

act as a pharmacy technician. Eligible candidates must have a high school diploma or GED, and those who pass the exam earn the title of Certified Pharmacy Technician (CPhT). The exam is offered several times per year at various locations nationally. Employers, often pharmacists, know that individuals who pass the exam have a standardized body of knowledge and skills.

Certified technicians must be recertified every 2 years. Technicians must complete 20 contact hours of pharmacy-related topics within the 2-year certification period to become eligible for recertification. Contact hours are awarded for on-the-job training, attending lectures, and college coursework. At least 1 contact hour must be in pharmacy law. Contact hours can be earned from several different sources, including pharmacy associations, pharmacy colleges, and pharmacy technician training programs. Up to 10 contact hours can be earned when the technician is employed under the direct supervision and instruction of a pharmacist.

Successful pharmacy technicians are alert, observant, organized, dedicated, and responsible. They should be willing and able to take directions. They must enjoy precise work—details are sometimes a matter of life and death. Although a pharmacist must check and approve all their work, they should be able to work on their own without constant instruction from the pharmacist. Candidates interested in becoming pharmacy technicians cannot have prior records of drug or substance abuse.

Strong interpersonal and communication skills are needed because there is a lot of interaction with patients, coworkers, and healthcare professionals. Teamwork is very important because technicians are often required to work with pharmacists, aides, and other technicians.

### Job Outlook

Good job opportunities are expected for full-time and part-time work, especially for technicians with formal training or previous experience. Job openings for pharmacy technicians will result from the expansion of retail pharmacies and other employment settings, and from the need to replace workers who transfer to other occupations or leave the labor force.

Employment of pharmacy technicians is expected to grow much faster than the average for all occupations through 2010 due to the increased pharmaceutical needs of a larger and older population, and to the greater use of medication. The increased number of middle-aged and elderly people—who, on average, use more prescription drugs than do younger people—will spur demand for technicians in all practice settings. With advances in science, more medications are becoming available to treat more conditions.

Cost-conscious insurers, pharmacies, and health systems will continue to emphasize the role of technicians. As a result, pharmacy technicians will assume responsibility for more routine tasks previously performed by pharmacists. Pharmacy technicians also will need to learn and master new pharmacy technology as it surfaces. For example, robotic machines are used to dispense medicine into containers; technicians must oversee the machines, stock the bins, and label the containers. Thus, while automation is increasingly incorporated into the job, it will not necessarily reduce the need for technicians.

Almost all States have legislated the maximum number of technicians who can safely work under a pharmacist at a time. In some States, increased demand for technicians has encouraged an expanded ratio of technicians to pharmacists. Changes in these laws could directly affect employment.

### Earnings

Median hourly earnings of pharmacy technicians in 2000 were \$9.93. The middle 50 percent earned between \$8.12 and \$12.26; the lowest

10 percent earned less than \$7.00, and the highest 10 percent earned more than \$14.56. Median hourly earnings in the industries employing the largest numbers of pharmacy technicians in 2000 were as follows:

Hospitals .....	\$11.44
Grocery stores .....	10.57
Drugs, proprietaries, and sundries .....	10.09
Drug stores and proprietary stores .....	9.00
Department stores .....	8.75

Certified technicians may earn more. Shift differentials for working evenings or weekends also can increase earnings. Some technicians belong to unions representing hospital or grocery store workers.

### Related occupations

This occupation is most closely related to pharmacists and pharmacy aides. Workers in other medical support occupations include dental assistants, licensed practical and licensed vocational nurses, medical transcriptionists, medical records and health information technicians, occupational therapist assistants and aides, physical therapist assistants and aides, secretaries and administrative assistants, and surgical technologists.

### Sources of Additional Information

For information on certification and a National Pharmacy Technician Certification Examination Candidate Handbook, contact:

► Pharmacy Technician Certification Board, 2215 Constitution Ave. NW., Washington DC 20037. Internet: <http://www.ptcb.org>

## Radiologic Technologists and Technicians

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### Significant Points

- Faster-than-average growth will arise from an increase in the number of middle-aged and older persons who are the primary users of diagnostic procedures
- Although hospitals will remain the primary employer of radiologic technologists and technicians, a greater number of new jobs will be found in offices and clinics of physicians, including diagnostic imaging centers.
- Radiologic technologists and technicians with cross training in nuclear medicine technology or other modalities will have the best prospects.

### Nature of the Work

Radiologic technologists and technicians take x rays and administer nonradioactive materials into patients' blood streams for diagnostic purposes. Some specialize in diagnostic imaging technologies such as computed tomography (CT) and magnetic resonance imaging (MRI).

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

Radiologic technologists and technicians, also referred to as *radiographers*, produce x-ray films (radiographs) of parts of the human body for use in diagnosing medical problems. They prepare



*A radiologic technologist positions an x-ray machine at the correct angle and height over the appropriate area of a patient's body.*

patients for radiologic examinations by explaining the procedure, removing articles such as jewelry, through which x rays cannot pass, and positioning patients so that the parts of the body can be appropriately radiographed. To prevent unnecessary radiation exposure, they 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.

Experienced radiographers may perform more complex imaging procedures. For fluoroscopies, 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, called *CT technologists*, operate computerized tomography scanners to produce cross sectional images of patients. Others operate machines using strong magnets and radio waves rather than radiation to create an image and are called *magnetic resonance imaging (MRI) technologists*.

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

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

### **Working Conditions**

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

Because technologists and technicians are on their feet for long periods and may lift or turn disabled patients, physical stamina is important. Technologists and technicians work at diagnostic machines but may also do some procedures at patients' bedsides. Some travel to patients in large vans equipped with sophisticated diagnostic equipment.

