
Radiologic Technologists and Technicians

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Significant Points

- Employment is projected to grow faster than average, and job opportunities are expected to be favorable.
- Formal training programs in radiography are offered in hospitals, colleges and universities, and less frequently at vocational-technical institutes; range in length from 1 to 4 years; and lead to a certificate, an associate degree, or a bachelor's degree.
- Although hospitals will remain the primary employer, a number of new jobs will be found in physicians' offices and diagnostic imaging centers.

Nature of the Work

Radiologic technologists take x-rays and administer nonradioactive materials into patients' bloodstreams for diagnostic purposes.

Radiologic technologists also referred to as *radiographers*, produce x-ray films (radiographs) of parts of the human body for use in diagnosing medical problems. They prepare patients for radiologic examinations by explaining the procedure, removing jewelry and other articles through which x-rays cannot pass, and positioning patients so that the parts of the body can be appropriately radiographed. To prevent unnecessary exposure to radiation, these workers surround the exposed area with radiation protection devices, such as lead shields, or limit the size of the x-ray beam. Radiographers position radiographic equipment at the correct angle and height over the appropriate area of a patient's body. Using instruments similar to a measuring tape, they may measure the thickness of the section to be radiographed and set controls on the x-ray machine to produce radiographs of the appropriate density, detail, and contrast. They place the x-ray film under the part of the patient's body to be examined and make the exposure. They then remove the film and develop it.

Radiologic technologists must follow physicians' orders precisely and conform to regulations concerning the use of radiation to protect themselves, their patients, and their co-workers from unnecessary exposure.

In addition to preparing patients and operating equipment, radiologic technologists keep patient records and adjust and maintain equipment. They also may prepare work schedules, evaluate purchases of equipment, or manage a radiology department.

Experienced radiographers may perform more complex imaging procedures. When performing fluoroscopies, for example, radiographers prepare a solution of contrast medium for the patient to drink, allowing the radiologist (a physician who interprets radiographs) to see soft tissues in the body.

Some radiographers specialize in computed tomography (CT), and are sometimes referred to as *CT technologists*. CT scans produce a substantial amount of cross-sectional x-rays

of an area of the body. From those cross-sectional x-rays a three-dimensional image is made. The CT uses ionizing radiation; therefore, it requires the same precautionary measures that radiographers use with other x-rays.

Radiographers also can specialize in Magnetic Resonance Imaging as an *MR technologist*. MR, like CT, produces multiple cross-sectional images to create a 3-dimensional image. Unlike CT, MR uses non-ionizing radio frequency to generate image contrast.

Another common specialty for radiographers specialize in is mammography. Mammographers use low dose x-ray systems to produce images of the breast.

In addition to radiologic technologists, others who conduct diagnostic imaging procedures include cardiovascular technologists and technicians, diagnostic medical sonographers, and nuclear medicine technologists. (Each is discussed elsewhere in the *Handbook*.)

Work environment. Physical stamina is important in this occupation because technologists are on their feet for long periods and may lift or turn disabled patients. Technologists work at diagnostic machines but also may perform some procedures at patients' bedsides. Some travel to patients in large vans equipped with sophisticated diagnostic equipment.

Although radiation hazards exist in this occupation, they are minimized by the use of lead aprons, gloves, and other shielding devices, as well as by instruments monitoring exposure to radiation. Technologists wear badges measuring radiation levels in the radiation area, and detailed records are kept on their cumulative lifetime dose.

Most full-time radiologic technologists work about 40 hours a week. They may, however, have evening, weekend, or on-call hours. Opportunities for part-time and shift work also are available.

Training, Other Qualifications, and Advancement

Preparation for this profession is offered in hospitals, colleges and universities, and less frequently at vocational-technical



Radiographers position equipment at the correct angle and height over the appropriate area of a patient's body.

institutes. Hospitals employ most radiologic technologists. Employers prefer to hire technologists with formal training.

Education and training. Formal training programs in radiography range in length from 1 to 4 years and lead to a certificate, an associate degree, or a bachelor's degree. Two-year associate degree programs are most prevalent.

Some 1-year certificate programs are available for experienced radiographers or individuals from other health occupations, such as medical technologists and registered nurses, who want to change fields. A bachelor's or master's degree in one of the radiologic technologies is desirable for supervisory, administrative, or teaching positions.

The Joint Review Committee on Education in Radiologic Technology accredits most formal training programs for the field. The committee accredited more than 600 radiography programs in 2007. Admission to radiography programs require, at a minimum, a high school diploma or the equivalent. High school courses in mathematics, physics, chemistry, and biology are helpful. The programs provide both classroom and clinical instruction in anatomy and physiology, patient care procedures, radiation physics, radiation protection, principles of imaging, medical terminology, positioning of patients, medical ethics, radiobiology, and pathology.

