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# Clinical Laboratory Technologists and Technicians

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## Significant Points

- Excellent job opportunities are expected.
- Clinical laboratory technologists usually have a bachelor's degree with a major in medical technology or in one of the life sciences; clinical laboratory technicians generally need either an associate degree or a certificate.
- Most jobs will continue to be in hospitals, but employment will grow rapidly in other settings, as well.

## Nature of the Work

Clinical laboratory testing plays a crucial role in the detection, diagnosis, and treatment of disease. *Clinical laboratory technologists*, also referred to as clinical laboratory scientists or medical technologists, and clinical laboratory technicians, also known as medical technicians or medical laboratory technicians, perform most of these tests.

Clinical laboratory personnel examine and analyze body fluids, and cells. They look for bacteria, parasites, and other microorganisms; analyze the chemical content of fluids; match blood for transfusions; and test for drug levels in the blood that show how a patient is responding to treatment. Technologists also prepare specimens for examination, count cells, and look for abnormal cells in blood and body fluids. They use microscopes, cell counters, and other sophisticated laboratory equipment. They also use automated equipment and computerized instruments capable of performing a number of tests simultaneously. After testing and examining a specimen, they analyze the results and relay them to physicians.

With increasing automation and the use of computer technology, the work of technologists and technicians has become less hands-on and more analytical. The complexity of tests performed, the level of judgment needed, and the amount of responsibility workers assume depend largely on the amount of education and experience they have. Clinical laboratory technologists usually do more complex tasks than clinical laboratory technicians do.

Clinical laboratory technologists perform complex chemical, biological, hematological, immunologic, microscopic, and bacteriological tests. Technologists microscopically examine blood and other body fluids. They make cultures of body fluid and tissue samples, to determine the presence of bacteria, fungi, parasites, or other microorganisms. Technologists analyze samples for chemical content or a chemical reaction and determine concentrations of compounds such as blood glucose and cholesterol levels. They also type and cross match blood samples for transfusions.

Clinical laboratory technologists evaluate test results, develop and modify procedures, and establish and monitor programs, to ensure the accuracy of tests. Some technologists supervise clinical laboratory technicians.

Technologists in small laboratories perform many types of tests, whereas those in large laboratories generally specialize.

Clinical chemistry technologists, for example, prepare specimens and analyze the chemical and hormonal contents of body fluids. Microbiology technologists examine and identify bacteria and other microorganisms. Blood bank technologists, or immunohematology technologists, collect, type, and prepare blood and its components for transfusions. Immunology technologists examine elements of the human immune system and its response to foreign bodies. Cytotechnologists prepare slides of body cells and examine these cells microscopically for abnormalities that may signal the beginning of a cancerous growth. Molecular biology technologists perform complex protein and nucleic acid testing on cell samples.

Clinical laboratory technicians perform less complex tests and laboratory procedures than technologists do. Technicians may prepare specimens and operate automated analyzers, for example, or they may perform manual tests in accordance with detailed instructions. They usually work under the supervision of medical and clinical laboratory technologists or laboratory managers. Like technologists, clinical laboratory technicians may work in several areas of the clinical laboratory or specialize in just one. Phlebotomists collect blood samples, for example, and *histotechnicians* cut and stain tissue specimens for microscopic examination by pathologists.

**Work environment.** Clinical laboratory personnel are trained to work with infectious specimens. When proper methods of infection control and sterilization are followed, few hazards exist.



*Clinical laboratory personnel examine and analyze body fluids and cells.*

## Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2008	Projected Employment, 2018	Change, 2008-2018	
				Number	Percent
Clinical laboratory technologists and technicians.....	29-2010	328,100	373,600	45,600	14
Medical and clinical laboratory technologists .....	29-2011	172,400	193,000	20,500	12
Medical and clinical laboratory technicians .....	29-2012	155,600	180,700	25,000	16

(NOTE) Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

Protective masks, gloves, and goggles often are necessary to ensure the safety of laboratory personnel.

Working conditions vary with the size and type of employment setting. Laboratories usually are well lighted and clean; however, specimens, solutions, and reagents used in the laboratory sometimes produce fumes. Laboratory workers may spend a great deal of time on their feet.

