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DEPARTMENT OF NORMAL AND PATHOLOGICAL CLINICAL ANATOMY

Discipline Pathomorphology

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LECTURE 1

INTRODUCTION TO PATOMORPHOLOGY. SUBJECT AND TASKS OF PATOMORPHOLOGY. MAIN STAGES OF PATOMORPHOLOGY

DEVELOPMENT. METHODS OF PATHOLOGATOMATIC DIAGNOSIS. CELLULAR DYSTROPHIES: HYALINO-DROP, HYDROPIC, HORNIC, FAT. PATHOMORPHOLOGY OF ACCUMULATION OF COMPLEX PROTEINS (HYALINOSIS) AND LIPIDS. PATOMORPHOLOGY OF CUMULATION OF PRODUCTS OF DISTURBED METABOLISM. DISORDERS OF IRON METABOLISM AND METABOLISM OF HEMOGLOBINOGENIC PIGMENTS. PATHOMORPHOLOGICAL MANIFESTATIONS OF DISTURBANCE OF MELANINE FORMATION, NUCLEOPROTEIDE AND COPPER EXCHANGE. LIME (CALCINOSIS) OF TISSUES. FORMATION OF STONES

Odessa National Medical University in 2020 celebrates 120 years since its founding. This date was a turning point for the Department of Pathological Anatomy. The department, as an independent unit of the university, ceased to exist in 2019 and became part of the department of normal and pathological clinical anatomy. The staff of the Department of Pathological Anatomy worked with full efficiency, contributed to the development of pedagogical work, fully provided the educational process with macro-, micro-drugs, which were manufactured in the laboratory of the department.

Thanks to the hard work of the staff of the department, according to the results of the license exam "STEP 1", students of all faculties showed good knowledge of the subject. Scientific achievements were highly valued by colleagues. The last research work ended with the defense of 1 doctoral and 1 candidate dissertation. During the last decade and a half of its existence, 2 doctoral and 9 candidate dissertations were defended at the department.

The staff of the department has created a modern methodological support of the educational process, multimedia presentations and video lectures are used to teach the subject.

Employees of the department in the educational process actively use macro- and micropreparations, including with modern diagnostic methods (immunohistochemical reactions). In addition, the educational process involved new data obtained in the research of the department and colleagues from other universities, it has become a good

tradition and an example of close cooperation for the benefit and prosperity of pathological anatomy in Ukraine. Participation in conferences and congresses of the Association of Pathologists of Ukraine was considered an honor for the staff of the department.

All members of the teaching staff cooperated with health care institutions, engaged in consulting work. The Odessa Regional Scientific Society of Pathologists did not interrupt its work, the meetings of which concerned issues of scientific, practical, methodological support of the needs of modern medicine.

There is an urgent need to pay tribute to the heads of the Department of Pathological Anatomy and say a few words about each of them with gratitude for their work.

The founder of the Department of Pathological Anatomy was Professor DP Kishensky, for some time he held the position of Rector of Odessa University. Mechnikov, and until 1919 he headed the Department of Pathological Anatomy. The scientific range of interests was aimed at studying the characteristics of the infectious course of peritoneal tuberculosis. Scientific research of infectious pathology was continued by his successor, Professor Tiesenhausen MM who studied the features of the plague, typhus, influenza, epidemic jaundice. Mikhail Mikhailovich devoted a lot of time in his research to the study of malignant tumors. The pathological museum stores micropreparations that were made during the reign of Mikhail Mikhailovich. Professor Tiesenhausen MM headed the scientific community of endocrinologists and pathologists of Odessa and the region ..

Much attention was paid to the educational process with the use of macro- and micro-drugs. The museum still stores drugs that managed to survive the occupation of Odessa during the war, for the storage of drugs used bricks that were heated and placed in cabinets with macrodrugs to keep the jars from bursting. The museum's collection is still being replenished.

In the postwar period, the Department of Pathological Anatomy was headed by Professor DM Khayutin. who continued to deal with oncomorphology.

Associate Professor Valchuk M.Y. took the position of head of the department for a short period with a subsequent trip to the city of Ternopil to the Medical Institute where he became the founder and first head of the department of pathological anatomy.

From 1956 to 1973, the department was headed by Professor Eugene Uspensky, who defended his dissertation for the degree of doctor of medical sciences on the topic: "On metastases of cancer of the nervous system." Thus, more than one generation of professors has been involved in oncomorphology.

The successor of the department's traditions was Kovryzhko Neonila Martynivna, whose scientific interests concerned the pathomorphology of the kidneys and endocrine organs. Representative of the school of Kyiv pathologists Professor Kovryzhko NM differed in strictness to himself and to others. Discipline and responsibility were valued above all else. Professor Kovrizhko NM worked part-time as a pathologist at an infectious disease hospital.

The next head was Professor AI Danylenko, who held this position for 22 years, and the staff of the department worked on the morphology of obstetric and gynecological diseases. Professor Danilenko AI also held administrative positions: Vice-Rector for Science, Dean of the Faculty of Medicine.

The next head of the department was a student of Professor Danylenko AI Professor Sytnikova Varvara Alexandrovna, who continued the direction of obstetric and gynecological morphology. Professor VO Sitnikova worked. in the position for the last 13 years until the creation of the Department of Normal and Pathological Clinical Anatomy.

To the 120th anniversary of ONMedU, a booklet about the museums of the morphological building was published, where information about the pathological anatomical museum occupies an important place.

Undoubtedly, the Department of Pathological Anatomy of ONMedU was the beauty of its alma mater and each member of the team deserves respect for their conscientious work. Unquenchable memory of all our predecessors and honor to the successors of their cause.

Pathomorphology - morphology of the diseased organism. The word "pathological" comes from the Greek word "pathos", which means "suffering". From the same word comes "pathology" - the name of the section of medical and biological knowledge, which includes the full range of issues related to the patient's body. This includes the clinic of the disease, ie its symptoms and manifestations, disorders of physiological functions, structural changes in organs and tissues, as well as treatment and precautions.

A distinctive feature of pathological anatomy is the clinical and anatomical direction, the study of the structural features of the disease is closely related to its clinical manifestations.

The study of the structural features of the disease is carried out at different levels: 1) organismic, 2) systemic, 3) organ, 4) tissue, 5) cellular, 6) subcellular, 7) molecular.

Pathomorphology establishes the morphogenesis of the disease and determines the phases when with the help of therapeutic measures it is possible to stop the disease and achieve complete or partial recovery. Pathomorphology examines various deviations from the usual course of the disease, which occur during its development, certain complications, as well as studies in detail the outcome of the disease and its possible consequences for the human body.

Changing the clinical and morphological picture of the disease under the influence of drugs or changes in people's lives is called pathomorphosis.

The concept of "pathomorphosis" has a broad and narrow interpretation. In a broad sense, pathomorphosis reflects changes in the structure of morbidity and mortality, ie changes in the overall panorama of diseases. They are associated with mass preventive and curative measures, changes in the human environment and living conditions of the population of developed countries, industrialization of production, the growth of occupational hazards, etc. Thus, pathomorphosis as a concept that reflects changes in the structure of morbidity and mortality, is determined primarily by the development of human society and the conquest of the civilized world.

In the narrow sense, pathomorphosis is a stable and significant clinical and morphological changes of a certain disease, nosology. It is in this sense that the concept of pathomorphosis was introduced into medicine and is most often used.

Pathomorphosis, as a change in a particular disease, is divided into natural, or spontaneous, associated with changes in living conditions and human constitution, and induced or therapeutic, resulting from the use of drugs. It is often extremely difficult to draw the line between drug and induced pathomorphosis.

Pathomorphology receives material on structural disorders in diseases by dissecting corpses, studying surgical material, biopsy and experiment.

DYSTROPHY

Dystrophy is a complex pathological process based on a violation of cellular metabolism, which leads to structural disorders.

Morphogenetic mechanisms of dystrophy: infiltration - excessive penetration of substances from the blood and lymph into cells or intercellular substance; decomposition - the decay of ultrastructures of cells and intercellular substance; transformation - the formation of products of one type of exchange from the total initial products; distorted synthesis - the synthesis in cells or tissues of substances that do not occur in the norm.

1. Classification of dystrophies

2. Depending on the predominance of morphological changes in specialized cells or stroma and vessels: a) parenchymal, b) stromal-vascular, c) mixed.

3. Depending on the type of metabolic disorder: a) protein (dysproteinosis), b) fat (lipidosis), c) carbohydrates, d) mineral.

4. Depending on the prevalence of the process: a) local, b) general.

5. Depending on the origin: a) acquired, b) hereditary.

6. Parenchymal dystrophies

7. At parenchymatous dystrophies there are disturbances of an exchange of highly specialized in the function of cells of parenchymatous bodies - heart, kidneys, liver.

8. Acquired or hereditary enzymopathy is the basis of the development of parenchymal dystrophies.

9. Hereditary enzymopathies are associated with a large group of diseases of accumulation, or thesaurysmoses. Parenchymal dysproteinosis

10. Hyaline-drip dystrophy is characterized by the fusion of small protein grains into large hyaline-like masses that fill the cell body. This dystrophy most often occurs in the kidneys, less often - in the liver and myocardium. Macroscopically, changes in the organs are not detected. The development of hyaline-drip dystrophy is associated with infectious and non-infectious diseases.

11. The outcome is unfavorable. The process is irreversible and causes cell necrosis.

12. The functional significance is very large - there is a sharp decrease in organ function.

13. Hydropic (vacuolar) dystrophy is characterized by the appearance in the cell of vacuoles filled with cytoplasmic fluid. The nucleus shifts to the periphery, sometimes vacuolating or shrinking.

Occurs in epithelial cells (skin, liver, kidneys), heart muscle, nerve cells.

The appearance of organs and tissues in hydropic dystrophy does not change. Microscopically, the increase in cell volume is determined, the cytoplasm is filled with vacuoles.

Causes: infectious and infectious-toxic effects, hypoproteinemia and water-electrolyte imbalance.

The outcome is unfavorable because it often turns into balloon dystrophy, which ends with colic necrosis of cells.

Horny dystrophy(pathological keratinization) is characterized by excessive formation of horny substance in the keratinized epithelium or the formation of horny substance where it does not normally occur (leukoplakia). The process can be local or general.

Causes: skin disorders, chronic inflammation, viral infections, beriberi.

The yield is determined by the degree of dystrophy, prevalence and duration of the process.

Examples of hereditary dystrophy associated with hereditary disorders of amino acid metabolism are cystinosis, tyrosinosis, phenylketonuria.

Parenchymal lipidosis.

Impaired metabolism of cytoplasmic lipids is observed in cells of the liver, myocardium, kidneys, vascular endothelium and reticular cells.

Mechanisms of fatty dystrophy development: fatty decomposition, fatty infiltration, fat transformation.

During fat decomposition, lipoprotein complexes are destroyed, the released fat in the form of dusty particles accumulates in the cytoplasm of cells (dusty obesity of heart muscle fibers). At fatty infiltration fat most often arrives to cells in excessive quantity and accumulates in the form of small, andsubsequently large drops (liver, kidneys). During fat transformation, fat is formed from carbohydrates and proteins of the cell, and accumulates in the cytoplasm in the form of drops (liver).

Appearance of organs - a slight increase in size, yellow or yellow-brown color, flabby texture.

The causes of fatty degeneration are various: oxygen starvation (heart disease, lung, anemia, alcoholism), intoxication (acute and chronic infectious diseases, poisoning by chloroform, phosphorus, arsenic, carbon tetrachloride), beriberi, protein starvation.

The functional significance of fatty degeneration is very large. The activity of the organs decreases sharply, and in some cases falls out.

The yield of fatty degeneration depends on its degree. It can be reversible or end in necrosis.

Systemic hereditary lipids include Gaucher disease (cerebrolipid lipidosis), Neiman's disease–Peak (sphingomyelin lipidosis) and others.

Parenchymal carbohydrate dystrophies.

Observed in disorders of neuro-endocrine regulation of carbohydrate metabolism (diabetes, glycogenosis).

In diabetes, liver and skeletal muscle cells lose glycogen, and the renal tubular epithelium accumulates glycogen by resorption and infiltration. At glycogenosis deposition of glycogen in cells of a liver, heart, kidneys, skeletal muscles is observed.

Hereditary glycogenosis includes diseases of Bitter, Pompe, Mack−Ardle, Hers and others.

Stromal-vascular (mesenchymal) dystrophies

Mesenchymal dystrophies develop as a result of metabolic disorders in the connective tissue, which are verified in the stroma of organs and vascular walls. Depending on the type of metabolic disorder, they are divided into protein, fat and carbohydrates.

Mesenchymal dysproteinosis includes mucoid edema, fibrinoid edema, hyalinosis, amyloidosis.

Very often mucoid, fibrinoid swelling and hyalinosis are successive stages of connective tissue disorganization, which is based on the accumulation of blood plasma products in the main substance as a result of increased vascular permeability (plasmorrhagia), destruction of connective tissue elements and the formation of protein proteins. . Amyloidosis differs from these processes in that the composition of the protein-polysaccharide complexes formed includes fibrillar protein, which does not occur normally, which is synthesized by cells - amyloidoblasts.

Mesenchymal dysproteinosis

*Mucoid edema.*The basis of myxomatous edema is the accumulation and redistribution in the interstitial tissue of hydrophilic glycosaminoglycans, which is associated with its further penetration by proteins and glycoproteins of blood plasma. There is swelling of the main substance and collagen fibers of the connective tissue, which determines the essence of the process. Mucoid edema is well studied in collagen diseases. There are no macroscopic changes in the organs.

At ultrastructural research in sites of mucoid hypostasis of connecting fabric of heart, at rheumatism, expansion of space between collagen fibers constantly finds. In the main substance is a granular precipitate, resembling the precipitate of blood plasma.

In fibers the defibering of collagen fibrils is observed. The prevalence of defibering of collagen microfibrils is correlated with the severity of metachromasia of mucoid edema.

The way out may be complete recovery or transition to fibrinoid edema.

Fibrinoid edema -is a manifestation of deep disorganization of connective tissue. This process is based on damage to collagen fibers and their acquisition of fibrin properties. This is how the concept of fibrinoid appeared– a substance that occurs in fibrinoid edema of connective tissue and differs in tinctorial properties.

Histochemically in different diseases fibrinoid is different.

Thus, in rheumatic diseases, the formation of fibrinoid is associated mainly with immunocomplex damage to connective tissue with subsequent adsorption of fibrin. It is a fibrinoid of immune complexes, "fibrinoid destruction". Fibrinoid of immune complexes also occurs in allergic inflammation - the phenomenon of Arthus, which is a manifestation of an immediate hypersensitivity reaction.

In vascular diseases of angioneurotic (hypertensive disease) and plasmorrhagic (atherosclerosis) genesis, as well as in coagulopathies (Sanarelli-Schwartzman phenomenon), the leading role in the construction of fibrinoid belongs to the insudation of plasma proteins, in particular fibrinogen. Due to this, in renal hypertension and atherosclerosis, fibrinoid is identical to fibrin.

As a result of fibrinoid changes necrosis with replacement of the center of destruction by connective tissue (sclerosis) or hyalinosis develops.

Hyalinosis -is a type of mesenchymal protein dystrophy, which is characterized by the formation in the tissue of homogeneous translucent dense masses resembling hyaline cartilage. Hyalinosis combines different processes by origin, mechanism of development and biological essence. Leading in its development is the destruction of fibrous structures and increased vascular permeability (plasmorrhagia), due to dyscirculatory, metabolic and immunopathological processes. Plasmorrhagia is associated with the impregnation of tissue by plasma proteins and their adsorption on altered fibrous structures with subsequent precipitation and protein formation–hyaline. Hyalinosis can be general or local in nature and occur in both physiological and pathological conditions. There are hyalinosis of blood vessels and hyalinosis of the

connective tissue itself, although the pathogenetic mechanisms of these types of hyalinosis are common.

Vascular hyalinosis. Hyalinosis is mainly small arteries or arterioles. It is preceded by damage to the endothelium, argyrophilic membranes and smooth muscle fibers of the wall and its impregnation with blood plasma, the components of which, especially proteins, are exposed to enzymes, coagulate and condense, turning into a dense hyaline-like substance common in heart disease. tissue, autoimmune diseases and diabetes. Dropping out in the subendothelial space, hyaline masses are pushed out and destroy the elastic plate, causing thinning of the middle shell, as a result of which arterioles turn into thickened dense tubes with a sharply narrowed or completely closed lumen.

The severity of hyalinosis in these diseases is directly dependent on their duration. Hyalinosis of small arteries and arterioles causes atrophy, deformation and shrinkage of the organ (atherosclerotic nephrocirrosis).

Types of vascular hyaline. Destruction of vascular wall elements and plasma impregnation can be expressed differently depending on the features of the pathogenesis of hyalinosis, which are determined by dyscirculatory, metabolic and immunopathological disorders. There are: 1) simple hyaline (hypertension, atherosclerosis), 2) lipohyalin (in diabetes), 3) complex hyaline includes immune complexes, fibrin, destroyed structures (rheumatic diseases).

*Hyalinosis of the actual connective tissue*develops as a result of various processes - fibrinoid edema, necrosis, sclerosis.

The output of fibrinoid edema, which causes the destruction of collagen, impregnation of tissue with plasma proteins and glycoproteins, connective tissue bundles swell, lose fibrillarity and merge into a homogeneous dense cartilaginous mass. The basis for the construction of hyaline in such cases is fibrinoid. Hyalinosis can complete fibrinoid changes in the days of chronic gastric ulcer, in the tissue of the appendix in appendicitis, in the center of chronic inflammation.

With hyalinosis, the connective tissue itself becomes dense, whitish, translucent (change of heart valves in rheumatism).

In most cases, hyalinosis is an irreversible process, but resorption of hyaline masses in scars (keloids) is possible. Calcium salts often fall out in hyalinized tissue, which is associated with subsequent changes in both the tissue itself and the soluble parts of the plasma. Sometimes hyalinized tissue slips or undergoes lipoidosis.

Stromal-vascular lipidosis

Stromal-vascular lipidosis includes disorders of fat metabolism of fat and fat depots, and disorders of fat metabolism (cholesterol and its esters) in the walls of large arteries in atherosclerosis.

The increase in fat in fat is called obesity. Depending on the mechanism of development, the following types of obesity are distinguished: alimentary, cerebral (with trauma, brain tumor), endocrine (with Frelich and Itsenko-Cushing syndrome, adipose-genital dystrophy, hypothyroidism, etc.), hereditary.

According to the external manifestations, there are symmetrical type of obesity (uniform distribution of fat), upper type (face, nape, neck, upper shoulder girdle), middle (on the abdomen in the form of an apron) and lower (thighs and legs).

Depending on the percentage of excess body weight, there are several degrees of obesity: I degree - 20-29%, II degree - 30-49%, III - 50-59%, IV - more than 100%.

Depending on the number of adipozocytes and their size, there may be a hypertrophic variant of general obesity (the number of adipozocytes is not changed, adipozocytes are increased and contain several times more triglycerides, the course is malignant) and hyperplastic variant of obesity (

Mesenchymal carbohydrate dystrophies.

Mesenchymal carbohydrate dystrophies may be associated with imbalance of glycoproteins and glycosaminoglycans. Mesenchymal dystrophy associated with impaired glycoprotein metabolism is called mesenchymal mucosal dystrophy. Its essence is that chromotropic substances are released from bonds with proteins and accumulate mainly in the intermediate substance. In contrast to mucoid edema, collagen fibers are replaced by a mucous mass. Actually connective tissue, stroma of organs, adipose tissue, cartilage become swollen, translucent, mucous (tissue mucosa), and their cells have a star-shaped appearance.

The cause of tissue mucosa is often endocrine dysfunction, depletion (eg, mucosal edema, or myxedema, thyroid insufficiency; mucosal connective tissue formation in cachexia of any origin).

The process may be reversed, but its progression leads to colic and tissue necrosis with the formation of cavities filled with mucus.

The functional significance of tissue mucosa is determined by the severity of the process, its duration and the nature of the tissue that has undergone dystrophy.

Hereditary disorders of glycosaminoglycan metabolism (mucopolysaccharides) are represented by a large group of accumulation diseases - mucopolysaccharidosis. Among them the main clinical significance are gargoyle, or Pfaundler-Gurler disease, which is characterized by disproportionate growth, deformation of the skull ("massive skull"), other skeletal bones, heart defects, inguinal and umbilical hernias, corneal opacity, hepato- and splenomegaly. It is believed that the basis of mucopolysaccharidosis is the lack of a specific factor that determines the metabolism of glycosaminoglycans.

Mixed dystrophies. Mixed dystrophy is characterized by impaired metabolism in the parenchyma, stroma, vascular walls of organs and tissues. Mixed dystrophies occur in disorders of complex protein metabolism– chromoproteins, nucleoproteins, lipoproteins, minerals.

Disorders of chromoprotein metabolism. Endogenous pigments - chromoproteins - are divided into hemoglobinogenic, proteinogenic or tyrosinogenic and lipidogenic.

Hemoglobinogenic pigments: ferritin, hemosiderin, bile pigments, hematoidin, hematins, porphyrin.

Ferritin- iron protein containing up to 23% iron. Depending on the origin, there are anabolic and catabolic ferritin. Anabolic ferritin is formed from iron absorbed in the intestine, catabolic–from iron of hemolyzed erythrocytes. Normally, ferrin is found in the liver, spleen, bone marrow and lymph nodes, participating in the synthesis of hemoglobin, hemosiderin and cytochromes. In conditions of pathology, the amount of ferritin may increase. Ferritinemia explains the irreversibility of shock, accompanied by

vascular collapse, because the active form– SH-ferritin, which has vasoparalytic and hypotensive properties, acts as an adrenaline antagonist.

Hemosiderin consists of protein - globin and prosthetic pigment - heme, formed intracellularly in the form of brown grains. Contains iron and is determined by the Pearls reaction (under the action of iron-blue potassium and hydrochloric acid, a blue color is formed - "Berlin blue"), black from ammonium sulfate. In conditions of pathology, excessive accumulation of hemosiderin is observed–hemosiderosis. General hemosiderosis develops with intravascular destruction of erythrocytes and occurs in diseases of the hematopoietic system, intoxication with hemolytic poisons, some infectious diseases, transfusions of foreign blood, etc. The spleen, liver, bone marrow and lymph nodes become rusty brown.

Hemochromatosis, which can be primary (impaired absorption of iron in the small intestine) and secondary, is close to general hemosiderosis. The disease is associated with iron overload. In the form of ferritin and hemosiderin, it is deposited mainly in the parenchymal elements of various organs, as a result of which they acquire a brown color. The result is multiple sclerosis and atrophy of the internal organs.

In the stage of detailed changes determine pigmentary cirrhosis of the liver, in the pancreas - diffuse sclerosis with hemosiderosis and atrophy of the islets (bronze diabetes), hyperpigmentation of the skin.

