Participation in World War II increased both the numbers of persons working with radiation and United States involvement with radiation issues. Here the Picker field unit, used in the field for both therapy and diagnosis, was prepared for mass shipment in 1943. (Courtesy of the Center for the American History of Radiology, Reston, Va.)
It is impossible to separate entirely the early developments in therapeutic radiology and diagnostic radiology, as they were parallel in their growth and maturity. The two specialties melded together politically and economically for the first seventy-five years of their existence. It is true that there were a few physicians who specialized solely in radiotherapy in the earlier years, but economic changes and interactions with hospitals, fledgling insurance companies, and the federal government were always directed at "radiology" in general.

Many of the early pioneers of radiation therapy were not even radiologists but surgeons or gynecologists who used radiation in the cancer treatment portions of their specialties. Even today membership in the American Radium Society (ARS) is not confined to radiation oncologists but is open as well to members of surgical specialties such as gynecology, otorhinolaryngology, and general surgery.

At the beginning of this century, when medicine was developing its various subspeciality groups, patients were responsible for their own medical payments. There were no health insurance companies as we know them today, no government regulations, and no third party intermediaries. The only political and socioeconomic issues addressed by physicians in these years were directly involved with hospital boards and occasionally with their fledgling specialty societies.

Following the end of World War II there was rapid development and proliferation of new and sophisticated equipment for radiation therapy, starting with cobalt teletherapy units and progressing to modern linear accelerators. This led to a marked increase in the range and availability of applications in radiation therapy and, consequently, increased the demand for physicians specializing in this field. Developments in apparatus, scientific and biological knowledge, and in the specialized training of new physicians in radiation oncology are covered in detail in other sections of this book. Development along these numerous parallel paths led to the growth and eventual independence of radiation oncology as a fully recognized medical specialty.

Despite this modern independence, the economic history of radiation oncology has remained tightly entwined with
all of radiology, and the benefits of this relationship have far outweighed the bad points. Radiation oncology, if left alone as a small specialty, would have had little or no political influence on its fate.

THE RELATIONSHIP OF RADIATION ONCOLOGY WITH HOSPITALS

It should be remembered that the hospital was originally planned as an institution for the indigent, often annexed to an almshouse or prison. The doctor expected the hospital to provide space and some of the necessary tools, as well as assistance in the hospital, particularly since the doctor's services were usually rendered without charge. Until the last years of the nineteenth century, persons who were economically competent never thought of entering the hospital as a patient. Later, as these individuals began to patronize hospitals, the institution continued to furnish to the doctor, without charge, a shop in which to work, the tools of his trade, and a corps of professional and technical assistants. This placed the doctor in a very delicate position with respect to control of hospital policies.

Diagnostic X-ray units were constructed within months of Röntgen's announcement and first appeared in private clinics and offices. But hospitals very quickly realized that diagnostic X-rays could be a lucrative source of income and began to build specialized X-ray rooms within the hospital. Logically, these should be staffed by the physicians who were becoming expert in the reading of these radiographs, and the specialty of radiology was born of necessity—with the hospitals serving as midwives. This early symbiotic relationship between the new specialty physician and the hospital as owner of the equipment has kept the radiologist in a somewhat vulnerable position, at the same time that it set tones and precedents for increasing technical specialization in other fields. The question of how the radiologist would be compensated dominated economic discussions in the field for years to come.

The Intersociety Committee for Radiology reported in 1940:

...for several years, radiologists have warned surgeons, internists, obstetricians, urologists, orthopedists, etc., that hospitals would one day dominate all medicine if a few specialties were sacrificed to economic convenience. If hospitals could practice radiology, it has been said they could likewise practice other specialties. If radiology is included as a hospital benefit in group hospitalization plans, there is nothing to prevent the inclusion later of other services.

The process of hospital control of medical costs had started slowly. In the 1920s a few hospitals instituted flat rate plans under which patients paid a flat fee covering the cost of medical services and hospital facilities. The first instance of this type of flat rate or early health maintenance organization (HMO) began in Dallas in 1927, when Baylor University Hospital started a group hospitalization and insurance plan. Teachers at Baylor paid 50¢ per month for three weeks of “free of any additional cost” hospital care at Baylor Hospital. By 1929 other employee groups asked to join, and this was the beginning of what eventually would become the Blue Cross Hospital Insurance Plan. Steady income from insurance premiums provided new revenues for Baylor Hospital. Patients received their entire care from the hospital with no additional fees. Early plans like these soon showed that radiology and pathology were potent revenue sources, with income from these areas used to cover losses in other departments.

Most radiology services in the 1980s were billed as hospital services with the income split between the radiologist and the hospital. These percentages varied across the country and from institution to institution. Over the years this ratio gradually stabilized with 40 percent going to the radiologist and 60 percent retained by the hospitals—a split which provided the historical basis for today's Medicare technical/professional/global ratios. Many hospitals attempted to divide the billing process so that radiologists would bill for their own services, but, amazingly enough,
radiologists steadfastly held to the percentage split from the hospital-based billing. They reasoned that if radiologists were forced to bill separately, the hospitals would keep a larger percentage of the generated income from the department of radiology.

Other hospitals took a different approach and defined radiology as a simple hospital service (like pharmacy or brace-and-limb) and consequently put the radiologists on salary. Many radiology practices held on to these arrangements with their hospitals for years, until the Health Care and Financing Administration (HCFA) finally mandated that all physicians must bill separately for their professional services in 1983.

In 1939 the American College of Radiology (ACR) recognized the seriousness of hospital employment of the radiologist. The American Hospital Association (AHA) proposed to take over control of radiology, anesthesia, and pathology, on a salaried basis, making these physicians employees of their hospitals. This would be a striking contrast with other branches of medicine, but it was felt that this ownership of physicians' services was necessary to develop sufficient income to cover other costs under hospital insurance plans. The ACR strongly recommended that physicians be separate from any plan for hospital insurance because of the serious risks to their professional integrity. They recommended that medical services be entirely eliminated from any type of hospital insurance plan and that radiologists bill patients directly and assume full responsibility for their financial return, just as did other physicians in private practice.4

In June 1939 the American Medical Association (AMA) noted at their House of Delegates meeting that the physician roentgenologist should preferably be one who was a diplomate of the American Board of Radiology (ABR) and stated further that it should not be the policy of the hospital to make a profit from the department of radiology. The AMA noted as well that the hospital was rapidly becoming a dominant factor in the delivery of medical care in the United States. The importance of the traditional family doctor as the main healthcare provider was being obscured in a trend toward the institutionalization of medicine, increased technology, and the specialization of physicians. The hospital was rapidly becoming the central nexus of healthcare in this country. Hospitals began to encroach on private office-based outpatient care by opening pay clinics and outpatient departments.5 These early incursions into the outpatient field were the precursors to today's extensive ambulatory care facilities, many owned and operated by hospitals.

In 1940 the AMA stated publicly that many patients who were placed in the expensive facilities of hospitals could just as well be cared for in their own homes. The AMA felt that this overutilization stemmed from hospitals encouraging the use of their facilities, from patients demanding admission, and from physicians who found hospital care much more convenient than the inefficient but time honored house call.7

In the late 1930s some hospitals began using technicians—often without physician supervision—to operate radiology departments, not only for the taking of diagnostic X-rays, but for the rendering of therapeutic X-ray treatments. The Kansas Medical Society noted in 1939 that “all X-ray therapy should be administered under the personal supervision of a doctor of medicine. Therapeutic roentgenology is a specialized and technical branch of the practice of medicine which, in unskilled hands, might be dangerous. While it is recognized that there is a need for skilled technicians as a means of assistance to the physicians, these technicians should work only under the direct supervision of a doctor of medicine.”8

The Vincent Bill, introduced in the New York legislature in 1939, prohibited the practice of radiology by nonphysicians. It specifically stated, “To prevent terminology controversies, the Bill defines radiology as the diagnosis or treatment of disease by exposure to radium or roentgen rays.” The bill
explicitly defined radiology and limited its practice to physicians, dentists, and osteopaths.  

In the 1930s radiology was practiced in three different types of hospital settings: (1) those occupied exclusively by nonpaying patients, (2) those occupied by a combination of nonpaying and paying patients, and (3) those occupied by paying patients alone. Roentgenologists were paid differently in each setting. They could work for a straight salary in the hospital with nonpaying patients. In the hospitals with a mix of patients, the hospital billed on a fee-for-service basis, and the roentgenologist would receive a discount on the renting of space or facilities but would be expected to treat charity patients without charge. In the full-pay hospitals, the roentgenologist would lease the space and equipment and pay the hospital a monthly rental. The hospital usually billed straight fee-for-service with some split of collected revenue. In the late 1930s the rent charged to the roentgenologist could vary from as little as $300 per month in a small hospital to as much as $3000 per month in a large affluent institution.  

The ACR estimated that over 57 percent of hospital radiologists in 1939 practiced on a percentage basis, sharing the gross receipts with the hospital. Approximately 36 percent of radiologists were paid a salary, often based upon the amount of work performed. A small percentage, about 7 percent of radiologists, collected their own fees and had no financial arrangement at all with hospitals.  

The November 1939 Bulletin of the Intersociety Committee for Radiology quoted Arthur Christie's book on the economic problems of medicine:

During the years when radiology was being advanced from a physical technique to a clinical specialty, the hospitals also acquired a position of new importance in the delivery of medical services. In 1939, there were over 6,000 registered hospitals in the United States, with a bed capacity of more than a million and a half, and almost all of them had a radiology department. During this development, it was natural that radiology should become a medical science practiced almost 90 percent in the hospital.  

In 1940 one-fourth of the cost of medical care in the United States went to pay hospital bills. The total cost of hospitalization in 1940 was $656 million dollars, $300 million of which was covered by federal, state, and local taxes, and $302 million by patient fees and insurance, with the remainder by contributions and endowments.  

The years of the second World War postponed much of the conflict between physicians and hospitals, as the nation's entire effort for the five-year period was devoted to operating as efficiently as possible with severely reduced numbers of physicians and technical assistants. Price freezes prevented any major changes in economic policies in the hospital/radiology relationships, just as freezes on the manufacture of X-ray equipment relieved hospitals of any obligation to update radiology facilities.  

