Medical Imaging and Radiation Therapy

Includes:
- Diagnostic medical sonographer
- Magnetic resonance technologist
- Medical dosimetrist
- Medical physicist
- Nuclear medicine technologist
- Radiation therapist
- Radiographer
- Radiologist assistant

Post-Primary Specialties in Radiologic Technology
Practitioners of the following post-primary specialties in radiologic technology are eligible for certification by the American Registry of Radiologic Technologists. Candidates for certification must be certified in radiography, radiation therapy, or nuclear medicine and document specific clinical competencies to be eligible for the certification examination.
- Bone densitometry
- Breast sonography
- Cardiac-interventional radiography
- Computed tomography
- Magnetic resonance imaging (both a primary and post-primary track)
- Mammography
- Quality management
- Vascular sonography
- Vascular-interventional radiography
- Sonography (both a primary and post-primary track)

Diagnostic Medical Sonographer

The diagnostic medical sonographer provides patient services using medical ultrasound (high-frequency sound waves that produce images of internal structures). Working under the supervision of a physician responsible for the use and interpretation of ultrasound procedures, the sonographer gathers sonographic data which physician uses to diagnose a variety of conditions and diseases.

History
In 1972, the American Society of Ultrasound Technical Specialists (ASUTS) appointed a committee to explore the mechanism of accreditation of educational programs for the ultrasound technical specialist through the AMA Council on Medical Education (CME). In 1974, the occupation of diagnostic medical sonography received recognition by the AMA. From 1974 to 1979, the Standards (Essentials) of an Accredited Educational Program for the Diagnostic Medical Sonographer were developed. Because of the multidisciplinary nature of diagnostic ultrasound, many interested medical and allied health organizations collaborated in drafting the Standards. Educational programs were first accredited in January 1982. In 1995, the Commission on Accreditation of Allied Health Education Programs (CAAHEP) took over the oversight of program accreditation from the AMA. The Standards were most recently revised in 2007.

Career Description
The sonographer provides patients with diagnostic services in a variety of medical settings that assist the physician in the interpretation of ultrasound procedures. These duties include:
- Obtaining, reviewing, and integrating pertinent patient history and supporting clinical data to facilitate optimum diagnostic results
- Performing appropriate procedures and recording anatomical, pathological, and/or physiological data for interpretation by a physician
- Recording and processing sonographic data and other pertinent observations made during the procedure for presentation to the interpreting physician
- Exercising discretion and judgment in the performance of sonographic services
- Providing patient education related to medical ultrasound
- Promoting principles of good health

According to the US Bureau of Labor Statistics, sonographers may specialize in the fields noted below. Formal training in diagnostic medical sonography is offered through hospital-based programs, two-year associate degree programs, and/or four-year baccalaureate degree programs. Diagnostic medical sonography programs are accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP) and include general, cardiac and/or vascular learning concentrations in their curriculum.
- Obstetric and gynecologic sonographers specialize in the imaging of the female reproductive system. Included in the discipline is one of the more well-known uses of sonography: examining the fetus of a pregnant woman to track the baby's growth and health.
- Abdominal sonographers inspect a patient's abdominal cavity to help diagnose and treat conditions primarily involving the gallbladder, bile ducts, kidneys, liver, pancreas, spleen, and male reproductive system. Abdominal sonographers also are prepared to scan superficial parts of the body, such as the thyroid, scrotum, and breast as well as some portions of the chest, although studies of the heart using sonography usually are done by echocardiographers.
- Neurosonographers focus on the nervous system, including the brain and spine. In neonatal care, neurosonographers study and diagnose neurological and nervous system disorders in premature infants. They also may scan blood vessels to check for abnormalities indicating a stroke in infants diagnosed with sickle-cell anemia. Like other sonographers, neurosonographers operate transducers to perform the sonogram, but use frequencies and beam shapes different from those used by obstetric and abdominal sonographers.
- Breast sonographers use sonography to study diseases of the breasts. Sonography aids mammography in the differentiation of breast lesions, which may identify a lesion as benign or suspi-
cious for malignancy. Breast sonographers use high-frequency transducers, made exclusively to study breast tissue.