Data on the prevalence of hemochromatosis force caution in the enrichment of food with iron, which is widely practiced, the consequences of which, in relation to risk groups for the development of micronutrient overload, have not been studied.

The classification of trace elements associated with iron metabolism disorders is reflected in the register of Online Mendelian Inheritance in Man (OMIM).

Bile pigments - bilirubin, biliverdin, urobilin.

Bilirubin formed in the reticular cells of the spleen, liver and bone marrow. From these cells, bilirubin enters the hepatocytes, where bile is synthesized.

The increase in the content of bile pigments in the blood and the staining of tissues in yellow (jaundice) is observed in various pathological conditions.

Suprahepatic (hemolytic) jaundice occurs during hemolysis of erythrocytes. Occurs in blood diseases (anemia, leukemia), some infectious diseases (malaria, sepsis, typhoid fever) and intoxications.

Hepatic (parenchymal) jaundice occurs in infections and intoxications (viral hepatitis, sepsis, acute toxic liver disease, phosphorus poisoning, arsenic, fungi). Liver cells lose the ability to synthesize bilirubin and excrete it into the bile ducts.

Subhepatic (mechanical) jaundice develops with difficulty in the outflow of bile from the liver. Occurs in gallstone disease, bile duct cancer, and others. Bile stagnation leads to dilation of the bile ducts and rupture of the bile capillaries. Bile enters the bloodstream, causing jaundice and general intoxication of the body.

Hematoidin - crystalline pigment of bright orange color, which does not contain iron and is formed outside the cells in the foci of hemorrhage and heart attacks under anaerobic conditions.

Hematini -it is an oxidized form of heme and is formed by hemolysis of oxyhemoglobin. They have the form of dark brown or black diamond-shaped crystals or grains, give double refraction in polarized light (anisotropic), contain iron in a bound state, are soluble in alkalis, sparingly soluble in acids, discolored with hydrogen peroxide.

Hematins found in tissues include: malarial pigment (hemomelanin), hematin hydrochloric acid (hemin) and formalin pigment. Histochemical properties of these pigments are identical.

Hemomelanin - malarial pigment. Formed in the body of Plasmodium falciparum, which parasitizes in erythrocytes. It has the appearance of black and brown grains. When erythrocytes are destroyed, they enter the bloodstream and undergo phagocytosis by cells of the reticuloendothelial system. The spleen, liver, lymph nodes, bone marrow, brain become gray-aspid color.

*Hematin hydrochloric acid (hemin)*formed in erosions and gastric ulcers under the action of hemoglobin enzymes of gastric juice and hydrochloric acid. The place of the defect of the gastric mucosa becomes brownish-black. Crystals of hydrochloric acid hematin in polarized light show the properties of anisotropy and dichroism.

Formalin pigment in the form of dark brown needles or granules found in tissues when fixing them in acidic formalin (this pigment is not formed if the formalin has a pH greater than 6.0). It is considered a derivative of hematin.

Porphyrins -precursors of the prosthetic part of hemoglobin, which have, like heme, the same tetrapyrrole ring, but devoid of iron. By chemical nature, porphyrins are close to bilirubin: they are soluble in chloroform, ether, pyridine. The method of detecting porphyrins is based on the ability of solutions of these pigments to give red or orange fluorescence in ultraviolet light (fluorescent pigments).

Normally, a small amount of porphyrins is found in blood, urine, tissues. They have the ability to increase the sensitivity of the body, especially the skin, to light and therefore play the role of melanin antagonist.

At disturbances of a metabolism of porphyrins there are porphyrias for which increase in the content of pigments in blood (porphyrinemia) and urine (porphyrinuria), sharp increase in sensitivity to an ultraviolet beam (photophobia, erythema, dermatitis) is characteristic. There are acquired and congenital porphyria.

Acquired porphyria is observed in intoxication (lead, sulfazole, barbiturates), beriberi (pellagra), pernicious anemia, some liver diseases. There is a violation of the nervous system, increased sensitivity to light, often develops jaundice, skin pigmentation, in the urine are large amounts of porphyrins.

Congenital porphyria is a rare inherited disease. In violation of the synthesis of porphyrin in erythroblasts develops erythropoietic form, and in violation of the synthesis of porphyrin in liver cells - the hepatic form of porphyria.

Metabolic disorders of proteinogenic (tyrosinogenic) pigments

Melanin - black-brown pigment contained in the cells of the epidermis, hair, iris and retina. It consists of carbon, nitrogen, gray. In melanoblasts of the basal layer of the epidermis from tyrosine under the influence of tyrosinase in the presence of vitamin C dioxyphenylalanine is formed, which in turn under the influence of tyrosinase is converted into melanin. The pigment can be captured by macrophages - melanophages

and transported deep into the tissues. Regulation of melanin metabolism is carried out by endocrine glands: adrenal glands, gonads, pituitary gland, thyroid gland. There are racial and individual differences in melanin content. Physiological increase in melanin in the skin is observed under the action of ultraviolet light. Disorders of melanin metabolism can be manifested in an increase (hyperpigmentation) and decrease (hypopigmentation) of its content. And that

Hyperpigmentation develops with cachexia, beriberi (pellagra, scurvy), Addison's disease (a sharp decrease in adrenal function in tuberculosis, amyloidosis). Local hyperpigmentation: pigment spots, melanosis of the colon, chloasma during pregnancy, some tumors (melanoma). General hypopigmentation - albinism (congenital disease). Local hypopigmentation - leukoderma, vitiligo.

Adrenochrome - the product of adrenaline oxidation - occurs in the form of granules in the cells of the adrenal medulla.

Pigment granules of enterochromaffin cells, scattered in different parts of the gastrointestinal tract, is a derivative of tryptophan. In tumors of these cells, called carcinoids, many pigment-containing granules are usually found.

Disorders of lipidogenic pigment metabolism

Lipofuscin -it is a glycoprotein in which fats prevail, and from them - phospholipids. Lipofuscin is a normal component of the cell. Under conditions of pathology, the amount of lipofuscin increases sharply (lipofuscinosis). It can be primary (congenital) and secondary, it is observed most often in the elderly, as well as in debilitating diseases that cause cachexia (brown atrophy of the myocardium, liver), with increased functional load (lipofuscinosis of the myocardium in heart disease), phagocytosis (lipocytosis) .

Lipochromes represented by lipids in which carotenoids are dissolved, which are a source of vitamin A. Lipochromes give a yellow color to fat, adrenal cortex, serum. Under conditions of pathology there is an excessive accumulation of lipochromes (diabetes). In cachexia, lipochromes condense in adipose tissue, which becomes ocher-yellow.

Ceroid –lipopigment of mesenchymal cells, mainly macrophages. The formation of ceroid is most often observed in tissue necrosis, especially if the oxidation of lipids is enhanced by hemorrhage.

Disorders of nucleoprotein metabolism

Nucleoproteins are formed from protein and nucleic acids (DNA and RNA). The end product of nucleic metabolism is uric acid and its salts. Therefore, the presence of uric acid and its salts in the tissues, which is observed in uric acid infarction and gout, indicates a violation of nucleoprotein metabolism.

*Uric acid heart attack*occurs in newborns who have lived at least two days, and is manifested by prolapse in the tubules and tubules of the kidneys of amorphous masses of sodium uric acid and ammonium. These cells in the incision of the kidney have a triangular shape, resembling a heart attack.

Gout- a disease characterized by periodic loss of sodium uric acid in the synovium and cartilage of small joints, ankles and knees, in tendons and joint bags, in the cartilage of the auricles. At the site of salt deposition, necrosis develops, surrounded by an inflammatory reaction with an accumulation of giant cells such as foreign bodies - a gouty lump is formed, which can later become covered with ulcers. Often gout is a congenital metabolic disorder (primary gout), occasionally - a complication of other diseases (secondary gout), such as nephrocirrosis, blood diseases and others.

Urolithiasis, as well as gout, can be connected first of all with disturbance of a purine metabolism and be display of uric acid diathesis. In the kidneys there is an accumulation of uric acid and sodium uric acid salts in the tubules with obstruction of their lumen, the development of secondary inflammatory and atrophic changes.

Disorders of mineral metabolism (mineral dystrophies)

More than 20 elements take part in mineral metabolism. Disorders of calcium, potassium, copper and iron metabolism are of the greatest practical importance.

*Calcium*associated with the processes of permeability of cell membranes, excitability of the neuromuscular system, blood coagulation, regulation of acid-base status, skeletal formation, etc. Calcium metabolism is carried out by neurohumoral means. Disorders of calcium metabolism in body tissues are called calcification

(calcareous dystrophy). Its morphological manifestation is the precipitation of calcium salts from the dissolved state and their accumulation in cells or intercellular substance. The prevalence of the process can be general or local.

Calcareous dystrophy can be cellular, extracellular and mixed. The process can be systemic (common) and local. There are three forms of calcification: 1) metastatic, 2) dystrophic, 3) metabolic.

Metastatic calcification (calcareous metastases) - the general process of excretion of lime from the depot and delayed excretion from the body, which causes the loss of lime in tissues and organs with an alkaline environment (artery wall, myocardium, lungs, gastric mucosa, renal tubules).

Dystrophic calcification (petrification) - has a local character, lime loss is usually found in dead tissues and tissues with profound dystrophic changes or necrosis (caseous foci of tuberculosis, gums in syphilis, heart attacks, parasites, dead fetus, scars, cartilage).

Metabolic calcification(lime gout) - a local or systemic disease in which there is an accumulation of lime in the skin, along the tendons, muscles, nerves, vascular wall. The reason is not established.

Disorders of calcium metabolism may be accompanied by a decrease in the amount of calcium in the depot (bone system), sometimes with rickets, osteomalacia, parathyroid osteodystrophy.

Rickets– chronic disease characterized by changes in phosphorus-calcium metabolism with impaired bone mineralization and bone formation with the development of bone deformities.

Copper– mandatory component of the cytoplasm, where it participates in enzymatic reactions.

Acquired copper deficiency is rare, mainly in children and adults who are on parenteral nutrition for a long time. Such patients develop anemia and leukopenia.

Congenital disorder of copper metabolism develops in Wilson's disease–Konovalova (hepatocerebral dystrophy). Autosomal recessive disease characterized by a decrease in serum ceruloplasmin (copper-binding protein). The

disease is manifested by significant deposition of copper in the cells of the liver, kidneys, brain and cornea. Different types of changes are found in the liver–chronic active hepatitis, large or small nodular cirrhosis. Angiotoxic changes (paralysis of small vessels, stasis, hemorrhage, edema, foci of necrosis, cysts) and cytotoxic changes (dystrophy and necrosis of nerve cells and astroglia; ugly nuclei, bare nuclei, chromatolysis). In the peripheral parts of the cornea appears greenish Kaiser's ring–Fleischer, represented by the accumulation of copper-containing pigment.

Stone formation

Stones (concretions) - dense formations that lie freely in the cavity organs or excretory ducts of the glands. Stones are formed due to the precipitation of salts from liquids in these cavities or ducts.

The type of stone (shape, size, color, structure) is different, depending on the location in a cavity, chemical composition, mechanism of formation. There are huge stones and microliths. The shape of the stone often repeats the cavity it fills: round or oval stones - in the bladder and gallbladder, processes - in the pelvis and calyces of the kidneys, cylindrical - in the ducts of the glands. The stones can be single or numerous. In the latter case, the stones often have faceted, ground to each other surface (faceted stones). The surface of the stones is not only smooth but also rough (oxalates, for example, resemble a mulberry berry), which injures the mucous membrane, causing its inflammation. The color of stones is determined by their chemical composition: white (phosphates), yellow (urate), dark brown or dark green (pigmented) stones. In some cases, the cut stones have a radial structure (crystalloid), in others - layered (colloidal), in the third - layered-radial (colloidal-crystalloid). The chemical composition of the stones is also different. Gallstones can be cholesterol, pigmented, calcareous or cholesterol-pigmented-calcareous (complex or combined stones). Urinary stones can consist of uric acid and its salts (urate), calcium phosphate (phosphates), calcium oxalate (oxalates), cystine and xanthine. Bronchial stones usually consist of lime inlaid with mucus. Urinary stones can consist of uric acid and its salts (urate), calcium phosphate (phosphates), calcium oxalate (oxalates), cystine and xanthine. Bronchial stones usually consist of lime inlaid with mucus. Urinary stones can consist of uric acid

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Most often, stones are formed in the bile and urinary tract and are the cause of gallstones and urolithiasis. They are also found in other cavities and ducts: in the excretory ducts of the pancreas and salivary glands, in the bronchi and bronchiectasis (bronchial stones), in the crypts of the tonsils. A special type of stone is the so-called venous stones (phleboliths), which are petrified blood clots that have separated from the wall, and intestinal stones (coprolites), which occur when the contents of the condensed intestine are inlaid.

The pathogenesis of stone formation is very complex and is determined by general and local factors. Common factors include various metabolic disorders (fat, nucleoproteins, carbohydrates, minerals). To local - secretion disorders, inflammatory processes. The presence of stones can lead to disease. Their complications are unfavorable (duct obstruction, inflammation, necrosis and perforation of the wall, the formation of adhesions and fistulas).

LECTURE 2

NECROSIS-DEFINITION, TERMS AND PHASES OF DEVELOPMENT, CONSEQUENCES. CLINICAL AND MORPHOLOGICAL FORMS OF NECROSIS. PATHOLOGICAL ANATOMY OF MULTIORGAN FAILURE. FUNDAMENTALS OF THANATOLOGY. DEATH, MECHANISMS, SIGNS. BIOLOGICAL, MEDICAL, SOCIAL ASPECTS DUE TO CHRONIC INCURABLE DISEASE. THE CONCEPT OF THANATOGENESIS. STRUCTURAL MECHANISMS OF TERMINATION OF VITAL ORGANS DURING THE NATURAL COURSE OF THE DISEASE. THE IMMEDIATE CONSEQUENCES OF THE CESSATION OF THE HEART, LUNGS, BRAIN, KIDNEYS, LIVER.

Necrosis (from the Greek. nekros - dead) - death, death of cells and tissues in a living organism under the influence of pathogenic factors. This type of cell death is not genetically controlled.

Causes of necrosis: physical (gunshot wounds, radiation, electricity, low and high temperatures - frostbite and burns); toxic (acids, alkalis, heavy metal salts, enzymes, drugs, ethyl alcohol, etc.); biological (bacteria, viruses, protozoa); allergic (endo-and exoantigens, such as fibrinoid necrosis in infectious-allergic and autoimmune diseases, Arthus phenomenon); vascular (heart attack - vascular necrosis); trophoneurotic (bedsores, unhealed ulcers).

Depending on the mechanism of action of the pathogenic factordistinguish: direct necrosis caused directly by the action of the factor(traumatic, toxic and biological necrosis); indirect necrosis, which occurs directly through the vascular and neuroendocrine systems (allergic, vascular and trophoneurotic necrosis).

Necrosis is preceded by a period of necrobiosis, the morphological substrate of which are dystrophic changes. In the initial period of necrobiosis, the cell is not morphologically altered. It should take 1-3 hours before changes appear that are detectable by electron microscopy or histochemical, and at least 6-8 hours before changes appear that can be seen under light microscopy; even later, macroscopic changes develop.

One of the important and significant morphological signs of cell necrosis is changes in the structure of the nucleus. The chromatin of a dead cell condenses into large lumps, and the nucleus decreases in volume, becomes shrunken, dense, intensely basophilic, ie stained dark blue with hematoxylin. This process is called karyopyknosis (shrinkage). The pyknotic nucleus can then rupture into numerous small basophilic particles (karyorexis) or undergo lysis (dissolution) due to lysosomal deoxyribonuclease (karyolysis). Then it increases in volume, barely stained with hematoxylin, the contours of the nucleus are gradually lost. In rapidly developing necrosis, the nucleus undergoes lysis without a pyknotic stage.

In the cytoplasm there is a coagulation of proteins, which is replaced mainly by their colic.

Changes in the intercellular substance cover both the intermediate substance and the fibrous structures. The most characteristic changes characteristic of fibrinoid necrosis: collagen, elastic and reticulin fibers are transformed into dense, homogeneous pink, sometimes basophilic masses, which can be fragmented, broken into lumps or lysis. Less commonly, there may be swelling, lysis and mucus of fibrous structures, which is characteristic of colic necrosis.

Necrosis is manifested by various clinical and morphological changes. The differences depend on the structural and functional features of organs and tissues, the rate and type of necrosis, as well as the causes and conditions of development. Among the clinical and morphological forms of necrosis there are coagulation (dry) necrosis and colic (wet) necrosis.

Coagulation (dry) necrosis. In this type of necrosis, the dead cells retain their contours for several days. Cells devoid of a nucleus look like a mass of coagulated, homogeneous, pink cytoplasm.

The mechanism of coagulation necrosis is not clear enough. Coagulation of cytoplasmic proteins makes them resistant to lysosomal enzymes and therefore slows their dissolution.

Coagulation necrosis usually occurs in organs that are rich in proteins and poor in fluids, such as kidneys, myocardium, adrenal glands, spleen, mainly due to poor circulation and anoxia, physical, chemical and other damaging factors, such as coagulation cell necrosis liver in viral damage or during exposure to toxic agents of bacterial and nonbacterial origin. Coagulation necrosis is also called dry, because it is characterized by the fact that the resulting dry dry, dense, crumbling areas, white or yellow.

*Infarct*Is a dead area of an organ or tissue that is excluded from the bloodstream as a result of an immediate cessation of blood supply (ischemia). Myocardial infarction is a type of vascular (ischemic) coagulation or colic necrosis. Causes of heart attack: acute ischemia (due to prolonged spasm, thrombosis or embolism, external arterial pressure) and functional load on the body in conditions with insufficient blood supply. Usually heart attacks are wedge-shaped. At the same time the pointed part of a wedge is

turned to gate of body, and wide - goes to periphery. Myocardial infarction can cover most or all of the organ (subtotal or total infarction) or be detected only under a microscope (microinfarction). If the heart attack develops on the type of coagulation necrosis, the tissue in the area of necrosis - is compacted, becomes dry, white-yellow color (myocardial infarction, kidney, spleen). Depending on the mechanism of development and appearance, there are: white (ischemic) heart attack (with complete cessation of arterial blood circulation in the organs); red (hemorrhagic) heart attack (when leaving the area of blood infarction from necrotized vessels of the microcirculatory tract); white heart attack with hemorrhagic corolla.

There are aseptic and septic heart attacks. Most internal heart attacks that do not come into contact with the environment are aseptic. Septic infarcts occur only when a secondary bacterial infection enters the necrotized tissues.

Heart attacks of the heart, brain, intestines, lungs, kidneys, and spleen are of the greatest clinical importance.

In the heart, the heart attack is white with a hemorrhagic corolla, has an irregular shape, is more common in the left ventricle and interventricular septum. The necrosis can be localized under the endocardium, epicardium, in the thickness of the myocardium or cover the entire thickness of the myocardium. In the area of infarction on the endocardium appear thrombotic, and on the pericardium - fibrinous layers.

Hemorrhagic infarction occurs in the lungs, the cause of which is thromboembolism, less often - thrombosis in vasculitis. The infarct area is well separated, has the shape of a cone, the base of which is turned to the pleura. Layers of fibrin appear on the pleura, and a thrombus or embolus is found in the branches of the pulmonary artery.

In the kidneys, the heart attack is white with a hemorrhagic corolla. The conical area of necrosis covers either the cortical substance or the entire thickness of the parenchyma.

In the spleen there are white infarcts with reactive fibrous inflammation of the capsule and the subsequent formation of adhesions with the diaphragm, parietal leaf of the peritoneum and others.

In the intestine, heart attacks are hemorrhagic and are always subject to septic decay, which causes perforation of the intestinal wall and the development of peritonitis.

*Caseous necrosis*develops in tuberculosis, syphilis, leprosy, as well as lymphogranulomatosis. It is also called specific, because it is most common in specific infectious granulomas. In the internal organs there is a dry, limited area of white-yellowish tissue, which crumbles easily. In syphilitic granulomas very often such areas do not crumble, but pasty, resembling glue. This is a mixed (ie extra- and intracellular) type of necrosis, in which both the parenchyma and the stroma (both cells and fibers) die. Microscopically, this area of tissue is unstructured, homogeneous, stained with hematoxylin and eosin in pink, lumps of nuclear chromatin (karyorexis) are clearly visible.

Waxy, or Tsenker's necrosis (necrosis of muscles, most often of the anterior abdominal wall and thigh, in severe infections - typhoid and typhoid fever, cholera);

Fibrinoid necrosis - type of connective tissue necrosis, which was previously considered in the lecture "Stromal vascular dystrophy" as a way outfibrinoid edema. Fibrinoid necrosis is observed in allergic autoimmune diseases (eg, rheumatism, rheumatoid arthritis and systemic lupus erythematosus). Collagen fibers and smooth muscles of the middle membrane of blood vessels are most severely damaged. Fibrinoid necrosis of arterioles is observed in malignant hypertension. This necrosis is characterized by the loss of the normal structure of collagen fibers and the accumulation of homogeneous, bright pink necrotic material, which microscopically resembles fibrin.

Fat necrosis can be enzymatic and non-enzymatic.

*Enzymatic fatty necrosis*most often occurs in acute pancreatitis and damage to the pancreas, when pancreatic enzymes leave the ducts into the surrounding tissues. Pancreatic lipase acts on triglycerides in fat cells, breaking them down into glycerol and fatty acids, which interact with plasma calcium ions to form calcium soaps. In this case, in the adipose tissue surrounded by the pancreas, there are opaque, white (like chalk) plaques and nodules (steatonecrosis).

In pancreatitis, lipase may enter the bloodstream, followed by widespread, which is the cause of fatty necrosis in many parts of the body. Subcutaneous fat and bone marrow are most often damaged.

*Non-enzymatic fatty necrosis*observed in the breast, subcutaneous adipose tissue and in the abdominal cavity. Most patients have a history of injury. Non-enzymatic fat necrosis is also called traumatic fat necrosis, even if the injury is not identified as the root cause. Non-enzymatic fat necrosis causes an inflammatory response, which is characterized by the presence of numerous macrophages andwithfoamy cytoplasm, neutrophils and lymphocytes. This is followed by fibrosis, and this process is sometimes difficult to distinguish from the tumor.

Gangrene(from the Greek. gangraina - fire): this is the necrosis of tissues that come into contact with the external environment and change under its influence. The term "gangrene" is widely used to denote a clinical and morphological condition in which tissue necrosis is often complicated by a secondary bacterial infection of varying severity or in contact with the environment, resulting in secondary changes. There are dry, wet, gas gangrene and bedsores.

Dry gangrene Is a necrosis of tissues in contact with the external environment, necrosis occurs without the participation of microorganisms. Dry gangrene most often occurs on the extremities as a resultischemic coagulation tissue necrosis. Necrotized tissues look black, dry, they are clearly separated from the adjacent working tissue. Demarcation inflammation occurs on the border with healthy tissues. The color change is due to the conversion of hemoglobinogen pigments in the presence of hydrogen sulfide into iron sulfide.