Following the end of the war and throughout the 1950s, hospitals proliferated and prospered. Many new facilities were built, aided by government funding, and many included magnificent radiology departments. Radiologic procedures increased at an astonishing rate, and radiology flourished as a specialty. In spite of this prosperity, radiation therapy was often relegated to a relatively primitive facility, usually in the basement, primarily using orthovoltage equipment and operating as "a philanthropic sideline of diagnostic radiology."  

The advent of cobalt teletherapy units, followed by the application of linear accelerators, brought radiation therapy out of the dark corners and into new dedicated facilities. The relationship with the hospital, however, did not change appreciably, and many of the early radiation therapists remained salaried or working on percentage contracts with the institutions. The hospitals still tightly controlled the tools of the trade of radiology, especially in therapy, since the equipment was so expensive that very few radiation therapists could set up private and independent offices.  

At the time of the inception of
Medicare in 1964, a high percentage of both diagnostic and therapeutic radiologists were still working on some type of percentage contract or straight salary from hospitals. Some of these individuals remained on a percentage contract until 1983, when the realization that Medicare would no longer pay for the physician’s component of radiological services if it were bundled into the hospital’s unified or global billing finally convinced them to do otherwise. Global billing at this time remains one of the options in freestanding centers but is no longer recognized in hospital situations.

**The Development of Third Party Payers**

**Income from Radiologic Practice**

The minutes of the early meetings of the ACR and the ARS demonstrate that the problems members faced in the 1930s were similar to the major issues radiologists confront today. By 1937 sixty separate small group hospitalization plans were in operation in the United States. The largest, by far, was the Blue Cross–Blue Shield plan. Of these plans, fifteen provided full reimbursement for X-ray and radium therapy. Following the successful lead of the Blue Cross and Blue Shield plans, commercial insurance companies took up health insurance. The Aetna Insurance Company wrote its first hospital insurance policy in 1936; the Equitable Insurance Company followed in 1939. By the early 1940s Traveler’s Insurance, Metropolitan Life, and Prudential Insurance were also in the health insurance business. Health care insurance, covering both physician and hospital costs, became a lucrative market.

In 1940 the ACR noted that twenty-eight state medical societies were seeking authority to start Blue Shield plans called “The Doctor’s Plan.” The question was, “will radiology be included as a part of the professional benefits offered, or will these services be regarded as part of hospital care and be included in payments made to the hospitals both for radiation therapy and diagnostic radiology?” It was noted that the accepted practice in many of the larger hospitals was to make the services of diagnostic and therapeutic radiology available as part of hospital care. It seems that fault was found in the method of payment for these services through the hospital, with particular opprobrium directed against full-time salaried hospital radiology positions. The 1942 ACR Annual Report quoted the 1941 presidential speech of Dr. Henry Walton: “We can all recall instances in which radiologists, who through their own ability, had built up attractive practices in hospitals only to be replaced by the hospital in the later years by younger men who were willing to accept positions under arrangements which permitted the hospital to keep larger incomes from the department receipts.” Translation: This usually meant working for a lower salary than the incumbent radiologist was asking.

Dominance and medical leadership in the health provider organizations has historically remained with surgery and internal medicine, with radiology playing a relatively passive role. Even now, we see government health plans driven by primary care physicians. One explanation for the quiet role of radiology may be its consistent place among the highest paid specialties—with infrequent cause to press for special considerations.

*Medical Economics* reported in 1930 a median gross physician income of $12,000 with a net of $7,147. Surgeons were the only specialists reporting higher gross incomes than radiologists. By 1935, however, *Medical Economics* indicated that radiologists had become the highest paid of the medical specialties, with an average net income of $6,590. Surgery was second with a net of $5,961. This represented a substantial income in the Depression years of increased buying power per dollar.

In 1936 the average net income for all physicians had dropped to $4,443. The average net income for a radiologist on this survey was $9,700 with only 3 percent of radiologists reporting incomes greater than $50,000. By 1939 the average income for radiology was
$16,700 with a net of $9,860, indicating a cost of practice of about 32 percent.  

The fee schedules for diagnostic radiology were often described in detail in early ACR bulletins, but the fees for therapeutic radiology have always remained relatively vague—in part because of the wide range in variations in treatment methods among different practitioners and institutions. Occasionally global fees would be mentioned for radium therapy. In 1938 these ranged from $50 to $300 for radium applications. Superficial X-ray treatments averaged about $5 per treatment, and deep X-ray therapy averaged about $10 per treatment, with no other procedures listed. In 1938 the average global fee for a chest X-ray in the radiologist's office was approximately $12, with a total of twenty-five diagnostic X-ray procedures comprising the entire fee schedule.  

The most expensive procedure in diagnostic radiology was a three-film encephalogram at $50.  

By 1947 the average physician grossed $17,476 and after expenses netted $9,884 per year. At this level, physicians were in the top 3 percent of earners in the United States. The total gross income for all physicians in 1947 was approximately $2.5 billion dollars, with the single highest gross income reported at $180,000 and only 0.1 percent of physicians admitting to grossing over $100,000 per year. The seven physicians who made up the top income reports in 1947 were headed by a proctologist, and no radiologist made the list. The gross average income of a radiologist was $34,693 with an after expenses net of $20,319 per year. Radiology was reported as the highest average income medical specialty in the United States in 1947, exceeding surgery and obstetrics and gynecology by a significant margin.  

A survey done by the ACR in 1952 showed an income range of between $16,000 and $37,000 a year for the chief of radiology position at a university hospital. Surveys have been conducted over a number of years by the Society of Chairman of Academic Radiation Oncology Programs (SCAROP); in 1990 the seventy-fifth percentile of salaries in university hospitals was noted to be $281,000 per year for a chairman. This rose to $350,000 in 1995. Entry level positions into academic radiology in 1998 were reported between $125,000 and $150,000 for the first year. At the same time, entry level into radiology private practice was approximately $225,000 per year, rising to full partnership in the practice within an average of two to three years. Radiology continues to be a high income specialty but is now surpassed by cardiology, thoracic surgery, and in many situations medical oncology. The AMA News, 10 January 1994, reported from its Center for Health Policy Research that radiologists netted a median income of $240,000 per year compared to $148,000 per year average for all physicians in 1993.  

Billing for Radiological Services  

In 1939 Albert Rayle noted in the Journal of the Medical Association of Georgia and was quoted in the Bulletin of the Intersociety Committee for Radiology that "physicians should devote themselves to the scientific phase of their work and let the economics take care of themselves." He went on to say, "But now the economic phases have been thrust upon us and we have to talk about them, however distasteful it may be. We physicians have nothing to sell but our services. We have spent many years and many thousands of dollars to make those services worth something to the public, and we are entitled to sell them in a fair market without improper restrictions or unfair competition."  

The Bulletin of the Intersociety Committee for Radiology in October of 1939 quoted a book by Theodore Wiprud, "It is with such items as office procedures, accounting systems, and collection methods that the young, inexperienced doctor is apt to have difficulty. Every doctor must be a bit of a businessman and, rarely having received academic training in these subjects, he should seek assistance in sound business details. A proper accounting system, adequate files and
records, and efficient clerical methods are essential to the conduct of a successful practice. As you can see, very little has changed in the last fifty years. The major problems with billing have not changed in nature, despite their growing complexity.

### Relative Value Scale

Some of the earliest notations of the cost of medical services are related in *The History of Medicine* by Ralph Major. In this book, Major notes that in the Code of Hammurabi (ca. 1950 B.C.) the fees for surgeons were specified, together with the penalties for surgical failure: "If a physician set a broken bone for a man or cure diseased bowels, the patient shall give five shekels of silver to the physician." But, "If a physician operate on a man for a severe wound and cause the man's death, they shall cut off his fingers."

The *Bulletin of the Intersociety Committee for Radiology* in 1939 published a pioneering German relative value scale (RVS). (These values have been converted into United States dollars and reproduced as Table 8.1.) The plan had one restriction: specialists (roentgenologists) were entitled to administer any roentgen ray therapy in their specialty. Dermatologists, however, were allowed to give only superficial therapy; deep therapy could be administered only by an approved roentgenologist. In order to be paid under the German system, every physician was obliged to give an exact report about each patient and procedure. A report was transmitted to the insurance company and to the medical examining board, while copies were retained by the roentgenologist and sent to the referring physician. Each bill submitted was required to have the following items:

1. Name of patient
2. Statement of disease
3. Type of radiologic treatment or radiation therapy, the total "R dose" recorded
4. The roentgen diagnosis
5. Name and address of the referring physician
6. Calculation of charges divided into expenses and fees

Payment for radiological services was made by a special commission of radiologists, who supervised the qualifications of those desiring to practice radiology and audited all accounts submitted.

In 1937 the ACR and its radiologists struggled to retain global billing with a percentage division to the radiologist rather than splitting the bills into technical and professional components. The hospitals, on the other hand, were the proponents of division into technical and professional components and stated, quite logically, that the use of the operating room by the surgeon allowed the hospital to recover technical costs for the operating suite and its attendant expenses; the surgeon would then bill the patient for his professional services. The radiologist, they argued, should be no different. The hospitals owned the X-ray machines and should be entitled to collect the technical component for the use of the equipment, while the radiologist should bill the patient for professional opinions on interpreting films or expertise in treating malignancies. The ACR was quite adamant that the hospital should not pay radiologists a salary but should divide payments for the procedures with the radiologists. The argu-
ment was not fully resolved until HCFA mandated the institution of separate billing for the professional and technical components of all of radiology in 1983.

The total number of radiologists rose from 1,005 in 1931 to 2,191 radiologists in 1958. More than 75 percent of the physicians claiming to be radiologists were certified by the ABR and limited their practice exclusively to radiology. In 1957 the majority of radiologists apparently devoted less than one-third of their practices to therapeutic radiology, and only 1 percent of the radiologists stated they practiced therapeutic radiology 100 percent of the time. Very few of the radiation therapists in those days owned their own equipment; almost all were working in large hospital centers as employees of the institutions.33

By the mid-1960s radiation therapists were far more likely to be billing for professional services and acting as medical specialists than their counterparts in diagnostic radiology. A great deal of effort was exercised by the ACR and other specialty societies to convince members to scrap hospital billing contracts and bill for their services like other physicians. Radiation oncology led the way and laid a path for the rest of radiology to follow, a path that would ultimately save them from becoming hospital employees. By 1980 20 percent of diagnostic radiologists were still working under hospital billing contracts, at a time when almost all radiation oncologists were billing on a fee-for-service basis as individual practitioners.