Hours of clinical laboratory technologists and technicians vary with the size and type of employment setting. In large hospitals or in independent laboratories that operate continuously, personnel usually work the day, evening, or night shift and may work weekends and holidays. Laboratory personnel in small facilities may work on rotating shifts, rather than on a regular shift. In some facilities, laboratory personnel are on call several nights a week or on weekends, in case of an emergency.

### Training, Other Qualifications, and Advancement

Clinical laboratory technologists generally require a bachelor's degree in medical technology or in one of the life sciences; clinical laboratory technicians usually need an associate degree or a certificate.

**Education and training.** The usual requirement for an entry-level position as a clinical laboratory technologist is a bachelor's degree with a major in medical technology or one of the life sciences; however, it is possible to qualify for some jobs with a combination of education and on-the-job and specialized training. Universities and hospitals offer medical technology programs.

Bachelor's degree programs in medical technology include courses in chemistry, biological sciences, microbiology, mathematics, and statistics, as well as specialized courses devoted to knowledge and skills used in the clinical laboratory. Many programs also offer or require courses in management, business, and computer applications. The Clinical Laboratory Improvement Act requires technologists who perform highly complex tests to have at least an associate degree.

Medical and clinical laboratory technicians generally have either an associate degree from a community or junior college or a certificate from a hospital, a vocational or technical school, or the Armed Forces. A few technicians learn their skills on the job.

The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) fully accredits about 479 programs for medical and clinical laboratory technologists, medical and clinical laboratory technicians, histotechnologists and histotechnicians, cytogenetic technologists, and diagnostic molecular scientists. NAACLS also approves about 60 programs in phlebotomy and clinical assisting. Other nationally recognized agencies that accredit specific areas for clinical laboratory workers include

the Commission on Accreditation of Allied Health Education Programs and the Accrediting Bureau of Health Education Schools.

**Licensure.** Some States require laboratory personnel to be licensed or registered. Licensure of technologists often requires a bachelor's degree and the passing of an exam, but requirements vary by State and specialty. Information on licensure is available from State departments of health or boards of occupational licensing.

**Certification and other qualifications.** Many employers prefer applicants who are certified by a recognized professional association. Associations offering certification include the Board of Registry of the American Society for Clinical Pathology, the American Medical Technologists, the National Credentialing Agency for Laboratory Personnel, and the Board of Registry of the American Association of Bioanalysts. These agencies have different requirements for certification and different organizational sponsors.

In addition to certification, employers seek clinical laboratory personnel with good analytical judgment and the ability to work under pressure. Technologists in particular are expected to be good at problem solving. Close attention to detail is also essential for laboratory personnel because small differences or changes in test substances or numerical readouts can be crucial to a diagnosis. Manual dexterity and normal color vision are highly desirable, and with the widespread use of automated laboratory equipment, computer skills are important.

**Advancement.** Technicians can advance and become technologists through additional education and experience. Technologists may advance to supervisory positions in laboratory work or may become chief medical or clinical laboratory technologists or laboratory managers in hospitals. Manufacturers of home diagnostic testing kits and laboratory equipment and supplies also seek experienced technologists to work in product development, marketing, and sales.

Professional certification and a graduate degree in medical technology, one of the biological sciences, chemistry, management, or education usually speeds advancement. A doctorate usually is needed to become a laboratory director. Federal regulation requires directors of moderately complex laboratories to have either a master's degree or a bachelor's degree, combined with the appropriate amount of training and experience.

### Employment

Clinical laboratory technologists and technicians held about 328,100 jobs in 2008. More than half of jobs were in hospitals. Most of the remaining jobs were in offices of physicians and in medical and diagnostic laboratories. A small proportion was

in educational services and in all other ambulatory health care services.

### Job Outlook

Rapid job growth and excellent job opportunities are expected. Most jobs will continue to be in hospitals, but employment will grow rapidly in other settings, as well.

**Employment change.** Employment of clinical laboratory workers is expected to grow by 14 percent between 2008 and 2018, faster than the average for all occupations. The volume of laboratory tests continues to increase with both population growth and the development of new types of tests.

Technological advances will continue to have opposing effects on employment. On the one hand, new, increasingly powerful diagnostic tests and advances in genomics—the study of the genetic information of a cell or organism—will encourage additional testing and spur employment. On the other hand, research and development efforts targeted at simplifying and automating routine testing procedures may enhance the ability of nonlaboratory personnel—physicians and patients in particular—to perform tests now conducted in laboratories.

