

Modern Methods of Histological Examination

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Abstract: This article provides information about histology, the most modern methods of histological examination that are being tested and used in the current age of technology.

Keywords: histology, histological examinations, tissues, cells, age of technology, modern technology.

As we know, there are separate sciences that specialize in all directions and study these directions, one of them is the science of "Histology" that studies the cells and tissues of humans and animals. Histology is a branch of science in veterinary medicine that studies the structure and productivity of body tissues in both humans and animals. Pathological abnormalities in cell structure are detected in histological examination technologies. A doctor performs a biopsy, a procedure in which a small piece of soft tissue that looks or behaves suspiciously is removed from an organ or other surface and sent for examination.

Histology is a science that studies all cells present in all animals. The term "histology" was first proposed by the German scientist K. Mayer. It studies tissue and organ development, microscopic and microscopic structure and chemical composition, function, and the relationship between their structure and function.

Within the concept of histology, if we get acquainted with the term cell, through chemical analysis it was determined that the cell contains substances that are common in the atmosphere and the earth's crust. 96% of the human body is composed of 4 elements: carbon, hydrogen, oxygen and nitrogen. Calcium, phosphorus, potassium and sulfur make up 3% of the human body. There is a small amount of sodium, chlorine, iodine, iron, magnesium. Copper, manganese, cobalt, zinc and other microelements are less than them.

The vital properties of the cell depend on the protein content. Metabolism, the formation of new cellular substances is the basis of the vital process in the cell. These are: assimilation or transformation of substances in the intermediate environment into the cytoplasm (natural synthesis), dissimilation - breakdown of substances in the cytoplasm to generate energy for cellular needs; growth - an increase in the mass of the cytoplasm as a result of the enlargement of certain parts of the cell and the emergence of new ones: differentiation - the complexity of the cell structure with the formation of new functional characteristics, movement, the movement of the cell in the environment; heredity consists of complex processes such as preservation of biological characteristics and their transmission from generation to generation.

At the same time, we will also give a little information about the texture. Usually, the development of tissues is determined by their function in the body. Although the tissues in different animals are distinguished by some characteristics, in many creatures it is possible to distinguish certain types of tissues. Therefore, tissue evolution is a specific aspect of the evolution of the whole organism. The tissue consists of a complex of cells and non-cellular structures that have a general structure and are specialized to perform a certain function. As a result of historical development, 4 types of tissue have been created.

1. Epithelial tissue.
2. Tissue of the internal environment (support-trophic and protective tissue, connective tissue).
3. Muscle (muscle, tissue).
4. Nerve tissue.

Epithelial and connective tissue are the most ancient of them. In the last stages of its development, along with the complexity of the animal's structure, muscle and nerve tissues are improved. If the muscle tissue is involved in the movement function, the nervous tissue connects all the tissues. The process of tissue formation is called histogenesis.

The science of histology is closely related to human and animal anatomy, physiology, pathological anatomy, pathological physiology, biochemistry, embryology and several clinical sciences. The main departments of histology

(Fig. 1):

- the science of cells - cytology;
- tissue science - general histology;
- the science of the microscopic structure of organs - special histology.



Figure 1

Modern science of histology is divided into several branches depending on the goals and methods of examination: cell, tissue and organs and some structures in them, the doctrine of the function of cell organoids (mitochondria, endoplasmic reticulum) - histophysiology, biochemical analysis that occurs at various stages of cell and tissue development and life activity. These include cytochemistry and histochemistry, which study processes, and electron microscopy, the study of the subtlest structure of cells and tissues. In addition, there is imaging histology, which studies the microscopic structure of normal tissue and organs, experimental histology, which examines the morphological changes that occur in animal tissues during an experiment, and pathohistology, which studies the morphological changes of tissues and organs in a pathological state.

The formation of the science of histology is connected with the improvement of the microscope. The first simple microscope was discovered by the Dutch scientist Gene Jansen and his son Zaharias in 1591. In the 17th and 18th centuries, information on histology was partly included in anatomy and partly in physiology. Histology emerged as an independent science only in the 19th century. In the 30s of the 19th century, the German biologist T. Schwann based the theory (cell theory) that animals and plants are made of cells and develop from cells, using the achievements in histological science and the achromatic microscope he made. After that, Histology began to develop rapidly. The research scope of histology has been enriched due to the introduction of methods of extracting tissues outside the body and performing surgical operations on certain tissues. The use of cytophotometry, radioautography, ultraviolet microscopy, interference microscopy, differential centrifugation, electron microscopic histochemistry and other modern methods made it possible to study not only the location of the examined compounds, but also their quantity during the normal life of the organism and the development of pathological processes.