In the diagnostic radiology volume of this Centennial set, Otha Linton comments that in late 1955 a fierce debate raged between the United States House of Representatives and the Senate regarding the definition of radiology as either a medical specialty or a hospital service. The swing vote in favor of a medical specialty was carried because Senator Russell Long of Louisiana had been convinced that radiology was a bona fide specialty during his mother’s radiation treatment for cancer. One must conclude that radiology as a medical specialty was saved by radiation therapy.

With the advent of Medicare in 1964, the federal government wisely decided to contract out the provision and administration of the plan to already established health provider companies. One can be certain that the well-organized health providers did not want a competing government agency, and, at the same time, they realized that lucrative contracts could be achieved by providing services as Medicare intermediaries.

When Medicare was formally enacted in June of 1965, it was assigned to the Social Security Administration (SSA), a branch of the Department of Health and Human Services (HHS). SSA created the Bureau of Health Insurance (BHI), to which it assigned the task of designing and managing Medicare. HCFA was a contrivance of the Carter administration, announced and put into effect by HSS Secretary Joseph A. Califano, Jr., in 1977. This imposed four layers of management above the people in the BHI who had been managing the program and made the administrator of HCFA subject to Senate ratification.

In the late 1960s Medicare was still working with the usual and customary payment system (UCR). Medicare reimbursement to radiology was based on the California Relative Value Schedule (CRVS), which was accepted by the majority of insurance companies across the country. Prior to the advent of Medicare, there was little reason for radiologists to have any real direct relationship with the federal government. The development of RVs or fee schedules was a very slow process. The very earliest of the radiology fee schedules demonstrated charges for radiation therapy by the disease category or by the treatment or treatment course. These sometimes related to the X-ray energy used but had no consideration for any of the other procedures or thought processes that went into developing and performing the course of treatment.

In August 1957 the ACR Bulletin stated that a survey established a 60 percent overhead factor for an office, with 40 percent going to the physician for his professional services, based on.
<table>
<thead>
<tr>
<th>Head and Neck</th>
<th>CRVS UNITS</th>
<th>Miscellaneous (cont):</th>
<th>CRVS UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7500 Brain, including pituitary</td>
<td>60.0</td>
<td>7616 Spinal cord lesions</td>
<td>60.0</td>
</tr>
<tr>
<td>7502 Oral Cavity</td>
<td>40.0</td>
<td>7618 Polycystic kidney</td>
<td>20.0</td>
</tr>
<tr>
<td>7504 Orbit</td>
<td>60.0</td>
<td>7620 Skin neoplasm up to three cm. diameter</td>
<td>15.0</td>
</tr>
<tr>
<td>7506 Nasopharynx</td>
<td>60.0</td>
<td>7622 Lip</td>
<td>20.0</td>
</tr>
<tr>
<td>7510 Larynx</td>
<td>60.0</td>
<td>7624 Lymph node metastatic</td>
<td>20.0</td>
</tr>
<tr>
<td>7514 Thyroid</td>
<td>60.0</td>
<td>7625 Endocrine system, pituitary, adrenal</td>
<td>20.0</td>
</tr>
<tr>
<td>7522 Mediastinum</td>
<td>60.0</td>
<td>7638 Single high voltage treatment</td>
<td>2.6</td>
</tr>
<tr>
<td>7524 Pleura</td>
<td>60.0</td>
<td>7639 Consultation on therapeutic procedures</td>
<td>5.0</td>
</tr>
<tr>
<td>7530 Esophagus</td>
<td>60.0</td>
<td>7640 Acne, single treatment</td>
<td>1.5</td>
</tr>
<tr>
<td>7532 Stomach</td>
<td>20.0</td>
<td>7642 Adenitis, single treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7534 Small intestine</td>
<td>20.0</td>
<td>7644 Ankylosis</td>
<td>3.0</td>
</tr>
<tr>
<td>7540 Colon</td>
<td>40.0</td>
<td>7646 Arthritis, periarticular</td>
<td>7.0</td>
</tr>
<tr>
<td>7542 Rectum</td>
<td>60.0</td>
<td>7648 Asthma, course</td>
<td>7.0</td>
</tr>
<tr>
<td>7544 Anus</td>
<td>60.0</td>
<td>7650 Bursitis, course</td>
<td>7.0</td>
</tr>
<tr>
<td>7550 Kidney</td>
<td>50.0</td>
<td>7652 Carcinoma, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7556 Bladder, cancer, complete course</td>
<td>50.0</td>
<td>7654 Cellulitis, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7558 Testicle</td>
<td>60.0</td>
<td>7656 Dermatitis</td>
<td>5.0</td>
</tr>
<tr>
<td>7560 Prostate</td>
<td>50.0</td>
<td>7657 Infection, course</td>
<td>5.0</td>
</tr>
<tr>
<td>7563 Penis</td>
<td>40.0</td>
<td>7658 Endometriosis</td>
<td>20.0</td>
</tr>
<tr>
<td>7570 Ovaries</td>
<td>60.0</td>
<td>7660 Enteritis, regional</td>
<td>20.0</td>
</tr>
<tr>
<td>7572 Fallopian tubes</td>
<td>60.0</td>
<td>7662 Erysipelas, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7574 Uterus corpus</td>
<td>50.0</td>
<td>7664 Fibroids</td>
<td>20.0</td>
</tr>
<tr>
<td>7576 Cervix, complete course</td>
<td>70.0</td>
<td>7668 Fungus infection, per treatment</td>
<td>1.5</td>
</tr>
<tr>
<td>7577 Vagina</td>
<td>70.0</td>
<td>7670 Keratitis, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7580 Vulva</td>
<td>70.0</td>
<td>7672 Keloids, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7582 Peritonitis</td>
<td>60.0</td>
<td>7674 Hypermethyldism</td>
<td>50.0</td>
</tr>
<tr>
<td>7590 Preoperative</td>
<td>40.0</td>
<td>7676 Menorrhagia, Metrorrhagia</td>
<td>20.0</td>
</tr>
<tr>
<td>7592 Postoperative</td>
<td>40.0</td>
<td>7678 Lymphoid tissue</td>
<td>7.5</td>
</tr>
<tr>
<td>7594 Primary (radiotherapy only)</td>
<td>50.0</td>
<td>7680 Ovarian dysfunction</td>
<td>10.0</td>
</tr>
<tr>
<td>7596 Recurrent, chest wall</td>
<td>20.0</td>
<td>7682 Paronychia, per treatment</td>
<td>1.5</td>
</tr>
<tr>
<td>7598 Metastases</td>
<td>20.0</td>
<td>7684 Parotitis, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7600 Primary</td>
<td>40.0</td>
<td>7686 Pyelitis, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7604 Metastatic, one area</td>
<td>20.0</td>
<td>7688 Tinea capitis, full course</td>
<td>10.0</td>
</tr>
<tr>
<td>7610 Leukemia, maximum per annum</td>
<td>60.0</td>
<td>7690 Sympotymyia, full course</td>
<td>40.0</td>
</tr>
<tr>
<td>7612 Hodgkins, maximum per annum</td>
<td>60.0</td>
<td>7692 Varicella, per treatment</td>
<td>2.0</td>
</tr>
<tr>
<td>7614 Lymphosarcoma, fibrosarcoma, neurosarcoma, and other soft tissue sarcomas, maximum per annum</td>
<td>60.0</td>
<td>7698 Single low voltage treatment</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Prepared by the Committee on Fees of the Commission on Medical Services, California Medical Association, 12 February 1956

the historic average split of the radiology fees between the physician and the hospital. A complete fee schedule, including relative value units and professional and technical components, was included. This was the first wide-spread publication and distribution of an ACR RVIS. The first CRVS was published by the California Medical Association in February of 1956 (Table 8.22). Radiotherapy was covered as a disease-oriented system based upon diag-
nosis of disease. This was a global billing system with a conversion factor varying from $5 to $10, with an average of about $8 per CRVS unit. The factor was established by the hospital and the radiologist for the area of practice. The hospital billed the patient or the insurance company and paid the radiologist a set percentage or a salary. The average case treated with "deep X-ray" would net the radiologist $100 to $250.

By 1964 the CRVS had simplified the system by eliminating disease categories and based the new system on treatment modalities, a practice which expanded over the next thirty years (Table 8. III). Almost all diagnostic and therapeutic radiology professional service billing was based on the CRVS. Initially, the CRVS was a global billing system, and the radiologists would negotiate a percentage split with the hospital. Radiation oncology was included under the billing system of radiology; note the small number of procedures in the CRVS section for radiotherapy and the scarcity of reimbursement codes. Initially, HCFA utilized the 1964 CRVS to determine payment for radiation therapy for Medicare reimbursement. The conversion factor remained from $5 to $10 per unit depending upon the part of the country where the practice was located.

The ACR was well aware that the UCR reimbursement system was contributing to wide variations in payment values for similar procedures across the country. This was pointed out to HCFA, but, with little supporting data and the reasoning that "things had always been that way," HCFA saw little reason to change the system. Radiation oncology made up a relatively small percentage of the overall billing for radiology, consequently receiving little attention from HCFA. The ACR continued working with HCFA on a regular basis. The minutes from the various meetings of the ACR Board of Chancellors reflect these interactions but do not truly reflect the "behind the scenes" negotiations carried out by members of the ACR staff on behalf of American radiology, including radiation oncology.

In 1972 HCFA notified the ACR that the UCR billing and payment procedure for radiation oncology was creating an undue amount of wasted administrative time throughout the system because of wide inconsistencies in radiation oncology coding and billing. Many radiation oncologists had drifted away from the CRVS and were literally
making up their own billing systems. HCFA is reported to have stated to the ACR at one point, "for less than 1 percent of Medicare payments, it was spending almost 4 percent of administrative time sorting out the paper work." For this, and other reasons, Medicare notified the ACR that unless radiation oncologists standardized their own nomenclature and billing for Medicare, a standard nomenclature would be devised for them and mandated into use. A preliminary meeting was held in Chicago in the fall of 1973 to begin to study this problem. Representatives from the ACR and the leaders of American radiation oncology were brought together to be apprised of the urgency of arriving at a workable solution.

