

New York Post-Graduate MEDICAL SCHOOL AND HOSPITAL

FALL SESSION, 1917

Special opportunities for thorough, complete scientific instruction in Roentgenology.

For matriculates with limited time at their disposal the following courses may be combined, and completed in a period of six weeks:

Roentgenological Technique.
Fluoroscopy and Plate Reading.
Roentgen Therapy.


For further detailed particulars concerning special courses, apply to

THE SECRETARY OF THE FACULTY
303 East 20th Street

Early radiological education was largely unregulated. This 1917 advertisement promised complete training in therapy, diagnosis, and technology--in six weeks!
New York City
(Courtesy of the Center for the American History of Radiology, Reston, Va.)

CERTIFICATION AND EDUCATION

Kenneth L. Krabbenhoff, M.D.



This chapter focuses on the evolution of graduate medical education and, in particular, the development of the certification process which validates and ratifies that education. Educational needs in radiology are concentrated primarily at the graduate and post graduate levels of physician education. Undergraduate instruction has been of variable intensity depending on faculty interest and curricular access.

There are also continuing educational needs for radiological physicists, radiologic technologists, and other allied health professionals, such as nurses and administrators. Physicians in primary care practice and in other specialty practice have specific educational needs in radiology. It is of further importance to provide accurate information to the public to avoid misinterpretation of the effects of exposure to ionizing radiations.

Radiation oncology and radiologic physics are the subjects of companion volumes, and radiologic technology is the subject of another chapter in this volume. This chapter will therefore focus primarily on the evolution of graduate medical education in diagnostic radiology during the past century.

At the time of Röntgen's discovery of "a new kind of light," formal graduate education in medicine in the United States was less than a decade old. The American Medical Association (AMA), founded in 1847, had struggled for half a century to improve medical education. Upon reorganization at the turn of the century and the appointment of a committee to examine the entire issue of medical education, the AMA created a permanent Council on Medical Education. Gradually, physicians began to seek additional training, or internships, after graduation and before entering practice. In 1914 the AMA first published its "Provisional List of Hospitals Furnishing Acceptable Internships for Medical Graduates," which was compiled without inspection of facilities. In ensuing years the title and criteria for inclusion underwent many changes. In 1924 "Hospitals Approved for Residencies in Certain Specialties" appeared in the educational number of the *Journal of the American Medical Association (J.A.M.A.)* for the first time. By 1961 the listing of internships and residencies had become so extensive that it was published as a separate volume titled



ABR ORAL EXAMINATION

Oral examinations, introduced in 1934 when the ABR was formed, have grown in complexity with the burgeoning of knowledge and with dramatic technological advances. For many years the oral examination for radiology was conducted by six examiners: three in diagnosis, two in therapy, and one in physics. Currently, the oral examination for diagnostic radiology involves ten categories: musculoskeletal, chest, gastrointestinal, genitourinary, neurological, cardiovascular and interventional, nuclear, pediatric, breast, and ultrasonography.

Critics of the oral examination cite its subjective nature and lack of standardization. Advocates, in contrast, stress its ability to measure the skills of observation, integration, reasoning, and deduction—competencies difficult to assess by cognitive written examination. The ABR has taken several steps to improve the standardization of the oral examination. Standardized sets of film and other images have been assembled for examiners in each category and are reviewed in group session to develop consensus on analysis and interpretation. Panels of examiners are balanced, insofar as possible, to provide comparable degrees of difficulty.

Candidates for each examination session (half-day) are assigned according to the quartile of their performance on the written examination, and each panel is assigned a like number of repeat examinees to provide a further basis for the evaluation of individual ability.