*Wet gangrene*develops as a result of joining to necrotic changes of fabric of a severe bacterial infection. Under the action of enzymes of microorganisms there is a secondary colic. Lysis of a cell by enzymes that are not formed in the cell itself, but penetrate from the outside, is called heterolysis. The type of microorganisms depends on the location of gangrene. Moisture gangrene usually develops in tissues rich in moisture. It can occur in the extremities, but more often in the internal organs, such as the intestine with obstruction of the mesenteric arteries (thrombosis, embolism), in the

lungs as a complication of pneumonia (influenza, measles). In weakened by an infectious disease (often the bark) children may develop wet gangrene of the soft tissues of the cheeks, perineum, which is called nome (from the Greek. Nome - water cancer). Acute inflammation and bacterial accumulation are the cause ofspreading dead tissue.

*Gas gangrene*occurs when the wound is infected with anaerobic flora, such as Clostridium perfringens and other microorganisms in this group. It is characterized by widespread tissue necrosis and gas formation due to the enzymatic activity of the bacterium. The main manifestations are similar to wet gangrene, but with the additional presence of gas in the tissues. Crepitation (the phenomenon of cracking on palpation) is a frequent clinical symptom of gas gangrene.

Bed-sore(decubitus) is a type of gangrene, necrosis of the superficial parts of the body (skin, soft tissues) that are subject to pressure between the bed and the bone. Therefore, bedsores most often appear in areas of the sacrum, spinous processes of the vertebrae, the large spit of the femur. According to its genesis, it is trophoneurotic necrosis, because blood vessels and nerves are compressed, which exacerbates tissue trophic disorders in critically ill patients with cardiovascular, cancer, infectious or nervous diseases.

Colic (wet) necrosis.

Colic (wet) necrosis is characterized by melting of dead tissue. It develops in tissues that are relatively poor in protein and rich in fluid, where there are favorable conditions for hydrolytic processes. Cell lysis occurs as a result of the action of their own enzymes (autolysis). A typical example of wet colic necrosis is the area of gray softening (ischemic infarction) of the brain.

*Cerebral infarction*often called softening, because the main macroscopic sign is a decrease in the elasticity of brain tissue in the affected area at all times. During the first days, it is a vaguely limited area of bluish hue, soft to the touch. By the end of the first days, the area becomes clearer and paler. In the following days, the substance of the brain in this area becomes even more sluggish, yellowish in color, sometimes even with a greenish tinge.

Microscopically, the brain tissue is homogeneous, unstructured, slightly pink in color when stained with hematoxylin and eosin. Resorption of dead tissues is carried out by macrophages, which have the form of fat-grained balls.

Necrosis is an irreversible process. With a relatively favorable yield around the dead tissue there is a reactive inflammation, which separates the dead tissue. This inflammation is called a demarcation zone, and the separation zone is called a demarcation zone. In this area, blood vessels dilate, there is plethora, edema, there is a large number of leukocytes, which release hydrolytic enzymes and melt necrotic masses. Necrotic masses are resorbed by macrophages. Then the cells of the connective tissue that replace or overgrow the area of necrosis multiply. When replacing dead masses with connective tissue, they talk about their organization. At the site of necrosis in such cases, a scar is formed (scar at the site of infarction). Overgrowth of the necrosis area with connective tissue leads to its encapsulation. In dead masses with dry necrosis and in the area of necrosis, organized, calcium salts can be deposited. In this case, calcification (petrification) of the cell developsnecrosis. In some cases, the formation of bone - ossification - is observed in the area of necrosis. At resorption of fabric detritus and formation of a capsule which meets at a damp necrosis and most often in a brain, at the place of necrosis there is a cavity - a cyst.

Adverse outcome of necrosis - purulent (septic) melting of the necrosis site. Sequestration is the formation of an area of dead tissue that is not subject to autolysis, is not replaced by connective tissue and is freely located among living tissues. Sequesters are more likely to occur in the bones with inflammation of the bone marrow - osteomyelitis. A sequestral capsule and a cavity filled with pus form around such sequestration. Often sequestration comes out of the cavity through the fistulas, which close only after its complete removal. Type of sequestration - mutilation - rejection of fingertips.

The value of necrosis is determined by the exclusion from the function of dead zones, so necrosis of vital organs, especially large areas, often leads to death. Tissue necrosis can often cause severe complications of many diseases (rupture of the heart with myomalacia, paralysis with hemorrhoids and ischemic strokes, infections with

massive bedsores, intoxication due to exposure to tissue breakdown products, such as gangrene of the limbs, etc.).

Apoptosis.

The term "apoptosis" was first proposed by W. Kerr and AR Currie, who described the unique morphology of tumor cell death. They showed that there are two morphologically distinct forms of cell death: apoptosis and necrosis. The term "apoptosis" is used to refer to a form of cell death in which it actively produces certain molecules involved in energy production processes aimed at self-destruction. This term is used to describe the normal natural process of completion of tissue activity in a multicellular organism at different stages of embryogenesis, which is necessary for the formation of organs, replacement of some tissues with others, resorption of temporary organs and so on. Therefore, the following forms of programmed cell death were distinguished: phylogenetic, morphogenetic, histogenetic, and individual cell death. Such a program is necessary for the development and functioning of higher organisms, in which there is a constant change of cell populations of most tissues and complex processes of morphogenesis, which require streamlining the death of a large number of cells during embryogenesis. This mechanism is very important for multicellular organisms, because the death of a certain subpopulation of cells is not accompanied by damage to surrounding structures. In addition, a cell death program is needed to eliminate damaged, mutated, and virus-infected cells that are potentially dangerous to the entire body. Apoptosis is a form of cell death; cell self-destruction is active with the involvement of energy. It can occur as a programmed process carried out due to the effects of tumor necrosis factor- in which there is a constant natural change of cell populations of most tissues and complex processes of morphogenesis, which require streamlining the death of a large number of cells in the process of embryogenesis. This mechanism is very important for multicellular organisms, because the death of a certain subpopulation of cells is not accompanied by damage to surrounding structures. In addition, a cell death program is needed to eliminate damaged, mutated, and virus-infected cells that are potentially dangerous to the entire body. Apoptosis is a form of cell death; cell self-destruction is active with the involvement of energy. It can occur as

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energy. It can occur as a programmed process carried out due to the effects of tumor necrosis factor-α (TNF-α), or Fas-ligand (FasL) at the appropriate receptors, or in response to numerous exogenous effects –both physiological and pathological (chronic harmful stimuli at the subtoxic level). These include cytotoxic drugs, ionizing radiation, hypoxia, free radicals, cytolytic secretions of cytotoxic lymphocytes, rupture of cell-cell and cell-matrix bonds, the presence or absence of specific growth factors, increase or decrease in specific hormones (eg steroids), etc. . These etiological factors lead to the start of the next phases of the cell death process, which is cascading, with the participation of numerous activator, effector and negative regulators. The active process of apoptosis may be interrupted or stopped by common RNA inhibitors or protein synthesis, indicating the existence of a number of specific genes and proteins required for its initiation, progression and regulation. Morphological manifestations of apoptosis are observed in the nucleus, cytoplasm and plasma membrane. Characteristic changes are annular condensation of chromatin on the periphery of the nucleus (margination) with intact cytoplasmic and organoid membranes, cytoplasmic compaction, cell collapse due to cytoskeletal destruction, loss of microvilli, fragmentation of the whole cell, but in all tissues, in most tissues. A cell in the state of apoptosis is usually rapidly phagocytosed by macrophages, epithelial or other cells without demarcation inflammation. Apoptosis is always accompanied by compression and compaction of the cell due to its loss of water, although the membrane pump continues to function throughout the cascade. Characteristic changes are annular condensation of chromatin on the periphery of the nucleus (margination) with intact cytoplasmic and organoid membranes, cytoplasmic compaction, cell collapse due to cytoskeletal destruction, loss of microvilli, fragmentation of the whole cell, but in all tissues, in most tissues. A cell in the state of apoptosis is usually rapidly phagocytosed by macrophages, epithelial or other cells without demarcation inflammation. Apoptosis is always accompanied by compression and compaction of the cell due to its loss of water, although the membrane pump continues to function throughout the cascade. Characteristic changes are annular condensation of chromatin on the periphery of the nucleus (margination) with intact cytoplasmic and organoid membranes, cytoplasmic compaction, cell collapse due to

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Apoptosis plays a leading role in the normal development and regeneration of tissue, in the process of embryogenesis, immune response, ontogenesis. Many works are devoted to the study of this phenomenon in the placenta during pregnancy with a physiological course, and in pathology.

Early apoptotic damage to the cytoskeleton and plasma membranes induced by initiating caspases does not necessarily result in cell death by apoptosis, as cascade progression may be delayed or even blocked by executive caspase activation inhibitors until irreversible degenerative changes occur. Bcl-2 and mcl-1 are two leading inhibitors of the apoptotic cascade found in various tissues and cells in which apoptosis may be temporarily blocked, such as in E-lymphocytes.

The final stage of apoptosis is characterized by internucleosomal DNA degradation, which occurs under the influence of non-lysosomal nuclear endonucleases, which in some cells are activated by Ca2 + and Mg2 + and inhibited by Zn2 +, in others–Ca2 + - and Mg2 + -independent endonucleases were found. Late apoptotic changes that indicate an irreversible progression of the cascade caused by activation of executive caspases are chromatin condensation and damage to the nuclear structure.

Condensation of chromatin usually begins with a diffuse increase in the density of the nucleus with the subsequent formation of areas of greatest density on the periphery of the nucleus, which ultimately leads to annular (annular) condensation of chromatin. This is accompanied by a decrease in the volume of the nucleus. In most, but not all, tissues, nuclear and cellular fragments form small apoptotic bodies that are phagocytosed by macrophages without developing an inflammatory response.

Multiple organ failure

Multiple organ failure (PON) - universal damage to all organs and tissues of the body by aggressive mediators of the critical condition. PON is not a simple result of organ failure, it is a new form of pathology. It is the basis of any critical condition, regardless of its etiology. Thus, PON can be considered as a basic pathophysiological process. There are 2 groups of factors that cause PON: complications of pathology that lead to such a violation of vital functions that requires their artificial replacement; pathology arising in connection with medical actions of therapeutic, diagnostic and prophylactic nature (radiation injuries during X-ray and radiological examinations and radiation therapy; allergic and toxic reactions to contrast agents and test preparations; instrumental injuries with endoscopes and other instruments; drug intoxications (chemotherapy of tumors, etc.); allergic reactions to medications, mechanical damage to organs during operations, accompanied by the development of surgical stress; reactions to vaccination; invasive methods of intensive care and diagnosis, which sometimes cause an increase in PON.

All these processes lead to relative tissue ischemia. During the reduction of circulating blood volume (external blood loss, blood sequestration, capillary loss) there is a hypovolemic vicious circle, accompanied by centralization of blood circulation, in which there is a redistribution of blood in favor of vital organs (brain, heart, lungs, etc.). simultaneous reduction of microcirculation in peripheral tissues (ischemia). These mechanisms make a certain contribution to the pathogenesis of PON.

The problems of the strategy of such non-standard conditions as PON need to be solved by normalizing the body's energy, detoxification, syndrome therapy, reduction of harmful effects.

Death, signs of general death.

Death is an irreversible cessation of the body's vital functions. There are natural death, violent and disease.

*Natural death*occurs in the elderly from the front wear of the body. Violent death is the result of such malicious acts as murder, suicide, injury, accidents. Death from disease is caused by life-incompatible changes that occur under the influence of pathogenic factors.

*Clinical death*characterized by cessation of respiration and circulation and within a few minutes changes in life may be reversible. Biological death - irreversible changes in the vital functions of the organism, the beginning of autolytic processes.

Signs of general death are: cooling of the corpse, corpse clogging,cadaveric drying, redistribution of blood, cadaveric spots, decay of corpse tissues. Cooling of the corpse ("algorithm mortis") occurs as a result of the cessation of metabolic processes and the gradual equalization of body temperature and the environment. Corpse clogging ("rigor mortis") is characterized by a sharp compaction of somatic muscles in connection with the disappearance of them after the death of ATP acid and the accumulation of lactic acid in them (2 - 5 hours after the death). Corpse drying occurs as a result of evaporation of moisture from its surface: this applies to the skin, eyeballs, mucous membranes. The redistribution of blood is characterized by its accumulation in the veins, while the lumen of the arteries remains almost empty. Postmortem blood clotting occurs in the veins. Corpse spots appear in the connection ligament with redistribution of blood and are presented in the form of cadaveric hypostases (appear in 3-6 hours) or cadaveric imbibition (appears much later as a result of hemolysis of erythrocytes and imbibition of tissues by blood plasma stained with hemoglobin). Corpse decay is caused by autolysis processes in connection with the reproduction of putrefactive microorganisms in the intestine.

LECTURE 3

ACUTE SYSTEMIC CIRCULATORY DISORDERS (ACUTE CORONARY INSUFFICIENCY, SHOCK) AND SYSTEMIC CIRCULATORY DISORDERS IN CHRONIC HEART DISEASES. REGIONAL CIRCULATORY DISORDERS (HYPEREMIA, ISCHEMIA, PLASMORAGIA, BLEEDING AND BLEEDING). DISORDERS OF LYMPH FORMATION AND CIRCULATION. THROMBOSIS. EMBOLISM.

It is difficult to imagine the normal functioning of the body without a clear work of the circulatory and lymphatic systems, which are in close structural and functional unity.

The function of the circulatory system determines, above all, the level of metabolic processes in each tissue and each organ required to send specialized function. This transport and metabolic function is performed by the circulatory system together with the lymphatic drainage system and the blood system. It follows that in the course of microcirculation, through which transcapillary exchange takes place, the circulatory and lymphatic systems, like blood, serve the same purpose and function interconnectedly.

The circulatory system coordinates and connects functionally different organs and systems in the interests of the body as a whole. This coordinating function in relation to homeostasis is performed by the circulatory system through the lymphatic system. The function of the circulatory system, as well as lymphatic, is provided by the mechanisms of neurohumoral regulation (nervous devices of the heart, vascular receptors, vascular center, humoral blood constants, lymph, vasoconstrictors and vasodilators, etc.). But the circulatory system, like the lymphatic system, is united into a single whole not only functionally but also structurally: the heart - the source of blood flow, blood vessels - the source of blood distribution and lymph collection; microcirculatory tract - a bridgehead for transcapillary metabolism and tissue metabolism. However, structural and functional integration as a blood,

Circulatory disorders can be divided into 3 groups: 1) disorders of blood supply, determined by plethora (arterial or venous) and anemia; 2) violation of the permeability

of the vessel wall, which should include bleeding (hemorrhage) and plasmorrhagia; 3) violation of blood flow and condition (ie rheology) of blood in the form of stasis, sludge phenomenon, thrombosis and embolism.

Thoroughbred (hyperemia) may be arterial and venous.

Arterial plethora- increased blood supply to the organ, tissue due to increased inflow of arterial blood. It can be common,observed with an increase in the volume of circulating blood (plethora) or the number of erythrocytes (erythremia). In such cases, there is a red color of the skin and mucous membranes and increased blood pressure. More often arterial hyperemia has local character and arises at the various reasons.

There are physiological arterial hyperemia, which occurs under the influence of adequate doses of physical and chemical factors, feelings of anger, shyness (reflex hyperemia), with increased organ function (working hyperemia), and pathological arterial hyperemia.

Based on the peculiarities of the etiology and mechanism of development, the following types of pathological arterial hyperemia are distinguished: angioneurotic (neuroparalytic); collateral; hyperemia after anemia (postnemic); vacant; inflammatory; hyperemia on the basis of arteriovenous fistula.

Angioneurotic (neuropathic) hyperemia observed as a consequence of irritation of the vasodilating nerves or paralysis of the vasoconstrictors nerves. The skin and mucous membranes become red, slightly swollen, warm or even hot to the touch. This type of redness can occur in some parts of the body in violation of innervation; on the skin and mucous membranes of the face in some infectious diseases, which may affect the nodes of the sympathetic nervous system; this type of redness passes quickly, without consequences.

Collateral hyperemia occurs due to difficulty in blood flow to main arterial trunk closed by a thrombus or embolus. In such cases, the blood is directed through the collateral vessels. Their lumen reflexively expands, the inflow of arterial blood increases and the tissue receives an increased amount of blood.

Hyperemia after anemia (postanemic) develops in cases where the factor that caused the compression of the artery (tumor, accumulation of fluid in the cavities,

ligature, etc.) and anemia of the tissues, is quickly eliminated. In such cases, the vessels of previously exsanguinated tissue dilate sharply and overflow with blood, which can lead not only to their rupture and hemorrhage, but also to anemia of other organs, such as the brain, due to a sharp redistribution of blood. Therefore, such manipulations as removal of fluid from body cavities, large tumors, removal of the elastic tourniquet, should be performed slowly.

Vacant hyperemia (from the Latin. Vacuus - empty) develops due to a decrease in barometric pressure. It can be common, for example, in divers and caisson workers with a rapid rise from a place of high pressure. The resulting redness is associated with gas embolism, vascular thrombosis and hemorrhage.

Local vacant hyperemia appears on the skin under the influence of, for example, medical cans, which form a rarefied space (vacuum) over certain areas.

Inflammatory hyperemia - a constant companion of inflammation.

*Hyperemia on the basis of arteriovenous fistula*occurs when, for example, in a gunshot wound or other injury there is a connection between an artery and a vein, then the arterial blood is directed into a vein.

The value of pathological arterial hyperemia is determined by its type. Collateral hyperemia is essentially compensatory and provides blood circulation with a closed arterial trunk. Inflammatory hyperemia is a mandatory component of this protective-adaptive reaction. However, vacant hyperemia becomes one of the components of caisson disease.

Venous plethora- increased blood supply to the organ or tissue in connection with the violation (reduction) of blood flow; blood flow is not changed or reduced. Stagnation of venous blood (congestive hyperemia) leads to dilation of veins and capillaries, slowing of blood flow in them, which is associated with the development of hypoxia, increased permeability of the basement membranes of capillaries.

Venous plethora can be general and local.

*General venous plethora*develops in cardiovascular diseases systems that cause acute or chronic heart failure; can be both acute and chronic.

At acute general venous plethora which is a manifestation of a syndrome of acute heart failure (insufficiency of contractile ability of a myocardium at a myocardial infarction, acute myocarditis), owing to hypoxic damage of histogematic barriers and sharp increase in capillary permeability in tissues. , stasis in the capillaries and multiple hemorrhages of diapedetic nature; dystrophic and necrotic changes develop in parenchymal organs. Structural and functional features of the organ in which there is an acute venous stasis, determine the predominance of edematous-plasmorrhagic, hemorrhagic or dystrophic and necrotic changes, their combination is possible. Histophysiological features of the aerohematic bar ' pulmonary era explain the development of edema and hemorrhage in acute venous stasis. In the kidneys, due to the peculiarities of the structure of the nephron and blood circulation, there are mainly dystrophic and necrotic changes, especially the epithelium of the tubules. In the liver, due to the peculiarities of the architecture of the hepatic lobe and its circulation, it appears in acute plethora centrolobular hemorrhage and necrosis.

*Chronic general venous plethora*is a manifestation of the syndrome of chronic heart failure (cardiovascular insufficiency), which complicates many chronic heart diseases (heart disease, coronary heart disease, chronic myocarditis, myocardial infarction, endocardial fibroelastosis, etc.). It often causes severe, irreversible changes in organs and tissues. Long-term maintenance of tissue hypoxia, it determines the development of not only plasmorrhagia, edema, stasis and hemorrhage, dystrophy and necrosis, but also atrophic and sclerotic changes. Sclerotic changes, ie the development of connective tissue, are due to the fact that chronic hypoxia stimulates collagen synthesis by fibroblasts and fibroblast-like cells. Connective tissue displaces parenchymal elements, stagnant compaction (induration) of organs and tissues develops. Vadic circle at chronic venous plethora '

Organ changes in chronic venous stasis, despite a number of common features (stagnation and induration), have their own characteristics.

The skin, especially of the lower extremities, becomes cold and acquires a blue color (cyanosis). The veins of the skin and subcutaneous tissue are dilated, full of blood; dilated and overflowing with lymph and lymphatic vessels. Expressed edema of the

dermis and subcutaneous tissue, the development of connective tissue in the skin. In connection with venous stasis, edema and sclerosis in the skin there are inflammatory processes and ulcers that do not heal for a long time.

With chronic venous stasis, the liver is enlarged, dense, the edges are rounded, the surface of the autopsy is gray-yellow with a dark red spot, similar to nutmeg, so this liver is called "nutmeg".

At microscopic research it is observed that full-blooded only central parts of the lobes, where hepatocytes are destroyed; these areas on the autopsy of the liver are dark red. On the periphery of the lobules, liver cells are in a state of dystrophy, often fatty, which explains the gray-yellow color of liver tissue.

Morphogenesis of liver changes with prolonged venous stasis is quite complex. Selective plethora of the center of the lobules is due to the fact that stagnation in the liver covers, above all, the hepatic veins, extending to the prefabricated and central veins, and then to the sinusoids. The latter expand not only in the central and middle parts of the lobes, where they meet resistance from the capillary branches of the hepatic artery flowing into the sinusoids, where the pressure is higher than in the sinusoids. As plethora grows, hemorrhages appear in the center of the lobules; in hepatocytes at the same time dystrophy, atrophy and necrosis develop. Hepatocytes of the periphery of the lobes compensatory hypertrophied and become similar to the centrilobular. The growth of connective tissue in the area of hemorrhage and death of hepatocytes is associated with the proliferation of cells of sinusoids - lipocytes, which can act as fibroblasts, and near the central and collecting veins - with the proliferation of fibroblasts of the adventitia of these veins. Due to the growth of connective tissue in the sinusoids there is a continuous basement membrane (in the normal liver it is absent), ie there is capillarization of the sinusoids, there is a capillary-parenchymal block that exacerbates hypoxia, leads to progression of atrophic and sclerotic changes in the liver. This process is also facilitated by blood shunting, which develops in sclerosis of the walls and obstruction of the lumen of many central and collecting veins, as well as increasing stagnation of lymph - so formed stagnant fibrosis (sclerosis) of the liver. there is a capillary-parenchymal block, which exacerbates hypoxia, leads to the progression of

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With the progressive development of connective tissue appears incompleteregeneration of hepatocytes with the formation of regenerated nodes, reorganization and deformation of the organ. Stagnant (muscat) cirrhosis of the liver develops, which is also called cardiac, because it usually occurs in chronic heart failure.

In the lungs with chronic venous plethora there are two types of changes - multiple hemorrhages, which cause pulmonary hemosiderosis, and the development of connective tissue, ie sclerosis. The lungs become large, brown and dense - a brown seal (induration) of the lungs.

