

Nuclear Medicine Technologists

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Significant Points

- Nuclear medicine technology programs range in length from 1 to 4 years and lead to a certificate, associate degree, or bachelor's degree.
- Faster-than-average growth will arise from an increase in the number of middle-aged and elderly persons, who are the primary users of diagnostic procedures.

Nature of the Work

Diagnostic imaging embraces several procedures that aid in diagnosing ailments, the most familiar being the x ray. Another increasingly common diagnostic imaging method, called magnetic resonance imaging (MRI), uses giant magnets and radio waves, rather than radiation, to create an image. Not all imaging technologies use ionizing radiation or radio waves, however: In nuclear medicine, radionuclides—unstable atoms that emit radiation spontaneously—are used to diagnose and treat disease. Radionuclides are purified and compounded to form radiopharmaceuticals. Nuclear medicine technologists administer radiopharmaceuticals to patients and then monitor the characteristics and functions of tissues or organs in which the drugs localize. Abnormal areas show higher- or lower-than-expected concentrations of radioactivity.

Nuclear medicine technologists operate cameras that detect and map the radioactive drug in a patient's body to create diagnostic images. After explaining test procedures to patients, technologists prepare a dosage of the radiopharmaceutical and administer it by mouth, injection, or other means. They position patients and start a gamma scintillation camera, or "scanner," which creates images of the distribution of a radiopharmaceutical as it localizes in, and emits signals from, the patient's body. The images are produced on a computer screen or on film for a physician to interpret.

When preparing radiopharmaceuticals, technologists adhere to safety standards that keep the radiation dose to workers and patients as low as possible. Technologists keep patient records and record the amount and type of radionuclides received, used, and discarded.

Radiologic technologists and technicians, diagnostic medical sonographers, and cardiovascular technologists and technicians also operate diagnostic imaging equipment, but their equipment creates images by means of a different technology. (See the statements on these occupations elsewhere in the *Handbook*.)

Nuclear medicine technologists also perform radioimmunoassay studies that assess the behavior of a radioactive substance inside the body. For example, technologists may add radioactive substances to blood or serum to determine levels of hormones or of therapeutic drugs in the body. Some nuclear medicine studies, such as cardiac function studies, are processed with the aid of a computer.

Working Conditions

Nuclear medicine technologists generally work a 40-hour week, perhaps including evening or weekend hours in departments that operate on an extended schedule. Opportunities for part-

time and shift work are also available. In addition, technologists in hospitals may have on-call duty on a rotational basis.

Because technologists are on their feet much of the day and may lift or turn disabled patients, physical stamina is important.

Although the potential for radiation exposure exists in this field, it is kept to a minimum by the use of shielded syringes, gloves, and other protective devices and by adherence to strict radiation safety guidelines. Technologists also wear badges that measure radiation levels. Because of safety programs, badge measurements rarely exceed established safety levels.

Employment

Nuclear medicine technologists held about 17,000 jobs in 2002. About two-thirds of all jobs were in hospitals. Most of the rest were in offices of physicians or in medical and diagnostic laboratories, including diagnostic imaging centers.

Training, Other Qualifications, and Advancement

Many employers and an increasing number of States require certification or licensure. Aspiring nuclear medicine technologists should check the requirements for the State in which they plan to work. Certification is available from the American Registry of Radiologic Technologists and from the Nuclear Medicine Technology Certification Board. Nuclear medicine technologists must meet the minimum Federal standards on the administration of radioactive drugs and the operation of radiation detection equipment.

Nuclear medicine technology programs range in length from 1 to 4 years and lead to a certificate, associate degree, or bachelor's degree. Generally, certificate programs are offered in hospitals, associate degree programs in community colleges, and bachelor's degree programs in 4-year colleges and universities. Courses cover the physical sciences, biological effects of radiation exposure, radiation protection and procedures, the use of radiopharmaceuticals, imaging techniques, and computer applications.

One-year certificate programs are for health professionals—especially radiologic technologists and diagnostic medical sonographers—who wish to specialize in nuclear medicine. They also attract medical technologists, registered nurses, and others who wish to change fields or specialize. Others interested in the nuclear medicine technology field have three op-



A nuclear medicine technologist readies a patient prior to a scan.

tions: a 2-year certificate program, a 2-year associate degree program, or a 4-year bachelor's degree program.

The Joint Review Committee on Education Programs in Nuclear Medicine Technology accredits most formal training programs in nuclear medicine technology. In 2002, there were 92 accredited programs in the continental United States and Puerto Rico.

Nuclear medicine 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.

Technologists may advance to supervisor, then to chief technologist, and, finally, to department administrator or director. Some technologists specialize in a clinical area such as nuclear cardiology or computer analysis or leave patient care to take positions in research laboratories. Some become instructors or directors in nuclear medicine technology programs, a step that usually requires a bachelor's or master's degree in nuclear medicine technology. Others leave the occupation to work as sales or training representatives for medical equipment and radiopharmaceutical manufacturing firms or as radiation safety officers in regulatory agencies or hospitals.

Job Outlook

Employment of nuclear medicine technologists is expected to grow faster than the average for all occupations through the year 2012. Growth will arise from an increase in the number of middle-aged and older persons, who are the primary users of diagnostic procedures, including nuclear medicine tests. However, the number of openings each year will be relatively low because the occupation is small. Technologists who are also trained in other diagnostic methods, such as radiologic technology or diagnostic medical sonography, will have the best prospects.

Technological innovations may increase the diagnostic uses of nuclear medicine. One example is the use of radiopharmaceuticals in combination with monoclonal antibodies to detect cancer at far earlier stages than is customary today and without resorting to surgery. Another is the use of radionuclides to examine the heart's ability to pump blood. Wider use of nuclear medical imaging to observe metabolic and biochemical changes for neurology, cardiology, and oncology procedures also will spur demand for nuclear medicine technologists.

Nonetheless, cost considerations will affect the speed with which new applications of nuclear medicine grow. Some promising nuclear medicine procedures, such as positron emission tomography, are extremely costly, and hospitals contemplating these procedures will have to consider equipment costs, reimbursement policies, and the number of potential users.

Earnings

Median annual earnings of nuclear medicine technologists were \$48,750 in 2002. The middle 50 percent earned between \$41,460 and \$57,200. The lowest 10 percent earned less than \$35,870, and the highest 10 percent earned more than \$68,710. Median annual earnings of nuclear medicine technologists in 2002 were \$48,210 in general medical and surgical hospitals.

Related Occupations

Nuclear medical technologists operate sophisticated equipment to help physicians and other health practitioners diagnose and treat patients. Cardiovascular technologists and technicians, clinical laboratory technologists and technicians, diagnostic medical sonographers, radiation therapists, radiologic technologists and technicians, and respiratory therapists also perform similar functions.

Sources of Additional Information

Additional information on a career as a nuclear medicine technologist is available from:

► Society of Nuclear Medicine Technologists, 1850 Samuel Morse Dr., Reston, VA 20190-5316. Internet: <http://www.snm.org>

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. Telephone (tollfree): 800-444-2778. Internet: <http://www.asrt.org>

For a list of accredited programs in nuclear medicine technology, write to:

► Joint Review Committee on Educational Programs in Nuclear Medicine Technology, PMB 418, 1 2nd Ave. East, Suite C, Polson, MT 59860-2320. Internet: <http://www.jrcnmt.org>

Information on certification is available from:

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

► Nuclear Medicine Technology Certification Board, 2970 Clairmont Rd., Suite 935, Atlanta, GA 30329. Internet: <http://www.nmtcb.org>