ABR WRITTEN EXAMINATION

In 1966, after several years of discussion, the ABR Examination Committee decided that it was feasible to administer a written certifying examination in radiology. In consultation with the National Board of Medical Examiners, the ABR appointed three task forces to construct the examination. The first task force was to address miscellaneous subjects that have basic significance, such as pathology, physiology, roentgen anatomy, and technique. The second dealt with nuclear medicine, and the third with physics and radiobiology. The committee further recommended that passing the written examination be a prerequisite to admission to the oral examination, and that all candidates should take the exam upon completion of their three-year residency. The first examination was offered in June 1968 and annually thereafter. It was first administered on Saturday at numerous sites throughout the country, but this was changed subsequently in deference to those candidates who observed the Saturday Sabbath. For several years the written examinations of the ABR have been given in late September or early October on two half-days, Thursday afternoon and Friday morning.

In 1969 the examination was differentially graded for candidates in radiology, diagnostic radiology, and therapeutic radiology, with the expectation of a higher level of performance on those parts of the examination relating to the limited fields. Separate examinations were developed subsequently for each of the fields.

In the early 1980s examination development services were sought from the American Board of Family Practice and a successor organization, but in 1986 the American College Testing (ACT) service took over this task and continues to the present.

The ABR written examination committee develops and selects test items, using approximately 60 percent new and 40 percent used pool items. New items are edited by professional medical editors, and used items are those with strong performance statistics. Question formats are multiple true-false, multiple choice, and matching, with between 350 and 500 scorable units for each booklet. ACT provides candidate performance reports, which include a pass/fail notice, percentile ranks for the diagnostic radiology and physics tests, and quartile rankings for ten sub-areas of the diagnostic radiology examination and one sub-area for physics. Program reports sent to radiology program directors include the number of candidates, the average score and program percentile for each test (diagnostic radiology and radiological physics), and program quartiles. The candidate's percentile rank on the diagnostic radiology examination is one element used in the standardization of the oral examination.



The Directory of Approved Internships and Residencies. "Internships" was dropped from the 1974-1975 title. Currently titled the *Graduate Medical Education Directory*, it includes programs accredited by the Accreditation Council for Graduate Medical Education (ACGME).

The AMA House of Delegates defined the essentials of approved internships in 1919. Over the years these underwent many revisions and came to include special requirements for the various specialties. As new specialty boards were formed within the AMA, their individual requirements for certification, as well as requirements for training, were published. The desire to establish standards of training in the various specialties was stimulated by contemporary progress in the science and art of medicine, by the increased and unregulated self-designation of physicians as specialists, and the need to evaluate and identify those deserving recognition as specialists. Emerging medical specialties like radiology found it imperative to establish standards of education and certification which would be agreed upon inside the specialty and recognized by other physicians and within the courts.

THE AMERICAN BOARD OF RADIOLOGY

In 1932 five national radiologic organizations each appointed three members to form a group to investigate the establishment of a "qualifying board." Representatives of the American Roentgen Ray Society (ARRS), the Section on Radiology of the AMA, the Radiological Society of North America, the American College of Radiology (ACR), and the American Radium Society conferred at a 1933 AMA meeting in Milwaukee. There was unanimous agreement that a qualifying board should be established. Each of the sponsoring organizations approved the group's report and appointed three representatives who were empowered to form a national radiologic board.

The American Board of Radiology (ABR) was incorporated in Washington, D.C., in May 1934. By the end of that year, the board had certified 404 candidates,

most of them "grandfathered" in as "Class A" candidates recognized by the board as outstanding practicing radiologists. Two other classes were originally recognized: "Class B," radiologists with less experience and rank and "Class C," younger candidates who had only recently completed training. Initial certificates were granted in radiology, roentgenology, diagnostic roentgenology, and therapeutic radiology. Although provision had been made for certificates in radiological physics and in X-ray and radium physics, these were not granted until later.

Forty years after formation of the ABR, additional organizations were approved as sponsors: the American Society of Therapeutic Radiologists in 1974 (its name was changed in 1984 to the American Society for Therapeutic Radiology and Oncology), the Association of University Radiologists in 1986, and the American Association of Physicists in Medicine in 1992.

