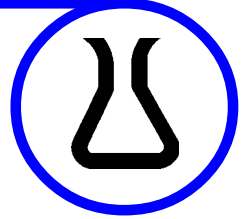


Histotechnologists



Occupational Brief Title Codes:

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Work Classification Based Related

D.O.T. Occupations:

- Biochemistry Technologists
- Cytogenetic Technologists
- Cytotechnologists
- Immunohematologists
- Medical Technologists

Interests Based Related

G.O.E. Occupations:

- Blood and Plasma Laboratory Assistants
- Biological Photographers
- Biomedical Equipment Technicians
- Phlebotomists
- Toxicologists

Skills Based Related

O*NET Occupations:

- Biologists
- Biological Technicians
- Coroners
- Medical and Clinical Laboratory Technicians
- Microbiologists

Noteworthy Quote:

“One of the reasons I like this job is that you’re not sedentary—you do different things. On a typical day, you perform processing, sectioning, and freezing of tissue samples. But you’re not working alone, either. You’re part of a team that’s usually working on a task. It’s close work, though. Precision counts. Sometimes you’re dealing with sections of tissue as thin as four microns. It takes dexterity. Also, a good background in math, biology, and chemistry is important. Overall, you should be someone who likes science because that’s what you’ll be using.”

—Jill Wirtala, Histotechnologist,
Phenopath Laboratories, Seattle,
Washington

Histotechnologists (his-to-tech`nol-o-gists) prepare tissue samples for microscopic examination by a pathologist or other medical scientist to determine whether a patient has a disease, dysfunction, or malignancy.

Histology is a science dealing with the structure of cells and their formation into tissues and organs. Histotechnology centers on the detection of tissue abnormalities and the treatment for the diseases causing the abnormalities. For instance, cancer can often be detected by the appearance of cells in a tissue sample. Once a tissue sample is taken from the patient, it is sent to the laboratory. Histotechnologists (HTLs) freeze, and cut tissue samples. They then mount the samples on slides and stain them with special dyes to make them visible under the microscope. They use delicate instruments and automated equipment as well as knives, chemicals and glass slides. They must be very precise and have good hand-eye coordination and manual dexterity.

Histotechnologists (HTLs) are members of a laboratory team. Most HTLs work with pathologists, physicians, or scientists who examine the tissue sections the HTLs prepare. Sometimes HTLs must work quickly and under pressure because the prepared samples may be needed while the patient is still undergoing surgery. With the information learned from the examination of the section of tissue, called a biopsy, the pathologist consults with the surgeon and the patient’s physician to determine if disease is present and if it has spread. They can then decide on the best course of treatment for the patient.



Histotechnologists prepare tissue samples for microscopic examination.

Photo by Melinda Leonard

Work Performed

The main task of histotechnologists (HTLs) and **histologic technicians** (HTs) is to prepare sections of body tissue for pathologists to examine. The tissue may be obtained from an operating room, clinic, doctor’s office, emergency room, or a postmortem examination.

Histotechnologists and histologic technicians use various methods to process the tissue samples. They dehydrate (remove water from) the specimen and

embed the tissue in a material such as paraffin. The paraffin hardens the tissue so it can be sliced with an instrument known as a microtome. These thin sections are then placed on microscopic slides. HTLs and HTs may also embed processed tissue in plastic rather than paraffin, so that the sections can be sliced much thinner. They can even remove calcium from pieces of bone so the bone can be processed.

HTLs and HTs place specific dyes on the sections, so that the cells and the structure of the tissue will be visible under a microscope. They apply special stains on microscopic slides to detect fungus, bacteria, connective tissues, and other components. They use a microscope to evaluate the quality of the stain.

A critical portion of the work of histotechnologists and histologic technicians is preparing frozen sections of tissue for immediate (less than 10 minutes) diagnosis for patients who are on the operating table. Surgical teams may remove tumors or other growths and give them to pathologists to examine. The pathologists in turn give biopsies of these tissues to HTLs or HTs, who flash-freeze them with liquid nitrogen. They then cut thin sections of the tissue with an instrument called a cryostat. When the sections are mounted on slides and stained, the pathologists examine them and report to the surgical teams whether the tissue samples are malignant or have some other abnormalities. The operations then continue accordingly.

HTLs and HTs use complex and delicate instruments such as high-power microscopes, chemical processors, electron microscopes, purification stills, and microtomes. They may also assist pathologists at autopsies and preserve organs for future research studies.