In the morphogenesis of brown lung compaction a significant role is played by stagnant plethora and hypertension in the small circle of blood circulation, which cause hypoxia and increased vascular permeability, edema, diapedetic hemorrhage. The development of such changes is preceded by adaptive processes in the vascular bed of the lungs. In response to hypertension in the small circle of blood circulation there is a hypertrophy of muscular-elastic structures of small branches of a pulmonary vein and an artery with reorganization of vessels on type of closing arteries which protect pulmonary capillaries from sharp overflow with blood.

After some time of adaptive changes of vessels of lungs become sclerotic, decompensation of pulmonary blood circulation, overflow of capillaries of interalveolar partitions with blood develops. Tissue hypoxia increases, and thereforevascular permeability increases, there are multiple diapedetic hemorrhages. In alveoli, bronchi, interalveolar septa, lymphatic vessels and nodes there are accumulations of cells loaded with hemosiderin - sideroblasts and siderophages and free-lying hemosiderin; diffuse

hemosiderosis of the lungs occurs. Hemosiderin and plasma proteins (fibrin) "clog" the stroma and lymphatic drainage of the lungs, causing resorption failure of the lymphatic system, which is replaced by mechanical. Sclerosis of blood vessels and insufficiency of the lymphatic system exacerbate pulmonary hypoxia, which causes the proliferation of fibroblasts, thickening of the interalveolar septa. Thus there is a capillary-parenchymal block, which closes the vicious circle in the morphogenesis of pulmonary induration - stagnant pulmonary sclerosis develops. It is more significant in the lower lungs, where venous stasis is more pronounced and more accumulations of blood pigments, fibrin. Pneumosclerosis, as well as hemosiderosis, at brown consolidation of lungs has caudoapical distribution and depends on degree and duration of venous stagnation in lungs.

Kidneys in chronic venous stasis become enlarged, dense and cyanotic - cyanotic induration of the kidneys; especially full-blooded veins of the cerebral substance and the adjacent zone. Against the background of venous stasis develops lymphostasis. Under conditions of increasing hypoxia, there is nephrocyte dystrophy of the main parts of the nephron and sclerosis, which is not pronounced.

Chronic venous stasis in the spleen also leads to its cyanotic induration.It is enlarged, dense, dark cherry color; determined by atrophy of follicles and sclerosis of the pulp. At the general chronic venous stagnation cyanotic induration is inherent in other bodies also.

Local venous plethora(hyperemia) is observed when the outflow of venous blood from a particular organ or part of the body in connection with the closure of the lumen of the vein (thrombus or embolus) or its compression from the outside (tumor, developed connective tissue). Thus, severe venous hyperemia of the gastrointestinal tract develops in portal vein thrombosis. Muscat liver and muscat cirrhosis occur not only in general venous plethora, but also in inflammation of the hepatic veins and their thrombosis (obliterating thrombophlebitis of the hepatic veins), which is characteristic of the disease (syndrome) Bada - Chiari. The cause of cyanotic induration of the kidneys can be thrombosis of the renal veins. Venous stasis and limb edema are also caused by venous thrombosis if the collateral circulation is insufficient.

Local venous hyperemia can occur as a result of venous development collateralsat obstruction or the termination of outflow of blood on the main venous highways (portocaval anastomoses at disturbance of outflow of blood on a portal vein). The blood-filled collateral veins dilate sharply, and their wall becomes thin, which can cause hemorrhages (from dilated and thinned veins of the esophagus in cirrhosis of the liver).

With venous hyperemia associated with the emergence of not only plasmorrhagic,dystrophic, atrophic and sclerotic changes, but also venous (congestive) heart attacks.

Anemia

Anemia (ischemia) is a decrease in blood supply to tissue, organ, part of the body due to reduced blood flow. We are talking about both insufficient blood supply and complete cessation of blood flow.

Tissue changes that occur with anemia are associated with hypoxia or anoxia (oxygen starvation). Depending on the cause of anemia, the time of its occurrence, the duration of hypoxia, the degree of sensitivity of the tissue to anemia, there are either subtle changes at the level of ultrastructures, or gross destructive changes that can even lead to ischemic necrosis - heart attack .

At acute anemia there are dystrophic and necrobiotic changes. Their precursors are histochemical and ultrastructural changes: disappearance from the tissueglycogen, decreased activity of redox enzymes and destruction of mitochondria. Based on the data of electronic-histochemical study of tissue changes in acute anemia and myocardial infarction, acute ischemia should be considered as a prenecrotic (preinfarction) condition. At long anemia atrophy of parenchymatous elements and a sclerosis owing to increase of collagen synthesizing activity of fibroblasts develops.

Depending on the causes and conditions, anemia is divided into the following types: angiospastic, obstructive, compression, due to redistribution of blood.

Angiospastic anemia occurs due to artery spasm due to exposure to various stimuli. Yes, a painful stimulus causes spasm of the arteries and anemia in some parts of the body. The same mechanism of action of vasoconstrictor drugs (adrenaline).

Angiospastic ischemia also occurs with negative emotional affects ("angiospasm of unresponsive emotions").

Obstructive anemia develops due to thrombosis or embolism, when growth of connective tissue in the lumen of the artery, inflammation of its wall (obliterating endarteritis), narrowing of the lumen of the artery by atherosclerotic plaque. Obstructive ischemia due to arterial thrombosis often completes angiospasm, and, conversely, angiospasm complements arterial obstruction with a thrombus or embolus.

Compression anemia appears when the artery is compressed by a tumor, tourniquet, ligature.

*Ischemia due to redistribution of blood*observed in cases of hyperemia after anemia. This is, for example, cerebral ischemia when releasing fluid from the abdominal cavity, where a significant amount of blood flows. The meaning and consequences of anemia are different; depend on the characteristics of the cause and the duration of its impact. Thus, anemia due to arterial spasm is short-lived, and it does not cause special disorders. However at long (long-term) spasms development of dystrophic changes and even ischemic necrosis (heart attack) is possible. Acute obstructive anemia is especially dangerous because it often leads to heart attack. If the artery closes gradually, then blood circulation can be restored with the help of collaterals and the consequences of such ischemia may be insignificant. However, long-term anemia sooner or later ends in tissue atrophy and sclerosis.

Bleeding(hemorrhage)Is the outflow of blood from the lumen of a blood vessel orheart cavity, into the environment (external bleeding) or into the body cavity (internal bleeding). Examples of external bleeding are hemoptysis (haemoptoa), epistaxis, haemotenesis, melaena, and metrorrhagia. With internal bleeding, blood may accumulate in the pericardial cavity (hemopericardium), pleura (hemothorax), abdominal cavity (hemoperitoneum). If blood accumulates in the tissues during bleeding, then talk about hemorrhage. It follows that hemorrhage is one of the types of bleeding. Accumulation of coagulated blood in the tissue with a violation of its integrity is called a hematoma, and during storage of tissue elements - hemorrhagic infiltration (hemorrhagic infiltration).

Plane hemorrhages in the skin, mucous membranes, called bruises, and small dot-shaped hemorrhages - petechiae or ecchymoses.

The causes of bleeding (hemorrhage) can be a rupture, corrosion and increased permeability of the vessel wall (heart). Bleeding due to rupture of the heart wall or blood vessel occurs when there is an injury, trauma to the wall or the development of pathological processes such as necrosis (heart attack), inflammation or multiple sclerosis.

Heart rupture and bleedingmost often causes necrosis (heart attack). Supravalvular rupture of the aorta is a consequence of necrosis of its middle membrane (medionecrosis), inflammation of the middle membrane of the aorta (mesoarthitis) with the transition tomultiple sclerosis in syphilis can also lead to rupture of the aortic wall and bleeding. Ruptures of aneurysms of the heart, aorta, arteries of the brain, pulmonary artery and blood vessels of other organs are quite common, causing fatal bleeding.

To the same category it is necessary to carry also bleedings at a rupture of a capsule of bodies in connection with development in them of pathological processes.

*Bleeding due to corrosion of the vessel wall (arrosive bleeding)*occurs in many pathological processes, but more often in inflammation, necrosis and malignancy. Such erosive bleeding at erosion of a vessel wall by proteolytic enzymes in the center of purulent inflammation (at purulent appendicitis), gastric juice - at the bottom of a stomach ulcer, caseous necrosis (in a wall of a tuberculous cavity), at ulcer of a cancerous tumor of a rectum, an ulcer breast). Arrosive bleeding also develops during ectopic (tubal) pregnancy, when the chorionic villi germinate and erode the wall of the fallopian tube and its vessels. Bleeding due to increased permeability of the vessel wall, diapedetic bleeding, occurs from arterioles, capillaries and venules for various reasons. Among them a significant place is occupied by angioneurotic disorders, changes in microcirculation, tissue hypoxia. Therefore, diapedetic hemorrhages are quite common in brain damage, hypertension, systemic vasculitis, infectious and infectious-allergic diseases, diseases of the blood system (hemoblastosis and anemia), coagulopathies. When diapedetic hemorrhages become systemic, they become a manifestation of hemorrhagic syndrome.

The consequences of bleeding (hemorrhage) can be various: resorption of blood, formation of cysts at the site of hemorrhage (brain), encapsulation or germination of hematoma connective tissue, joining infection and suppuration.

The value of bleeding is determined by its type and cause, the amount lost blood, blood loss rate. Rupture of the heart, aorta and its aneurysms leads to rapid loss of significant amounts of blood; in most cases - to death (death from rapid bleeding). Bleeding for several days can also lead to significant blood loss and death (death from acute anemia). Prolonged, recurrent bleeding (peptic ulcer of the stomach and duodenum, hemorrhoids) can cause chronic anemia (posthemorrhagic anemia). The value of hemorrhage for the body largely depends on the location. Particularly dangerous, often fatal, is hemorrhage into the brain (manifestation of hemorrhagic stroke in hypertension, rupture of a cerebral artery aneurysm). Often fatal is hemorrhage in the lungs with rupture of the aneurysm of the pulmonary artery, vascular erosion in the wall of the tuberculous cavity, etc. At the same time, massive hemorrhages in the subcutaneous fat, muscles often do not threaten human life.

Plasmorrhagia- is the exit of plasma beyond the bloodstream. The consequence of plasmorrhagia is the infiltration of blood plasma into the walls of the vessel and surrounding tissues - plasma impregnation; this is one of the manifestations of impaired vascular permeation, which normally provides transcapillary metabolism.

The mechanism of development of plasmorrhagia and plasma impregnation is determined by two main conditions - damage to the vessels of the microcirculatory tract by changes in blood constants that increase vascular impregnation.

Microvascular damage is associated with neurovascular disorders (spasm), tissue hypoxia, immunopathological reactions. Changes in the blood contribute to plasmorrhagia and due to increased plasma levels of vasoactive substances (histamine, serotonin), natural acticoagulants (heparin, fibrinolysin), coarse proteins, lipoproteins, the appearance of immune complexes, impairedrheological properties. Plasmorrhagia often occurs in hypertension, atherosclerosis, decompensated heart disease, infectious, infectious-allergic and autoimmune diseases.

Consequences plasma impregnation is fibrinoid necrosis and hyalinosisvessels.

The value of plasmorrhagia is a violation of transcapillary metabolism with a consistent change in the structure of organs and tissues.

Stasis - it cessation of blood flow in the vessels microcirculatory tract (mainly in the capillaries). Cessation of blood flow begins slowly, which is defined as a pre-static state, or prestasis.

The main properties of the sludge phenomenon are the adhesion of erythrocytes, leukocytes or platelets; at the same time the viscosity of plasma increases that causes difficulty of perfusion of blood through vessels of a microcirculatory channel. Sludge phenomenon (syndrome) is a type of stasis.

Development mechanism. The main importance in the occurrence of stasis is given to change rheological propertiesblood as a manifestation of enhanced intracapillary aggregation of erythrocytes, which leads to increased resistance to blood flow through the capillaries, its slowing down and complete cessation. Hemolysis and blood clotting during stasis does not occur. The development of intracapillary aggregation of erythrocytes is facilitated by: changes in capillaries with increasing permeability of their walls, ie plasmorrhagia; violation of the physicochemical properties of erythrocytes, in particular the reduction of their surface potential; changes in the composition of blood proteins due to an increase in coarse fractions; dyscirculatory disorders - venous plethora (congestive stasis) or ischemia (ischemic stasis) and impaired innervation of the microcirculatory tract.

Dyscirculatory circulatory disorders are often the cause of stasis. They develop due to the influence of physical (high temperature, cold) and chemical (acids, alkalis) factors; occur in infectious (malaria, typhus), infectious-allergic and autoimmune (rheumatic diseases) diseases, cardiovascular disease (heart disease, coronary heart disease).

The value of stasis depends not only on the duration but also on the sensitivity of the organ or tissue to oxygen starvation (brain). Stasis is the opposite phenomenon; the condition of blood vessels after stasis is called poststatic; irreversible stasis ends in necrobiosis and tissue necrosis.

ShockIs an acute pathological process caused by action overpowering stimulus, characterized by disruption of the central nervous system, metabolism and autoregulation of the microcirculatory system, which leads to destructive changes in organs and tissues.

The basis of shock of various origins is a single complex multiphase mechanism of development. The early period of shock is characterized by relatively specific signs, which are due to the peculiarities of etiology and pathogenesis.

Depending on the cause, the following types of shock are distinguished: 1) hypovolemic, which occurs with a sharp decrease in the volume of circulating blood (or fluid); 2) traumatic, the trigger of which is excessive afferent (mostly painful) impulse; 3) cardiogenic, which occurs due to a rapid decline in myocardial contractile function and an increase in the flow of afferent (mostly "hypoxic") impulses; 4) septic (toxicoinfectious), the cause of which is endogenous intoxication by pathogenic microflora.

In the late period of shock, the relative specificity of the signs, due to the peculiarities of its etiology and pathogenesis, disappears, and clinical and anatomical manifestations become stereotyped.

Morphological changes of shock are characterized by disorders of hemocoagulation in the form of DIC syndrome, hemorrhagic diathesis, liquid cadaveric blood, which can be the basis for the diagnosis of shock at autopsy. At microscopic research of disturbance of hemodynamics and rheological properties of blood find the widespread vasospasm, microthrombi in system of microcirculation, signs of the increased permeability of capillaries, hemorrhages.

IN internal organs develop a number of general changes in the form of dystrophy and necrosis, due to hemodynamic disorders, hypoxia, damaging effects of biogenic amines, endotoxins of pathogenic microflora. The severity of these changes largely determines the possibility of reversibility of the shock.

Morphological changes in shock have a number of features due to both structural and functional specialization of the organ, and the predominance in the pathogenesis of

shock of one of its chains (neuroreflex, hypoxic, toxic). Based on this, the term "shock organ" is used to describe shock.

Necrotic nephrosis (sometimes symmetrical cortical necrosis of the kidneys) develops in the shock kidney, which causes acute renal failure. In the shock liver, hepatocytes lose glycogen, are subject to hydropic dystrophy, develop centrolobular necrosis of the liver, there are signs of structural and functional insufficiency of stellate reticuloendotheliocytes. Such morphological changes cause the possibility of developing acute liver failure in shock. Often there is a combination of renal and hepatic failure; in such cases speak about a hepatorenal syndrome.

Shock lungcharacterized by the appearance of foci of atelectasis, serous hemorrhagic edema with fibrin loss in the alveoli, hemostasis and the formation of blood clots in the microcirculatory tract, which causes the development of acute respiratory failure.

Structural changes of the myocardium in shock are represented by dystrophic and necrobiotic changes of cardiomyocytes: the disappearance of glycogen, the appearance of lipids and contractures of myofibrils. The appearance of small foci of necrosis is possible.

Structural damage during shock is found not only in shock organs, but also in the gastrointestinal tract, nervous, endocrine and immune systems.

Thrombosis

Thrombosis is a lifelong clotting of blood in the lumen of blood vessels or cavities of the heart. The clot that forms is called a blood clot.

*Stages of thrombosis:*1) the formation of prothrombinase; 2) thrombin formation; 3) the formation of fibrin.

In addition to the coagulation system, there is an anticoagulant system, which normally provides a liquid state of the blood. Thus, thrombosis is a manifestation of dysregulation of hemostasis systems (coagulation and anticoagulation).

*Conditions for thrombus development:*1) damage to the vascular wall (ruptures, inflammation, spasms of arteries and arterioles); 2) slowing of blood flow (cardiovascular insufficiency); 3) violation of regulation of coagulation and anti-

coagulation systems; 4) violation of blood composition (increase in fractions of coarse proteins (fibrinogen), lipoproteins, lipids, platelets). Such changes are often observed in atherosclerosis, autoimmune diseases, blood tumors.

Features of a thrombus: 1) the thrombus is attached to the wall of the vessel at the site of its damage (ie where the process of thrombosis began); 2) the thrombus has a corrugated surface (due to the layering of platelets and fibrin); 3) the consistency of the clot is dense, dry, brittle.

Types of blood clots by structure and appearance: 1) White (consists of thrombocytes, fibrin and leukocytes). Formed more often in the arteries, slowly, with rapid blood flow. 2) Red (contains platelets, fibrin and erythrocytes). Formed more often in the veins, slowly, with slow blood flow. 3) Mixed (contains elements of both white and red blood clots, has a layered structure). It distinguishes between the head (structure of the white blood clot), the body (mixed blood clot) and the tail (red blood clot). Such thrombi are more common in the veins, in the cavities of the aortic and heart aneurysms. 4) Hyaline (does not contain fibrin, consists of destroyed erythrocytes, platelets and precipitated plasma proteins, resembling hyaline from the outside). It is more common in the vessels of the microcirculatory tract.

Thrombi can be parietal (most of the lumen of the vessel remains free) and occluding (obturating). Parietal thrombus is more common in heart valves, endocardium, atrial ears, in large arteries in atherosclerosis and large veins in thrombophlebitis, in aneurysms of the heart and blood vessels. Obturating is formed more often in veins and small arteries at growth of a parietal thrombus, less often in large arteries and an aorta.

Thrombosis is a leading trigger for DIC and thromboembolic syndrome.

Consequences of thrombosis: 1) aseptic autolysis of the thrombus (under the influence of proteolytic enzymes of leukocytes); 2) organization, sewerage and vascularization of the thrombus (ingrowth of connective tissue into the thrombus with the subsequent appearance of cracks and channels lined with endothelium, which contain blood); 3) calcification of the thrombus (sometimes stones are formed - phleboliths); 4) separation of the thrombus and its transformation into a thromboembolism, which is a source of thromboembolism; 5) purulent melting (when hit in the thrombotic masses of

purulent bacteria). It can be observed at sepsis; 6) strengthening of a wall of an aneurysm of heart and large vessels (for example, at a myocardial infarction); 7) obstructive thrombi lead to the development of heart attack or gangrene, portal hypertension syndrome (with portal vein obstruction), splenomegaly (splenic vein obstruction), etc.

Embolism- is the circulation in the blood or lymph of particles that do not occur normally, with subsequent blockage of blood vessels. These lobes are called emboli. Emboli more often move with the bloodstream: 1) from the venous system of the great circle of blood circulation and the right heart to the vessels of the small circle of blood circulation (ie emboli of the veins of the lower extremities can migrate into the vessels of the lungs); 2) from the left half of the heart, aorta and large arteries in the arteries of the heart, brain, kidneys, spleen, extremities, etc. (ie along the great circle of blood circulation); 3) from the branches of the portal system of the liver to the portal.

Occasionally, the embolus, due to its weight, moves retrograde: from the vena cava descends into the renal, splenic veins, and others.

In the presence of defects of the atrial and interventricular septa, the emboli, bypassing the lungs, fall from the small circle of blood circulation into the large (paradoxical embolism). Paradoxical embolism can also include microembolism through arteriovenous anastomoses.

Types of emboli depending on the nature of emboli: thromboembolism occurs when the thrombus or part of it. If the emboli are blood clots in the great circle of blood circulation, there is a thromboembolism of the pulmonary artery, which leads to death (if large branches are blocked) or hemorrhagic pulmonary infarction (when small branches are blocked). If the emboli are blood clots in the heart, aorta or large arteries, then develop heart attacks. Fat embolism. The source of embolism is fat droplets (body fat). It develops with traumatic crushing of fat, bone marrow (fractures of the tubular bones), the introduction of oil solutions. Death occurs when the vessels of the brain become blocked by emboli. Air embolism. Occurs when air enters the bloodstream (when injuring the veins of the neck, yawning veins of the uterus after childbirth due to negative pressure in them, during open heart surgery, pneumothorax, accidental introduction of air into a vein with drugs). Air bubbles cause embolism of the vessels of

the small circulation and sudden death occurs. Gas embolism. Clogging of blood vessels with gas bubbles. This embolism occurs in cases of rapid transition from high to normal pressure (divers, caisson workers - caisson disease). Gas emboli clog the capillaries of the brain and spinal cord, liver, kidneys and other organs, which is accompanied by the appearance of foci of ischemia and necrosis. Tissue (cell) embolism. It develops when tissues are destroyed due to trauma or a pathological process that leads to pieces of tissue (or cells) entering the bloodstream. Emboli can be tumor tissue (with decay or metastasis), brain tissue (for head injury), amniotic fluid in the divider, etc. Microbial embolism. It develops when microbes circulate in the blood and obscure the lumen of capillaries. At the same time, metastatic abscesses develop at the site of vascular occlusion by microbial emboli. Embolism by foreign objects. It is observed when fragments of shells, mines, bullets and other bodies hit the lumen of large vessels. Because foreign objects are heavy, they often move retrogradely. This embolism also includes embolism with lime and cholesterol crystals of atherosclerotic plaques, which crumble into the lumen of the vessel during ulceration. Embolism by foreign objects. It is observed when fragments of shells, mines, bullets and other bodies hit the lumen of large vessels. Because foreign objects are heavy, they often move retrogradely. This embolism also includes embolism with lime and cholesterol crystals of atherosclerotic plaques, which crumble into the lumen of the vessel during ulceration. Embolism by foreign objects. It is observed when fragments of shells, mines, bullets and other bodies hit the lumen of large vessels. Because foreign objects are heavy, they often move retrogradely. This embolism also includes embolism with lime and cholesterol crystals of atherosclerotic plaques, which crumble into the lumen of the vessel during ulceration.

Disseminated intravascular coagulation syndrome(DIC syndrome) is a generalized blood clotting in the middle of blood vessels, which causes the formation of a large number of microclots and cell aggregates that disrupt microcirculation in organs and tissues. This syndrome is often characterized as a catastrophe for the body.

Depending on the causes of development, the following types of DIC syndrome are distinguished:

1) infectious-septic (develops in sepsis); 2) post-traumatic (with crash syndrome, burn disease, multiple bone fractures);

3) shock (for all types of shock); 4) surgical (after operations with major tissue trauma); 5) obstetric (with premature detachment of the placenta, entry into the blood of amniotic fluid); 6) toxicogenic (with malignant tumor growth); 7) tumor (with immune tissue damage), etc.

The pathogenesis of DIC syndrome is based on the so-called "humoral protease explosion", ie the simultaneous activation of all proteolytic enzymes in blood plasma, which are part of four extracellular biochemical systems: a) coagulation system; b) fibrinolytic system; c) kallikrein-kinin system; d) complement systems.

