two Technamatic units were installed in Saigon teaching hospitals, in addition to new conventional apparatus in eight examination rooms. The Technamatic system was used by the hospital staffs, but political unrest prevented thorough training programs for medical students and technologists.71 The cooperative program with the University of Saigon came to an abrupt halt in 1975; by that time nine Technamatic units had been installed in Vietnam.72 Despite the system’s technical efficiency, it was destined to fail in the Third World because there was no prestige associated with the ownership of such a simplistic piece of apparatus.73

Richard Chamberlain also served as a consultant to a number of national organizations, including the National Advisory Council on Radiation and the National Council on Radiation Protection, and was an active participant in the work of University committees and local and state medical societies and organizations. As a member of the State of Pennsylvania Advisory Committee on Atomic Energy, he interacted with responsible officials from business, industry, and state government, and found that there was extreme concern about the industrial uses of radiation and the potential for a disaster.

With the assistance of a local Philadelphia businessman, Dr. Chamberlain organized the Radiation Management Corporation in 1969. The effort was funded by the sale of stock shares among industrial users in the mid-Atlantic region, and its purpose was
to pursue research on the evaluation, diagnosis, and treatment of all types of radiation exposure. Dr. Roger E. Linnemann, a respected specialist in radiological protection, left the U.S. Army to become President of the corporation. It was responsible for the laboratory and nonclinical aspects of the investigation, while the department was responsible for the clinical aspects of the program.

The department equipped a residential treatment center on the sixth floor of the Maloney Building, including a radiosurgery decontamination room and a reverse isolation room. Hospital personnel were trained to handle radiation emergencies, and the corporation and department jointly maintained surface and air transportation which could respond immediately in the case of an emergency. The corporation's independent status enabled it to fund special projects at the hospital, and in the early 1970s it funded the Department of Hematology so that it could use the special clinical facility for a bone marrow transplant program, and donated a laminar air reverse isolation room for the clinical facility as well as a centrifuge for the Blood Bank. Dr. Linnemann held a faculty appointment, and the corporation's staff also participated in programs for medical students and residents.74

Richard H. Chamberlain's enthusiastic commitment to projects outside the hospital, in addition to his work at the hospital and School of Medicine, earned him respect among radiologists worldwide. He was honored with the receipt of the Gold Medal of the American College of Radiology in 1969, the Gold Medal of the Radiological Society of North America in 1971, and the Medal of the University of Lund, Sweden in 1975.

NOTES

1. Edward M. DeYoung, Personal Interview, 7 June 1978.
3. DeYoung, Personal Interview, 7 June 1978.
4. Ibid.
THE CHAMBERLAIN ERA

11. DeYoung, Personal Interview, 7 June 1978.
15. Hospital of the University of Pennsylvania, Annual Report (30 June 1965), inside front cover.
27. Friedman, Personal Interview, Spring 1976; Bilaniuk, Personal Interview, Spring 1976.
30. DeYoung, Personal Interview, 7 June 1978.
32. DeYoung, Personal Interview, 7 June 1978; Mishkin, Personal Interview, Spring 1976.
33. DeYoung, Personal Interview, 7 June 1978.
34. Mishkin, Personal Interview, Spring 1976.
35. Ibid.
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[137]
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