Although hospitals are expected to continue to be the major employer of clinical laboratory workers, employment is expected also to grow rapidly in medical and diagnostic laboratories, offices of physicians, and all other ambulatory health care services.

**Job prospects.** Job opportunities are expected to be excellent because the number of job openings is expected to continue to exceed the number of jobseekers. Although significant, job growth will not be the only source of opportunities. As in most occupations, many additional openings will result from the need to replace workers who transfer to other occupations, retire, or stop working for some other reason. Willingness to relocate will further enhance one's job prospects. Earnings Median annual wages of medical and clinical laboratory technologists were \$53,500 in May 2008. The middle 50 percent earned between \$44,560 and \$63,420. The lowest 10 percent earned less than \$36,180, and the highest 10 percent earned more than \$74,680. Median annual wages in the industries employing the largest numbers of medical and clinical laboratory technologists were:

Federal Executive Branch .....	\$59,800
General medical and surgical hospitals .....	54,220
Medical and diagnostic laboratories.....	53,360
Offices of physicians .....	49,080
Colleges, universities, and professional schools .....	47,890

Median annual wages of medical and clinical laboratory technicians were \$35,380 in May 2008. The middle 50 percent earned between \$28,420 and \$44,310. The lowest 10 percent earned less than \$23,480, and the highest 10 percent earned more than \$53,520. Median annual wages in the industries employing the largest numbers of medical and clinical laboratory technicians were:

General medical and surgical hospitals.....	\$36,840
Colleges, universities, and professional schools .....	36,290
Offices of physicians .....	33,980
Medical and diagnostic laboratories.....	32,630

Other ambulatory health care services .....31,320

According to the American Society for Clinical Pathology, median hourly wages of staff clinical laboratory technologists and technicians, in various specialties and laboratory types, in 2007 were:

**Table 1. Median hourly wages by specialties and laboratory type, 2007.**

Occupation	Hospital	Private clinic	Physician office laboratory
Cytotechnologist .....	\$27.55	\$28.75	\$26.24
Histotechnologist .....	22.93	23.35	25.00
Medical technologist.....	23.45	23.00	20.00
Histotechnician .....	20.00	20.00	21.00
Medical laboratory technician .....	18.54	17.00	16.96
Phlebotomist .....	12.50	12.50	13.00

SOURCE: American Society for Clinical Pathology

### Related Occupations

Clinical laboratory technologists and technicians analyze body fluids, tissue, and other substances, using a variety of tests. Similar or related procedures are performed by:

- Chemists and materials scientists
- Science technicians
- Veterinary technologists and technicians

### Sources of Additional Information

For a list of accredited and approved educational programs for clinical laboratory personnel, contact:

- National Accrediting Agency for Clinical Laboratory Sciences, 5600 N. River Rd., Suite 720, Rosemont, IL 60018. Internet: <http://www.naacls.org>

Information on certification is available from:

- American Association of Bioanalysts, Board of Registry, 906 Olive St., Suite 1200, St. Louis, MO 63101. Internet: <http://www.aab.org>
- American Medical Technologists, 10700 W. Higgins Rd., Suite 150, Rosemont, IL 60018. Internet: <http://www.amt1.com>
- American Society for Clinical Pathology, 33 West Monroe St., Suite 1600, Chicago, IL 60603. Internet: <http://www.ascp.org>
- National Credentialing Agency for Laboratory Personnel, P.O. Box 15945-289, Lenexa, KS 66285. Internet: <http://www.nca-info.org>

Additional career information is available from:

- American Association of Blood Banks, 8101 Glenbrook Rd., Bethesda, MD 20814. Internet: <http://www.aabb.org>
- American Society for Clinical Laboratory Science, 6701 Democracy Blvd., Suite 300, Bethesda, MD 20817. Internet: <http://www.ascls.org>

➤ American Society for Cytopathology, 100 West  
10th St., Suite 605, Wilmington, DE 19801. Internet:  
**<http://www.cytopathology.org>**

➤ Clinical Laboratory Management Association, 993 Old  
Eagle School Rd., Suite 405, Wayne, PA 19087. Internet:  
**<http://www.clma.org>**

The Occupational Information Network (O\*NET) provides information on a wide range of occupational characteristics. Links to O\*NET appear at the end of the Internet version of this occupational statement, accessible at **<http://www.bls.gov/ooh/ocos096.htm>**