The main principle of activation of extracellular proteases is the cleavage of peptides that close their active center.

Sources of active proteases in the blood in DIC:

1) damaged cells. Acute damage to a large number of cells, from which lysosomal proteases, tissue thromboplastin enter the extracellular space and blood, is important. Inflammation, as a local process that occurs when the cell is damaged, limits the flow of breakdown products into the blood, thus localizing the damage and prevents the development of DIC; 2) the entry into the blood of a large number of extracellular proteases, such as trypsin in acute pancreatitis, enzymes that are in amniotic fluid; 3) exogenous proteases. Their sources can be bacterial cells in sepsis, snake venom and others.

There are two phases in the pathogenesis of DIC syndrome: 1) Phase of hypercoagulation and platelet aggregation. The basis of this phase is the generalized activation of the blood coagulation system, ie the formation of thrombin (thrombinemia), which leads to the formation of fibrin and platelet aggregates. Clinical manifestations of the syndrome in phase 1: hypoxia, acidosis, intoxication with breakdown products, acute respiratory failure (microclots clog the capillaries of the lungs), acute renal failure (clogged capillaries of the glomeruli), cerebrovascular disorders. 2) Phase of hypocoagulation (hemorrhagic syndrome). This phase develops as a consequence of depletion of the mechanisms of vascular-platelet and coagulation

hemostasis. This phase is clinically manifested by heavy bleeding, which is difficult to stop.

Lymphatic circulation disorders - is a condition in which the lymphatic vessels do not perform their main function - the implementation of permanent and effective drainage of the interstitium.

There are the following forms of lymphatic disorders: 1) Mechanical insufficiency. Manifested by difficulty in the outflow of lymph due to the presence of organic (compression tumor, scar, obliteration of lymphatic vessels in their inflammation, thrombosis, etc.) or functional causes (increased pressure in the main venous vessels, lymphatic spasm, cessation of muscle contractions and etc.); 2) dynamic failure. Occurs when the volume of interstitial fluid transudation exceeds the ability of the lymphatic system to provide effective drainage of interstitial tissue;

3) resorption insufficiency. It is caused by structural changes in the border of the exact tissue, accumulation of proteins and deposition of their pathological species in the interstitium.

The main manifestations of lymphatic insufficiency in the acute stage are edema, accumulation of proteins and their breakdown products in the precision tissue, and in the chronic stage - the development of fibrosis and sclerosis.

Violation of tissue fluid content

The content of tissue fluid depends primarily on the state of blood and lymph circulation and the level of vascular permeability. It is also determined by the state of the blood andlymph, cells and intercellular substance, where tissue fluid accumulates. The content of tissue fluid is regulated by neurohumoral mechanisms, and a significant place is occupied by aldosterone and antidiuretic hormone of the pituitary gland.

Tissue fluid is poor in proteins (up to 1%) and is bound in cells with protein colloids, and in connective tissue - with proteins and glycosaminoglycans of the main substances. Its considerable mass is in intercellular substance. Violation of tissue fluid content can fluctuate in the direction of increase or decrease.

An increase in tissue fluid content leads to the development of edema or dropsy. At the same time in fabrics or in body cavities the edematous liquid, or transudate

accumulates. This clear liquid contains no more than 2% protein and binds poorly to protein colloids. The accumulation of edematous fluid in the subcutaneous tissue is called anasarca; in the cavity of the cardiac shirt - hydropericardium, in the pleural - hydrothorax, in the abdominal cavity - ascites, in the cavity of the vaginal membrane of the testis - hydrocele.

Depending on the disease, a pathological process that can cause edema, there are the following types of edema: stagnant, cardiac, renal, dystrophic, marantic (cachectic), inflammatory, allergic, toxic, neurotic, traumatic.

Stagnant edema occurs in phlebothrombosis, thrombophlebitis, venous compression, lymphostasis; usually have a limited, local nature. Theycaused by chronic venous stasis, which causes increased pressure in the veins, tissue hypoxia with consecutive damage to the endothelium and basement membranes of capillaries, increased permeability and transudation of the liquid part of the blood into the tissue. Weakening of the lymphatic system contributes to increased edema.

Cardiac edema is observed in the decompensation of cardiac activity. The redistribution of blood that occurs in this case leads to increased secretionaldosterone and its insufficient destruction in the liver under conditions of decompensation. Aldosteronemia means sodium retention, which contributes to the growth of edema.

Both oncotic factor and sodium retention are important in the development of renal edema, but their role in various kidney diseases is different. In nephrotic syndrome of any genesis, characterized by the loss of a significant amount of protein in the urine (proteinuria) and their depletion of blood plasma (hypoproteinemia), the main role in the development of edema belongs to the reduction of oncotic blood pressure. In glomerulonephritis, sodium retention and, to a lesser extent, oncotic pressure are of major importance. Renal edema appears primarily on the face - on the eyelids, under the eyes, then they spread to the hands and feet.

Dystrophic edema occurs due to insufficient protein content in food. Hypoproteinemia, which develops as a result, leads to a decrease in oncotic blood pressure. This also includes marantic (cachectic) edema. Inflammatory edema is observed around the site of inflammation (so-called perifocal edema), they are due to

increased permeability of capillary membranes. The same mechanism of allergic, toxic, neurotic and traumatic edema.

Thus, edema, which occurs for various reasons in various diseases and pathological processes, often have common mechanisms.

The effects of edema in many cases can be favorable - the edematous fluid is absorbed. With prolonged edema in the tissues develops hypoxia, which leads to dystrophy and atrophy of parenchymal cells and the development of multiple sclerosis.

The value of edema depends on the cause, location, distribution.

Allergic edema disappears quickly; cardiac and renal– long, and from themthe presence depends on the consequence of the disease. Swelling of the brain or lungs is often the cause of death; edema of the cavities leads to disruption of organ function.

In swollen tissues, inflammation often occurs, which is associated with trophic disorders or autoinfection. Transudate in body cavities for the same reason can become a basis for formation of liquid of the inflammatory nature, ie to pass to exudate (for example, development of peritonitis against ascites - ascites-peritonitis).

Decreased tissue fluid is called dehydration, or exsiccosis, which is accompanied by blood loss of water, ie anhydremia.

The appearance of a person with exsiccosis is quite characteristic:pointed nose, swollen eyes, cheeks, wrinkled skin, severe weight loss. The blood becomes thick and dark, the surface of the serous membranes is dry or covered with a mucous viscous mass. The organs are reduced, their capsule becomes wrinkled. Exsiccosis develops under conditions of rapid loss of large amounts of fluid, which is characteristic of cholera, prolonged diarrhea, dyspepsia. Sometimes dehydration is observed in comatose states, such as encephalitis.

LECTURE 4

INFLAMMATION: CAUSES, MORPHOGENESIS. PATOMORPHOLOGY OF EXUDATIVE INFLAMMATION. PROLIFERATIVE (PRODUCTIVE) INFLAMMATION: WITH THE FORMATION OF SPICY CONDYLOMA, AROUND PARASITES, INTERSTITUTIONAL PRODUCTIVE INFLAMMATION. SPECIFIC PROLIFERATIVE INFLAMMATION.

Inflammation is complex vascular-mesenchymal reaction on damage caused action of various agents.

Inflammation is a protective-adaptive reaction that aimed at site restrictions damage; destruction (neutralization) of agents that caused inflammationno; restoration of damaged tissues (repair).

In addition to the positive, inflammation has negative sides: it may be accompanied by melting of tissues with the formation of fistulas and scars; inflammation is the basis of many diseases.

Inflammation can be caused by various factors: 1) biological (exogenous and endogenous): a) microorganisms and products of their activity; b) immune factors: antibodies, immune complexes, sensitized lymphocytes, etc., 2) physical (radiation, electric current, high and low temperatures, trauma), 3) chemical (drugs, toxins, poisons).

Not necessarily to external etiologicalthe factors themselves were the trigger for the inflammatory response. Dystrophic or dead substrate biochemically irritates the vascular nerves, disrupts the permeability of vascular walls, ie increases inflammation. The products of denaturation of the body's own tissues can cause inflammation, so there is an inflammatory reaction around heart attacks, on the verge of gangrene. Such inflammation at the boundary between living and dead tissue is called demarcation.

Usually the inflammatory reaction in a given person under the action of this stimulus is moderate in nature, adequate to the strength of the etiological factor. At weak action it is weak, at strong - strong. This inflammatory reaction is called normergic. The body may be hypersensitive to the cause of inflammation of allergic or antigenic nature. The resulting inflammatory reaction is pronounced and is called hyperergic. There are hypoergic and anergic reactions that reflect reduced sensitivity and reactivity. This happens in old age, in premature newborns. Clinical signs of inflammation: fever, fever, redness, etc. with an anergic reaction may be completely absent.

In the center of inflammation and in the adjacent lymph nodes with inflammation there are changes. Adjacent lymph nodes enlarge and form together with the inflammatory focus of the primary inflammatory complex. Complexes are formed in infectious human diseases: tuberculosis, plague, syphilis, typhoid fever, etc .. In childhood, the reaction of the lymph nodes to inflammation is weak.

Inflammation consists of three phases: alteration, exudation and proliferation.

Alteration is represented by dystrophy and necrosis. This is the initial phase of inflammation, which leads to the release of mediators that determine the subsequent development of the inflammatory reaction.

The phenomenon of alteration, ie tissue damage, is accompanied by dystrophic changes, cell rejection, their necrobiosis and necrosis. Alteration occurs as a result of direct action on the tissue of the pestagent, and due to circulatory disorders and innervation. Membranes are destroyed in cells, enzymes that autolize structures are released. Mucoid and fibrinoid swelling and necrosis are observed in the connective tissue. Plasma and cellular mediators act in the area of damage

Plasma mediatorsprovide increased vascular permeability, activate the chemotaxis of polymorphonuclear leukocytes for phagocytosis, intravascular coagulation in the vessels leaving the site of inflammation to distinguish the pathogen and the cell itself. They appear when activating circulating factors in the blood.

Plasma mediators are represented by the following systems: kallikrein-kinin system, complement system, blood coagulation system and fibrinolytic system.

The main mediators: Hagemann's factor, plasmin, fibrin degradation products (formed during fibrinolysis).

Hagemann factor is a link between the complementary, kallikrein-kinin system and the coagulating - fibrinolytic systems. It activates the kinin system, "starts" the internal coagulation system and the fibrinolytic system, which, in turn, includes a complementary system.

Cellular mediatorsproduced by different cells; contained in the cell in the finished form (histamine, serotonin, lysosomal enzymes) or formed during the inflammatory reaction. They provide: increased permeability of the vascular wall, chemotaxis, phagocytosis; inclusion of an immune response to eliminate the damagingagent; repair by proliferation and differentiation of cells in the inflammatory focus.

There are the following groups of cellular mediators: vasoactive amines (histamine, serotonin); products of arachidonic acid metabolism, lysosomal products (leukocytes, macrophages), platelet activating factor, cytokines.

Exudation- the release of the liquid part of the blood and formed elements outside the vascular bed. At first the reaction of a microcirculatory channel with disturbance of rheological properties of blood develops: short-term vasoconstriction;

vasodilation (arterioles, capillaries and postcapillaries) with the development of inflammatory hyperemia; slowing of blood flow and increasing blood viscosity, stasis. In the future, there is an increase in the permeability of the microcirculatory tract: the appearance of pores between endothelial cells due to their contraction and dilation of blood vessels, as well as due to endothelial damage. The above promotes the release of fluid and plasma proteins: interendothelial through the interndothelial pores; intraendothelially with increased pinocytosis in the endothelium.

Emigration of cells (exit of cells from vessels) occurs mainly in postcapillaries and venules. Polymorphonuclear leukocytes (PYAL) appear first in the field of view (in 10-15 minutes at stimuli of average force).

Stages of leukodiapedesis: margination (marginal standing); adhesion to the endothelium (using adhesive molecules that are expressed on the cell surface); emigration - occurs interendothelially: leukocytes with the help of pseudopodia push the interendothelial contacts and migrate between the endothelium and the basement membrane. The penetration of PYAL through the basement membrane of the endothelium is associated with the phenomenon of thixotropy, which is based on the transition of the basement membrane from the state of the gel to the sol and vice versa. The movement of PYAL in the direction of the lesion is carried out using chemotactic factors.

Phagocytosis is the uptake and digestion by cells (phagocytes) of various particles (living and dead bacteria and other pathogens, necrotic detritus, foreign bodies, etc.). The most important phagocytic cells are PYAL and monocytes-macrophages.

Phagocytosis can be: complete; incomplete (microorganisms are not digested by phagocytes and multiply in their cytoplasm; incomplete phagocytosis causes chronic inflammation).

An exudate and an inflammatory cellular infiltrate are formed.

Exudate - an inflammatory fluid containing protein (more than 2%) and cellular elements. At accumulation in fabrics of cells speak about an inflammatory cellular infiltrate.

The composition of infiltrate cells is different: in the first 6-24 hours in the exudate is dominated by PYAL; in the period of 24-48 h begin to dominate monocytes-macrophages; in inflammation associated with immediate hypersensitivity reactions, the exudate is dominated by eosinophils.

Inflammation in the clinic is manifested by 5 classic signs: redness, swelling, pain, fever and dysfunction. Redness - rubor, reflects redness, dilation of all working and auxiliary blood vessels as a result of irritation of the vasodilator nerves. Initially, blood flow accelerates, and then slows to perestasis and stasis.

Tumor swelling - a tumor - is an inflammatory infiltrate - the exit of blood vessels into the tissue of blood plasma and leukocytes mixed with local tissue cells. Thus, the infiltrate consists of histiogenic and hematogenous elements.

Pain - dolor, associated with irritation of nerve endings in the area of inflamed infiltrate. When the nerve endings are dead, the pain disappears, although the inflammation has not been eliminated

Local increase in temperature, heat - calor, associated with a rapid course of metabolism and synthesis, blood flow.

Dysfunction - functio laesa - damaged tissue works less.

All these phenomena are not an exclusive part of inflammation. They are also found in the norm, such as the migration of leukocytes during digestion or redness of the face when feeling ashamed.

Proliferation - the final phase of inflammation, which is characterized by:

1. Reproduction in the inflammatory center of cells prone to proliferation: macrophages, cambial mesenchymal cells, smooth muscle cells (SMC), epithelium.

2.Cell differentiation and transformation: a macrophage can transform into an epithelioid and a giant cell; B-lymphocyte - in the plasma cell; the cambial mesenchymal cell transforms into a fibroblast.

The proliferation of cells in the inflammatory focus with the appearance of a large number of fibroblasts is the basis for the repair of damaged tissues.

Proliferation and differentiation of cellular elements in the inflammatory focus are carried out with the help of cytokines and numerous growth factors.

Inflammation is regulated by hormonal, nervous and immune factors. Hormones such as pituitary somatotropic hormone (HGH), deoxycorticosterone, and aldosterone enhance the inflammatory response (proinflammatory hormones), others - glucocorticoids and pituitary adrenocorticotropic hormone (ACTH), on the contrary, reduce it (anti-inflammatory). Cholinergic substances that stimulate the release of inflammatory mediators act like pro-inflammatory hormones, adrenergic substances, suppressing mediator activity, behave like anti-inflammatory hormones.

The biological essence of proliferation - the revival of dead structures - regeneration.

Depending on the nature of the course of inflammation can be acute, subacute and chronic.

Exudative inflammation - xcharacterized by the predominance of exudation and the formation of exudate in tissues and body cavities.

The nature of the exudate depends on the state of vascular permeability and the depth of damage, which is determined by the type and intensity of the damaging factor.

Depending on the nature of the exudate there are: serous, fibrinous, purulent, septic, hemorrhagic and mixed inflammation; on the mucous membranes may develop a special type of inflammation - catarrhal.

Serous, fibrinous and purulent are independent and main forms of inflammation. Hemorrhagic, catarrhal and ichorous (putrefactive) are not independent forms of inflammation.

Serous Inflammation is characterized by the release of aqueous exudate from the blood, with a low content of protein and cells.

Externally, this exudate is similar to stagnant fluid transudate, which appears, for example, in cardiac edema.

The transudate has a low specific gravity and contains no more than 1-2% protein. In serous exudate protein is more, up to 6-8%, the proportion is higher (1018-1020 BP), more cells.

If acetic acid is added to a test tube with serous exudate, the proteins coagulate, forming a cloud like a haze of cigarettes. Subsequently, the exudate accumulates

rapidly, so the serous inflammation is acute. The transudate accumulates slowly, slowly and increases in number only with time. However, the transudate is resorbed without a trace, while after serous inflammation, on the basis of the remaining proteins, connective tissue and adhesions develop. Connective tissue, collagen fibers occur in serous exudate with incredible ease. After peritonitis, pleurisy, pericarditis so often patients have adhesions, even complete obliteration of the cavities. A distinctive feature is also the condition of the tissues and serous leaves of the cavities that contain fluid. At an inflammation the hyperemia, reddening, small hemorrhages is defined, some darkening from protein layering. The cause of serous inflammation can be various factors: chemical, physical, biological. Serous inflammation can develop in the skin, serous leaves, mucous membranes and internal organs. In different tissues, this inflammation manifests itself in different ways. Serous inflammation of the skin is characterized by vascular reactions in its own layer of skin. Serous exudate accumulates between the collagen and elastic fibers of the skin under the epidermis and between the malpighian and horny layers of the epidermis. Unable to destroy the stratum corneum, serous exudate accumulates under it, exfoliates the epidermis and forms blisters, vesicles. Serous inflammation of the skin develops with thermal or chemical burns in the I and especially in the II degree, when blisters appear on the damaged area of skin between the stratum corneum and malpighian layer, filled with a clear liquid or slightly turbid, due to abundant inflammatory exudation. Blisters are formed either immediately after the burn, or after 1-2 days. Serous inflammation in the serous leaves of the pleura, pericardium, peritoneum, joints is accompanied by accumulation of serous exudate in the cavity, because the exudate easily penetrates through the serous leaves, which are covered with a single layer of endothelium. Accumulation of exudate in serous cavities can reach large volumes - many liters. Thus there are exudative serous pleurisy, peritonitis, pericarditis, etc. Along with the presence of serous fluid in the cavities, there are signs of inflammation of the serous membranes in the form of redness, edema, fading, which is an important feature of the relevant dropsy - hydrothorax, ascites, hydropericardium. Serous inflammation on the serous leaves occurs in rheumatism,

Similarly, serous inflammation can develop on the mucous membranes.

In the internal organs, serous inflammation is quite common. These include serous inflammation in the myocardium - serous myocarditis, in the lungs - serous pneumonia, in the kidneys - serous nephritis and in the liver - serous hepatitis.

If in the skin, serous leaves, mucous membranes serous inflammation is complicated by purulent, then in the internal parenchymal organs this does not happen.

Serous inflammation in the internal organs always develops in the intermediateorgan tissue, and is usually diffuse in nature, covering the organ as a whole. It is usually acute, ends with the resorption of serous fluid and recovery, or turns into productive inflammation.

Another independent type of exudative inflammation is fibrinous inflammation. Fibrinous inflammation is characterized by the release of exudate, which contains a large amount of coarse proteins and fibrinogen, leukocytes and cells of necrotized tissue. Due to the content of fibrinogen and enzymes released from necrotized tissue, hyaluronidase and thromboplastin, for example, the exudate coagulates immediately after leaving the vessels. If the necrosis at a fibrinous inflammation captures only superficial layers of fabric, the folded fibrin lies superficially, it is easily removed, without damaging fabrics. This subtype of fibrinous inflammation is called lobar inflammation. If the necrosis of the tissue is deep, the fibrinous exudate is released and coagulated in the depth of the tissue itself, often hyalinized to form a tightly bound film. When you try to remove the film, bleeding, ulceration. This subtype of fibrinous inflammation is called diphtheria inflammation.

The type of fibrinous inflammation (lobar or diphtheria) depends not only on the depth of the lesion of the underlying tissue, but also on the nature of the epithelium. Where the stratified squamous epithelium is located (mouth, pharynx, tonsils, epiglottis, esophagus, true vocal cords, cervix), the films are strongly associated with the epithelium, although necrosis and fibrin loss are sometimes limited to the epithelial lining. This is due to the fact that the multilayered squamous epithelium is closely associated with the underlying connective tissue and therefore "firmly holds" the film.

On the mucous membranes covered with prismatic epithelium (upper respiratory tract, gastrointestinal tract, etc.), the connection of the epithelium with the underlying

tissue is weak. The films formed here are easily separated along with the epithelium even with deep fibrin loss. Therefore, the clinical significance of fibrinous inflammation in the pharynx and trachea is ambiguous, even with the same etiology. For example, in diphtheria on the tonsils, the films are tightly bound to the underlying tissues, and microorganisms that multiply under the films cause intoxication. At the same time, the films in the trachea are easily separated along with the epithelium and the underlying tissue. Intoxication in these cases is insignificant, but there is another danger: the films which are easily separated can be aspirated, cause a reflex spasm, irritating surrounding fabrics and be the reason of asphyxia.

Scars appear at the site of deep ulcers that occur after film rejection.

Purulent inflammation -characterized by a predominance in the exudate of PYAL (preserved and disintegrated).

The most common cause is purulent microorganisms (staphylococci, streptococci, gonococci, meningococci, Pseudomonas aeruginosa, etc.).

A characteristic morphological feature is histolysis - the melting of tissues by proteolytic enzymes of leukocytes (neutral proteases - collagenase, elastase, cathepsin and acid hydrolases).

Purulent inflammation can be limited (abscess) and diffuse (phlegmon), purulent inflammation in the pre-existing cavities with the accumulation of pus in them is called empyema.

An abscess is a focal purulent inflammation characterized by the formation of a cavity filled with pus. An abscess, or abscess, develops when tissue necrosis, impregnation with leukocytes and melting occurs as a result of the proteolytic action of enzymes released from leukocytes during their death. The formed abscess is separated from the next fabric by a shaft of the granulation fabric rich in capillaries through which walls there is the strengthened emigration of leukocytes, that is formed as if a cover. This shell has a different structure. Externally, it consists ofconnective tissuefibers adjacent to the unaltered tissue, and the inside is formed by granulation tissue and condensed pus, which is continuously renewed due to the release of leukocytes by granulation tissue. The shell of the abscess, which forms pus, is called the pyogenic

membrane.

Abscesses can be single or numerous; the latter are often formed in the organs during septicemia due to microbial embolism.

Scars form at the site of abscesses; in some cases, the abscess becomes chronic: a connective tissue capsule is formed around it, the inner layer of which is granulation tissue.

Phlegmon - diffuse (diffuse) purulent inflammation, in which purulent exudate spreads diffusely between tissue elements, impregnating and exfoliating tissues. It most often occurs in the subcutaneous tissue, in the area of fascia, along the vascular-nervous trunks. Diffuse purulent inflammation can also occur in parenchymal organs, in the soft meninges. Tissues with phlegmonous inflammation swell, impregnated with pus.

