Department of Radiology, University of Virginia Health Sciences Center: Genesis and Growth

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Thomas Jefferson recorded in the March 29, 1819, minutes of the Board of Visitors of the University of Virginia that eight schools were authorized for the institution, one of them being the School of Anatomy and Medicine. Thus began one of the first medical schools in the United States.

The school opened in 1825; courses consisted of anatomy and surgery in the anatomical theater designed by Jefferson, materia medica, pharmacy, pathology of disease, physiology, and history of the progress and theory of medicine. Medical students and faculty saw outpatients in the nearby clinic and observed surgical procedures in a hospital dispensary built in 1896. Patients recovered and boarded in a hotel across the street. Patient care was performed in a small hospital several miles from the university and medical school.

The University of Virginia Hospital opened in Charlottesville on April 17, 1901, with 26 beds. Increasing demand for inpatient medical services from surrounding communities resulted in three hospital additions in the next 18 years, for a total of 200 beds.

Formative Years

The faculty of the school of medicine was very much aware of the diagnostic and therapeutic applications of X-ray after the discovery by Roentgen in 1895. The first X-ray unit at the university hospital was a machine purchased in 1910 for $1000. The chairman of the surgery department contributed half the cost; the remainder was provided by the hospital auxiliary and the hospital. This X-ray machine was placed in the basement of the 1901 building to be operated by interns; it would be nearly 50 years before X-ray service moved from the basement.

Robert Wiatt was appointed adjunct professor of roentgenology in 1919 when the department was formed and established a required course in roentgen diagnosis. Some brief treatment notes from 1920 bear Dr. Wiatt's name. Vincent W. Archer had been a student assistant in X-ray and returned as instructor in roentgenology in 1924. He retired as chairman in 1961. For most of the intervening 37 years, he owned the equipment and employed his physician associates, residents, and staff. He started a training program in 1925, and by 1961, 65 physicians had held residencies for 1–3 years.

George Cooper was the second faculty member in the department, specializing in radiation therapy. The third and fourth faculty members were added in 1948 and 1951, the latter being William Craddock, who had trained at University College Hospital in London, and who later developed the department's neuroradiology division.

The department grew; by 1955, it had five diagnostic and two therapy rooms. Nuclear medicine was transferred to the radiology department about 1960. Equipment was purchased from funds from clinical earnings, but needs often exceeded resources. Dr. Cooper remembers an exciting 1954 proposal to install a cobalt therapy unit. He had been part of a group at Oak Ridge, TN, that developed a workable unit, and one of the first units produced was offered to the University of Virginia. The price was modest by today's standards and Dr. Cooper was crushed to find there was no way to fund the purchase. He enlisted the help of three women in the community to organize a fund-raising campaign. The cobalt therapy facility opened in 1955 in a concrete building that had been designed as an animal centrifuge research building during World War II. For several years, this was the only cobalt therapy unit in the southeastern United States.
and the demand for supervoltage treatments was more than the capacity of the unit and personnel.

Expansion and Maturation

By 1951, after several more additions, the university hospital had 485 beds. The radiology department had 45,000 examinations that year, and it was soon apparent that a modern building with more space was needed. The unified hospital was opened in 1960 and included a two-story, 40,000-sq-ft radiology wing. Dr. Archer persuaded the Virginia General Assembly to appropriate nearly $6 million in support of the wing. At last the radiology department had come out of the basement. Unfortunately, the structural design of the building did not allow necessary expansion of the radiology department. Modifications provided some space for new equipment and intensive care units, but a replacement hospital was again needed. The current hospital, opened in 1969, includes space and equipment for the full scope of diagnostic radiology. The division of radiation oncology remains in the 1960 building.

Dr. Archer retired as chairman of the radiology department in 1961. Dr. Cooper served as acting chairman until Theodore Keats arrived in 1964. Dr. Keats spent the first year of his appointment on a sabbatical leave as visiting professor at the Karolinska Institute in Stockholm, Sweden. He observed Scandinavian departments, where radiology had evolved differently from the pattern in the United States. He saw competent radiologists performing the full range of studies, including interventional procedures. That experience had a profound effect on the new chairman, and he arrived in Charlottesville determined to make radical changes in the department. The University of Virginia is not known for its radical thoughts, and, not surprisingly, there were to be many conflicts in the years to come. However, the results of Dr. Keats' changes were appreciated, although resisted by some faculty outside the department.

