

Diagnostic Medical Sonographers



Occupational Brief Title Codes:

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Work Classification Based Related

D.O.T. Occupations:

- CT Scan Technologists
- Echocardiograph Technicians
- Electrocardiograph Technicians
- Electromyographic Technicians
- Magnetic Resonance Imaging Technologists
- Polysomnographic Technicians

Interests Based Related

G.O.E. Occupations:

- Film Laboratory Technicians
- Radiopharmacists
- Scientific Photographers
- Spectroscopists

Skills Based Related

O*NET Occupations:

- Cardiovascular Technologists
- Nuclear Medicine Technologists
- Radiation Therapists
- Radiologic Technologists

Noteworthy Quote:

"The increased use of ultrasound equipment has led to a job opportunity boom in this field. Sonography is such a useful modality in diagnosis that more and more hospitals and clinics are encouraged to use it. In fact, the demand for sonographers is well below the supply. In terms of career satisfaction, what's different about sonography is it is not like other imaging fields. You actually have your hand on the patient. The results of the exam are a direct result of your skill level. Physicians tend to have respect for sonographers because of their role in diagnosis."

—Clarice Miller, Sonographer and Co-Owner of Great Lakes Sonography, Inc., Elm Grove, Wisconsin

Diagnostic medical sonographers (di-ag`nos-tic `med-i-cal so`no-graph-ers) operate specialized equipment to create images of structures inside the human body that are used by physicians to make a medical diagnosis.

Sonography, also called ultrasonography or ultrasound, uses high frequency sound waves (ultrasound) to produce visual images of organs, tissues, or blood flow inside the body. This type of procedure is often referred to as a sonogram or ultrasound scan. Diagnostic medical sonography derives from SONAR (Sound Navigation and Ranging), a system the Navy uses. With SONAR, high frequency sound waves or ultrasound signals from the surface of the sea strike submerged objects and bounce back to the source in the ship and appear on a screen. In diagnostic medical sonography the sound waves travel from the surface of the skin. When they hit an organ, a mass, or a collection of fluid, they bounce back, and the results show on a screen.

Diagnostic sonography is an important aid to physicians and other health professionals. Sonography shows the contours, inner structures, and blood flow of most internal structures such as the brain, heart, liver, gall bladder, and reproductive system. It can also aid in diagnosis of disease or trauma to the eyes and other body parts such as tendons and ligaments. Unlike X-rays, sonography is a radiation-free imaging method. It is considered the safest imaging technique, especially for viewing developing babies inside pregnant women.

Sonography is increasingly being used in the detection and treatment of heart disease, heart attack, and vascular disease that can lead to stroke. It is used to guide the fine needles used in tissue biopsy when a sample of tiny cells from an organ is taken for lab testing. Therapeutic ultrasound technology is also used for other medical procedures, such as the heating of deep tissue to treat arthritis, and in surgery such as operations on the brain and vascular systems. Dentists even use ultrasound to remove calcium deposits from teeth.



Diagnostic medical sonographers operate equipment to create images of structures inside the human body.
Photo by CGP Staff

Work Performed

Diagnostic medical sonographers, also known as *ultrasonographers* or *ultrasound technologists*, often work under the supervision of physicians such as neurosurgeons and obstetricians. They set up and operate ultrasound equipment and perform ultrasound exams or sonograms. Sometimes they specialize in a specific area of the body, including abdomen (liver, kidneys, gallbladder, spleen, and pancreas); female reproductive system (obstetrics and gynecology); breasts (mammography); eyes (ophthalmology); or brain (neurosonology). Sonographers may also specialize in vascular technology or echocardiography (evaluation of the heart and related blood vessels); they are covered in our brief on cardiovascular technologists.

Before preparing a patient for these exams, they review the results of any diagnostic procedures already performed on the patient. Then they explain to the patient what the equipment does and what to expect during the procedure. They obtain a medical history as well as clinical data from the patient to integrate with the information the sonogram will produce.

Sonographers then assist the patient onto the examining table and position him or her. They apply a special gel on that part of the body they will check. The gel permits the transducer—the hand-held instrument that sends and receives the sound waves—to make better contact with the skin. Good contact helps insure clear images.

Sonographers select the transducer appropriate for the examination. The transducer works like a loudspeaker and microphone because it can both transmit and receive sound. The transducer sends a stream of high frequency sound waves into the body that bounce off the structures inside. The transducer detects sound waves as they bounce off the internal structures.

Different structures in the body reflect these sound waves differently. These sounds are analyzed by a computer to make a two-dimensional image of the structure(s) on a television screen or that can be recorded on videotape. Sonographers adjust controls on the ultrasound machine to get the best possible images. They are careful in these adjustments because errors can result in imaging that may be misinterpreted, thus leading to an incorrect diagnosis.