The science of histology is one of the sciences of high theoretical and practical importance. It is clear to all of us that in recent times, the method of studying the fine structure of tissues and cells using an electron microscope has been widely developed.

Scientists of the Tashkent State Medical Institute, academician of the Academy of Sciences of Uzbekistan KL. Zufarov, professors V.M. Gontmacher, A.Y. Yoldoshev and other scientists conducted effective scientific research and made an important scientific discovery in 1987. They proved for the first time in the world that exogenous protein substances absorbed through the intestine in infants are broken down and reabsorbed in the kidney, and made a significant contribution to the development of the sciences of pediatrics, dietology, nephrology.

Histology is developing in close connection with current problems of medicine, animal husbandry and veterinary medicine.

If you are interested in histology - what it is, an expert will tell you. He will tell you what this invasive lab test shows. Thus, by decoding the analysis by histology, you can determine the following:

- inflammatory process;
- disruption of systemic blood circulation;
- facts of internal bleeding, presence of thrombosis;
- presence of cancer cells;
- presence of malignant neoplasms and their parameters;
- metastases of neighboring organs.

The analysis can be carried out in a hospital equipped with modern equipment, such as laboratory research, biopsy. In modern medicine, this is a reliable diagnostic method that detects pathology even at the cellular level. In histological analysis, biological materials, which are particles of the epithelial layer of internal organs and systems, are studied. This is done at the same time as a biopsy, which involves taking a few live cells for further testing.

The science of histology is also important in gynecology. This procedure, which is often performed in modern gynecology, is a reliable way to identify the wide range of pathologies of the uterus and its appendages, and timely identifies inflammatory and infectious processes of the cervix. Women who have had problems with missed pregnancies or early miscarriages know very well what histology is in gynecology. This laboratory examination helps to determine the cause of the pathology of the reproductive system. Uterine histology This morphological analysis determines the structure of cells, therefore, their mutation is immediately detected against the background of oncological diseases. In order for histology of the endometrium to help determine the final diagnosis, the doctor requires preparatory measures. A complex approach to the problem increases the information content of laboratory studies, helps to start intensive therapy with drugs as soon as possible.

Stomach histology If the doctor suspects malignant tumors of the gastrointestinal tract, the patient should undergo, for example, a stomach histology. The resulting transcript gives an idea not only of the presence of an oncological disease, but also of the neoplasm itself. Stomach histology determines the size of the pathology focus, cellular composition, presence of metastases. This is an informative study, so doctors accept a positive answer as a definitive diagnosis of cancer. For clarification, in addition to histology, hysteroscopy may be required. Learn more about how the surgery works.

What is histology in oncology? Before ordering such a laboratory study at a specific price, it is necessary to understand whether it is necessary in a specific clinical picture. If these are suspected malignancies, the answer is definitely yes. Cytology and histology are the basis for a comprehensive diagnosis, because such studies identify cancer cells at the initial stage of their formation. Decoding helps to quickly start treatment to ensure a stable therapeutic effect.

Histological examination (the term "histology" comes from the Greek words meaning "tissue study") is carried out by macro (micro) copying of tissue materials obtained from organs and pathological structures by various methods. In medicine, especially in theoretical sciences, the name "pathomorphological studies" is also used. Histological examination of materials is necessary to make a correct diagnosis. "Histology" is of particular importance in the diagnosis of human oncological diseases, in the dynamic monitoring of the course of treatment and in the correct evaluation of the results.

A doctor who diagnoses and treats diseases prescribes a histological examination to the patient: to confirm a tentative or uncertain diagnosis; determination of the stages of the pathological process; dynamic monitoring of the course of the disease; differential (differential) diagnosis of various diseases; determination of tumor level; determining the scope of surgical treatment; control of tissue changes under the influence of radiation and cytostatic treatment.

Histological examination: interpretation of results Tissue analysis is performed by a pathologist or pathologist. Macroscopic diagnostics evaluates the following:

- the size of the test material; color, density and consistency;
- pathological changes (softening, replacement and growth of other tissues, etc.).

After analyzing the prepared tissue section, microscopy allows for a detailed pathological analysis with the detection of atypical tissue growth and other changes. Based on the obtained results, the pathologist examines the data of clinical studies in the anamnesis and makes a conclusion. In specific cases, a final diagnosis is made. If the data is insufficient, only a description of the detected changes can be made, which will help the attending physician to make a differential diagnosis with other pathologies.