- **Vascular sonographers** specialize in evaluating disease of the vascular system. Through use of Doppler and imaging, they can assess vessels for plaque, thrombus, and/or post-treatment evaluations.

- **Cardiac sonographers** use diagnostic medical sonography to evaluate the fetal, pediatric and adult heart. Cardiac sonography is used to evaluate heart chamber size and function as well as the presence of congenital and acquired heart disease.

**Employment Characteristics**

Diagnostic medical sonographers may be employed in hospitals, clinics, private offices, or industry. Most full-time sonographers work about 40 hours a week and may provide on-call support which constitutes being on call and readily available to report to work within the response time established by the medical facilities.

**Salary**

Data from the US Bureau of Labor Statistics from May 2011 show that wages at the 10th percentile are $44,950, the 50th percentile (median) at $65,210, and the 90th percentile at $90,640 (www.bls.gov/oes/current/oes292032.htm).

For more information, refer to www.ama-assn.org/go/hpsalary.

**Employment Outlook**

The demand for sonographers, including suitably qualified educators, researchers, and administrators, continues to exceed the supply; BLS data show that employment is expected to increase by about 44 percent through 2020—faster than the average for all occupations. The supply and demand ratio affects salaries, depending on experience and responsibilities.

**Educational Programs**

**Length.** Accredited programs are between one and four years (certificate, associate, and baccalaureate level), depending on program design, objectives, and the degree or certificate awarded.

**Prerequisites.** Applicants to a one-year program must possess qualifications in a clinically related allied health profession. Applicants to two-year programs must be high school graduates (or equivalent) with an educational background in basic science, general physics, and algebra. All applicants must demonstrate satisfactory completion of the following courses at college level: general physics, biological science, algebra, and communication skills.

Skills potential and practicing sonographers should exhibit include social perceptiveness, strong hand-eye coordination, learning strategies, critical thinking skills, instructional skills, active listening, active learning, reading comprehension, and written/oral expression.

**Curriculum.** Curricula of accredited programs include physical sciences, applied biological sciences, patient care, clinical medicine, applications of ultrasound, instrumentation, related diagnostic procedures, and image evaluation. A plan for well-structured, competency-based clinical education is an essential part of the curriculum of all sonography programs.

**Certification and Licensure**

Some states are now passing laws requiring licensure for diagnostic medical sonographers. Most of these states accept certification by a nationally registered organization as a component of the licensure process. Two states that have established licensing requirements are Oregon and New Mexico. Organizations such as the American Registry for Diagnostic Medical Sonography (ARDMS), the American Registry of Radiologic Technologists (ARRT), and Cardiovascular Credentialing International (CCI) certify the competency of sonographers through certification. Because certification provides an independent, objective measure of an individual’s professional standing, many employers prefer to hire registered sonographers. Certification with ARDMS requires passing a sonography principles and instrumentation examination, in addition to passing an exam in a specialty such as obstetric and gynecologic sonography, abdominal sonography, neurosonography, breast sonography, fetal echocardiography, pediatric echocardiography, adult echocardiography, and vascular echocardiography. Registration by ARRT requires passing an examination in general sonography, vascular sonography, or breast sonography. CCI certification involves passing a combined basic cardiovascular science exam and specialty exam such as the Registered Cardiac Sonographer or Registered Congenital Cardiac Sonographer registry exams. To keep their certification current, sonographers must complete continuing education to stay abreast of technological advances related to the occupation. Intersocietal Accreditation Commission (IAC) is requiring that accredited labs must have a process in place to ensure that echocardiographer sonographers be credentialed by 2014 and vascular sonographers by 2017.

**Inquiries**

**Careers/Curriculum**

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Society for Vascular Ultrasound
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www.svunet.org

American Society of Echocardiography
2100 Gateway Centre Blvd Suite 310
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**Certification**

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