DEFINING AND EVALUATING TRAINING

As will be recounted elsewhere in this volume, telegraphic dissemination of news internationally and the widespread availability of the kind of equipment used by Röntgen resulted in the immediate application of radiography in many settings. Since imaging was involved, the X ray often fell first to the hospital photographer or, in other instances, to the pharmacist, electrician, or others. Physicians who sensed the potential of this new modality learned by trial and error, personal observation, and communication with interested colleagues, and soon formed specialty societies to share their interests.

With the formation of the ABR in 1934, certification of individuals preceded any systematic evaluation of the many and varied training programs in the United States. In 1937 the Committee on Graduate Radiologic Training of the ABR recommended the following requirements for radiology:

A. Professional Education*

- (1) Graduation from a medical school of the United States or Canada, recognized by the Council on Medical

Education and Hospitals of the American Medical Association.

(2) Completion of an internship of not less than one year in a hospital approved by the same Council.

B. Special Training (to be effective after January 1, 1940)

(1) A period of study after the internship of no less than three years in an institution or radiological department recognized by the same Council and the Board of Radiology as competent to provide a satisfactory training in the field of Radiology, or equivalent training acceptable to the Board.

(2) This period of specialized preparation shall include:

(a) Graduate training in pathologic anatomy, radiophysics and radiobiology;

(b) An active experience of not less than twenty-four months in a radiological department recognized by the Board and the Council as capable of providing satisfactory training;

(c) Examination in the basic sciences of radiology as well as in the clinical aspects thereof.

*In case of an applicant whose training has been received outside of the United States and Canada, the credentials must be satisfactory to the Advisory Board for Medical Specialties.

These requirements remained in place without substantial change until the late 1960s.

In the late 1930s and throughout the 1940s the ABR evaluated training programs in conjunction with the Council on Medical Education and Hospitals (CME) of the AMA. In 1940 the AMA-CME, in cooperation with the American Board of Internal Medicine and the American College of Physicians, formed a conference committee on graduate training in internal medicine. The committee was inactive during the war, but was reactivated in 1949. A similar conference committee on graduate training in surgery was formed in 1950. In 1953 these conference committees became the first residency review committees.

ACCREDITATION

The United States has a sophisticated system of accreditation of graduate medical training programs based on conformity with established educational standards. The Residency Review Committee (RRC) for radiology was created on 12 December 1953 by the ABR and the AMA-CME, each appointing three members, later raised to four. In 1984 the ACR became a third participant with four representatives, two in diagnostic radiology and two in radiation oncology. In 1993 ACGME recommended increasing the representatives from each of the three organizations to five for a total of fifteen members.

In recent years programs in diagnostic radiology and nuclear radiology were reviewed by diagnostic committee members, and those in radiation oncology were reviewed by radiation oncology committee members. The two groups would then meet in plenary session to ratify all actions. Beginning in 1993 the RRC was reorganized into two separate committees meeting at different times and places.

Historical perspective is afforded by noting a statement made by Byrl R. Kirklin, longtime ARRS representative to the board and first ABR secretary, in his Caldwell Lecture of 1948. In discussing the allotment of time to various subjects and the desirable sequence of assignments in a radiology residency, he said:

In this connection it is noteworthy that the division of radiology into two independent specialties, diagnostic roentgenology and therapeutic radiology, is being advocated. This may occur eventually, for it is a normal, evolutionary and progressive step. At this time, however, I feel strongly that complete separation would be premature and not in the best interests of any party concerned.¹

The ABR received the first reports from departments of radiology requesting separate approval for diagnostic or therapeutic radiology in 1968. Of ten requesting diagnostic radiology, five were approved by "paper inspection," and five were scheduled for on-site evaluations. Seven of eleven requesting

approval for therapeutic radiology were scheduled for on-site evaluations.

There was considerable resistance to the division of radiology, a phenomenon which had already occurred in Europe. The RRC, under the aegis of the ACGME, withdrew the last approval of residency training in general radiology in 1979.