This task force began gathering billing data from many practitioners across the country and compiled this information in a document published by the ACR entitled, "A Standard Nomenclature for Radiation Therapy, ACR Supplement #2, 1975," the first User's Guide for Radiation Oncology. The concept of front end loading—placing the values for radiation therapy in the appropriate context of physician work—was first set out in this publication. Prior to that time, most radiation therapy reimbursement was based upon the delivery of daily treatments, although this actually played a smaller role in terms of physician time and involvement. The designation of treatment planning, simulation, dosimetry, and fabrication of treatment devices as front end services was established, and appropriate values were determined for these procedures. The original 1975 User's Guide was supposed to have included an RVS, but that was pulled at the last minute on the recommendation of the ACR counsel as a potential problem with the Federal Trade Commission (FTC). The codes were submitted to the AMA for inclusion in the radiation therapy section of the Physicians' Current Procedural Terminology (CPT). It was accepted and published as CPT-IV, and HCFA embraced the system as a workable solution to their needs for standardization.

Table 8.IV is a broad range of the average charges for some of these procedures over the years. These values have been compiled from many payment schedules studied as part of research for the 1988 ACR-RVS Valuation Panels. The wide range of values illustrates the problems caused by the longstanding FTC ban on the publication of RVSs. The ranges should actually start at zero fee since many practices failed to realize that they could charge for items such as treatment planning, simulation, and dosimetry. Diagnostic radiology-based practices with general radiologists performing radiation therapy were more likely to miss these procedures than full-time radiation oncologists. All practices suffered from a wide range of values as there was no baseline from
which to work.

Over the years the User's Guide has been revised several times by the ACR, each time with the blessing of the AMA and with the endorsement of HCFA, thus promoting nationwide standardization of coding (Table 8.5).

Congress mandated that a fee schedule for radiology services go into effect in January 1989, and as a consequence a full RVS for radiology had to be developed. Many ACR groups worked diligently throughout the summer and fall of 1988 developing the appropriate RVS for all of radiology, including diagnostic radiology, therapeutic radiology, and nuclear medicine. The radiology RVS was developed from a vast amount of information gathered from billing systems across the country as well as from HCFA's own internal Part B payment data. As these billing systems were reviewed, it became obvious that the discrepancies that had developed over the years between various localities were more numerous and complex than anyone had suspected. This was the beginning of the standardization of radiology fees nationwide and gradually brought an end to wide disparities in Medicare payments to physicians across the country for radiologic procedures.

The ACR Consensus Panel in 1988
developed global, professional, and technical relative value units for the CPT-IV procedures for diagnostic radiology and therapeutic radiology. The original relative value units were based on radiology procedures, but when all of medicine was mandated to come under a single RVS, the relative value units were adjusted to match the nationwide resource-based relative value scale (RB-RVS). Table 8.V reflects the 1995 relative value units for the more common radiation oncology procedures. This is not a complete listing of all of the present descriptors utilized in radiation oncology.

The average cost for the physician component for a full course of curative radiation therapy in 1964 was $300. In 1967 it would cost an average of $325, and by 1978 this same course of treatment would be valued at about $400. The 1996 Medicare RVS, with a conversion factor of approximately $54.65 per relative value unit, limits the physician professional payments to an average of about $2,100 per case. The multitude of new and sophisticated treatment methods and modalities has contributed to significant increases in the technical costs associated with adequate radiation therapy services. However, there has been very little change in the professional component value in almost thirty years.

The Development of RVS and CPT as Related to Radiation Oncology

Most of the roentgenologists in the early part of this century practiced both diagnostic and therapeutic radiology. Diagnostic roentgenology, however, was the predominant source of income, with therapeutic radiology practiced almost as a sideline. In the 1930s, with the development of supervoltage X-ray units, came the emergence of consistently curative radiation therapy. A few physicians began to split off from diagnostic radiology and practice therapeutic radiology full time.55

Following the end of World War II, scientific advancements were everywhere in medicine, and atomic power was the key to high-activity radioactive sources. The advent of the cobalt-60 teletherapy units in the late 1950s heralded a long awaited breakthrough and boosted the practice of therapeutic radiology to its full potential. These units made the widespread use of curative cobalt radiation therapy, with its average energy of 1.2 megavolts (MV), available in most large hospitals nationwide. Megavoltage linear accelerators soon followed and have now become the standard equipment in the majority of treatment centers.56

The development of national specialty associations, increased output from radiation therapy residency programs, and better equipment all worked together to bring about a small but growing nationwide corps of full-time therapeutic radiologists. Close communication and cooperation among these newly emerging specialists resulted in a rapid standardization of treatment protocols. With this proliferation of knowledge through scientific meetings and publications, standardization of treatment techniques soon followed.

Uniformity in nomenclature and its associated billing and collecting processes, however, was slow in developing, with the first published nomenclature and RVS to be utilized nationwide being the 1956 CRVS. In 1977 the ACR was placed under a consent order from the FTC stating that all communication relative to the values of procedures performed in radiology would cease and all copies of the CRVS were to be collected and destroyed to prevent possible price fixing and restraint of trade.

The ACR remained under this oppressive regulation for the next ten years. During this period there was little or no communication among physicians regarding the amounts that were being charged for their various services. The insurance carriers knew every physician’s fee profile, and Medicare knew all the values. Each carrier made up its own payment scheme to fit these national averages, but physicians were not allowed access to these fee schedules. Medicare was divided into more than two hundred payment localities, each with its own
allows the usual and customary charges of the physicians in that area. This lack of uniformity in nomenclature was brought into sharp focus as Medicare began to assume a significant portion of the financial burden of many cancer patients in the early 1970s. It was only after the consent order was lifted by an act of Congress in 1987 that the full extent of this variation became public knowledge.

CPT is a five-digit system for coding procedures and services performed by the physician. It is produced and copyrighted by the AMA and goes through yearly updates with input from all of the medical specialty societies. CPT was not originally intended to include any type of hospital technical coding. The Omnibus Reconciliation Act (OBRA), which went into effect 1 October 1988, directed hospitals to bill all outpatient Medicare charges under Part B and to use CPT as the proper nomenclature for billing the services rendered. CPT was originally designed as a coding and reporting system but gradually, over the years, came to be used as a vehicle for carrying the appropriate nomenclature for the billing of procedures to Medicare and the other insurance carriers. Changes in Medicare have forced the AMA to concede that CPT must also be used for billing of some selected technical services. In 1991 CPT for radiation oncology published an entirely new set of codes which covered "technical only" procedures. CPT codes are now utilized for both professional and technical values. CPT provides a uniform language to accurately describe both hospital and physician services while allowing a framework for charges in freestanding centers. The RVS attaches value modifiers to the CPT code which, with the proper conversion factor and locality modifiers, will relate directly to a dollar reimbursement figure.

As we look back through the ACR Users Guides, starting with the standard course of nomenclature in 1975, we see that the concept of simple, intermediate, and complex has been expanded to cover many procedures, such as simulation, treatment management, and isodose plans. Over the ensuing years many of the early codes were collapsed, combined, and eliminated. Newer, more explicit codes were devised to take their place. Today forty-six physician-specific radiation oncology codes exist, and sixteen technical-only codes are used by hospitals or centers for radiation therapy. In addition, radiation oncologists have access to thirty-nine evaluation and management codes that may be used by any physician. Radiation oncologists may also utilize other special codes, such as endoscopic procedures found in other sections of CPT. Relative value numbers exist for all of these codes and are standardized nationwide.

The ACR, working under a direct mandate from Congress and in cooperation with HCFA and the AMA, was the first to develop and implement a full RVS for a medical specialty. This was done at a time when the Board of Chancellors of the ACR predicted an RVS for all United States medicine in the near future. By being allowed to develop the system from the beginning, radiology was given the privilege of designing the nomenclature and the appropriate weight of various procedures based on its own needs and perceptions. Many of the other medical specialties were not allowed this luxury, and now all of medicine is encompassed in a single RVS.

THE RELATIONSHIP OF RADIATION ONCOLOGY WITH THE FEDERAL GOVERNMENT AND HCFA

Mae Cahal, the executive secretary of the ACR in 1987, remarked to the Board of Chancellors, "The public is aware that the present day methods of treatment for cancer have yielded only a moderate degree of success, hence the desire for an active federal program directed toward the eradication of this scourge of mankind. We must be prepared to demonstrate that the private physician is capable and prepared to lead the war against cancer."

He went on to say, "The public health service's war (1920–1937) on
tuberculosis, syphilis, gonorrhea, diphtheria, and other diseases will now logically lead to the diagnosis and treatment of cancer as a national medical responsibility. It is essential that the profession let the public know that the private practitioner is fulfilling the duties of prevention and treatment. Medical research and the cure of many common diseases had allowed cancer to progress from sixth place to second place as the medical cause of death in America in 1937, a position it continues to hold.58

In August of 1937 President Roosevelt signed a bill appropriating $750,000 for a cancer institute in Washington with an annual appropriation of $700,000 for its operation. The institute was to devote its attention to research only. This was the beginning of what would become the National Cancer Institute (NCI). The fear at that time was that once the NCI was organized the government would start a series of free clinics across the country for diagnosis and treatment of cancer.49 Although the federal government did ultimately appropriate funding and assist in the construction of cancer hospitals in various locations, the NCI never became involved in the actual treatment of cancer as a sponsored service of the federal government, remaining instead a research institution.

Cahal went on to state in his 1937 report:

Private medical practice has everything to offer that could be offered by a bureaucratic government in a war on cancer. Unfortunately, the public does not know that. An intelligent campaign of institutional advertising might help to make them aware of this fact. Unless the public has a course of intelligent education offered to them in a form which they will accept, the hands of Mr. Average Citizen will be roused in thunderous applause for the first senator who proposes to command a large portion of the practice of private radiologists, dig deeply into the pockets of the taxpayer, and set up a federal program for the diagnosis and cure of cancer.41

This more than fifty years ago and sounds like the "new" health plans of the 1990s.