Dr. Keats enlisted the support of the dean and the hospital administrator in centralizing radiologic services. Many services had been operating radiographic and fluoroscopic units of uncertain age and safety. Dr. Keats had considerable resistance from one chairman. In his frustration, Keats muttered at a Chicago meeting that he wanted a "contract" on the recalcitrant opponent. Later, he was approached by a shadowy figure who offered to perform the deed for $5000. Dr. Keats wanted to have all radiologic procedures performed by radiologists. Bronchography was being done by thoracic surgeons, excretory urography by urologists, and angiography by surgeons, neurologists, and neurosurgeons. Although some radiology faculty members had experience in newer imaging and interventional techniques, this change in practice would require improvement in radiologists' skills.

A nuclear medicine physician, Richard Wetzel, was added to the faculty in 1966. Dr. Craddock was sent to Ullevaal Hospital in Norway to study Seldinger techniques, air myelography, and encephalography. Ivar Enge, an internationally known interventionalist from Oslo, Norway, spent a year setting up a special procedures and interventional service. Dr. Enge was followed by several other Norwegians until Charles Tegtmeyer became a permanent angiographer in 1972. Dr. Tegtmeyer built a widely respected interventional division, introducing angioplasty procedures to the region in 1978 after studying with Andreas Gruentzig in Switzerland. Results on more than 600 renal angioplasties have been carefully documented. He developed new procedures such as the "kissing balloon" method of dilating branching vessels, the auxiliary approach to renal angioplasty, and a method of dilating totally occluded femoral vessels. He designed numerous new instruments such as the Tegwire catheter and the lymph duct cannulator. In 1969, William Constable accepted an appointment as radiation therapist. He developed a full-service, educational radiation oncology program that remained part of the department until January 1994. The goal of providing radiologic services by highly trained radiologic faculty was attained.

During the formative years, the department was independent of the hospital for funding and personnel management. Dr. Archer agreed to sell the X-ray units to the hospital, providing the opportunity for better equipment when the 1960 hospital opened. A dedicated angiographic room and a neuroradiologic suite were opened in the mid 1960s. Sonography and CT services and linear accelerators for radiotherapy were added in the 1970s. A 1.0-T MR imager was purchased for research by the department in 1985 and later sold to the hospital for clinical studies. In 1989, a gamma knife, the second in the country, was added. Thus the medical center was able to provide the tools for evolving radiologic practice. All funding was provided from clinical earnings, and until 1980, the Commonwealth of Virginia did not allow the hospital to retain annual profits to provide for new ventures.

Dr. Keats was frustrated by delays in initiating new services, but his successor as chairman, Bruce J. Hillman, noted that he found few departments so well equipped. The teaching programs for residents and medical students were reviewed and revitalized. Daily film rounds were started and were open to medical students and house staff from all departments. The teaching file was organized and expanded. These efforts resulted in Dr. Keats' being chosen for the 1968 Robley Dunglison Award as the outstanding teacher in the medical school. All current and future residents were offered the opportunity to attend the Armed Forces Institute of Pathology 3-month course in radiologic pathology. None turned down the opportunity.

Department Leadership

Robert Graham Watt

Little is known about Dr. Watt, the first chairman. He graduated from the Medical College of Virginia in Richmond in 1914 and started the University of Virginia roentgenology program in 1919. Four years later, he died after an automobile accident. He established a course of lectures and demonstrations for medical students.

Vincent William Archer

Most old timers credit Vincent Archer with starting the department. He was largely self-trained but spent the first year after his 1923 graduation from the University of Virginia as roentgenologist at Black Mountain Sanitarin in North Carolina. He established a training program for physicians 1 year later and started a training program for technicians in 1935. His first student, Elizabeth Nalley, served as chief technologist and
department manager until her retirement in 1981. Miss Nalley describes him as demanding and authoritarian, but fair. Dr. Archer was highly regarded outside the department and medical center. He authored or coauthored more than 30 significant articles and a monograph entitled "The Osseous System: A Handbook on Roentgen Diagnosis," which was printed in 1945 and again in 1963. His long interest in radiation protection led to design of a lead fiberglass material suitable for protective jackets and aprons which was patented in 1952. Dr. Cooper relates that Archer's greatest professional disappointment was the failure of this concept to become accepted, because the fabric was more comfortable than lead rubber and offered more complete body protection. The patent was donated to the American College of Radiology (ACR) Foundation in 1968.

Dr. Archer served as president of the Albemarle County Medical Society, the Virginia Radiological Society (now the Virginia chapter ACR), the Medical Society of Virginia, and the ACR. He was delegate to the American Medical Association and chairman of the ACR Board of Chancellors. He was a cofounder and chairman of the Virginia Medical Service Association, now Blue Shield of Virginia, and the University of Virginia Medical Alumni Foundation. He received numerous awards and honors, including the ACR Gold Medal in 1961 (Fig. 1). These achievements were impressive, given that his base was a rural teaching hospital.