Approval of graduate medical education training programs was carried out jointly by the board and the AMA-CME with the formation of the RRCs. In 1966 the report of the Citizens Commission on Graduate Medical Education on the graduate education of physicians recommended abolishing internships, combining them with residencies into a continuum of graduate education. Another recommendation was to create a "Commission on Graduate Medical Education" to plan, coordinate, and review standards. One result of these recommendations was the formation of the Liaison Committee on Graduate Medical Education (LCGME) in 1972 by the AMA, the Association of American Medical Colleges, the American Board of Medical Specialties (ABMS), the Council of Medical Specialty Societies, and the American Hospital Association to take over the accreditation of graduate medical education. These same organizations formed the Coordinating Council on Medical Education to consider policy matters for both undergraduate and graduate medical education. The LCGME underwent organizational difficulties, but began to accredit residency training programs in 1975. The name was changed in the early 1980s to the Accreditation Council for Graduate Medical Education. Its activities, as well as those of the residency review committees, are governed by policies and procedures for graduate medical education review committees. The accreditation process involves the review and evaluation of training programs to determine whether they are in compliance with general (institutional) and special (program) requirements.

CERTIFICATION

Licensure is a legal requirement to practice medicine in a given jurisdiction. In contrast, certification of individual physicians is a voluntary process—a recognition of training and experience beyond the basic requirements. Certification connotes successful completion of required approved training and the passing of certification examinations.

The content of residency training, as reflected in special or program requirements, expands and changes with progress in the science and practice of medicine. Certificates issued by specialty boards reflect these changes as well. The original certificates in roentgenology and diagnostic roentgenology were phased out in favor of diagnostic radiology, radiation oncology (therapeutic radiology prior to 1987), and radiological physics (including one or more of its subfields of diagnostic radiological physics, therapeutic radiological physics, and medical nuclear physics). The certificate in radiology is still issued, but rarely. Certificates in diagnostic radiology with special competence in nuclear radiology have been issued since 1974.

The trend toward subspecialization has affected radiology as it has much of medicine. Although there is no requirement for a diplomate in a recognized specialty to have subspecialty certification in order to be regarded as qualified to include that subspecialty in a practice, certification is of importance for those who teach, conduct research, or confine their practices to that subspecialty.

The call for subspecialty recognition may come from specialty societies, the RRCs, or the boards. Special requirements are generated by the RRC, submitted to its sponsoring organizations for review, and transmitted to the ACGME for approval. This process usually leads to the issuance of a subspecialty certificate by a board within guidelines set out by the ABMS. If programmatic accreditation is undertaken without the expectation of certifying its graduates, the RRC must meet certain criteria to warrant approval.

In 1970, having developed special requirements for training in pediatric radiology at the behest of the Society for Pediatric Radiology, the ABR offered a certificate of diagnostic radiology with special competency in pediatric radiology. No applications for admission to the examination for subcertification were received, however, and the program was discontinued in 1982.

Within the past ten years the radiology RRC has developed special requirements for approved fellowship training in neuroradiology, pediatric radiology, and vascular and interventional radiology. These were approved by the three sponsors of the RRC and in turn by the ACGME. At first, there was no intention of subcertifying in these fields, despite ACGME policies and procedures. A precedent for accreditation without attendant subcertification had been set by one of the recognized member boards of the ABMS. However, following a conference on accreditation without certification sponsored by ACGME and ABMS, criteria were developed for recognition of a subspecialty area based on its professional and scientific status.

In the early 1980s the ABMS wrestled with the appropriate terminology for subspecialty certificates. The term "special competence" was considered too difficult to define with accuracy, and alternative terms were sought. Thus, "certificates of added qualification" (CAQs) and "certificates of special qualification" were issued to recognize at least one year of additional approved training in a fellowship after completion of residency and passing an examination. Provisions have been made for the grandfathering in of training requirements, usually for a period of five years, to accommodate those physicians with prior unaccredited training or practice experience. Differences between the two new certificates have been unclear and continue to be debated.

Member boards of the ABMS must get approval to issue new types of certificates, to modify existing types of certificates, or to recertify or change the name of a certificate. By 1994 CAQs in pediatric radiology, vascular and inter-

ventional radiology, and neuroradiology had been approved.

