The Stamford Hospital
Careers in Radiography

Radiologic Technologist

If you've ever had an x-ray, you've probably met a radiologic technologist. Radiologic technologists are the allied health personnel who perform diagnostic imaging examinations and plan and administer radiation therapy treatments.

Radiologic technologists who perform diagnostic imaging examinations are responsible for accurately positioning patients, delivering the lowest radiation dose possible during each examination, and ensuring that a quality diagnostic image is produced. They are educated in anatomy, patient positioning, examination techniques, equipment protocols, radiation safety, radiation protection and basic patient care.

Diagnostic radiologic technologists work closely with radiologists, the physicians who interpret medical images. For the images to be interpreted correctly by the radiologist, the imaging examination must be performed properly by a radiologic technologist.

Diagnostic radiologic technologists may specialize in a particular imaging area:

RADIOGRAPHERS use radiation (x-rays) to produce black-and-white images of anatomy. The images are captured on film, computer or videotape. X-rays images may be used to detect bone fractures, find foreign objects in the body, and demonstrate the relationship between bone and soft tissue. The most common type of x-ray exam is chest radiography.

MAMMOGRAPHERS produce diagnostic images of breast tissue using special x-ray equipment. Under a federal law known as Mammography Quality Standards Act, mammographers must meet stringent educational and experience criteria in order to perform mammographic procedures.

MAGNETIC RESONANCE TECHNOLOGISTS are specially trained to operate MR equipment. During an MRI scan, atoms in the patient's body are exposed to a strong magnetic field. The technologist applies a radiofrequency pulse to the field, which changes the alignment of tissue atoms. When the technologist turns the pulse off, the atoms return to their original position. In the process, they give off signals that are measured by a computer and processed to create detailed images of the patient's anatomy.

COMPUTED TOMOGRAPHY TECHNOLOGISTS use a rotating x-ray unit to obtain "slices" of anatomy at different levels within the body. A computer then stacks and assembles the individual slices, creating a diagnostic image. With CT technology, physicians can view the inside of organs – a feat not possible with general radiography.

CARDIOVASCULAR – INTERVENTIONAL TECHNOLOGISTS use sophisticated imaging techniques such as biplane fluoroscopy to help guide catheters, vena cava filters, stents or other tools through the body. Using these techniques, disease can be treated without open surgery.

NUCLEAR MEDICINE TECHNOLOGISTS administer trace amounts of radiopharmaceuticals to a patient to obtain functional information about organs, tissues and bone. The technologist then uses a special camera to detect gamma rays emitted by the radiopharmaceuticals and create an image of the body part under study. The information is recorded on a computer screen or on film.

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SONOGRAPHERS use sound waves to obtain images of organs and tissues in the body. During an ultrasound examination, the sonographer places a transducer in contact with the patient's body. It emits high-frequency sound waves that pass through the body, sending back "echoes" as they bounce off organs and tissues. Special computer equipment converts those echoes into visual data.

BONE DENSITOMETRISTS use a special type of x-ray equipment to measure bone mineral density at a specific anatomical site (usually the wrist, heel spine or hip) or to calculate total body bone mineral content. Results can be used by physicians to estimate the amount of bone loss over a specific period of time, and to estimate the risk of fracture.

QUALITY MANAGEMENT TECHNOLOGISTS use standardized data collection methods, information analysis tools and data analysis methods to monitor the quality of processes and systems in the radiology department. They perform processor quality control tests, assess film density, monitor timer accuracy and reproducibility and identify and solve problems associated with the production of medical images.

Some radiologic technologists use radiation therapeutically rather than diagnostically. Here is a look at the radiologic technologists who serve on the radiation therapy team:

MEDICAL DOSIMETRISTS determine how much radiation will be delivered to a tumor site. Under the supervision of a medical physicist, they calculate and generate radiation dose distribution in accordance with the treatment plan developed by the radiation oncologist. Medical dosimetrists use their knowledge of physics, anatomy and radiobiology to design optimal treatments that apply an effective dose to the targeted area while sparing normal tissue that surrounds it.

RADIATION THERAPISTS administer targeted doses of radiation to the patient's body to treat cancer or other diseases. As the radiation strikes human tissue, it produces highly energized ions that gradually shrink and destroy the nucleus of malignant tumor cells. Radiation therapists are highly skilled medical specialists educated in physics, radiation safety, patient anatomy and patient care. They typically see each of their patients three to five days a week throughout a four-to-seven week treatment plan.