There are soft and hard phlegmon. Soft phlegmon is characterized by the absence of foci of necrosis in the tissue, hard phlegmon - the presence of such cells, which are not subject to purulent melting, resulting in the tissue becomes very dense; dead tissue is gradually separated.

*Hemorrhagic inflammation*characterized by the presence in the exudate of a large number of erythrocytes. Vascular permeability is of great importance in its development. Occurs in severe infectious diseases: plague, Siberianulcers, influenza, in the past - with smallpox.

*Septic inflammation*more often occurs in wounds with large tissue crushing. It is most often associated with anaerobic infection in combination with purulent microorganisms. Large foci of necrosis are characteristic.

*Catarrhal inflammation*occurs on mucous membranes. It is characterized by a large amount of exudate that drains from the surface. The exudate always contains mucus. May be serous, purulent and mucous. Occurs in infectious diseases of the upper respiratory tract, allergic conditions, etc.

The consequence is often favorable - complete recovery of the mucous membrane; sometimes catarrhal inflammation can become chronic, accompanied by remodeling of the mucous membrane and its atrophy or hypertrophy.

Productive inflammationcharacterized by the predominance of proliferation of cells of hematogenous and histiogenic origin. The causes of productive inflammation are different. It can be caused by biological (microorganisms, animal parasites), physical (radiation) and chemical (medicinal substances) factors; arise as a result of the development of immunopathological processes (immune inflammation). Productive inflammation occurs in the case of persistence of the damaging agent in connection with an imperfect exudative reaction (often due to defects in PYAL) or in connection with the special properties of the pathogen (resistance to phagocytes - incomplete phagocytosis). It is accompanied by the appearance of limited or diffuse infiltrates, consisting mainly of macrophages, lymphocytes, plasma cells. Characteristic transformation of macrophages into epithelioid cells, and the latter - in giant cells (foreign bodies or Pirogov-Langhans), as well as increased activity of fibroblasts. Mediators of productive inflammation occur when monocytes-macrophages interact with lymphocytes.

A frequent consequence of productive inflammation is multiple sclerosis with the development of atrophy and shrinkage of organs with a violation of their structure - cirrhosis.

Types of productive inflammation: interstitial, granulomatous and inflammation with the formation of polyps and genital warts.

Interstitial inflammation occurs in the stroma of parenchymal organs - myocardium, liver, kidneys and lungs.

Consider, for example, interstitial myocarditis, which occurs in many infectious diseases (influenza, diphtheria, typhoid fever, etc.).

An infiltrate consisting of macrophages, lymphocytes, plasma cells, single PYAL, epithelioid cells, and fibroblasts is formed in the myocardial stroma. Dystrophic, sometimes necrobiotic changes are expressed in cardiomyocytes. Newly formed collagen fibers are visible in the areas of infiltration.

The result is diffuse small-cell cardiosclerosis.

*Granulomatous inflammation*characterized by the formation of granulomas - cell nodules based on monocytic phagocytes.

In the development of granulomatous inflammation, the resistance of the pathogen (stimulus) to phagocytes is crucial.

Positive value of granuloma: restriction (localization) of the pathogen when it is impossible to eliminate it.

The morphogenesis of granuloma consists of 4 stages:

1. Accumulation of young monocytic phagocytes in the center of tissue damage
2. Maturation of these cells in macrophages and formation of a macrophage granuloma.
3. Maturation and transformation of monocytic phagocytes and macrophages into epithelioid cells and the formation of epithelioid cell granuloma.
4. Fusion of epithelioid cells (or macrophages) with the formation of giant cells (foreign body cells or Pirogov-Langhans cells) and epithelioid cell or giant cell granuloma.

Giant cells are characterized by significant polymorphism: from 2-3 nuclei to giant symplasts containing 100 nuclei or more. In giant cells of foreign bodies, the nuclei are located uniformly in the cytoplasm, and in Pirogov – Lanhhans cells, mainly along the periphery. The diameter of the granuloma does not exceed 1-2 mm. The consequence of granuloma is multiple sclerosis.

The composition of granuloma cells is divided into three types: macrophage granuloma, epithelioid-cell, giant cell.

Depending on the level of metabolism, there are granulomas with a low level of metabolism when damaged by inert substances (inert foreign bodies) and consist mainly of giant cells of foreign bodies and granulomas with a high level of metabolism when damaged by toxic stimuli (mycobacteria, tuberculosis and leukemia .

By etiology: infectious (associated with bacteria, viruses, rickettsiae, protozoa, chlamydia, etc.); non-infectious granulomas (around foreign bodies, particles of organic and inorganic dust: silicosis, talc, bisinosis (from the Greek. byssos - flax)). Such granulomas may be the result of drug action: granulomatous hepatitis, oleogranulomatous disease; granulomas of unknown nature– in sarcoidosis, Crohn's disease, Horton's disease, Wegener's granulomatosis, etc.

Diseases accompanied by the development of granulomas are called granulomatous diseases.

By pathogenesis: immune (which often reflects the GST response based on the interaction of macrophage-T-lymphocytes) - most infectious granulomas or arising from the introduction of dust particles of plant or animal origin are immune; in infectious diseases reflect the relative resistance of the organism to the pathogen (non-sterile immunity); non-immune (most foreign body granulomas): most often constructed of foreign body cells, containing a small number of lymphocytes and plasma cells.

By morphology: nonspecific granulomas have no specific features. An example is inflammation around foreign bodies and animal parasites; specific granulomas have a certain structure, which often (but not always) allows to establish the etiological factor.

Detected in the following diseases: tuberculosis; syphilis; leprosy; scleroma; actinomycosis; сап.

Tuberculosis caused by Mycobacterium tuberculosis, which has certain properties.

High resistance, stability. It is stored in the body for many years, even in calcined media - petrified.

Mycobacteria cause increased sensitivity of the body, ie sensitization to further entry of Koch bacilli into the body.

Invokes the installationimmunity; immunity is called infectious, ie exists until the activity of tuberculosis. After the death of mycobacteria, the immunity disappears.

When tuberculosis mycobacteria, which usually occurs in early childhood, first enters the human body, it causes the development of exudative inflammation. In the place of primary localization of Koch's bacilli, as a rule, in lungs there is a small center of fibrinousinflammation and alteration in the form of caseous necrosis - necrosis, resembling cheese lying down and dried up. Inflammation and caseous necrosis also develop in regional lymphatic vessels and regional lymph nodes. The area of primary localization of Koch's bacilli and inflammation is called primary tuberculous affect. Inflammatory reaction develops in the lymph nodes - lymphadenitis, lymphatic vessels - lymphangitis.

Together, these 3 elements are called the primary tuberculosis complex. The primary tuberculosis complex can heal and can be complicated by the development of any form of tuberculosis.

Among the forms of inflammation in tuberculosis in humans there are exudative, necrotic and productive. Productive forms of inflammation occur with the formation of tuberculous granuloma. Tuberculous granuloma is otherwise called epithelioid cell tubercle. Epithelioid-cell granulomas develop under conditions of sensitization

In the center of the granuloma is a focus of caseous necrosis. It is an unstructured mass of tissues that have disintegrated with the phenomena of karyorexis and karyopyknosis, which are quite characteristic of tuberculosis. Adjacent to caseous necrosis on all sides is a mass of various mesenchymal cells and these catkins are located in a certain order as if in zones. Closest to the necrosis are single very largegiant Pirogov-Langhans cells. The shape of giant cells is round or oval, protoplasm with a large number of round nuclei located on the periphery of the cell in the form of a corolla or horseshoe. The nuclei are well colored, dark, lie under the cell membrane. Outside of the giant Pirogov-Lankhgans cells is the widest zone of so-called epithelioid cells. These cells on the preparations have an elongated oval shape and a light, chromatin-poor blistercore. Because chromatin is low, the nucleus is pale in color and resembles an air bubble. Epithelioid cells lie in several rows, layers and make up the majority, so the tubercle is called epithelioid. On the very periphery of the granuloma are round lymphoid cells. They are small in size, have a round core, which is quite compact, well colored. This is the 3rd zone. Finally, around the granuloma scattered in varying amounts of plasma cells, which are also round, the nucleus is located eccentrically, lumps of chromatin in the nucleus are rough, dense, well visible, lie in the form of spokes in the wheel. Between the cells in the tubercle are thin reticulin fibers. In the treatment of tuberculosis with antibiotics, the granuloma can consist almost entirely of giant cells and is then called a giant cell tubercle.

Syphiliscaused by pale treponema. The disease is chronic, lasts for many years and is characterized by stages, depending on the change of immune phases and hypersensitivity to the pathogen and tissue breakdown products. In the course of

syphilis there are periods of alternation of exudative, alternative and productive reactions, just as it happens with tuberculosis. There are basically three such periods.

I period - the formation of primary affect at the site of treponema and regional lymphadenitis. The primary affect in syphilis is called a solid chancre. A solid chancre appears 2-4 weeks after infection in the form of a dense copper-red painless infiltrate (nerves die, so there is no pain). This infiltrate isproductive inflammation without any specific features. Soon the infiltrate is covered with ulcers and turns into a dense shallow chancre ulcer, which contains a lot of spirochetes, and therefore very contagious. In the vessels - the phenomenon of productive panvasculitis. Inflamed lymph nodes are called syphilitic buboes. After 1-1.2 months. the ulcer heals and there is an asymptomatic period of pseudo-well-being. But during this time the spirochete multiplies in the body and spreads to all organs and tissues. The disease progresses to the second stage.

II period or stage - stage of cutaneous syphilis or papular period occurs 6-8 weeks after infection. It is found on the skin or visible mucous membranes copper-red rash in the form of flat red spots - roseola and dense infiltrative papules that protrude. There are also pustules and broad warts (on the genitals) - papillary growths. Syphilis contains a lot of treponemes, which when ulcerated easily get into the environment. The secondary period is considered very contagious, syphilis heal with scars. In the second stage of the disease, there is again an asymptomatic period, during which infectious immunity develops. In the conditions of immunity which has appeared, the following stage is shown.

Stage III - gummosis stage occurs 3-6 years after infection. This 3rd period differs in the focal nature of productive inflammation, the formation of granulomas. Granuloma in syphilis is called gumma.

Gumma is composed mainly of lymphoid and plasma cells, chaotically mixed with each other, no zonation. This is the first difference from tuberculosis. Among the small cells, there are single giant multinucleated cells similar to the giant Pirogov – Langhans cells in tuberculous granuloma. However, the second difference from the tubercle tubercle is that the nuclei in giant cells do not lie under the cell membrane, but

in the center of the protoplasm. Occur in gumma and epithelioid cells, but in small quantities. The third difference between gum and tuberculous granuloma is that there are many blood vessels in gum. The walls of these vessels are thickened, and the lumens are narrowed and even completely closed - the phenomenon of obliterating endarteritis. Due to the obliteration of blood vessels in the rubber there are several foci of semi-liquid colic necrosis, adhesive mass (gummi - glue). This is another difference. In a tuberculous tubercle one center of a necrosis, in gumma - some. In the foci of necrosis in the gum, there are often separately preserved structures of the tissue in which the gum is located, such as bone beams, hepatic trabeculae, and others. In tuberculous tubercles no structures in the necrosis zone are visible. Gradually, the gum is subject to scarring, and a sharp, rough scarring with the formation, again, in contrast to tuberculous granuloma, stellate retracted scars. The gums have different localization and come in different sizes. Small micro gums can be located in the walls of the thoracic aorta, called syphilitic mesoaortitis. The intima of the aorta becomes uneven - shagreen, elastic fibers are destroyed and an aortic aneurysm is formed - a protrusion that may even rupture. This is another difference. In a tuberculous tubercle one center of a necrosis, in gumma - some. In the foci of necrosis in the gum, there are often separately preserved structures of the tissue in which the gum is located, such as bone beams, hepatic trabeculae, and others. In tuberculous tubercles no structures in the necrosis zone are visible. Gradually, the gum is subject to scarring, and a sharp, rough scarring with the formation, again, in contrast to tuberculous granuloma, stellate retracted scars. The gums have different localization and come in different sizes. Small micro gums can be located in the walls of the thoracic aorta, called syphilitic mesoaortitis. The intima of the aorta becomes uneven - shagreen, elastic fibers are destroyed and an aortic aneurysm is formed - a protrusion that may even rupture. This is another difference. In a tuberculous tubercle one center of a necrosis, in gumma - some. In the foci of necrosis in the gum, there are often separately preserved structures of the tissue in which the gum is located, such as bone beams, hepatic trabeculae, and others. In tuberculous tubercles no structures in the necrosis zone are visible. Gradually, the gum is subject to scarring, and a sharp, rough scarring with the formation, again, in contrast to

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In addition to gum, in the tertiary period of syphilis in the aorta and other vessels, as well as in the liver there are diffuse productive-necrotic processes, or so-called gum infiltrates.

This is the characteristic of inflammatory reactions in acquired syphilis. If a woman with syphilis becomes pregnant, intrauterine infection of the fetus can occur hematogenously through the placenta and umbilical vein, and then congenital syphilis occurs. Placental circulation is established at the 4th month of pregnancy, infection of the fetus occurs no earlier than this period. There are: syphilis of stillborn fetuses; syphilis of newborns and infants; late congenital syphilis at the age of 4 to 17 years.

At a congenital syphilis of newborns and children till 4 flyings there is an immunity establishment, inflammation has exudative-necrotic character, with development in all bodies of small centers of a necrosis with impurity of leukocytes and a large number of treponemes. These cells have long been called "miliary gums", although they have nothing to do with gums of the tertiary period of syphilis. The rash on the skin is diffuse, merging, typically located rashes on the soles and palms, there are diffuse lesions of internal organs - liver, lungs.

In late congenital syphilis, the changes are similar to acquired syphilis - the usual syphilis of the papular type and gum in the internal organs.

Actinomycosis.

It is now established that the causative agent of actinomycosis are gram-positive bacteria - microaerophilic, aerobic and anaerobic actinomycetes, which are widespread in nature. They make up 65% of the total number of soil microorganisms, are found in water, in particular tap and spring, in hot (up to 65oC), mineral springs, on plants, on rocks and even in the sands of the Sahara. In the human body, actinomycetes are also permanent residents, they contaminate the mouth, bronchi, gastrointestinal tract, vagina.

Actinomycetes usually lead a saprophytic lifestyle, but some strains can cause disease under certain conditions. It is known that actinomycetes do not penetrate through healthy skin and mucous membranes, so the main contributing factor, along with a decrease in the body's immune defenses, is trauma to the barrier coverings. The pathogen enters the body, usually through the digestive tract. The process spreads

mainly through the tissue and connective tissue layers of organs and tissues. In some cases, there is a general infection. Skin lesions are more likely to recur due to the spread of the pathological process from deep tissues. According to the ways of its distribution and localization, there are cervical-maxillofacial actinomycosis, pulmonary and other types. The affected area is characterized by the presence in the subcutaneous adipose tissue of a dense tuberous infiltrate, which is formed from fused nodes, the skin under which has a bluish-red color. Later, the infiltrate softens in some areas and small fistulas appear, from which pus is released.

Actinomycotic granuloma is composed of plasma, epithelioid and giant multinucleated cells. All cells are scattered in a mess. In 50% of cases, actinomycotic friends are found in the granuloma. Friends are well colored by Gram and Van Gizon. Rusel bodies and hyaline spheres, which are hyalinized dead plasma cells, are also found. Characterized by the presence of large dense sclerotic fields, among which are scattered abscesses. In abscesses among the dead leukocytes and there are usually friends.

Near the border of abscesses is determined by the accumulation of xanthoma cells loaded with cholesterol. The word "xanthos" means "yellow"; cells are yellow from cholesterol.

Respiratory scleroma - xchronic respiratory disease. Called by Frisch-Volkovich's wand. It is characterized by the growth of a peculiar, dense consistency of granulation tissue, builtof plasma, epithelioid and lymphoid cells. Specific large cellsMikulich with vacuolated cytoplasm, light, as if reticulate. Nuclei, in the amount of 1 or 2, small, dense, rod-shaped, located near the shell on the periphery of the cell. In the vacuoles of the cytoplasm of Mikulich cells are pathogens - Frisch-Volkovich bacilli. They have a mucous capsule and therefore the cytoplasm of cells, slipping, becomes light, reticulate. During the development of the processpart of plasma cellsages and undergoes hyalinosis, turning into Rusel bodies and hyalinebullets. In granulomaquite a few blood capillaries. The growth of connective tissue narrows the airwayways. It causes respiratory disorders and can cause death from asphyxia.

Leprosy -chronic infectious disease that usually affects the skin and peripheral nerves.

The disease is caused by Hansen's mycobacteria. The source of infection is a sick person. There are three types of leprosy: lepromatous, tuberculoid, intermediate.

The skin, upper respiratory tract and peripheral nerves are most often affected. Specific granulomas - leprosy are formed.

Lepromatous form of leprosy most often develops in the skin, is characterized by the appearance in it of different sizes of nodules and nodes (leprosy) of fleshy consistency, located in the surface layers of the skin.

Histologically active lepromatous process is represented by the development of nodules. They merge with each other and consist mainly of macrophages with an admixture of lymphocytes, plasma cells, histiocytes. Leprosy contains a huge number of leprosy mycobacteria. According to Binford, 1 g of flowering leprosy contains 5·109 mycobacteria. Such a powerful and unrestrained reproduction of the leprosy pathogen is due to the fact that their phagocytosis by macrophages is incomplete. Electron microscopy shows that the phagolysosomes of the macrophage contain unchanged, viable mycobacteria arranged in regular rows. Only with time comes the partial decay of mycobacteria. Macrophages that phagocytosedleprosy mycobacteria increase in size. Gradually, they appear vacuoles, fatty inclusions, very characteristic of leprosy. The macrophages changed in this way are called Virchow's leprosy cells. Masses of bacteria in the macrophage are glued together in the form of "balls", when the cell dies are released from it, are located freely in the tissue. Later, the balls are phagocytosed by giant cells of foreign bodies. Lepromatous infiltration into the skin is often diffuse. The tuberculoid form of leprosy is characterized by the proliferation of epithelioid cells, the formation of giant Pirogov-Langhans cells, and the accumulation of lymphocytes. Cellular infiltrates in the tuberculous form of leprosy are located in the papillary layer under the epidermis. Leprosy mycobacteria are found in very small quantities. In the tuberculoid form of leprosy, small nerves of the skin are constantly involved in the process, which are destroyed. Nerve damage is accompanied by loss of skin sensitivity as one of the early symptoms of leprosy. By the nature of the tissue reaction, we can

assume that in the tuberculoid form there is a high resistance of the macroorganism to infection.

*Intermediate form of leprosy*manifested by the appearance in the skin of a nonspecific cellular reaction around the vessels and appendages of the skin, and sometimes small nerve trunks. In this form of mycobacteria leprosy is sometimes found in unaltered nerves. The intermediate form of leprosy is very difficult for clinical and morphological diagnosis.

Leprosy granulomas are not always susceptible to necrosis. Ulcerative complications on the skin occur as a result of trophic disorders due to damage to nerve trunks. In some cases, when a specific inflammatory reaction occurs in the bone marrow of the phalanges of the fingers or toes, their separation (mutilation) is possible. Under the influence of treatment leprosy granulomas are replaced by proliferating cells of connective tissue and scars remain in place of granulomas. However, after some period of remission, the disease may worsen again with a complete repetition of the entire cycle of cellular reactions. In other words, both clinically and morphologically leprosy proceeds in waves, and periods of outbreaks of the disease alternate with the attenuation of inflammation. In this regard, patients with leprosy should be constantly monitored by a physician.

Sap - zoonotic infectious disease, which runs on the type of septicemia with the formation of specific granulomas, abscesses in various tissues and organs.

At an acute sciatica there are nodules which consist of epithelioid cells with an impurity of neutrophilic leukocytes. These nodules are very quickly subject to necrosis and purulent melting. Very characteristic is karyorexis; the nuclei turn into small lumps, intensely stained with hematoxylin. In addition to granulomas, abscesses can occur in organs and skin.

At a chronic sap nodules are formed. Nodules appear in various organs, including the lungs, and are very similar to tuberculous tubercles. At a chronic sap in bodies, in particular in lungs, sclerotic changes can arise.

Productive inflammation with the formation of polyps and genital warts. Observed on the mucous membranes and in the squamous epithelium adjacent to them.

It is characterized by the simultaneous involvement of the epithelium and the stroma of the mucous membrane. The growth of the glandular epithelium together with the cells of the underlying connective tissue leads to the formation of polyps. Such polypoid growths are observed at a long inflammation of a mucous membrane of a nose, a stomach, a rectum, a uterus, a vagina, etc. It should be noted that polyps on some mucous membranes are often of inflammatory origin, while on others - of tumor origin. In areas of squamous epithelium, which is located near the prismatic (anus, genitals), the exudate in chronic inflammation constantly irritates them, which causes the growth of the stroma and epithelium with the formation of papillary formations - genital warts. Similar papillary growths of an epithelium are observed at syphilis,

In the second half of the 1970s, views on cervical warts changed significantly. Togetherwith the well-known classical form - acute warts (papillary or exophytic type), two more types of papillomavirus lesions were identified in the cervix: "flat" and endophytic warts (intraepithelial and inverted types). The latter type, namely endophytic warts, is rare. Flat warts predominate among cervical lesions. The development of all three types of papillomavirus lesions in the vagina is possible.

According to the literature, there is a gradual increase in the incidence of warts, and flat warts of the cervix are observed almost exclusively in young women.

The incubation period for papillomavirus infection ranges from 1 to 9 months, averaging three months. Acute warts have the form of single or numerous small (sometimes large, gigantic) papillary formations, pale pink on a short stalk and resembling a wart, raspberry, cauliflower, or rooster crest. Depending on the location (external genitalia, vagina, cervix), pointed warts can be flesh-colored or intensely red, with maceration - whitish. When ulcerated, they emit a liquid with an unpleasant, foul odor. Giant warts can be symmetrically located on the labia majora and labia minora, occupy the entire genital slit, move to the femoral-inguinal folds. Occasionally they are located on the perineum, between the buttocks, and also isolated around the anus with the transition to the mucous membrane of his sphincter. Large warts in the form of a clutch can be localized around the urethra.

In the initial period of formation of acute condyloma symptoms are often absent, but with their rapid growth, patients seek medical help. The appearance of a significant amount of exudate causes maceration, genital warts and skin, which leads to itching and heartburn. At the big and gigantic sizes of a condyloma patients hardly move.

For the diagnosis of papillomavirus infection, in particular squamous warts, cytological and histological examination of the tissue removed by targeted biopsy are of great importance. At cytological research in smears find koylocytes which are cells of a squamous epithelium of an intermediate and superficial layers with a wideperinuclear clarification, a narrow rim of the cytoplasm preserved on the periphery, with amphephilic properties (Papanicolaoul staining) and nuclei with dystrophic changes and as if "suspended" in space, as well as dyskeratocytes (isolated or peeling in the form of aggregates) squamous epithelial cells with enlarged hyperchromic or pyknotic nucleus and orangephilic cytoplasm. Both cell types can be multinucleated.