The Bulletin of the Intersociety Committee for Radiology in May of 1939 quoted Albert Rayle's paper in the Georgia Medical Association Journal, "We are all interested in what we call 'socialized medicine', which, for our purposes, we shall define as any system whereby either the professional or economic aspects of practice are controlled by laymen. The two go hand-in-hand, for economical control will lead to professional control. It is axiomatic that the man who pays the fiddler eventually will call the tune."42

Senator Henry Cabot Lodge of Massachusetts introduced on 19 March 1940 a bill to provide for a federal health insurance program and the furnishing of those medical services and facilities which had become standardized in their nature but which, because of high cost, were seldom used. To quote Senator Lodge,

I believe it is not disputed that countless instances occur every day in which X-ray examinations are desirable—may essential—but are not given because of the prohibitive cost. The suffering which could be prevented by prompt X-ray examination is indescribable. The prevention of disease automatically tends to reduce the cost of caring for the disease once it has been allowed to take hold. In the case of X rays, it is not inconceivable that it would become a routine part of every physical examination were it not for the cost.43

George Cooper, a radiologist from Virginia and a member of the ACR Board of Chancellors, warned in his address to the Tennessee Radiological Society in 1965 that, "when the new Medicare laws will be enacted, radiology may well be defined as a hospital service and, thereby, fixed forever in that position unless specific changes are enacted." The ACR reacted and proposed a separate fee structure for radiological services and managed to have these placed in the professional service section for physicians in the new Medicare structure. The ACR also developed a nonprofessional component for the hospital with the physician and hospital collecting their separate amounts and billing under the separate Part B and Part A sections of Medicare.
The legislation was eventually signed into law.\textsuperscript{46}

In 1984 the federal government was struggling to control health care costs. Awareness of the escalation of the cost of health care began in the early 1970s, shortly after the inception of Medicare. With more accurate tracking of the true cost of health care delivery, it was estimated that the national medical bill reached $390 billion in 1984 and made up 11 percent of the gross national product. This amounted to more than $1,500 per United States resident to cover the cost of medical care.

It is easy to look back and identify factors that have caused the cost of health care to grow by leaps and bounds. New, innovative, and lifesaving high-technology diagnostic and therapeutic procedures resulting in the cure of potentially fatal diseases have been the most significant factors in the rise in the cost of health care. Inflation, however, continues to play an extremely important role and one that is commonly overlooked.\textsuperscript{45}

Another significant factor contributing to the escalation of costs was the usual and customary billing scheme, which allowed physicians to continually increase the value of their services. This, however, was surpassed by the ability of hospitals to pass through to the patient all of their related costs of health care delivery, significantly contributing to the increase in cost. The RVS and diagnostic related group (DRG) classification have somewhat curbed the rate of price escalation and may eventually completely control this factor. Physicians and hospitals may well end up contributing proportionally more of their potential incomes to the control of health care costs than any other facet of society.

The Social Security Amendment of 1965 created a hospital insurance program for the elderly (Medicare, Part A) and a voluntary insurance program to pay for physician services to the elderly (Part B). Expenditures under Medicare increased from $3 billion in its first year to $33 billion in 1982 and exceeded $80 billion in 1993. Everyone benefited: patients, physicians, and hospitals. Medicare reimbursed not only the minimum treatment required for a patient but whatever the physicians deemed worthwhile, including the higher number of diagnostic tests and new modalities of therapy. Other third-party payers also paid hospitals either their costs plus all applicable pass-throughs and overhead or their flat rate charges. This open-ended method of paying hospitals began to change in 1982 when Congress passed the Tax Equity and Fiscal Responsibility Act (TEFRA).

In 1987 the DRG system was completely in place, and hospitals were paid by Medicare under the new prospective fixed payment system based on 467 DRGs. Instead of paying hospitals for total cost for services, Medicare allotted a predetermined amount based on the DRG under which each patient was admitted and treated, but outpatient payment continued to be partially based on cost passsthrough.

In an attempt to further control the costs of hospital care under the DRG system, peer review organizations (PROs) were set up in each state by the federal government to monitor hospital usage under Medicare, with the prime purpose to discourage hospital admissions and excessive surgery. The PROs resembled the professional standards review organizations (PSROs) created in the early 1970s but differed with the additional authority of numerical targets which the hospitals had to meet.

MALPRACTICE AND RADIATION ONCOLOGY

In its earliest applications, the use of radiation to treat cancer was not without risk to patients and practitioners. Litigation over "X-ray burns" occurred as early as 1896, less than a year after Röntgen's discovery. One of the earliest references to the rising malpractice costs for radiation oncology occurred in the minutes of the ARS in 1936. The malpractice insurance premiums for radiotherapists in 1936 were higher than those paid by other physicians, and premiums were based mainly on the cost of litigation and to a
lesser extent on judgments against physicians engaged in radiotherapy. In the late 1950s the ARS began to formulate and sanction plans to make the practice of radiation therapy less hazardous. A committee was formed to designate minimum standard parameters for radiation therapy.46

This committee was to designate a maximum radiation dosage consistent with the type of disease for which X-radiation was used, namely carcinoma. This should be the highest dosage consistent with safety and at the same time adequate to influence the disease. The radiation dosage should be qualified at 200 kilovolts, 1/2 millimeter aluminum, and 1 millimeter of copper filtration with a skin portal of 10 x 10 centimeters. Tolerances should be established for dry exposed surfaces as well as for moist and unexposed surfaces. The dosage as well as the time interval should be specified and whether the radiation was given daily, every other day, or biweekly. There was no need at that time to include what was referred to as "super high voltage" dosages, as these modalities were too few in number and had been insufficiently studied.47 Despite the best efforts of the ARS, very few standards were ever developed or codified. It has only been in the last few years that true standards for radiation oncology have been seriously considered, developed, and published.

**REGULATIONS OF RADIIUM, OTHER RADIOACTIVE MATERIALS, AND THE NUCLEAR REGULATORY COMMISSION**

The control of the distribution and use of radium over the years has always been a "hot" topic. Shortly after the discovery of radium, its clinical usefulness was demonstrated. The effects that this easily portable form of radiation had upon surface tumors was, indeed, miraculous. And as with all miracles came the desire for control and profit, as well as doing good for mankind—the old story of "doing well while doing good."

The rarity of radium and its tedious extraction process soon established it as an extremely expensive commodity that was bought, traded, and sold. Its inherent radioactive dangers were probably the only reason that it did not become a medium of exchange in the early years of this century. In its earliest medical applications, the control and safety of radium were relatively lax. There were no state or federal regulating bodies, and only the professional medical societies were interested in maintaining some level of radiation safety, both for the user and for the patient. Volumes of information were written from 1920 through the end of the 1930s discussing—but not agreeing upon—proper usage, distribution, and control of radium.

At a meeting of the ARS in 1922, it was recommended that radium, being used for the proper treatment of certain diseases, should have its purchase price deductible as a business expense from income tax. A petition was made to the Treasury Department that radium should be treated as a current expense of a physician's practice if the substance were rented or as a capital expense if it were actually owned, allowing proper deductions for "precarious obsolescence."48

At the eleventh annual meeting of the ARS in 1926, the prime concern was "to overcome the pernicious and promiscuous use of radium by anyone and everyone who could procure it through mail order business, rental companies, and so forth." They noted that public education would be extremely important so that the public would have some opinion as to who should be allowed to treat them with an element such as radium, which was "known to be dangerous even in experienced hands." Standards were to be developed by the ARS and coordinated with the American Society of Gynecologists and Obstetricians and the American Dermatological Society and promoted nationwide.49

In 1931 the ARS continued to follow up on the inappropriate use of radium. Many so-called "cancer clinics" in the United States were using unscientific measures, others were run on a completely fraudulent basis. A minimum standard established by the ARS was
that a community cancer clinic should have available at least 200 milligrams of radium and no less than a 200,000 volt X-ray apparatus 50.

In 1934 a suggestion was made for a bill to be submitted to Congress to permit the president of the United States to accept $10 million worth of radium in partial payment of war debts due from Belgium. The ARS wanted to send representatives of their executive committee to the congressional hearings to express their concerns that government ownership and distribution of this quantity of radium would amount to state control of the practice of radium therapy. The bill, however, did not pass, and the specter of a government-controlled medical specialty was not raised again until after World War II. 51

The Journal of the American Medical Association in May of 1939 presented a resolution through the Illinois delegation that was both praised and contested by many physicians and radiologists from coast to coast. The resolution condemned the rent of radium under certain conditions, namely, prescribing and directing the use of radium in the case of a patient whom the prescriber had not personally examined. The journal reported:

Such a rigid ruling was thought to work a great hardship upon thousands of members of the American Medical Association and cause great suffering to thousands of citizens of the United States who were remotely situated from sources of radium. Many patients would be denied the use of radium, if they were compelled to make long trips to a source of radium. Many patients were stated to have such great confidence in their physicians that they distinctly preferred that he personally administer such radium treatments rather than travel great distances for a radiologist to administer the treatments. The AMA pointed out that the pioneers in radium therapy, and the greatest advocates of radium, were not radiologists, but were leading gynecologists and dermatologists and many of these specialists were well-qualified to make applications of radium. It was felt that radium could be utilized and diseases could be satisfactorily treated, with great benefit to the patient by the average physician under proper supervision without a radiologist personally examining the patient. 52

Because of the great expense of radium it was not practical for the average small town physician to own radium, especially since the average physician saw so few cases in which it was needed; therefore, rental was the only solution to the problem. The same reasoning was utilized by the radiologists in countering this position, stating that the physician who did not have a broad experience with radium was the very person who should not be administering this extremely dangerous modality. 53

The AMA finally passed a compromise resolution stating that it would be considered ethical for a member of the AMA to personally describe a patient and submit this description to an experienced radiologist, who would then prepare a suitable radium applicator and course of treatment for the case. The case would then be treated by the original physician without the supervision of the radiologist. Opposition was raised by radiology to this compromise resolution, and the debate continued. The AMA House of Delegates finally passed a resolution stating "a physician prescribing for a patient without examining said patient is performing an unethical act." This resolution, however, did not preclude the rental of a definite amount of radium and specific applicator by the physician who had examined the case. The resolution did not specifically state that this physician must be a radiologist and, therefore, the controversy continued unabated. 54

The problems over the control of radium were never fully resolved as radium, being a natural element, never fell under the control of any regulating body. Some states had relatively weak laws regarding the storage, use, and disposal of radium, but even these laws were lax and seldom enforced. The only truly effective weapon against the indiscriminate use of radium came through the insurance carriers who eventually refused to pay for the application of radioactive materials unless performed by a physician, and eventu-
ally the payment schedules were limited to those physicians with expertise in the field of radium therapy. Radium remained an expensive material, even after the appearance of cesium and cobalt, a factor which, along with its inherent hazards, contributed significantly to its ultimate obsolescence.