Educational Preparation

Students follow many paths into radiologic technology. Some attend two-year programs based in hospitals, earning a certificate when they graduate. Other students enroll in two-year programs at community colleges or technical schools, earning an associate degree. And others choose to attend four-year programs at universities and colleges, graduating with a bachelor's degree. There are nearly 1,000 accredited programs in the United States, but radiologic science students don't spend all of their time in the classroom. They also work side-by–side in radiology departments with doctors, nurses and experienced radiologic technologists. During this part of their education, known as clinical rotation, students have a hands-on opportunity to practice patient care skills and fine-tune their technical knowledge.

During their educational programs, radiologic science students learn subjects such as anatomy, biology, radiation safety and physics. They learn to use computers to acquire and manipulate images, and they work with some of the most technologically advanced equipment in the

medical field. They also learn to communicate with patients, to solve problems and to work with other members of the health care team.

Certification, Credentialing and Continuing Education

Following graduation from an accredited program, individuals become certified in the profession by taking and passing an entry-level certification examination. The four main certification bodies in the radiologic sciences are the American Registry of Radiologic Technologists (ARRT), the American Registry of Diagnostic Medical Sonographers (ARDMS), the Nuclear Medicine Technology Certification Board (NMTCB) and the Medical Dosimetrist Certification Board (MDCB).

Certification bodies award credentials to individuals who pass the examinations they administer. For example, a person who passes the ARRT certification examination in radiography earns the right to use the credential "R.T.(R)." which stands for registered technologist, and the "(R)" indicates that the individual is certified in radiography. A person who passes the ARDMS certification examination in diagnosis medical sonography is awarded the credential "RDMS", and a person who passes the NMTCB examination in nuclear medicine technology is awarded the credential "CNMT." Other certification and registration bodies award other credentials.

After radiologic technologists pass their certification examinations, their certificates are "registered" by awarding certification body. Most certificates bodies require technologist to earn continuing education credits to maintain their certifications. The ARRT, for example, requires its registrants to earn 24 CE credits every two years.

Career Outlook

A career in radiologic technology offers a promising future, job stability and good salaries. As technology advances and the American population ages, the demand for radiologic exams and procedures has soared. The country needs a growing number of qualified professionals to provide medical imaging and radiation therapy. The U.S. Bureau of Labor Statistics predicts that the nation will need 75,000 more radiographers and 7,000 more radiation therapists in 2010 than it did in 2000.

Wages of radiologic technologists are competitive with other health professionals who have similar educational backgrounds. A 2001 survey by the American Society of Radiologic Technologists showed that wages averaged about $16 per hour for entry level radiographers and $20 per hour for entry-level radiation therapists. With experience, additional or supervisory responsibilities, wages can reach an average of $20 to $25 per hour. In addition, many employers allow radiologic technologists to work flexible schedules, including part-time or evenings.

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Additional Resources

For a list of accredited educational programs in nuclear medicine, visit the Web site of the Joint Review Committee on Educational Programs in Nuclear Medical Technology at www.jrcnmt.org

For information about accredited educational programs in sonography, click on www.jrcdms.org, the web site of the Joint Review Committee on Education in Diagnostic Medical Sonography.

For names and addresses of accredited schools in radiography and radiation therapy, contact the Joint Review Committee on Education in Radiology Technology at www.jrcert.org

For information about entry-level certification examinations in radiography, radiation therapy and nuclear medicine that are offered by the American Registry of Radiologic Technologists, go to www.arrt.org

Information about certification examinations offered by the Nuclear Medicine Technology Certification Board may be found at www.nmtcb.org

The Web site of the American Registry of Diagnostic Medical Sonographers has information about certification examinations in sonography. Go to www.ardms.org

Several membership associations represent professionals who work in the radiologic sciences. The web site of the American Society of Radiologic Technologists is at www.asrt.org. The Society of Diagnostic Medical Sonographers is at www.sdms.org. The Society of Nuclear Medicine Technologist Section can be reached at www.snm.org. The American Association of Medical Dosimetrists Web site is www.medicaldosimetry.org. The Association of Vascular and Interventional Radiographers is at www.avir.org. The Section for Magnetic Resonance Technologists can be reached at www.ismrm.org.

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