According to the literature, cytological examination of hyperkeratosis is diagnosed in 53% of cases, parakeratosis - in 28%, proliferation of the cylindrical epithelium - in 50%, hyperplasia of reserve cells - in 11%, dyskaryosis - in 7%, koilocytosis - in 48%. More often these signs are observed in combination.

On histological examination, classic acute condyloma is characterized by papillomatosis, acanthosis, elongation and expansion of the papillae, parakeratosis and the presence of koilocytes. Squamous warts are located in the multilayered squamous epithelium with acanthosis. There is usually a clear demarcationbetween the unaltered basal and parabasal layers and the more superficial layers of the epithelium, which contain koilocytes. Sometimes in the superficial parts of the lesion there is a layer of different thickness of dyskeratocytes with pyknotic nuclei and other changes of dystrophic nature. Warts are always removed regardless of their type, location and size, spontaneous recovery (disappearance) never occurs, and benign acute warts in some cases can regenerate into carcinoma. Removed warts should be examined histologically to rule out signs of malignant transformation.

Thus it is possible to come to a conclusion that features of displays of productive inflammation are caused not only by character of the activator, but also by features of

structure of bodies. Thus, in the myocardium, productive inflammation can have both nodular limited and interstitial diffuse nature. In the liver, interstitial inflammation is often diffuse, spreading to the stroma of the organ. In the kidneys, productive inflammation is observed both in the glomeruli in the form of productive glomerulitis without damage to the stroma of the organ, and in the stroma in the form of intermediate nephritis. In the central nervous system, proliferation occurs mainly due to neuroglia and vascular elements. In the walls of blood vessels, inflammation is accompanied by proliferation of cambial cells of the endothelium and adventitia.

The course of productive inflammation can be acute, but in most cases chronic. The acute course is characteristic of productive inflammation, which occurs in a number of infectious diseases - typhoid and rash, tularemia, recurrence of acute rheumatism; productive glomerulitis is observed in scarlet fever. The chronic course is characteristic of most interstitial productive inflammatory processes (for example, in the myocardium, kidneys, liver, muscles, etc.), which end in sclerosis.

The consequence of productive inflammation is different depending on in which organ or tissue it occurs and the nature of the disease. Chronic productive inflammation causes the development of focal or diffuse sclerosis of the organ. If at the same time deformation (shrinkage) of body and its structural reorganization develops, then it is a question of cirrhosis. Nephrocirrosis as a way out of chronic glomerulonephritis, liver cirrhosis as a way out of chronic hepatitis, pneumocirrhosis as a way out of chronic pneumonia, etc.

LECTURE 5

MOLECULAR-PATOMORMOLOGICAL FUNDAMENTALS OF THE IMMUNE RESPONSE, IMMUNE SYSTEM IN THE PRENATAL AND POSTNATAL PERIOD, PATHOLOGY OF IMMUNE PROCESSES, HYDRAULIC PROCESSES IMMUNE FAILURE. AUTOIMMUNE DISEASES.

Immunity - it is a complex of reactions aimed at protecting the body from infectious agents of substances that differ from it by biological (antigenic) properties.

The immune response consists of cellular interactions that are activated by the entry of foreign antigenic material. After processing by macrophages, lymphocytes which are the main cells of an executive link of immune system are engaged in antigen (fig. 1).

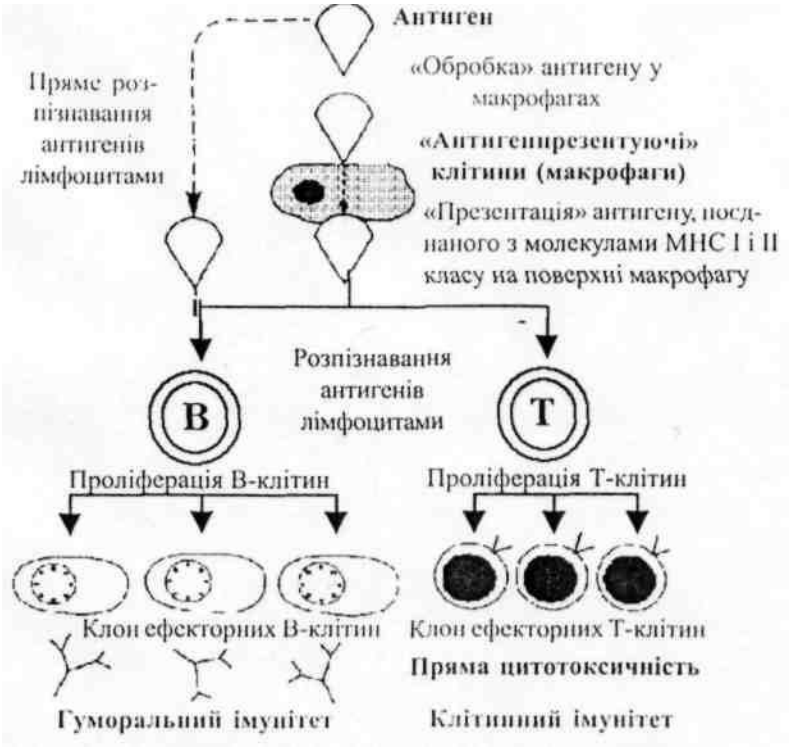

Fig.1. General scheme of immune response

Activation of lymphocytes by antigen leads to proliferation and transformation of lymphocytes. There are two main types of immune response.

Lymphocytes (both T and B) that carry specific antigen receptors begin to proliferate (the phase of growth of the immune response) after encountering the antigen. Antigen-presenting cells (various types of macrophages) are involved in the mechanism of antigen recognition. During reproduction, clones of effector cells are formed. Plasma cells that secrete immunoglobulins (antibodies) emerge from B cells, and cytotoxic cells emerge from T cells.

Cellular immunity- is the function of T-lymphocytes; during cellular immunity, effector cells are formed - T-killers, capable of destroying cells that have antigenic structure, by direct cytotoxicity and by synthesis of certain substances called

lymphokines, they participate in the processes of cell interaction (macrophages, T-cells, B- cells) in the immune response. In addition, two subtypes of T cells are taken. participation in the regulation of the immune response: T-helpers enhance the immune response; T-suppressors have the opposite effect.

Humoral immunity -it is a function of B cells and is characterized by the transformation of B cells into plasma cells that secrete immunoglobulins (antibodies) that have specific activity against the antigen that has entered the body.

The immune response is characterized:

1) specificity (reactivity is directed only at a specific agent called an antigen);

2) potentiation (the ability to produce an enhanced response with a constant supply of the same antigen);

3) immunological memory (the ability to recognize and produce an enhanced response against the same antigen when it re-enters the body, even if the first and subsequent hits occur at long intervals).

These features distinguish the immune response from other nonspecific host responses (acute inflammation and non-immune phagocytosis).

Tolerance to own antigens. The concept of "one's own" and "another's" is central to immunological reactivity. A large number of molecules in the body are antigens, ie they cause an immune response when introduced into another body, but are not recognized as antigens by the host. The inability to respond to one's own antigens is called natural tolerance. This phenomenon prevents the destruction of its own tissues by the host's immune system. Tolerance to one's own antigens develops in the embryonic period, and this is a manifestation of the specificity and memory of the immune response.

The cellular basis of the immune response

Lymphoid system

The immune response is carried out by the lymphoid system of the body, which is divided into central and peripheral organs of immunogenesis.

*To the central organs of immunogenesis*include the thymus and bone marrow, in which in the fetal period there are primary, semi-stem lymphoid cells (during this period

there is diversity and tolerance). It is believed that in humans the final development of diversity and tolerance is completed within a few months after birth).

To peripheral organs of immunogenesis include lymph nodes, spleen, Pirogov-Waldeyer ring (tonsils) and lymphatic follicles in the intestinal wall, which accumulate mature lymphocytes that respond to antigenic stimulation.

Peripheral blood also contains lymphocytes. Circulating lymphocytes form a pool of cells that continuously exchange with cells of peripheral lymphoid tissue.

*Lymphocytes*formed in the embryonic period from a lymphoid sprout in the bone marrow. By origin and immune function, lymphocytes are divided into two main types - T- and B-lymphocytes: 1) T-lymphocytes (thymus-dependent) are formed in the thymus and 2) B-lymphocytes are formed outside the thymus. B-lymphocytes develop in birds in the bag of Fabricius (Latin bursa - bag, hence the term "B-cells"); functional equivalent in humans - embryonic liver or bone marrow.

Inactive small lymphocytes are cells with a diameter of about 8-10 μm, with a small volume of cytoplasm and a spherical nucleus, which occupies almost the entire cell. The nucleus contains condensed chromatin, which looks quite basophilic in the usual color of drugs. All inactive lymphocyte populations are morphologically similar to each other and can be differentiated only by immunological and immunomorphological means.

Distribution of T cells in the body: T lymphocytes are formed in the embryonic thymus. In the post-embryonic period after maturation, T-lymphocytes settle in the T-zones of peripheral lymphoid tissue. These zones include:

- paracortical zone of lymph nodes and the space between lymphoid follicles (70% of lymphocytes in lymph nodes - T-lymphocytes);

- periarterial zones of lymphoid follicles in the white pulp of the spleen (40% of splenic lymphocytes - T cells). T-lymphocytes continuously and actively circulate between peripheral blood and peripheral lymphoid tissue. 80 to 90 percent of peripheral blood lymphocytes are T cells.

Transformation of T cells: After stimulation (activation) by a certain antigen, T-lymphocytes become large, actively dividing, and are called transformed T-

lymphocytes, or T-immunoblasts, from which the executive link of T-cells then arises. T-immunoblasts with a diameter of 15-20 μm, with a large volume of cytoplasm and an irregular nucleus with light chromatin and nucleolus; the nucleus is located in the center of the cell. T-immunoblasts can be distinguished from B-immunoblasts only by immunomorphological methods. Effector T lymphocytes are morphologically similar to inactive small lymphocytes and are often referred to as sensitized, cytotoxic cells, or T killers.

This process of transformation of T cells is a stage of development, (strengthening) of the immune response, during which several T cells that carry receptors recognize this specific antigen, form a numerous clone of T cells of the executive link, active against the same antigen, so that they have a corresponding receptor. The complete process of T cell activation begins when macrophages intercept the antigen and, through a mechanism that is still poorly understood, "process" the antigen and re-bring it to the cell surface in conjunction with MHC molecules before interacting with the T cell. Recognition occurs only when the T cell carries a specific receptor capable of recognizing the complex "antigen -MHC molecule",

Effector T cells play an important role in three functions of the immune system:

- cellular immunity;
- regulation of B-cell activity;
- delayed (IV) type hypersensitivity.

1. Cellular immunity includes two main aspects:

- cytotoxic cells that carry surface antigens cause direct cell damage (cytotoxic or killer cells). Direct cytotoxicity is observed in the immune response to antigens on the surface of neoplastic cells, transplanted tissues and virus-infected cells. Cytotoxic T cells may induce lysis by the formation of antigen-positive cells in the cytoplasmic membranes.

- production of lymphokines: executive T cells play a crucial role in the formation of the immune response through the formation of soluble proteins (lymphokines) that regulate the functions of certain cells, such as macrophages and other lymphocytes

2. Regulation of B-lymphocyte activity: two important subtypes of T-lymphocytes Participate in the regulation of B-lymphocyte function.

Helper T cells (CD4 antigen-positive) aid in the activation and transformation of B lymphocytes and in the synthesis of immunoglobulins. Suppressor T cells (CD8 antigen-positive) inhibit B cell activation and regulate immunoglobulin synthesis.

Distribution of B cells in the body: B-lymphocytes develop in the functional equivalent of the Fabricius sac of birds (probably in the embryonic bone marrow of mammals), undergoing a complex process that involves reproduction and division into classes. After that, B-lymphocytes spread through the bloodstream to the B-zone of peripheral lymphoid tissue. These areas include: 1) reactive (secondary or germinal) centers of follicles and sinuses of the cerebral layer of lymph nodes (30% of lymphocytes in the lymph nodes - B cells); 2) reactive centers in the follicles of the white pulp of the spleen (40% of splenic lymphocytes - B-cells). The term "primary follicle" is used to denote the accumulation of B cells in the lymph nodes or spleen that do not show proliferative activity. Like T cells, B cells are also constantly circulating between lymphoid tissue and peripheral blood. yu however less active. B cells make up 10-20 percent of the total number of peripheral blood lymphocytes.

Transformation of B cells: after stimulation with a specific antigen, B-dimphocytes are transformed into plasma cells. This process proceeds in stages, with the formation of a number of intermediate forms that form the reactive (germinative) center of the follicle. Plasma cells synthesize immunoglobulins (antibodies) that are specific for the antigen. The formation of circulating antibodies specific for antigens is the basis of acquired immunity, which is called humoral immunity.

"Zero" cells are a heterogeneous group of lymphocytes that are unable to form E-rosettes (an immunological test previously used to identify T-lymphocytes) and do not carry surface immunoglobulin (hence, unlabeled, or "zero" cells). This group includes some cells that are explicitly T- or B-cells, which has recently been proven by genetic methods and the method of monoclonal antibodies, but the designation of these cells has been abandoned. The population of "zero" cells are T- and B-cells, which are in the early stages of differentiation, before the appearance of a large number of markers on

their surface "Zero" cells make up 5-10% of all peripheral blood lymphocytes. NK cells (natural killers) have cytotoxic activity; K-cells are involved in cell destruction by antibodies.

Types of immune response

Based on whether or not the immune system was familiar with the antigen in advance, there are two types of immune response: primary and secondary.

Primary immune response"occurs at the first encounter with a specific antigen. Although the antigen is recognized almost immediately after entering the body, it takes several days before enough immunoglobulin is produced to detect an increase in serum immunoglobulin levels. During this latent period, those B cells with receptors that have reacted to a specific antigen undergo six to eight consecutive cycles of division before a sufficiently large clone of plasma cells secreting antibodies is formed.IgM is the first immunoglobulin produced during the primary response, followed by IgG. Switching from IgM to IgG synthesis or other immunoglobulins occurs as a normal phenomenon in the activation of B cells and is carried out by switching heavy chain genes.

*Secondary immune response*occurs upon re-encounter with the antigen. Re-recognition occurs immediately and the production of serum immunoglobulins, which is detected in laboratory studies, occurs faster (2-3 days) than in the initial response. IgG is the major immunoglobulin secreted during the secondary response. In addition, the peak level is higher and the decline is slower than in the initial response.

Anomalies of the immune response

Basically, immune reactions develop covertly, and they lead either to the complete destruction of the antigenic aggressor; or to partially suppress its pathogenic action, providing the body with a state of immunity.

However, in some circumstances, these reactions may develop abnormally.

In some cases; when introduced into the body of a foreign agent, they are so intense that they lead to tissue damage and are accompanied by the phenomenon of inflammation then talk about a reaction (or disease) of hypersensitivity.

Sometimes, under certain conditions, the cells of the body acquire antigenic properties or the body produces antibodies capable of reacting with normal cell

antigens. In these cases, talk about diseases due to autoimmunization, or autoimmune diseases.

Finally, there are conditions in which, despite the receipt of antigenic material, immune responses do not develop. Such conditions are referred to as immune failure, or immunodeficiency.

Thus, the immune system, which is normally involved in maintaining homeostasis, can be a source of pathological conditions caused by excessive reaction or lack of response to aggression, which are referred to as immunopathological processes.

Immunopathological called such processes, the development of which is associated with dysfunction of immunocompetent (lymphoid) tissue. Immunopathological processes form the basis of immunopathology - a branch of medicine that studies all pathological diseases arising from immunological conflict and disorders of immunological homeostasis. In addition to such a broad interpretation of immunopathology, there is another, narrower. According to him, immunopathology means autoimmunization, autoallergy and autoaggression.

The morphology of immunopathological processes includes the structural reflection of disorders of immunogenesis (antigenic stimulation or immune deficiency) and local immune reactions that occur in a sensitized organism - hypersensitivity reactions.

Morphology of immunogenesis disorders

Morphology of disorders of immunogenesis (immunological homeostasis) can affect both the thymus and peripheral lymphoid tissue and is associated with two types of immune responses - humoral and cellular.

Changes in the thymus gland (thymus) that occur in disorders of immunogenesis

The thymus belongs to the central organs of the immune system, at the same time it is an endocrine gland, so this gland is called a connecting chain - a "switch" between the immune and endocrine systems.

The main functions of the thymus (lymphopoietic, immunoregulatory and endocrine) are carried out primarily due to its secretion by hormones of epithelial cells,

mainly of polypeptide nature - thymosin, thymopoietin, thymic serum factor and others. The influence of the thymus on the processes of immunogenesis is also mediated by the endocrine system and regulatory T-lymphocytes - T-effectors, helpers, suppressors.

Throughout human life, the thymus is subject to age-related involution, which is characterized by the slow replacement of its tissue with adipose tissue. However, at any age in the adipose tissue of the anterior mediastinum remain islands of the parenchyma of the thymus and partially retains the secretion of thymic hormones and the production of T lymphocytes. Age-related involution of the thymus is one of the reasons for the decrease in the activity of cellular immunity and the increase in the frequency of infectious, autoimmune and oncological diseases in the elderly. Thymus pathology is associated with aplasia, hypo- and dysplasia, accidental involution, atrophy, thymomegaly and hyperplasia with lymphoid follicles. Thymus pathology is associated with the development of a number of immunodeficiency syndromes, autoimmune diseases and some endocrine disorders.

Aplasia, hypo-, thymic dysplasia are congenital anomalies of thymus development and are accompanied by a deficiency of a cellular chain of immunity or the combined immune deficiency. Thymic hormones are not produced at all or their production is minimal. At aplasia (agenesis) the thymus is absolutely absent; at hypo- and dysplasias its sizes are reduced; the division into cortex and brain substance is disturbed, the number of lymphocytes is sharply reduced.

Accidental involution of the thymus represents a rapid decrease in its mass and volume under the influence of primarily glucocorticosteroids in various stressful situations, including infectious diseases, intoxications, injuries. This progressively reduces the production of thymic hormones, increases the emigration of T-lymphocytes from the thymus, although the bulk of them are subject to decay in place (apoptosis). The functional significance of acute involution of the thymus is unknown, but its delay ("immobile" thymus) is accompanied by a decrease in the activity of cellular and humoral parts of the immune system. Accidental involution of the thymus may be reversible, but in cases of adverse effects leads to atrophy of the thymus.

Thymus atrophy develops as an adverse consequence of accidental involution of the thymus and may be the cause of some acquired immunological syndromes (in chronic infectious diseases, immunosuppressive therapy). Due to the reduction of lymphocytes and the collapse of the network of epithelial cells, the lobes of the parenchyma of the thymus decrease in volume, thymic bodies calcify, connective and adipose tissue grows in the perivascular spaces. The production of thymic hormones is significantly reduced.

Thymomegaly characterized by an increase in the mass and volume of the parenchyma of the thymus above the age norm while maintaining its normal structure. It can be congenital or acquired. Congenital thymomegaly is more common in children, less common in adults, often associated with malformations of the nervous and cardiovascular systems, congenital dysfunction of the endocrine system, especially chronic renal and gonadal insufficiency. Congenital thymomegaly, especially in infectious diseases, is accompanied by generalized hyperplasia of lymphoid tissue. The production of thymic hormones is reduced, there are violations of mainly cellular immunity, which are close to congenital immunodeficiency syndrome.

The cause of death of patients with thymomegaly can be infectious and infectious-allergic diseases. In connection with endocrine disorders under the influence of stress factors (medical manipulations, surgical interventions) sudden death is possible.

Previously, cases of thymomegaly were combined with the concept of "thymico-lymphatic state", which was based on congenital hyperthymic function. This interpretation is essentially incorrect, so the concept of "thymic-lymphatic condition" in medical life is not used. In our time, this condition has acquired a different meaning and reflects immunoendocrine dysfunction of various origins.

Thymus hyperplasia with lymphoid follicles characteristic of autoimmune diseases. In sharply expanded intraparticle perivascular spaces of a parenchyma of a thymus B-lymphocytes, plasma cells accumulate, lymphoid follicles which normally do not meet there appear. The production of thymic hormones may be increased or decreased. Until recently, the importance of thymic hyperplasia with lymphoid follicles

in the pathogenesis of autoimmune diseases is not yet known. It is suggested that the lesion of the thymus may be one of the causes of the autoimmune process, but secondary damage to this gland is possible.

Changes in peripheral lymphoid tissue that occur in violation of immunogenesis

Changes in peripheral lymphoid tissue are most characteristic of antigenic stimulation and its hereditary insufficiency.

At antigenic stimulation (sensitization) of an organism changes of peripheral lymphoid fabric are unambiguous and are shown by macrophage reaction, a hyperplasia of lymphocytes with their consecutive plasmacytic transformation. These changes are complemented by increased permeability of microvessels, edema of the interstitium and the accumulation of protein-polysaccharide (CHIC-positive) substances (tissue dysproteinosis). The degree of macrophage-plasmacytic transformation of lymphoid tissue reflects the voltage of immunogenesis and, above all, the level of formation of antibodies (immunoglobulins) by plasma cell cells.

Changes at antigenic stimulation are especially brightly shown in lymph nodes (first of all regional in relation to a place of receipt of antigen) and a spleen.

In the lymph nodes, which increase, become full-blooded and swollen, in their cortical layer, in the bright centers of the follicles and the cerebral layer, a large number of plasmablasts and plasma cells appear. They displace lymphocytes. There is a proliferation and desquamation of sinus cells, the formation of a significant number of macrophages and protein-polysaccharide substances in the stroma. The spleen is enlarged, has the appearance of full-blooded and juicy; large follicles are clearly visible on the autopsy surface. There is hyperplasia and plasmatization of both red pulp and its follicles, the peripheral zone of which consists entirely of plasmoblasts and plasma cells. In the red pulp, along with plasmoblasts, there are many macrophages.

If in response to antigenic stimulation mainly cellular immune reactions develop, then in the lymph nodes and spleen proliferate mainly sensitized lymphocytes, rather than plasmablasts and plasma cells. At the same time there is an expansion of T-dependent zones.

The same changes in the form of cellular hyperplasia and macrophage-plasmacytic transformation, and in some cases myeloma hyperplasia, are found in the bone marrow, portal tracts and sinusoids of the liver, in the interalveolar septa, perivascular and peribronchial tissue of the left ventricle. and intestines, intermuscular layers, adipose tissue, etc.

Hereditary insufficiency Peripheral lymphoid tissue is characterized by changes in both the spleen and especially the lymph nodes. In the spleen, the size of the follicles is significantly reduced, light centers and plasma cells are absent. There are no follicles and cortical layer in the lymph nodes (B-dependent zones), only the cortical layer (T-dependent zone) is preserved. Such changes are characteristic of hereditary immunodeficiency syndromes associated with a defect of humoral immunity.