Histotechnologists differ from histologic technicians, however, in that histotechnologists typically do more complex procedures for processing and staining tissues. Histotechnologists may, for instance, identify tissue structures and cell components, and do DNA and immunoperoxidase studies on tumors and their specific staining characteristics. They may relate these characteristics to physiological activity. They may perform immunology procedures to determine if a transplanted heart or kidney is being rejected. Or they may process tissues cut very thin for examination with an electron microscope, which can magnify the tissue up to half a million times.

Histotechnologists may also initiate new test techniques. They may set up procedures to maintain accuracy and precision. They often serve as section supervisors, and may be in charge of judging the results of quality control measures. Some even teach students.

Working Conditions

As a rule, histotechnologists and histologic technicians work in clean, well-lighted, and well-ventilated laboratories. At times they may work with materials having unpleasant odors and with infectious specimens. Exposure to toxic

substances is a potential hazard. Correct handling of specimens, materials, and equipment, and adherence to federal safety guidelines minimizes risks to workers.

Both HTLs and HTs work with sophisticated equipment, such as balances, pH meters, processors, automated stainers, coverslippers, and microtomes. They also work with potentially dangerous instruments such as knives, chemicals, and glass slides. They may stand or sit while working. The work can also be repetitive at times, but newer technologies are challenging to work with. More often, the work is vigorous because the work must be done quickly and with precision.

Hours and Earnings

Most histotechnologists and histologic technicians work forty hours a week. Since hospitals are open twenty-four hours a day, seven days a week, HTLs and HTs may work nights or rotating shifts. They may work weekends and holidays and have days off in the middle of the week.

The earnings of HTLs and HTs vary with their training, certification level, the employer, and the location of the hospital or laboratory. According to the American Society for Clinical Pathology (ASCP), salaries for histotechnologists ranged from around \$33,000 to over \$46,000 a year in 2002; and salaries for histologic technicians ranged from around \$28,000 to over \$39,000 a year. Overall, the average wage for HTLs was \$41,122 a year and \$34,549 a year for HTs.

Benefits for both HTLs and HTs include health insurance, sick leave, paid vacations and holidays, and pension plans. Other benefits depend on the employer and may include tuition assistance for continuing or advanced education.

Education and Training

To prepare for a career as a histotechnologist or histologic technician, a high school student should have a solid foundation in high school sciences including biology, chemistry, and computer science, as well as mathematics. After graduation, there are a few ways to become either a certified histotechnologist or a certified histologic technician.

One route combines a college degree with on-the-job training. Histotechnologists must obtain a bachelor's degree with thirty semester hours in biology and chemistry, and successfully complete a one-year on-the-job training in a histology laboratory under the supervision of a certified pathologist or medical scientist. Histologic technicians must obtain an associate degree, with at least twelve semester hours in biology and chemistry, and successfully complete twelve months of on-the-job training in a histology laboratory supervised by a certified pathologist or medical scientist.

Another route is to complete a histotechnologist or histologic technician program accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). The NAACLS-accredited HTL and HT programs are associated with hospitals. Colleges and universities offering studies for this work arrange for their students to take their clinical practice at an affiliated hospital.

As of April 2005, the NAACLS fully accredited 28 programs providing education specifically for histology. The minimum prerequisite education for admission to histotechnologist programs is a bachelor's degree with at least thirty semester hours in chemistry and biology. The minimum prerequisite education for admission to histologic technician programs may range from a high school diploma, to some college courses, to an associate degree. Prerequisite courses for both programs include: biology, anatomy, physiology, microbiology, organic or inorganic chemistry, biochemistry, and math.

Instruction in the histotechnologist and histologic technician programs include topics such as fixation and processing techniques, sectioning, staining, instrumentation, laboratory computer, microscopy, and medical terminology. Histotechnologists take additional course work in techniques in immunology, electron microscopy, enzyme histochemistry, quality control, management and education methodology, as well as research techniques. Students must also obtain clinical experience in a hospital laboratory, which may range from six to twelve months.

Licensing, Certification, and Professional Societies

Some states require laboratory personnel, such as HTLs and HTs to be licensed or registered. To get a license or register to practice in a state, they must meet the education, experience, and certification qualifications set by that state. Information on licensure and registration is available from state departments of health or boards of occupational licensing.