In the 1930s exotic new radioisotopes that potentially could be used in brachytherapy were predicted, but only small quantities could be produced. During and following World War II, however, the development of nuclear reactors made the production of radioactive materials commonplace and eventually doomed the use of radium as a brachytherapy source. The Atomic Energy Commission (AEC) effectively ended the controversy by licensing the use of the newly created man-made radionuclides, eventually making radium obsolete. The development of encapsulated sources of cesium and cobalt began to displace radium as brachytherapy sources. These isotopes were then followed by even safer and more easily produced iridium and a succession of other radionuclides. All of the man-made radionuclides initially fell under the control of the AEC, today known as the Nuclear Regulatory Commission (NRC). Many states have assumed the regulatory activities previously held by the NRC. Under all of these circumstances, the man-made radionuclides are carefully regulated, but in many states the little radium remaining is outside the full regulation of the law.

 Licensing by the NRC, and more recently by states, has produced very tight regulations as to the availability of radionuclides and the approval of physicians who may use them. So far, organized radiology has resisted attempted incursions by the NRC into licensure and control of electronic radiation producing devices (linear accelerators). Cobalt teletherapy units have always fallen within the purview of the NRC. Licensing fees continued to increase in cost, and cobalt units, with their lower effective energy, drifted into obsolescence, leading to a decline in the number of cobalt teletherapy units in the United States today.

Regulation of all medical devices is becoming more stringent. Linear accelerators and even the software that drives them must have Food and Drug Administration approval before they are licensed for human use. Safety remains a primary concern of the physicians who use this equipment, and the government remains eager to step in and develop the appropriate layers of regulators and regulations.

The American Radium Society and Radiation Oncology

The earliest record of the beginning of the organization of radiation therapy comes from the minutes of the first ARS meeting. The organizational meeting of the ARS was held in Detroit on 22 June 1916. It was voted to organize and establish a permanent society, dedicated to the study and advancement of radium as a curative agent against many forms of disease. Among the organizers of this first meeting were R. H. Boggs of Pittsburgh, vice president; W. H. B. Aikins, of Toronto, Canada, president; H. E. Pancoast of Philadelphia, corresponding secretary; and R. E. Loucks, of Detroit, Michigan, recording secretary and treasurer. The first formal meeting was convened in Philadelphia on 26 October 1916. One of the first duties, proposed by Albert Soiland of California, was that the annual dues of active and associate members should be $5, payable in advance.55

Soiland believed it might be of value to the society to publish the pro-
ceedings of the ARS meetings in a respected medical journal. There was ill-concealed antagonism between the physicians doing radium work and X-ray work, and he believed that if such an arrangement could be made, they might strike a better note of harmony between the two agents which were so nearly allied. Pancost noted that for the first time the American Journal of Roentgenology (A.J.R.) had been fit to publish papers on radium therapy. The minutes reflect the fact that the A.J.R. was recommended, but not formally adopted, as the official publication source for the ARS.

In June 1917 the second meeting was held, and scientific papers were presented that covered the established value of radium as a therapeutic agent in dermatology and gynecology. Over the next few years the meetings consisted of scientific sessions covering the effect of radium and X-rays on tissues as well as some of the physics aspects of radiation dosimetry.

In 1919 C. Everett Field of New York City first suggested that a committee should be appointed to prepare the ARS to become a section of the AMA. In 1922 the ARS made application to the American Congress of Physicians and Surgeons to become affiliated with that organization and to meet with them every three years. A committee was appointed by the president of the ARS to confer with the American Roentgen Ray Society (ARRS) and the Radiological Society for North America (RSNA) for the purpose of considering the formation of a national board of examiners to pass upon the qualifications of physician candidates in roentgen diagnosis, roentgen therapy, and radium therapy, and for certificates of efficiency for technicians working under the direction of physicians. This movement would eventually lead to the establishment of the ABR.

At the 1920 meeting in New Orleans, Pancost noted a letter from the editor of the A.J.R. offering to become the official journal for the ARS. The A.J.R. was finally adopted as the official organ of publication at the annual meeting in 1921. Later the name of the journal reflected this change as it became the American Journal of Roentgenology and Radium Therapy. Annual ARS dues were raised to $12, and this amount included a yearly subscription to the journal.

The minutes of the ARS in 1926 reflected more than $4,000 in the bank. There was a note in the minutes thanking the treasurer, who was complimented on getting these funds out of a failing bank just an hour before it closed its doors.

The minutes of the eighteenth annual session of the ARS, held at the Palmer House in Chicago in September 1933, reflect that the ARS, the RSNA and the ACR met jointly as the first American Congress of Radiology. This constituted the first—and last—joint scientific meeting of all the radiological societies in America.

In 1941 the ACR changed its methods of organization and invited the ARRS, the ARS, and the RSNA, to elect one member each as chancellors with full powers on the ACR board. This was an important step forward for the field, as radiation therapy was now represented in the ACR by a specific individual from the ARS. Dr. O'Brien of Boston was nominated as the first chancellor from the ARS to the ACR. In 1956 it was recommended that any appointee to the ACR from the ARS should be an individual active in therapeutic radiology procedures in order to better represent the interests of the ARS.

The relationships among the various radiological societies have been, for the most part, peaceful. As one would expect of a large family, there have been squabbles, but overall, the various subspecialty societies of radiology have, by their unity, contributed significantly to the advancement of radiology as a parent specialty.
many of these meetings has reflected the changing leadership of the two organizations. It has ranged over the years from cordial to hostile depending on the leaders and the issues.

The AMA maintains the dominant role in the political and economic future of all of medicine, and radiology is still considered by many individuals in the AMA as a hospital-based specialty. This perception is gradually changing as the membership and leadership of the AMA become more sensitive to the unique issues confronting radiology as a specialty. Radiation oncology continues to be associated with radiology in the eyes of the AMA and is seldom singled out for special consideration. The AMA remains responsive to the needs of the radiation oncology community when specific issues are brought before its governing bodies. The issue of self-referral and ownership of freestanding centers is one prime example.

THE RELATIONSHIP OF THE AMERICAN COLLEGE OF RADIOLOGY AND RADIATION ONCOLOGY

The American College of Radiology was proposed by the ACR in 1936 and established in 1937. It was founded to study matters of economics in the practice of radiology and to improve the relations of radiologists with organized medicine. Its function was to collect facts and information, to make this information available to members and local groups of radiologists, and to offer advice and counsel when requested. The ACR, RSNA, and the ARRS each had three delegates. This was a time during which it became clear that specialty unity was necessary to counter state legislation and respond to an increasing number of federal constraints on radiological practice. Today's Intersociety Commission and its sponsored summit meetings represent thirty-eight radiological societies comprising all of the societies in radiology.
Representation of the various subspecialty societies of radiology was through appointment to the ACR Board of Chancellors by selected individuals. These individuals, chosen as representative from the various specialty societies as new chancellors, came on to the board when old ones retired. The Board of Chancellors in the 1940s and 1950s was a self-perpetuating group and, although they served the needs of American radiologists appropriately, were still viewed as a closed circle club. It was only after increasing complaints from members and from participating societies that more democratic representation from the various radiological societies began to appear on the Board of Chancellors.66

One of the earliest functions of the ACR was to develop a structure that would promote the formation of local and state chapters for participation in the national organization. The ACR was made up of individuals from around the country with keen political interests in advancing the cause of radiology. Many cities and states had unofficial gatherings of radiologists for social as well as scientific purposes. In 1941 the ACR instituted local and state chapter representation through the establishment of a council with elected members. The bylaws were appropriately modified, and the council began to bring the needs and problems of all radiologists to the attention of the Board of Chancellors for resolution.67 In 1955 thirty-four of these councilors had their first separate formal meeting. In 1959 the ACR adopted a formal state chapter system and won from the Board of Chancellors permission for trial ACR chapters in states whose radiologists wished to organize them. The chapters were established as divisions of the ACR and were bound by its rules and regulations and dedicated to implementing college policies within the respective states. The chapters included both diagnostic and therapeutic radiologists. Chapter officers were designated as officers of the ACR, and the bylaws of the state chapters were patterned after those of the ACR. This resulted in the revitalization of the council of the ACR and greatly strengthened the college, as it was now better able to relate to the concerns of individual radiologists.

Radiation oncology was sporadically represented within the chapters, but there were many areas of the country where diagnostic radiology was overwhelmingly dominant and radiation oncologists were unable to achieve the desired level of representation at the governing level of the college. This disparity became more obvious, and in 1978 the bylaws were modified and a nationwide chapter of the ACR, known as the Council of Affiliated Regional Radiation Oncology Societies (CARROS) was formed. This allowed radiation oncologists to have better representation in the ACR at the level of the council as well as an alternate route to the rank of fellow (FACR).

The 1959 minutes of the Board of the Chancellors of the ACR, as reported to the Board of the ARS, reflected a budget to finance the rapidly expanding activities of the college, but the budget was so large that its adoption would have produced a deficit of $35,000. It was felt that such spending would completely exhaust the funds of the ACR in approximately two years.68 In 1960 a resolution was introduced by the chancellor from the ARS recommending that the practice of adopting a budget calling for deficit spending be stopped and suggested that a reserve fund equal to one year's expenses be set up. This resolution was most unpopular and was defeated unanimously.69 It is interesting to note that twenty-five years later the ACR did adopt a policy against deficit budgeting and established a reserve fund equal to at least one year’s full operating budget.

In his 1923 presidential address to the ACR, Russell Carman noted:

Deep in our thoughts, I feel that all of us cherish a dream of a day when the radiologic workers of America shall be gathered in one mighty union, with permanent headquarters, functioning capably through stable bureaus, possessing a great library, conducting a journal with the newest and best in radiologic literature, advancing education, inspiring its members to constant self-improvement, and leading them to greater achievements in glory.60
Even from the earliest time, the dream of a single unified radiological organization has been put forward only to be diluted by a continuing proliferation of small specialty and subspecialty societies and interest groups. Considering the number of avenues of interest and self-interest that have been available over the years, it is a tribute to its strength and necessity that the ACR has survived as the primary socioeconomic organization for American radiology.

In 1965 the ACR Annual Report contained numerous items of interest to radiation oncology. The previously existing Committee on Cancer became the Commission on Cancer, a status which it maintains today. The first Annual Regionalization Conference to discuss cancer staging and end results reporting was held between the American College of Surgeons and the ACR. Cooperative guidelines were drawn up and minimal standards for radiation therapy and major cancer treatment centers and tumor clinics were established. Guidelines for determining the standards of radiotherapy in approved cancer centers were presented. The concentration of patients with certain types of tumors into designated treatment centers was extremely important to assure the success of such clinical research.