Licensure. Federal legislation protects the public from the hazards of unnecessary exposure to medical and dental radiation by ensuring that operators of radiologic equipment are properly trained. Under this legislation, the Federal Government sets voluntary standards that the States may use for accrediting training programs and licensing individuals who engage in medical or dental radiography. In 2007, 40 states required licensure for practicing radiologic technologists and technicians.

Certification and other qualifications. The American Registry of Radiologic Technologists (ARRT) offers voluntary certification for radiologic technologists. In addition, 35 States use ARRT-administered exams for State licensing purposes. To be eligible for certification, technologists generally must graduate from an accredited program and pass an examination. Many employers prefer to hire certified radiographers. To be recertified, radiographers must complete 24 hours of continuing education every 2 years.

Radiologic technologists should be sensitive to patients' physical and psychological needs. They must pay attention to detail, follow instructions, and work as part of a team. In addition, operating complicated equipment requires mechanical ability and manual dexterity.

Advancement. With experience and additional training, staff technologists may become specialists, performing CT scanning, MR, and angiography, a procedure during which blood vessels are x-rayed to find clots. Technologists also

may advance, with additional education and certification, to become a radiologist assistant.

Experienced technologists also may be promoted to supervisor, chief radiologic technologist, and, ultimately, department administrator or director. Depending on the institution, courses or a master's degree in business or health administration may be necessary for the director's position.

Some technologists progress by specializing in the occupation to become instructors or directors in radiologic technology programs; others take jobs as sales representatives or instructors with equipment manufacturers.

Employment

Radiologic technologists held about 196,000 jobs in 2006. More than 60 percent of all jobs were in hospitals. Most other jobs were in offices of physicians; medical and diagnostic laboratories, including diagnostic imaging centers; and outpatient care centers.

Job Outlook

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Employment change. Employment of radiologic technologists is expected to increase by about 15 percent from 2006 to 2016, faster than the average for all occupations. As the population grows and ages, there will be an increasing demand for diagnostic imaging. Although health care providers are enthusiastic about the clinical benefits of new technologies, the extent to which they are adopted depends largely on cost and reimbursement considerations. As technology advances many imaging modalities are becoming less expensive and their adoption is becoming more widespread. For example, digital imaging technology can improve the quality of the images and the efficiency of the procedure, but it remains slightly more expensive than analog imaging, a procedure during which the image is put directly on film. Despite this, digital imaging is becoming more widespread in many imaging facilities because of the advantages it provides over analog.

Although hospitals will remain the principal employer of radiologic technologists, a number of new jobs will be found in offices of physicians and diagnostic imaging centers. Health facilities such as these are expected to grow through 2016, because of the shift toward outpatient care, encouraged by third-party payers and made possible by technological advances that permit more procedures to be performed outside the hospital.

Job prospects. In addition to job growth, job openings also will arise from the need to replace technologists who leave the occupation. Radiologic technologists are willing to relocate and who also are experienced in more than one diagnostic imaging procedure—such as CT, MR, and mammography—will

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-2016	
				Number	Percent
Radiologic technologists and technicians	29-2034	196,000	226,000	30,000	15

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

have the best employment opportunities as employers seek to control costs by using multi-credentialed employees.

CT is becoming a frontline diagnosis tool. Instead of taking x-rays to decide whether a CT is needed, as was the practice before, it is often the first choice for imaging because of its accuracy. MR also is increasing in frequency of use. Technologists with credentialing in either of these specialties will be very marketable to employers.

Earnings

Median annual earnings of radiologic technologists were \$48,170 in May 2006. The middle 50 percent earned between \$39,840 and \$57,940. The lowest 10 percent earned less than \$32,750, and the highest 10 percent earned more than \$68,920. Median annual earnings in the industries employing the largest numbers of radiologic technologists in 2006 were:

Medical and diagnostic laboratories	\$51,280
General medical and surgical hospitals.....	48,830
Offices of physicians	45,500

Related Occupations

Radiologic technologists operate sophisticated equipment to help physicians, dentists, and other health practitioners diag-

nose and treat patients. Workers in related occupations include cardiovascular technologists and technicians, clinical laboratory technologists and technicians, diagnostic medical sonographers, nuclear medicine technologists, radiation therapists, and respiratory therapists.

Sources of Additional Information

For information on careers in radiologic technology, contact:
 ➤ American Society of Radiologic Technologists, 15000 Central Ave. SE., Albuquerque, NM 87123-3917.

Internet: <http://www.asrt.org>

For the current list of accredited education programs in radiography, write to:

➤ Joint Review Committee on Education in Radiologic Technology, 20 N. Wacker Dr., Suite 2850, Chicago, IL 60606-3182. Internet: <http://www.jrcert.org>

For certification information, contact:

➤ American Registry of Radiologic Technologists, 1255 Northland Dr., St.Paul, MN 55120-1155.

Internet: <http://www.arrt.org>