Although voluntary, national certification is widely accepted by employers in the health industry as a prerequisite for many jobs, and is often necessary for advancement. The Board of Registry (BOR) through the American Society for Clinical Pathology (ASCP) is the primary certifying agency for histotechnologists and histologic technicians. To qualify for the HTL and HT certification examinations, applicants must meet academic and laboratory education and experience requirements. The examinations consist of two parts: written and practical. After passing both parts of the examination, histotechnologists may use the initials HTL(ASCP) and histologic technicians may use the initials HT(ASCP). The ASCP also offers a qualification in immunohistochemistry to eligible candidates. All certifications are good for five years and may be renewed with documentation of acceptable continuing education.

Histotechnologists and histologic technicians may find additional professional support from organizations such as the ASCP and the National Society for Histotechnology (NSH). Both ASCP and NSH encourage the professional growth and advancement of histoprotectionals, and promote the exchange of ideas and knowledge in histotechnology through workshops, seminars, training courses, and publications. Other affiliated organizations include the American Association of Pathologists' Assistants (AAPA), the American Medical Technologists (AMT), and the American Society for Clinical Laboratory Science (ASCLS).

Personal Qualifications

Histotechnologists and histologic technicians should have an aptitude for science and good analytical judgment. They must be accurate, reliable, and able to work quickly and carefully under pressure. They should be able to perform exacting and repetitious work, and handle specimens of diseased tissues. This work requires precision, attention to detail, and concentration. Good communication skills, in both writing and speaking are important. With the widespread use of automated laboratory equipment, computer skills are essential. Manual dexterity, good hand-eye coordination, and the ability to distinguish fine shades of color is also a requirement of this work.

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

Most histotechnologists and histologic technicians work in hospitals, for-profit laboratories, medical clinics, universities, and public health facilities. Other opportunities exist in business and sales, industrial research, veterinary pathology, marine biology, and forensic pathology. Some HTLs and HTs, for instance, work in the laboratories of firms that produce or process chemical, pharmaceutical, and household products, and medical devices. Opportunities also exist in government agencies such as the Food & Drug Administration and the Environmental Protection Agency.

Employment Outlook

According to American Society of Clinical Pathologists, "Today, there are more jobs for laboratory personnel [including histology professionals] than educated people to fill those jobs. The need is great everywhere throughout the country, and the future long-term employment looks bright well into the next century."

Because laboratory tests are essential in medical treatment, the volume of testing and development of new

types of tests are sure to continue growing by leaps and bounds. General population growth as well as the large increase in the number of elderly—who are more susceptible to illness—will increase the demand for all types of medical care, staff, and resources, including histologic procedures.

On the other hand, technological advances will affect the employment of these workers both positively and negatively. New and powerful diagnostic tests will create a demand for more testing, and more employment for these workers. At the same time, research efforts to automate lab procedures may make it possible for each HTL and HT to perform more tests. More simplified procedures may also allow physicians to perform tests now done in laboratories by HTLs and HTs.

Hospitals will continue to be a major employer of HTLs and HTs. However, rapid employment growth is also expected in independent laboratories serving hospitals and physicians' offices, who send them a large share of their testing, as well as other ambulatory health care services, including organ banks.

Entry Methods

Histotechnology students can get help from the career services office of the school they attend. Hospitals and other employers often send recruiters to the school or campus to interview job seekers. Commercial agencies, some of which deal only with medical personnel, may direct HTLs and HTs to employers. Word of mouth, want ads in papers, and notices in medical journals, as well as affiliation with professional organizations are other means of learning about jobs. The NSH and ASCP, for instance, maintain job posting services.

Advancement

Advancement in this work, as in any other, depends on skill, performance, and education. With experience HTLs and HTs can gain greater independence. Both technologists and technicians can become supervisors in a laboratory. Technicians who wish to advance themselves can acquire more education and become histotechnologists. Histotechnologists not only perform more complex procedures, but can also teach, be the director of a school for histologic technology, or become chief technologists or laboratory managers.

A doctorate is needed to become a laboratory director. However, Federal regulations allow directors of moderately complex laboratories to have a master's degree or a bachelor's degree, combined with the appropriate amount of training and experience. Histotechnology also provides an excellent background for continuation into other health-related disciplines, including medical or veterinary school.

For Further Research

American Society for Clinical Pathology, 2100 West Harrison Street, Chicago IL 60612-3798. Web site: www.ascp.org.

National Society for Histotechnology, 4201 Northview Drive, Suite 502, Bowie, MD 20716-2604. Web site: www.nsh.org.

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