In 1965 the American Cancer Society asked the College of Physicians to make a general statement supporting the Surgeon General’s report on cigarette smoking. However, the ACR felt that this was not within their province and such a statement was not recommended by the Committee on Cancer. A discussion on the importance of mammography was stimulated by the comment that a study was conducted in New York City in 1964 to evaluate mammographic procedures as diagnostic aids for early detection of breast cancer. Many members of the committee thought that “this might possibly be of some assistance but that the value might be overestimated.”

In 1965 the Commission on Cancer put forth a new set of standards for radiotherapy in approved cancer centers. These stated that such a center must have a full-time radiotherapist in charge of the radiotherapy section of the facility. It noted that radiotherapy required, in addition to conventional low and medium voltage equipment of modern design, the availability of some adequate device operating in the megavoltage range. It also noted, however, that in “other centers,” at least medium voltage equipment of modern design should be available and that megavoltage equipment was usually not recommended for other than major cancer management centers.

The Relationship of the American Society for Therapeutic Radiology and Oncology with Radiation Oncology

The most important intersociety relationship that radiation oncology has today is with ASTRO. ASTRO remains the focus of our scientific endeavors and has become the largest scientific organization in the world representing radiation oncology. Radiation oncology prior to the mid-1950s was represented almost entirely by the ACR and the ARS. In 1956, with less than a hundred therapeutic radiologists practicing in the United States, it was felt that an organization should be formed to look toward the economic and educational goals of radiation therapy. The American members of the International Club of Radiotherapists initiated informal periodic gatherings to which other radio-
therapists were invited. The first of these meetings took place on 5 December 1955 at Barney's Market House on Randolph Street in Chicago. Subsequently, luncheon or dinner meetings took place during the annual conventions of the ARS or the RSNA.74

Juan A. del Regato suggested that the group "formalize their informality" and founded the American Club of Therapeutic Radiologists on 18 November 1958, with 54 initial members. By 1966 membership had risen to 254, and the name of the organization was changed to the American Society of Therapeutic Radiologists. In November of 1970 this fledgling society had its first separate scientific meeting at the Mountain Shadows Lodge in Scottsdale, Arizona, with an initial registration of 308 members. In 1983 the name of the society was changed to the American Society for Therapeutic Radiology and Oncology, and a new mission statement was adopted. Today ASTRO is the largest society of radiation oncologists in the world with almost 3,000 active members. The development of ASTRO and the radiation oncology community has proceeded as a one-to-one relationship. As radiation oncology grew and became more organized, ASTRO grew and followed the success of the specialty.75

**The Relationship of the American Board of Radiology with Radiation Oncology**

The ABR has played a key role in the life of American radiology and the specialty of radiation oncology. In his 1964 book, A History of the American Board of Radiology, Edward L. Jenkinson noted:76

With increasing specialization in medicine, as the nineteenth century gave way to the twentieth, there sprang up across America innumerable groups of 'specialists,' looking to improve the quality of practice in their respective fields. The American Roentgen Ray Society was organized in 1900, the Radiological Society of North America in 1915, and the American Radium Society in 1916. Just what constituted a 'specialist' was, however, open to a variety of interpretations. Any Doctor of Medicine was entitled to a listing in the Directory of the American Medical Association as specializing in the field in which he considered himself best qualified. In other words, he was the judge of his own qualifications.

With the stage thus set, the medical profession as a whole had considered there should be at least minimal standards in preparation for their practice of any medical specialty. It was felt that unless some method of control was established, each of the states might well enact laws prescribing requirements in various specialties with the result, there would be a large number of separate state boards of examiners for each specialty. The practical solution would be for each specialty to set a specific examining body in place and begin certification of positions wanting to practice that specialty.77,78

The American Ophthalmological Society organized the first specialty board, the American Board of Ophthalmology, in 1916 and incorporated it in 1917.

Despite earlier recommendations to form a radiology examining board, it was not until 1922 that five radiologic societies—the ARRS, the RSNA, the ARS, the ACR, and the Section on Radiology of the AMA—appointed a joint committee of three representatives from each organization to investigate the feasibility of establishing a qualifying board in this field.79 The following men were appointed by the five organizations:

W. Edward Chamberlain, M.D.
Willis E. Manges, M.D.
Arthur C. Christie, M.D.
John W. Pierson, M.D.
Edwin G. Ernst, M.D.
LeRoy Sanie, M.D.
Lester Hollander, M.D.
Henry Schmitz, M.D.
George W. Holmes, M.D.
Albert Soiland, M.D.
Edward L. Jenkinson, M.D.
Walter W. Wasson, M.D.
Lyell C. Kinney, M.D.
Rollin H. Stevens, M.D.
B. R. Kirklin, M.D.

Among these names were some of the early giants of radiology and radiation therapy. Radiation therapy was considered an important part of the specialty board of radiology even at the time of its inception.

The board was incorporated in Washington, D.C., 31 January 1934, by Arthur Christie, Paul B. Cromelin, and Bolitha J. Laws for the avowed purpose of encouraging the study and promoting and regulating the practice of radiology (including diagnostic and therapeutic applications of radiant energy including roentgen rays and radium).

The ABR was to determine the competence of specialists in radiology and to examine and test the qualifications of voluntary candidates. The board would grant and issue certificates in the field of radiology. They would prepare and furnish lists of those who were certified by this board and vowed to protect the public against irresponsible and unqualified practitioners who professed to be specialists in radiology.

A board of trustees was established with fifteen members, three of whom were appointed by each of the founding societies. It is important for the members of the radiation oncology community to remember that radiation therapy was included from the inception of the ABR and continues to play a key role. The ABR in 1934 began examining in diagnostic radiology, general radiology (a combination of diagnostic and therapeutic radiology), and radiotherapy.

The ABR held the first examination for certification in radiology in Cleveland, Ohio, in June 1934. Candidates were divided into three classes: Class A, outstanding radiologists of long experience (who for all practical purposes were certified without examination at this initial meeting); Class B, radiologists of less experience; and Class C, young radiologists who had recently completed training.

At the time of the initial examination in June of 1934, sixteen people were certified by examination and 149 were certified without examination. The number of applicants applying for the Class A examination continued to progressively decrease, and by 1940 it was voted there should be no further Class A or Class B candidates. However, as late as 1980 there was a Class A certification, but the board closed this route forever in 1981. By 1940 there were eighty-eight approved radiological centers training one or more radiologists. In 1999 there were eighty-three approved residencies in therapeutic radiology.

Initially, the examination was divided into five types of certification:

1. Diagnostic roentgenology (diagnostic radiology only)
2. Roentgenology (usually referred to as general radiology with the capability of doing both therapy and diagnosis)
3. Therapeutic roentgenology
4. Therapeutic radiology (the difference between 3 and 4 is not entirely clear)
5. Radium therapy (open to those individuals using only radium and not wishing to be examined in any of the other sections of roentgenology, either diagnostic or therapeutic).

In 1959 these were reduced to three divisions: diagnostic roentgenology, radiology (both specialties), and therapeutic radiology (radiation therapy only). Eventually the section on radiology was dropped so that the board now examines only in diagnostic roentgenology and therapeutic radiology. A section covering the examination on radiological physics was added in 1947.

Radiation Oncology and Joint Ventures

The conservative approach of President Ronald Reagan regarding health policy matters during the 1980s
emphasized competition, rather than regulation, as the mechanism for balancing healthcare spending. For-profit hospitals were converted, formed, or built throughout the country, and many of these hospital chains invested in outpatient facilities. Physicians, always quick to recognize an opportunity, noted that joint-venture outpatient facilities provided the opportunity for a more convenient way of caring for patients as well as the promise of profit from both professional and technical revenues that such centers were bound to generate. Healthcare spending increased during this time by approximately 10 percent per year, and entrepreneurs quickly seized upon the opportunity. Joint ventures, limited partnerships, and creatively financed outpatient radiation oncology facilities flourished nationwide. Hospital planning requirements and oppressive federal regulations for the procurement of expensive high-technology equipment had stymied small community hospitals from installing much-needed new linear accelerators. Private freestanding outpatient facilities were mostly immune from these regulations and as such provided the opportunity for community hospitals to improve medical care as well as an opportunity for physicians to profit from ownership of these facilities.

The growth of outpatient radiation oncology centers began slowly in the early 1980s and reached a peak by the end of the decade. In some instances, a radiology group or a group of radiation oncologists would raise most of the capital to build these facilities. In other situations, referring physicians, such as medical oncologists and surgeons, would also be significant partners or even sole owners in these joint ventures. Hospitals also invested in these centers hoping to share the profit and retain the radiation oncologist as part of the institutional staff. The dominant pattern, however, was the physician joint venture in which physicians were both the primary source of referrals as well as owners of the centers, a practice by no means limited to radiation oncology.

Questions of ethics arose: for instance, if a physician investor's return from a radiation oncology center was directly tied to the volume of referral, did this not color his or her medical judgment? This was seen as a violation of antitrust law and a violation of the physician/patient relationship in its most traditional form. In 1984, ACR president Jerome Wiot cautioned against abandoning the ethical standards of radiology by supporting the concept of imaging or radiation therapy centers owned partially or totally by physicians other than radiologists.

The ACR Council adopted a guideline which asserted “dividends or profits related to such investments should be commensurate with the individual's investment.” In 1985 the council went on to amend and strengthen its statement to “recognize and acknowledge the potential for abuse by self-referral in imaging and/or radiation therapy centers owned either in whole or in part by referring physicians.”

By 1988 the ACR Council began to condemn the practice of ownership in these centers stating that, “the practice of self-referral of patients for diagnostic or therapeutic medical procedures may not be in the best interest of the patient. Accordingly, referring physicians should not have a direct or indirect financial interest in diagnostic or therapeutic facilities to which they refer patients.”

Also at this time, the United States Office of the Inspector General (OIG) was directed to develop guidelines for acceptable business practices by healthcare providers. This eventually culminated in 1991 when Inspector General Richard Kusserow issued a management advisory and guidelines on what the Medicare program would consider acceptable business practices. These guidelines were expressed as “safe harbors,” defining accepted practices and leaving any other arrangement in some jeopardy of possible prosecution.