Examinations are an integral part of any educational program as a means of assessing its effectiveness and to measure the degree of success students have had in acquiring knowledge. Testing strategies attempt to measure parameters beyond cognitive recall, with variable success. All twenty-four ABMS member boards employ written examinations for certification, and fifteen of them administer oral examinations as well.

UNDERGRADUATE RADIOLOGICAL INSTRUCTION

In the early 1930s, when interest in graduate education in radiology was growing, a number of articles appeared citing the need for teaching radiology to undergraduate students as well. Writing in *J.A.M.A.* in 1932, Pancoast stressed the need to teach the value, necessity, and limitations of roentgen diagnosis, which had become essential to all of medicine.² In the same issue Case wrote that more than 80 percent of the hospitals approved for intern training offered instruction in radiology and that such training was essential for understanding the scope and limitations of the field. Case further noted that most medical schools had required courses of didactic instruction and that senior clerkships were available in some departments.³

In 1937 Pendergrass outlined in detail the instruction of medical students in all four years.⁴ In 1955 Felson described innovations in the teaching of diagnostic roentgenology to medical students.⁵ Many authors emphasized instruction on the dangers inherent in radiological practice, and others addressed medical-legal aspects of practice. The teaching of roentgen anatomy and physiology and roentgenologic-pathologic correlation was repeatedly underscored as central to the teaching of radiology at all levels.

CONTINUING MEDICAL EDUCATION

The need and desire for demonstration of continuing professional compe-

tence has been around for longer than most realize. The continuous introduction of new apparatus, techniques, and interpretations has made this an area of interest to radiologists from the earliest days. In the 1960s the enactment of Medicare legislation brought renewed pressures for periodic evaluation and the assurance that physicians honed their knowledge and skills on an ongoing basis.

In 1973 and again in 1978 the ABMS and its member boards adopted a policy on recertification with the goal of evaluating the continuing competence of a diplomate in the specialty in which he or she was initially certified. In the early 1970s an ABR/ACR Liaison Committee on Recertification was appointed to consider proposed methods and procedures. Three potential routes were identified: (1) continuing medical education courses, a portion of which would be validated; (2) a cognitive examination; and (3) a practice audit, which would include some type of individual examination. Pressures, both real and perceived, abated to some extent in the late 1970s and early 1980s but have returned in the past decade, partially as the result of federal legislative threats, state initiatives, and other attempts at quality control and outcome assessment in medicine. To date, nine-

teen of the twenty-four member boards of the ABMS have instituted or are instituting time-limited certificates for periods of seven to ten years. Voluntary recertification is offered to those previously certified, because no time limit was originally attached to them. The first time-limited certificates are currently being issued to selected subspecialties by the ABR, and will no doubt be the norm in the field by the turn of the century.

The Accreditation Council for Continuing Medical Education approves courses, seminars, symposia, visiting fellowships, and other instructional formats conducted by specialty societies, hospitals, universities, and other organizations which in turn grant continuing medical education credits. Licensure, relicensure, initial appointments and reappointments to medical staffs, and membership in specialty societies and other professional organizations are only some of the reasons to require continuing medical education credits.

Educational materials are also abundantly available today through electronic media. Regional, national, and international electronic networks are proliferating for the linkage of image archiving and communication systems throughout the world.



REFERENCES

- 1 Kirklin, B.R., "Graduate Education in Radiology; Caldwell Lecture," *A.J.R.* 62 (1949):159-166.
- 2 Pancoast, H.K., "Teaching of Radiology to Undergraduate Students," *J.A.M.A.* 98 (1932):938-943.
- 3 Case, J.T., "Teaching of Radiology to Interns," *J.A.M.A.* 98 (1932):936-938.
- 4 Pendergrass, E.P., "Experience in Teaching Radiology to Undergraduate Students," *J.A.M.A.* 109 (1937):634-637.
- 5 Felson, B., "Some Techniques in the Undergraduate Teaching of Diagnostic Roentgenology," *A.J.R.* 73 (1955):110-114.