To perform the examination, sonographers move the transducer slowly back and forth over the skin. By viewing the image, sonographers can detect subtle differences between healthy and diseased tissue. They check details such as the position of the organ, obstructions, and changes in shape, size, and texture. To monitor the behavior of a moving structure, such as flowing blood or a beating heart, Doppler scanning is used.

During the examination, sonographers operate equipment that records individual photographic views or sequences as real-time images of the area. These images are recorded on a computer disk, magnetic tape, printout, film, or videotape. Sonographers remove the film after recording and prepare it for analysis by the physician. If asked, sonographers may record other observations or data relative to the examination.

The physician examines and interprets the sonogram to make decisions on diagnosis and treatment. The sonogram may reveal tumors, cysts, or blockages. Using ultrasound, an obstetrician can, for instance, examine the detailed anatomy of an unborn child, identify multiple fetuses, or detect abnormalities.

Sonographers must perform quality assurance procedures on their equipment at intervals to make sure the equipment will produce accurate images. They check the displays for interference that might distort the image and thereby affect the exam results.

Sonographers also keep a daily log. They record the tests performed on each patient and the results, and label photos and printouts. Many sonographers assist in electronic and clerical scheduling and appointments, record keeping, and computerized image archiving. They adjust and maintain equipment.

Sonographers may also have managerial or supervisory responsibilities, including preparing work schedules, evaluating equipment purchases, or managing a sonography or diagnostic imaging department. Sonographers in research and development in manufacturing firms and medical research centers evaluate or develop new equipment or techniques.

Working Conditions

Sonographers can choose to work in clinics, hospitals, private practice physician offices, public health facilities, laboratories, and other medical settings performing examinations in their areas of specialization. They may work in departments of gynecology, obstetrics, cardiology, neurology, pediatrics, or other specialties. Sonographers also work in emergency rooms. At times sonographers transport equipment and work at the bedside of very ill patients.

Sonographers are usually very busy, sometimes examining up to twenty patients a day. They may stand much of the time. Although they are not exposed to ionizing radiation, diagnostic medical sonographers may be exposed to communicable diseases and hazardous materials. A physician or a supervisor may also be present during an examination. Because accuracy is essential, the work carries a certain amount of stress.

Hours and Earnings

Sonographers generally work thirty-five to forty hours a week. Sonographers may have evening and weekend hours, and often work overtime. Hospital-based sonographers may also have times when they are on-call to conduct emergency examinations after normal work hours. If they work more than forty hours a week, they may get equal time off or on-call pay. Some sonographers work part-time or have flexible hours.

Earnings for sonographers vary with experience, education, number of specialties practiced, employer, as well as geographic location. Administrative and supervisory positions also pay higher rates. According to the Bureau of Labor Statistics, in 2002, diagnostic medical

sonographers earned an average of \$23.90 an hour. Overall, earnings ranged from around \$17 an hour to over \$32 an hour. A more recent report from the Society of Diagnostic Medical Sonography Salary and Benefits Survey (released March 2005) listed the median salary for sonographers at \$61,984 a year (about \$29 an hour).

Sonographers in hospitals and other health care organizations receive the same fringe benefits as those of other workers. They get health insurance, paid vacation time, sick leave, and pension plans. Some hospitals and medical centers offer tuition assistance or cost reimbursement to employees who wish to continue their education.

Education and Training

Diagnostic medical sonographers must complete a comprehensive diagnostic medical sonography education program. Programs vary in length from one to four years depending on the degree or certificate awarded. Prerequisites also vary from a high school diploma or GED to specific qualifications in a related allied health profession. In general, those interested in becoming diagnostic medical sonographers should have a strong educational background in basic sciences. Courses in health, biology, chemistry, physics, mathematics, and English will prove especially helpful.

Instruction in diagnostic medical sonography is offered in hospitals, vocational-technical institutions, colleges and universities, and the Armed Forces. Two-year associate degree programs are most common, although four-year bachelor's degree programs are also available. Graduates of one-year programs may receive a diploma or certificate. However, these programs are generally only open to allied health workers, such as obstetric nurses and radiologic technologists, and sonographers specializing in one particular discipline seeking training in others.

As of April 2005, the Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredited around 131 formal training programs in sonography. An accredited program consists of classroom and laboratory instruction, as well as clinical practice. Classroom studies include physical and applied biological sciences. Students learn patient care and communication, medical ethics, anatomy, physiology, pathology, clinical medicine, applications of ultrasound, and instrumentation. They also study image evaluation and related diagnostic procedures. The clinical practice portion of the program gives students hands-on experience in a hospital, office, or clinic ultrasound department under the guidance of an experienced sonographer.