Documentation of the abuse of referrals to these centers and the increase in charges and procedures performed brought this matter fully into the spotlight of public attention.
Various reports had indicated a marked increase in the utilization of diagnostic procedures in physician-owned imaging centers. Two studies of joint ventures in Florida demonstrated the extent of referring physician investment and concluded that such enterprises markedly elevated the cost of health care. Moreover, there appeared to be adverse effects on patient access to care. Mitchell and Sunshine concluded that self-referral also substantially increased the use of services and costs.

Throughout most of this controversy, the AMA held to the position that the physician/owners of a medical facility had the obligation to advise patients of their ownership interest, but beyond this point, would not condemn the practice. In the late fall of 1981 the entire issue of self-referral reached a pinnacle of political and ethical jousting. A group of radiation oncologists in Florida aggressively challenged self-referral by rallying against a series of joint venture facilities planned by a for-profit group primarily controlled by medical oncologists who would be the owners as well as the prime source of referral to these centers. This group of radiation oncologists found themselves squarely positioned against the Florida Medical Association and indirectly against the position of the AMA. The ACR backed the radiation oncologists, and in early 1983 the Florida legislature passed a very broad resolution condemning the ownership of radiation oncology facilities by referring physicians. Many other states, led by Illinois and California, entered their own versions of strong state laws prohibiting physician ownership in freestanding facilities, including reenactment of strong certificate of need regulations.

During this time, the AMA vacillated between various stances, eventually stating “physician investment in health-care facilities can provide important benefit for patient care. However, when physicians refer patients to facilities in which they have an ownership interest, a potential conflict of interest exists. In general, physicians should not refer patients to a healthcare facility outside their office practice at which they do not directly provide care or services when they have an investment interest in the facility.”

The final result for the radiation oncologists who had invested in or owned these centers was reorganization of the financial structure of the center, which resulted in ownership outside the field of medicine or ownership by the radiation oncologist alone. On the positive side, outpatient centers proved that they could provide radiation oncology services at a much more cost-effective rate than comparable hospital facilities. As a consequence, many of these centers are now well poised to move into the next decade of managed care competition. A single center can compete effectively in the new marketplace, and a coalesced group of practices or centers is able to provide broad coverage to a wide area of a community and, thus, effectively compete under the new managed healthcare plans. These freestanding centers are able to effectively compete against the more cost-burdened hospital-based systems under the new managed healthcare plans.

Radiation oncology remains an independent medical specialty in the fast changing environment of medicine. The identity of radiation oncology as a clinical specialty has served the specialty well over the years and will continue to do so in the years to come. The lessons of the past are well taught, and any specialty is advised to heed the messages. Radiation oncology is a small specialty, but now, as throughout the last century, its strength lies in unity.
REFERENCES

6 Ibid.
9 Ibid.
11 Ibid.
14 Travis, Jack, M.D., Topeka, Kansas, personal communication.
17 Ibid.
18 ACR Annual Report, 1942.
19 ACR Communication M-86, 1 June 1939.
20 ACR Annual Report, 1942.
23 Christy, Economic Problems of Medicine.
25 Society of Chairman of Academic Radiation Oncology Programs (SCAROP), Survey 1993.
30 Major, R. The History of Medicine, Springfield, Ill.: Charles C. Thomas, 1954.
32 Ibid.
35 Ibid.
36 Ibid.
37 Ibid.
38 Personal Communication, Mac Cahal, in letters to the Chancellors and committee members of the ACR, 1937. Center for the American History of Radiology, Reston, Va.
39 Personal Correspondence from Mac Cahal to the Board of Chancellors, 19 August 1937. Center for the American History of Radiology, Reston, Va.
40 Ibid.
41 Ibid.
44 George Cooper, Address to the Tennessee Radiological Society, October 1965.
45 In looking at the economics of past medical practice it is often helpful (though sometimes deceptive) to put historical dollars into contemporary figures. The following table gives a synopsis in five-year increments dramatically illustrating the effects of inflation, and places the past costs in the perspective of today's values.

DOLLARS REQUIRED TO EQUAL THE PURCHASING POWER OF $1000 IN 1939:

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1915</td>
<td>$29.93</td>
</tr>
<tr>
<td>1920</td>
<td>$58.88</td>
</tr>
<tr>
<td>1925</td>
<td>$121.27</td>
</tr>
<tr>
<td>1930</td>
<td>$155.73</td>
</tr>
<tr>
<td>1935</td>
<td>$189.94</td>
</tr>
<tr>
<td>1940</td>
<td>$224.12</td>
</tr>
<tr>
<td>1945</td>
<td>$258.41</td>
</tr>
<tr>
<td>1950</td>
<td>$292.80</td>
</tr>
<tr>
<td>1955</td>
<td>$327.20</td>
</tr>
<tr>
<td>1960</td>
<td>$361.60</td>
</tr>
<tr>
<td>1965</td>
<td>$396.00</td>
</tr>
<tr>
<td>1970</td>
<td>$430.40</td>
</tr>
<tr>
<td>1975</td>
<td>$464.80</td>
</tr>
<tr>
<td>1980</td>
<td>$500.00</td>
</tr>
<tr>
<td>1985</td>
<td>$535.20</td>
</tr>
<tr>
<td>1990</td>
<td>$570.40</td>
</tr>
<tr>
<td>1995</td>
<td>$605.60</td>
</tr>
</tbody>
</table>

[Prepared by Jonathan Sunshine, Ph.D., ACR Director of Research]

46 Proceedings of the annual meeting of the American Radium Society, 1936, Kansas City, Missouri. Typescript and original, Center for the American History of Radiology, Reston, Va.
47 Ibid.
48 Minutes of the 7th annual meeting of the American Radium Society, May, 1922, St. Louis, Missouri. Typescript and original, Center for the American History of Radiology, Reston, Va.
REFERENCES

6. Ibid.
9. Ibid.
11. Ibid.
17. Ibid.
19. ACR Communication M-86, 1 June 1939.
21. Nyberg, "The Economics of the Practice of Radiology."
22. ACR Annual Report, 1942.
32. Ibid.
35. Ibid.
36. Ibid.
37. Ibid.
40. Ibid.
41. Ibid.
44. George Cooper, Address to the Tennessee Radiological Society, October 1965.
45. In looking at the economics of past medical practice it is often helpful (though sometimes deceptive) to put historical dollars into contemporary figures. The following table gives a synopsis in five-year increments dramatically illustrating the effects of inflation, and places the past costs in the perspective of today's values.

DOLLARS REQUIRED TO EQUAL THE PURCHASING POWER OF $1000 IN 1939

<table>
<thead>
<tr>
<th>Year</th>
<th>1915</th>
<th>1920</th>
<th>1925</th>
<th>1930</th>
<th>1935</th>
<th>1940</th>
<th>1945</th>
<th>1950</th>
</tr>
</thead>
<tbody>
<tr>
<td>1915</td>
<td>$69.93</td>
<td>$138.88</td>
<td>$121.27</td>
<td>$115.73</td>
<td>$195.72</td>
<td>$205.13</td>
<td>$218.30</td>
<td>$268.88</td>
</tr>
<tr>
<td>1920</td>
<td>$294.54</td>
<td>$297.02</td>
<td>$242.47</td>
<td>$237.40</td>
<td>$285.72</td>
<td>$305.13</td>
<td>$318.30</td>
<td>$368.88</td>
</tr>
<tr>
<td>1925</td>
<td>$340.47</td>
<td>$397.02</td>
<td>$322.47</td>
<td>$317.40</td>
<td>$365.72</td>
<td>$385.13</td>
<td>$398.30</td>
<td>$448.88</td>
</tr>
<tr>
<td>1930</td>
<td>$386.47</td>
<td>$437.02</td>
<td>$362.47</td>
<td>$357.40</td>
<td>$405.72</td>
<td>$425.13</td>
<td>$438.30</td>
<td>$488.88</td>
</tr>
</tbody>
</table>

[Prepared by Jonathan Sunshine, Ph.D., ACR Director of Research]

47. Ibid.
48. Minutes of the 7th annual meeting of the American Radium Society, May, 1922, St. Louis, Missouri. Typescript and original, Center for the American History of Radiology, Reston, Va.

228 Inter society, Government, and Economic Relations
Minutes of the 11th annual meeting of the American Radium Society, 15 April 1926. Typescript and original, Center for the American History of Radiology, Reston, Va.

Minutes of the 16th annual meeting of the American Radium Society, 1931. Typescript and original, Center for the American History of Radiology, Reston, Va.


Ibid.

Radiology 31 (1939):234-236.


Ibid. Pancost was incorrect in his statements about the AAR. In its earlier incarnation as the American Quarterly of Roentgenology the journal published regularly on radiation therapy.

Minutes of the 2nd annual meeting of the American Radium Society, June, 1917. Typescript and original, Center for the American History of Radiology, Reston, Va.

Minutes of the 7th annual meeting of the American Radium Society, May, 1922. St. Louis, Missouri. Typescript and original, Center for the American History of Radiology, Reston, Va.

Ibid.

Minutes of the American Radium Society, 11th annual meeting, 15 April 1926. Typescript and original, Center for the American History of Radiology, Reston, Va.


Minutes of the 25th annual meeting of the American Radium Society, 2 June 1941, Cleveland, Ohio. Typescript and original, Center for the American History of Radiology, Reston, Va.


Minutes of the 42nd annual meeting of the American Radium Society, 18 March 1960, San Juan, Puerto Rico. Typescript and original, Center for the American History of Radiology, Reston, Va.

Minutes of the 20th annual meeting of the American Radium Society, 2 June 1941, Cleveland, Ohio. Typescript and original, Center for the American History of Radiology, Reston, Va.

Minutes of the 41st annual meeting of the American Radium Society, March 1959. Typescript and original, Center for the American History of Radiology, Reston, Va.

Minutes of the 42nd annual meeting of the American Radium Society, 18 March 1960, San Juan, Puerto Rico. Typescript and original, Center for the American History of Radiology, Reston, Va.

Minutes of the annual meeting of the ACR, 1923. Center for the American History of Radiology, Reston, Va.

1965 Annual Report of the American College of Radiology, as it appeared in the ACR Bulletin.

Ibid.

Ibid.


Ibid.


Ibid.

Ibid.

Minutes of the 7th annual meeting of the American Radium Society, May, 1922, St. Louis, Missouri. Typescript and original, Center for the American History of Radiology, Reston, Va.

Jenkins, History of the American Board of Radiology.