Dr. Archer taught best in one-on-one situations. He preferred to sit behind residents who were interpreting films, commenting on film details or interpretations offered. One of his favorite comments was, "What could it be other than what you think it is?" He kept a file of classic reprints nearby and could instantly provide a key reference. He witnessed radiology grow into a legitimate specialty. His opinion was rarely questioned because of his extensive knowledge of radiology and because his demeanor did not encourage such debate. He died July 31, 1968, at the age of 72.

George Cooper, Jr.

Dr. Cooper (Fig. 2) served as acting chairman of the department from 1951 to 1964. He started residency at the University of Virginia in 1936 and was the first of the 3-year residents. He relates that he was "put out" by Dr. Archer requiring 3 years of training, but Archer insisted. The decision could not be appealed, because Dr. Archer was the department. Dr. Cooper's clinical interest was therapy, but he had a love of teaching medical students and gave a popular lecture series for third-year students. He also taught roentgen anatomy and physiology to first-year medical students by demonstrating barium swallowing on a small fluoroscope. Small groups of students would dark adapt and one or more would volunteer to swallow the contrast agent. This may seem unacceptable today, but at that time one could fluoroscope one's feet in the shoe store without dark adaptation.

Dr. Cooper was instrumental in the reorganization of the ACR in the late 1950s, giving state chapters more voice through the council. He was the first chair of the council and served as a chancellor between 1964 and 1969. Dr. Cooper became chairman of the department of radiology at the University of Tennessee in 1964. In 1969, he went into partial retirement, continuing to teach and practice at the University of Virginia in Charlottesville, where he resides today. He retired from the University in 1979.

Theodore E. Keats

Dr. Keats (Fig. 3) was appointed the fourth chairman of the department in 1963. His experience in Sweden prepared him to reorganize the radiology faculty to facilitate the growth of subspecialties because of the need for trained radiologists who could perform all radiologic procedures. This change strengthened both the department and medical center. The department tripled the number of studies performed and initiated the full gamut of services during his 29-year leadership.

Dr. Keats' love of writing clinical articles became evident shortly after he completed residency at the University of Michigan. He developed a lifelong pattern of observing and reporting unusual and important radiographic patterns in health and
among physicians. He has published more than 100 articles, 30 book chapters, review articles, and several texts, and he is editor of Academic Radiology, formerly Investigative Radiology. As the fifth radiology department chairman, he is addressing issues such as basic and applied research, organ system subspecialization, and academic survival in a managed care environment. These new directions illustrate the never-ending evolution of teaching departments.

**Training Programs**

Dr. Archer had hired nurses as assistants but realized that a more formal training program was needed, and a course for technicians was started in 1935. The training programs have graduated 874 students in radiography, nuclear medicine, radiation therapy, interventional, and CT and MR imaging technology.

Dr. Archer accepted his first physician for training in 1925. The residency was mainly on-the-job training with a single instructor. Radiation therapy was an essential part of the training, because even small hospitals offered X-ray therapy. By 1961, 59 residents had entered the program. As the residency grew in size and content, subspecialization occupied a greater portion of the allocated 3 years. With the arrival of William Constable as director of radiation therapy in 1969, total separation of diagnostic and therapeutic training allowed 3 years' of training in each field. The therapy program has graduated 30 residents since then. The general and diagnostic programs had trained 121 residents by 1980, when the 4-year curriculum appeared. Eighty-four residents

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**Bruce Jay Hillman**

Dr. Hillman (Fig. 4), who arrived in 1992, trained at Brigham and Women's Hospital and is well known for his studies on conflict of interest and self-referral for diagnostic imaging

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**Fig. 4.—Bruce J. Hillmen, fifth chairman of the department of radiology.**
have completed the 4-year program in diagnostic radiology. Fellowships in various subspecialty fields appeared about 1977, and 84 fellows have been trained.

The evolution of the University of Virginia's department of radiology reflects the trends of academic programs throughout the country. The initial capability and emphasis were centered on plain films, fluoroscopy, and therapy. Training lengthened and service became more complex as the knowledge base expanded and the specialty became more powerful.

This institution has been fortunate to have strong leadership from nationally and internationally recognized radiologists. That leadership has maintained continuity for long periods and has had sustained support from the administration. There is great optimism that the radiology and radiation oncology departments at the University of Virginia will continue to occupy a prominent place in academia during a stressful period of change in American health care delivery and health professional education.