Although potential 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 radiation exposure. Technologists and technicians wear badges measuring radiation levels in the radiation area, and detailed records are kept on their cumulative lifetime dose.

### **Employment**

Radiologic technologists and technicians held about 167,000 jobs in 2000. About 1 in 5 worked part time. More than half of all jobs are in hospitals. Most of the rest are in physicians' offices and clinics, including diagnostic imaging centers.

### **Training, Other Qualifications, and Advancement**

Preparation for this profession is offered in hospitals, colleges and universities, vocational-technical institutes, and the U.S. Armed Forces. Hospitals, which employ most radiologic technologists and technicians, prefer to hire those with formal training.

Formal training programs in radiography range in length from 1 to 4 years and lead to a certificate, associate's degree, or bachelor's degree. Two-year associate's 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 or specialize in computerized tomography or magnetic resonance imaging. 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 this field. They accredited 584 radiography programs in 2000. 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.

In 1981, Congress passed the Consumer-Patient Radiation Health and Safety Act, which aims to protect the public from the hazards of unnecessary exposure to medical and dental radiation by ensuring operators of radiologic equipment are properly trained. Under the act, the Federal Government sets voluntary standards that the States, in turn, may use for accrediting training programs and certifying individuals who engage in medical or dental radiography.

In 1999, 35 States and Puerto Rico licensed radiologic technologists and technicians. Voluntary registration is offered by the American Registry of Radiologic Technologists (ARRT) in radiography. To be eligible for registration, technologists generally must graduate from an accredited program and pass an examination. Many employers prefer to hire registered radiographers. To be recertified, radiographers must complete 24 hours of continuing education every other year.

Radiologic technologists and technicians 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.

With experience and additional training, staff technologists may become specialists, performing CT scanning, angiography, and magnetic resonance imaging. Experienced technologists may also 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 becoming instructors or directors in radiologic

technology programs; others take jobs as sales representatives or instructors with equipment manufacturers.

### Job Outlook

Employment of radiologic technologists and technicians is expected to grow faster than the average for all occupations through 2010, as the population grows and ages, increasing the demand for diagnostic imaging. Opportunities are expected to be favorable. Some employers report shortages of radiologic technologists and technicians. Imbalances between the supply of qualified workers and demand should spur efforts to attract and retain qualified radiologic technologists and technicians. For example, employers may provide more flexible training programs, or improve compensation and working conditions.

Although physicians are enthusiastic about the clinical benefits of new technologies, the extent to which they are adopted depends largely on cost and reimbursement considerations. For example, digital imaging technology can improve quality and efficiency, but remains expensive. Some promising new technologies may not come into widespread use because they are too expensive and third-party payers may not be willing to pay for their use.

Radiologic technologists who are educated and credentialed in more than one type of diagnostic imaging technology, such as radiography and sonography or nuclear medicine, will have better employment opportunities as employers look for new ways to control costs. In hospitals, multi-skilled employees will be the most sought after, as hospitals respond to cost pressures by continuing to merge departments.

Hospitals will remain the principal employer of radiologic technologists and technicians. However, a greater number of new jobs will be found in offices and clinics of physicians, including diagnostic imaging centers. Health facilities such as these are expected to grow very rapidly through 2010 due to the strong 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. Some job openings will also arise from the need to replace technologists and technicians who leave the occupation.

### Earnings

Median annual earnings of radiologic technologists and technicians were \$36,000 in 2000. The middle 50 percent earned between \$30,220 and \$43,380. The lowest 10 percent earned less than \$25,310, and the highest 10 percent earned more than \$52,050. Median annual earnings in the industries employing the largest numbers of radiologic technologists and technicians in 2000 were:

Medical and dental laboratories .....	\$39,400
Hospitals .....	36,280
Offices and clinics of medical doctors .....	34,870

### Related Occupations

Radiologic technologists and technicians operate sophisticated equipment to help physicians, dentists, and other health practitioners diagnose 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 career information, send a stamped, self-addressed business size envelope with your request to:

► American Society of Radiologic Technologists, 15000 Central Ave. SE., Albuquerque, NM 87123-3917. Internet: <http://www.asrt.org/asrt.htm>

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 600, Chicago, IL 60606-2901. Internet: <http://www.jrcert.org>

For information on certification, contact:

► American Registry of Radiologic Technologists, 1255 Northland Dr., St. Paul, MN 55120-1155. Internet: <http://www.arrt.org>

## Surgical Technologists

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### Significant Points

- Most educational programs for surgical technologists last approximately 1 year and result in a certificate.
- Employment of surgical technologists is expected to grow faster than average as the number of surgical procedures grows.

### Nature of the Work

Surgical technologists, also called *scrubs* and *surgical or operating room technicians*, assist in surgical operations under the supervision of surgeons, registered nurses, or other surgical personnel. Surgical technologists are members of operating room teams, which most commonly include surgeons, anesthesiologists, and circulating nurses. Before an operation, surgical technologists help prepare the operating room by setting up surgical instruments and equipment, sterile drapes, and sterile solutions. They assemble both sterile and nonsterile equipment, as well as adjust and check it to ensure it is working properly. Technologists also get patients ready for surgery by washing, shaving, and disinfecting incision sites. They transport patients to the operating room, help position them on the operating table, and cover them with sterile surgical "drapes." Technologists also observe patients' vital signs, check charts, and assist the surgical team with putting on sterile gowns and gloves.

During surgery, technologists pass instruments and other sterile supplies to surgeons and surgeon assistants. They may hold retractors, cut sutures, and help count sponges, needles, supplies, and instruments. Surgical technologists help prepare, care for, and dispose of specimens taken for laboratory analysis and help apply dressings. Some operate sterilizers, lights, or suction machines, and help operate diagnostic equipment.



*Surgical technologists prepare operating rooms and assist surgical personnel during operations.*