Today, continuing education is also a standard practice to insure that sonographers keep up-to-date with the changes and advances in the field. Continuing education can be acquired through participation in meetings, seminars, or further programs of study offered by professional organizations, colleges and universities, hospitals, and ultrasound equipment companies.

Registration and Professional Societies

On successful completion of studies and appropriate practical experience, individuals may take an examination offered by the American Registry of Diagnostic Medical Sonographers (ARDMS). Registration is optional at this time, but it is typically required by employers and increasingly being mandated by third party payers (such as HMOs and health insurance providers) and the government.

To become registered applicants must pass a general physics and instrumentation examination, in addition to an exam in one of the specialties. To keep their registration current, sonographers must complete continuing education to stay abreast of technological advances related to the occupation.

Many sonographers find additional professional support from the Society of Diagnostic Medical Sonography (SDMS). This organization promotes and advances the field of sonography through initiating and overseeing educational programs; stimulating and encouraging research; collecting and disseminating information; and reviewing and establishing policies regarding their professional status, as well as legislative activity. SDMS also offers the Advanced Practice Sonographer (APS) designation to members who meet specified standards of education, training, specialty certification, and clinical excellence.

Personal Qualifications

Sonographers should be able to work with no supervision in a professional manner within the guidelines of the physician or medical establishment. Because they sometimes may perform invasive procedures, they must show empathy, patience, and understanding with patients. They need good interpersonal skills and must be able to explain technical procedures and results to their patients, some of whom may be nervous about the exam or the problems it may reveal. They should also communicate well with physicians and other health care staff, and be accurate and thorough in recording data.

Occupations can be adapted for workers with disabilities. Persons should contact their school or employment counselors, their state office of vocational rehabilitation, or their state department of labor to explore fully their individual needs and requirements as well as the requirements of the occupation.

Where Employed

According to the Bureau of Labor Statistics, diagnostic medical sonographers held around 37,000 jobs in 2002. More than half of all sonographer jobs were in hospitals. Most of the rest were in offices of physicians or medical and diagnostic laboratories, including diagnostic imaging centers and mobile imaging services. They also worked for health maintenance organizations and public health facilities.

Some served as advisers for the manufacturers of ultrasound equipment. In government they worked for the U.S. Department of Veterans Affairs, the Public Health Service, and the Armed Forces. Some individuals with the required education taught in hospitals and universities. They

also worked as researchers, consultants, or in administrative positions. Others were self-employed.

Employment Outlook

The outlook for diagnostic medical sonographers is excellent. In fact, the Bureau of Labor Statistics predicts employment of sonographers to grow by 24 percent—roughly 9,000 positions. An additional 7,000 jobs are also expected to open due to replacement needs.

A growing population and the large aging population will increase demand for diagnostic imaging and therapeutic technology. As patients seek safer treatment methods, sonography is becoming an increasingly attractive alternative to radiologic procedures. As a result, ultrasound technology will continue to evolve rapidly and spawn many new ultrasound procedures, such as 3D-sonography.

Hospitals will remain the prime employer. However, the shift toward outpatient care will also increase employment in offices of physicians and in medical and diagnostic laboratories, including diagnostic imaging centers. Currently, the demand for qualified sonographers is greater than the supply, especially in rural communities, small towns, and some retirement areas.

Entry Methods

Qualified sonographers should have no difficulty finding employment. Some schools offer career or placement services. The Society of Diagnostic Medical Sonography maintains a list of job openings.

Certification through the American Registry of Diagnostic Medical Sonographers (ARDMS) is a requirement of many employers. Registered sonographers may apply to any department within the hospital that uses sonography such as radiology, obstetrics, pediatrics, and so forth. They may also apply at HMO's, imaging centers, private physicians' offices, and manufacturing firms.

Those who are flexible about hours, earnings, and location stand the best chance of finding employment. Sonographers who have training in related imaging areas such as radiologic technology, magnetic resonance imaging, computer tomography, nuclear medicine technology, or other specialties may have an advantage in finding employment and in advancing.

Advancement

Advancement for sonographers depends on education, achievements, competence, and place of employment. Sonographers may, for instance, advance to supervisory or management positions in charge of a particular shift of workers or entire sonography or diagnostic imaging department. Other career advancement opportunities also exist in education, administration, and research, as well as in

commercial companies as training and application specialists, sales representatives, and technical advisors.

For Further Research

American Registry of Diagnostic Medical Sonographers, 51 Monroe Street, Plaza East One, Rockville, MD 20850-2400. Web site: www.ardms.org

Society of Diagnostic Medical Sonography, 2745 Dallas Parkway, Suite 350, Plano, TX 75093-8730. Web site: www.sdms.org

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