Contact with a pathologist with no pathological changes can lead to a misdiagnosis. Therefore, it is very important to collect the tissue to be examined correctly. In controversial and unclear cases, a joint medical consultation is appointed. Histological diagnosis is determined according to the classifications accepted and approved by the Ministry of Health or WHO.

The purpose of histological examination. Pathological examination performs the following tasks: Diagnosis and confirmation of presumptive diagnosis. The degree of development of the pathological process, its stage. Spread of the oncological process to determine the extent of surgery. Differential diagnosis with other similar processes. When a hysteroscopy is performed, the biological material is pieces of the mucous membrane of the cervix and uterine cavity, as well as a polyp from which the tissue is removed for research, if it is detected during a diagnostic hysteroscopy, etc.

Cytology is a branch of medical science that studies the structure, nucleus, function, and other organelles of a single cell. Tissue sampling is the same. Usually, the doctor examines and examines the structure of the tissue.

A biopsy is a procedure in which a doctor takes a piece of suspicious tissue for histology and cytology. Several options can be used for this. If the neoplasm is in an accessible place, then the piece can be cut out with a scalpel. Otherwise, an incision or surgery is possible.

All of the above-mentioned histological diseases are examined in separate devices and techniques, but all of them are technologies that examine cells and tissues. All of the devices that test our normal blood tests that we have come across are histological examination technologies.

Currently, the science of histology in Uzbekistan is armed with histochemistry, radioautography, ultraviolet, luminescence and electron microscopy, quantitative cytochemistry, immunomorphology and other modern examination methods. It should be said that the creation of electron microscopy made a global turn in the research of world histologists. The electron microscope was created in 1928-1931. The creation of the ultramicrotome, the further development of the methods of fixation, casting, and staining made it possible for the electron microscope to be widely used in biological research. With its use in histological examinations, it was found that the cell is composed of a system of membranes, and that there are delicate structures such as ribosomes inside the cell. The use of modern, new examination methods such as electron microscopy, electron microscopic radioautography and cytochemistry in morphology has created a new direction in histology - functional morphology of cells.

There is a lot of evidence in the literature that indicates an increase in the amount of glycogen in various pathological conditions. Muller observed accumulation of small and large granules of glycogen in the epithelium of excretory ducts of the tongue and submandibular glands when the secretory nerve was cut. The author notes that glycogen matures in the form of small grains in the basal part of secretory and tubular cells. The fine structure of glycogen has been fully studied only in recent years - as a result of the improvement of electron microscopic examination methods.

Electron microscopic observations showed that glycogen is a small electron-dense granule in the cytoplasm of the cell, and it can be found not only in the cytoplasm of the cell, but also in the nucleus (intenuclear glycogen). Aggregation and fragmentation of glycogen granules may occur in the agranular endoplasmic reticulum and possibly the Golgi apparatus. Vitamin C, which is necessary for the normal life of cells and intercellular structures of connective tissue, appears in the adrenal glands, the nerve cells of the fetus and other organs only when it is processed in a special way.

Examinations conducted in recent years under the electron microscope have shown the great importance of the cell plasma membrane in the process of pinocytosis. The liquid droplet is surrounded by a part of the cell membrane and moves to the cytoplasm, where it is separated from the cell envelope. Thus, the wall of the pinocytotic vesicle is composed of a plasma membrane.

Pinocytosis mechanism includes the following phases:

- 1) formation of invagination of the outer cytoplasmic membrane;

2) ingestion of a drop of liquid into these intussusceptions;
3) movement of vesicles into the cytoplasm and formation of cytoplasmic vacuoles. A process close to pinocytosis is ropheocytosis, in which submicroscopic particles and macromolecules are ingested. Ropheocytosis, unlike pinocytosis, can only be seen under an electron microscope.

Summary.

In conclusion, it can be noted that the science of histology is not one of the sciences with a very easy and narrow concept, it is one of the sciences that is studied on a very large scale and has a large database. In the current age of technology, the development of this science is increasing on a wider scale, because the innovations introduced in all sciences have entered this direction, for example, even a few years ago, it was impossible to determine the sex of a child in the mother's womb, and to determine any disease in it. However, in the present era, nothing is impossible. When they discovered a cell in the child's womb that could not develop even recently, they performed an operation while the child was still in the womb. We look forward to the emergence of new techniques in histology.

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