Amyloidosis - the concept is not unambiguous. This is a type of dysproteinosis and a complication of many diseases of infectious, inflammatory or tumor nature. This is an independent disease of genetic (hereditary amyloidosis), or unknown yet "primary" nature, old age disease, tumor-like disease and the disease of the tumor itself (APUD-amyloid). This does not exhaust the variety of amyloidosis, which can be considered equally a problem of modern clinic, a problem of molecular biology.

Amyloid is a glycoprotein in which the fibrillar protein (F-component) is closely related to plasma glucoproteins (P-component).

The basis of glycosaminoglycans of amyloid are chondroitin sulfate, heparin sulfate or both of these polysaccharides. Certain links between polysaccharides and amyloid proteins have been established.

The chemical nature and physical properties of amyloid indicate the strength of the bonds of its protein-polysaccharide components between themselves and the elements of the tissue where they fall out. The strength of these bonds can explain the resistance of amyloid to the action of many enzymes. Physico-chemical features of amyloid determine its tinctorial properties, which are detected using different methods. Congo red, methyl violet and especially thioflavin T have diagnostic value.

Cellular transformations of the reticuloendothelial system (RES) are the essence of the preamyloid stage, which is characterized by plasmaization of RES organs, primarily the spleen, bone marrow, lymph nodes and liver.

The synthesis of amyloid fibrillar protein by cells of mesenchymal origin can be considered proven.

The connection of amyloid fibrils with plasma proteins and glycoproteins and tissue glycosaminoglycans is the final stage in the formation of amyloid substance. The formation of amyloid occurs outside the cells, in close connection with the connective tissue fibers - reticular or collagen. These data served as the basis for the selection of two types of amyloid depending on its relationship to the fibrillar structures of connective tissue - perireticular and pericollagen.

For perireticular amyloid (AA-amyloidosis), which falls along the membranes of blood vessels and glands, as well as along the reticular stroma of parenchymal organs, typical predominant lesions of the spleen, liver, kidneys, adrenal glands, intestines, intima vessels of small and medium caliber.

Pericollagen amyloid (AL-amyloidosis), which is formed along the collagen fibers, is characterized by a predominant lesion of the adventitia of large and medium-sized vessels, myocardial stroma, striated and smooth muscles, nerves, skin (mesenchymal amyloidosis).

Typical organ localization of amyloid deposits. The spleen, kidneys, liver, adrenal glands, intestines are most often affected, which is characteristic of parenchymal amyloidosis. Less commonly affected myocardium, skeletal muscle, lungs, skin. Even less often, the thyroid and pancreas, lymph nodes, bones, vascular plexuses and brain matter. There are clinical types of amyloidosis: a) cardiopathic, b) nephropathic, c) neuropathic, d) hepatopathic, e) others.

Amyloidosis can be generalized (general, common) or local (local). In some cases, amyloid deposits grow like a tumor ("amyloid tumor"), amyloid is formed and in tumors of endocrine organs - apudomas, such amyloid is called - APUD-amyloid.

The appearance of organs in amyloidosis depends on the degree of the process. If the amyloid deposits are small, the appearance of the organ changes little and

amyloidosis is detected only by microscopic examination. At the expressed amyloidosis the body increases in volume, becomes very dense, fragile, and on a section has original waxy, or sebaceous look.

Immunological hypersensitivity

Hypersensitivity is a pathological excessively strong immune response to a foreign agent, which leads to damage to body tissues. There are four different types of hypersensitivity. All forms, except type IV, have a humoral mechanism (ie they are mediated by antibodies); Type IV hypersensitivity has a cellular mechanism. In all forms, the primary intake of a particular antigen (sensitizing dose) causes a primary immune response (sensitization). After a short period (one or more weeks) during which the immune system is activated, a hypersensitive response occurs to any subsequent influx of the same antigen.

Type And hypersensitivity (immediate) (atopy; anaphylaxis)

Development mechanism: the first receipt of antigen (allergen) activates the immune system, which leads to the synthesis of antibodies - IgE (reagins), which have a specific; reactivity against this antigen. After that, they are fixed on the surface membrane of tissue basophils and blood basophils due to the high affinity (affinity) of IgE to Fc receptors. The synthesis of antibodies in sufficient quantities to develop hypersensitivity lasts one or more weeks. At the subsequent introduction of the same antigen there is an interaction of antibody (IgE) and antigen on a surface of fabric basophils or basophils of blood that causes their degranulation. From the cytoplasmic granules of tissue basophils in the tissues come vasoactive substances (histamine and various enzymes involved in the synthesis of bradykinin and leukotrienes (see "Inflammation"), which cause vasodilation,

Local events - atopy, congenital predisposition, related to the pathological response against certain allergens.

Skin - when the allergen enters the skin there is a sudden redness, swelling (urticaria) and itching; in some cases - acute dermatitis and eczema.

Nasal mucosa- when inhaling an allergen (eg, plant pollen, animal hair) in the nasal mucosa there is vasodilation and hypersecretion of mucus (allergic rhinitis).

Lungs -inhalation of allergens (plant pollen, dust) leads to a reduction in bronchial smooth muscle and hypersecretion of mucus, which leads to acute airway obstruction and asthma (allergic bronchial asthma).

Gut - oral exposure to an allergen (eg, nuts, shellfish, crabs) causes muscle contraction and fluid excretion, manifested as spastic abdominal pain and diarrhea (allergic gastroenteritis).

Systemic manifestations - anaphylaxis. A rare but extremely life-threatening systemic type I hypersensitivity reaction. The entry of vasoactive amines into the bloodstream causes a contraction of smooth muscle, widespread vasodilation and increased vascular permeability with the release of fluid from the vessels into the tissues. The resulting peripheral vascular insufficiency and shock can lead to death within minutes (anaphylactic shock). In less severe cases, increased vascular permeability leads to allergic edema, which is the most dangerous manifestation in the larynx, because it can cause fatal asphyxia.

Systemic anaphylaxis mainly occurs with the injection of allergens (eg, penicillin, foreign serum, local anesthetics, X-ray contrast agents). Less commonly, anaphylaxis can occur with oral allergens (mollusks, crabs, eggs, berries) or when allergens get into the skin (bee and wasp bites). In sensitized people, even a small amount of allergen can provoke the development of fatal anaphylaxis (penicillin hypersensitivity test).

Type II hypersensitivity

Mechanism of development: type II hypersensitivity is characterized by the reaction of an antibody with an antigen on the surface of a host cell, which causes the destruction of this cell. The antigen may be its own, but for some reason recognized by the immune system as foreign (there is an autoimmune disease). The antigen may also be external and may accumulate on the cell surface (for example, the drug may be a hapten when combined with a cell membrane protein and, thus, they stimulate the immune response).

A specific antibody, mainly IgG or IgM, which is synthesized against the antigen, interacts with it on the cell surface and causes cell damage in several ways:

1. Cell lysis - activation of the complement cascade leads to the formation of "membranes" of the attacking "complex" C5b6789, which causes lysis of the cell membrane.

2. Phagocytosis - the antigen-carrying cell is absorbed by phagocytic macrophages having Fc or Cbb receptors, which allows them to recognize anti-gene-antibody complexes on the cell.

*3.*Cellular cytotoxicity - the antigen-antibody complex is recognized by non-sensitized "zero" lymphocytes (K cells; see "Immunity"), which destroy the cell. This type of hypersensitivity is sometimes classified separately as type VI hypersensitivity.

4. Changing cell function - the antibody can react with cell surface molecules or receptors, causing either amplification or inhibition of a particular metabolic response without causing cell necrosis (see Stimulation and Inhibition in Hypersensitivity, below). Some authors classify this phenomenon separately as type V hypersensitivity.

Manifestations of type II hypersensitivity reactiondepend on the type of cell that carries the antigen. Note that blood transfusion reactions are actually normal immune responses against foreign cells. They are identical in the mechanism of the type II hypersensitivity reaction and also adversely affect the patient, in connection with which blood transfusion complications are often considered together with the disorders that occur in hypersensitivity.

Type II hypersensitivity occurs in blood transfusion reactions (antibodies in the patient's serum react with antigens on erythrocytes, causing either indirect intravascular hemolysis with complement, or delayed hemolysis as a result of immune phagocytosis by splenic macrophages); hemolytic disease of the newborn; hemolytic reactions caused by drugs, infectious diseases (mycoplasma pneumonia, infectious mononucleosis).

Immunocomplex damage.

The third mechanismassociated with toxic effects on cells and tissues of circulating immune complexes, which leads to the activation of the complement component and the development of reactions of immune complexes (immunocomplex reaction). The accumulation of immune complexes activates complement and causes acute inflammation and necrosis (reactions such as the Arthus phenomenon - with

repeated administration of vaccine in rabies; serum sickness reactions - re-entry of large amounts of antigen of foreign serum proteins, drugs, viral, microbial).

The fourth mechanism is due to the effect on the tissues of effector cells of sensitized T-lymphocytes, which show cytotoxicity either directly or by secretion of lymphokines. Type IV hypersensitivity reactions generally occur 24-72 hours after antipyretic administration. Histological examination of tissues in which the type IV hypersensitivity reaction occurs reveals cell necrosis and pronounced lymphocytic infiltration.

Direct cytotoxicity plays an important role in contact dermatitis, in response to tumor cells infected with the virus, transplanted cells, in some seutoimmune diseases.

Thus, the first immunological mechanisms are a manifestation of humoral immunity (antibodies, complement components, circulating antigen-antibody complexes) and other cellular immunity (lymphocytes, macrophages). This determines the nature of hypersensitivity reactions and the principle of their classification. Reactions associated with immunopathological mechanisms, which are manifestations of humoral immunity, are called immediate-type hypersensitivity reactions (GNT), and those associated with immunopathological mechanisms, which are manifestations of cellular immunity, are called delayed-type hypersensitivity reactions (GST). In addition, there are transplant immune reactions (rejection reactions).

Hypersensitivity reactions are morphologically reflected in immune inflammation. It is called immune because the trigger for the development of this inflammation is an immune response. Immune inflammation can be acute or chronic.

*Immediate type hypersensitivity reaction*morphologically it is a manifestation of acute immune inflammation. It is characterized by the speed of development, the predominance of alternative and vascular-exudative changes, the slow course of reparative processes. Alternative changes relate mainly to the walls of blood vessels, the main substance and the fibrous structures of connective tissue. They are represented by plasma impregnation, mucoid and fibrinoid swelling, fibrinoid necrosis. The appearance of coarsely dispersed proteins, fibrin, neutrophils, "digesting" immune complexes, and erythrocytes in the center of immune inflammation is associated with pronounced

plasmamorgic and vascular-exudative reactions. In this regard, the most characteristic of GNT is fibrinous or fibrinous-hemorrhagic exudate. Proliferative-reparative reactions in GNT develop later and are poorly expressed. They are manifested by proliferation of endothelial cells and perithelium (adventitia) of blood vessels and over time coincide with the appearance of mononuclear-histiocytic elements, which reflects the elimination of immune complexes and the beginning of reparative processes. Evaluation of morphological changes in GNT, their belonging to the immune response require evidence using immunohistochemical method.

Most typically, the dynamics of morphological changes in GNT is reflected in the Arthus phenomenon, which occurs in sensitized animals with local administration of a solution dose of antigen. In human pathology, GNT is the essence of many bacterial infections, allergic diseases and processes. Manifestations of GNT with a predominance of alteration are constant in tuberculosis, syphilis, they are the basis of vascular changes in rheumatism, systemic lupus erythematosus, glomerulonephritis, nodular periarteritis and others. Vascular-exudative manifestations of GNT are pronounced in croupous pneumonia.

The reactions of GNT are similar to the so-called reagin reactions, ie reactions in which allergic antibodies or reagins (IgE) fixed on cells take part. They are characterized by superficial alteration of cells and tissues, which explains the lack of participation of complement in the reaction and the predominance of vascular-exudative changes associated with massive degranulation of tissue basophils (labrocytes) and histamine release; the infiltrate is dominated by eosinophils - inhibitors of basophils. An example of a reagin reaction may be changes in atopic bronchial asthma.

Delayed type hypersensitivity reaction (GST). Two types of cells take part in this reaction - sensitized lymphocytes and macrophages. Lymphocytic and macrophage infiltration in the focus of immune conflict is a reflection of chronic immune inflammation, which underlies GST.

The destruction of the target cell, ie immunologically induced cellular cytolysis, of course, is associated with the activation of lysosomal enzymes of killer lymphocytes. Macrophages thus react specifically with the antigen with the help of mediators of

cellular immunity - lymphokines and cytophilic antibodies adsorbed on the surface of these cells. In this case, between lymphocytes and macrophages there are contacts in the form of cytoplasmic bridges, which may serve to exchange information between cells about the antigen. Immunologically induced cellular cytolysis can be associated with cellular antibodies, ie with NK and K cells.

Inflammation in the form of lymphohistiocytic and macrophage infiltration of tissue in combination with vascular-plasma and parenchymal-dystrophic processes can be considered immune, ie reflecting GST, only in the presence of evidence of connection of infiltrate cells with sensitized lymphocytes. These evidences can be found on histochemical and electron microscopic examination.

The clinical and morphological manifestations of GST include the following: tuberculin-type reaction in the skin in response to antigen administration, contact dermatitis (contact allergy), autoimmune diseases, immunity to many viral and some bacterial infections (viral hepatitis, tuberculosis, brucellosis). The morphological manifestation of GST is granulomatosis.

The reactions of GNT and GST often combine or change each other, reflecting the dynamics of the immunopathological process.

Manifestations of transplant immunity are represented by the reaction of the recipient's organism to the genetic foreign transplant of the donor, ie the reaction of transplant rejection. Graft antigens induce the formation of specific antibodies that circulate in the blood and the production of sensitized lymphocytes that carry out cell invasion of the graft. The main role in the rejection reaction is played by sensitized lymphocytes, so the manifestations of transplant immunity are similar to GST.

Morphological manifestations of the rejection reaction are reduced to increasing infiltration of the graft mainly by lymphocytes, as well as histiocytes due to the invasion of these cells and their proliferation on the spot. Cellular infiltration is accompanied by circulatory disorders and graft edema. In the end, many neutrophils and macrophages appear among the infiltrate cells. Immune lymphocytes, which destroy graft cells, are thought to be saturated with its antigens, so humoral antibodies directed against transplant antigens not only bind to the graft cells but also lyse the lymphocytes.

Enzymes that are released from activated lymphocytes destroy graft cells, leading to the release of new transplant antigens. This is the growing enzymatic destruction of the graft. Clinical types of graft rejection: transient reaction that occurs within minutes after transplantation; acute rejection lasts from several days to months; chronic rejection, characterized by progressive deterioration of organ function over many months or years. The rejection reaction can be suppressed by a number of immunosuppressive agents. This allows the transplantation of organs and tissues to use not only isotransplant (recipient and donor - twins), but also allograft (recipient and donor - foreign) both from a living person and from the corpse. characterized by progressive deterioration of organ function over many months or years. The rejection reaction can be suppressed by a number of immunosuppressive agents. This allows the transplantation of organs and tissues to use not only isotransplant (recipient and donor - twins), but also allograft (recipient and donor - foreign) both from a living person and from the corpse. characterized by progressive deterioration of organ function over many months or years. The rejection reaction can be suppressed by a number of immunosuppressive agents. This allows the transplantation of organs and tissues to use not only isotransplant (recipient and donor - twins), but also allograft (recipient and donor - foreign) both from a living person and from the corpse.

Autoimmunization and autoimmune diseases

Autoimmunization (autoallergy, autoaggression) is a condition characterized by the appearance of a reaction of the immune system to normal antigens of its own tissues.

Autoimmunization is closely related to the concept of immunological tolerance (from the Latin tolerare - to tolerate, tolerate), which is characterized by a state of reactivity ("tolerance") of lymphoid tissue against antigens that can cause an immune response. During the maturation of lymphoid tissue there is an immunological tolerance to antigens of all organs and systems, except for the tissues of the eye, thyroid gland, gonads and adrenal glands, brain and nerves. It is considered that the antigens of these organs and tissues are separated from the lymphoid tissue by physiological barriers, which explains the lack of tolerance to them by the immunocompetent system. The

immune system begins to recognize "its" and "foreign" tissue antigens in the newborn a few weeks after birth. In this case, the production of autoantibodies in small quantities is constantly occurring throughout life, and autoantibodies are believed to be involved in the regulation of various body functions. their action is under the control of T-suppressors and antiidiotypic antibodies, which prevents the development of autoimmune processes.

Among the etiological factors of autoimmunization are chronic viral infections, radiation and genetic disorders. The etiology is closely related to the pathogenesis. In the pathogenesis of autoimmune diseases, there are causative, initiating and contributing factors. Causes include some HLA genes that determine the quantitative and qualitative individual abilities of the immune response; hormonal background associated primarily with sex (in women, autoimmune diseases are 6-9 times more common than in men) and genetically determined features of the cells of the target organs of the autoimmune process. An unfavorable combination of these factors determines 50% of the risk of developing the disease. The initiating factors can be viral and bacterial infections, physical, chemical damage to both the immune system and target organs.

Autoimmune diseases - these are diseases that occur as a result of autoimmunization, ie aggression of autoantibodies, circulating immune complexes containing autoantigens, and effector immune cells (killer lymphocytes) against antigens of the body's own tissues. Therefore, autoimmune diseases are also called autoaggressive.

Guided by the mechanism of autoimmunization, there are two groups of autoimmune diseases. The first group is organ-specific autoimmune diseases that occur due to damage to physiological barriers of immunologically isolated organs, which allows the immune system to respond to their unchanged antigens by producing autoantibodies and sensitized lymphocytes. At the same time in the organs there are morphological changes, characteristic mainly for GST - the tissue of the organs is infiltrated by lymphocytes, parenchymal elements die, in the end sclerosis develops. This group includes thyroiditis (Hashimoto's disease), encephalomyelitis, polyneuritis,

multiple sclerosis, idiopathic Addison's disease, aspermatogeny, sympathetic ophthalmia.

The second group is organ-specific autoimmune diseases. Leading in these diseases are violations of the control of immunological homeostasis by the lymphoid system. Autoimmunization thus develops in relation to antigens of many bodies and fabrics which do not have organ specificity and are not capable to cause production of antibodies at parenteral administration. Morphological changes develop in organs and tissues, which are characteristic of both delayed-type hypersensitivity reactions and especially immediate ones. This group of autoimmune diseases includes systemic lupus erythematosus, rheumatoid arthritis, systemic scleroderma, dermatomyositis (group of rheumatic diseases), secondary thrombotic thrombocytopenic purpura (Moshkovich's disease).

Also known are autoimmune diseases of the intermediate type, ie close to autoimmune diseases of the first or second type. These are myasthenia gravis, type 1 diabetes mellitus, thyrotoxicosis, Sjogren's and Goodpasture's syndromes, and others.

In addition to autoimmune diseases, there are diseases with autoimmune disorders. The appearance of autoantigens in these diseases is associated with changes in the antigenic properties of tissues and organs - denaturation of tissue proteins (burns, radiation, trauma, chronic inflammation, viral infections); the formation of autoantigen is possible under the influence of bacterial antigen, especially cross-reactive (eg, glomerulonephritis, rheumatism). In the formation of autoantigen great importance is attached to the hapten mechanism, and the role of hapten can be both metabolic products of the body and microorganisms, toxins and drugs. Autoimmunization in these conditions does not cause the disease, but the progression of its characteristic local (organ) changes, which reflect the morphology of hypersensitivity reactions of delayed and immediate types.

Immunodeficiency syndromes

Immunodeficiency syndromesrepresent an extraordinary manifestation of the insufficiency of the immune system. They can be primary, caused by underdevelopment (hypoplasia, aplasia) of the immune system - hereditary and congenital

immunodeficiency syndromes, or secondary (acquired), which occur in connection with the disease or treatment.

Primary immunodeficiency syndromes

Primary immunodeficiency syndromes may be a manifestation of insufficiency:

1) cellular and humoral immunity (combined)

2) cellular immunity;

3) humoral immunity.

Syndromes of insufficiency of cellular and humoral immunity are called combined. Most patients have an autosomal recessive form, occur in children and newborns (agammaglobulinemia of the Swiss type, or Glanzmann-Riniker syndrome, ataxia-telangiectasia Louis-Bar). In these syndromes, hypoplasia of both the thymus and peripheral lymphoid tissue is found, the number of lymphocytes is reduced in the thymus as well as in the lymph nodes, spleen, and peripheral blood. There are no immunoglobulins in the serum, which determines the defect of cellular and humoral immunity. Due to the lack of immunity in such children often develop infectious diseases (viral, fungal, bacterial), which recur and give severe complications (pneumonia, meningitis, sepsis), there is a delay in physical development. At the combined immunodeficiency syndromes malformations and malignant mesenchymal tumors often arise.

Syndromes of cellular immunity insufficiency in some cases they are, of course, followed by the autosomal dominant type (immunodeficiency with achondroplasia, or McCusick's syndrome); in others, they are congenital (agenesis or hypoplasia of the thymus, or Dai-George's syndrome). The syndrome is characterized by a lack of T-lymphocytes in the blood, in the thymus-dependent areas of the lymph nodes and spleen. Signs of cellular immunity are manifested in the form of severe viral and fungal infectious diseases in childhood. Children die from malformations or complications of infectious diseases.

Syndromes of humoral immunity insufficiency have a hereditary nature, and their linkage with the X chromosome. Children of the first five years of life are ill. Some syndromes (agammaglobulinemia linked to the X chromosome or Bruton's syndrome)

are characterized by loss of ability to synthesize all immunoglobulins, which is morphologically confirmed by the absence of B-dependent zones and plasma cells in the peripheral lymphoid tissue and in all lymphoid tissues. Observed in boys, infectious diseases break down mainly in the second half of the first year of life after the level of passively transmitted maternal antibodies falls.

Isolated InA deficiency is the most common immunodeficiency, resulting from a defect in the final differentiation of plasma cells secreting InA. In most patients, InA deficiency is asymptomatic. Only some patients are prone to liver and intestinal infections.

Secondary immunodeficiency syndromes

Secondary (acquired) immunodeficiency syndromes differ from primary ones in that they occur in connection with the disease or as a result of drug therapy.

Among the diseases that lead to the development of immune system insufficiency, the most important is the acquired in many countries of the world acquired immune deficiency syndrome, or AIDS - an independent disease caused by a virus (see Viral diseases). The development of secondary immunodeficiency syndromes can also be caused by various infections, leukemia, malignant lymphomas (lymphogranulomatosis, reticulosarcoma), thymoma, sarcoidosis. In these diseases, there is a lack of humoral and cellular immunity due to a defect in the population of both B- and T-lymphocytes, and possibly their precursors.

Among the treatments leading to secondary insufficiency of the immune system, a significant place is occupied by radiation therapy, the use of corticosteroids, immunosuppressants after organ transplantation.

Immune system insufficiency, which occurs in connection with the treatment of a disease, is considered a pathology of therapy (iatrogenic).

Immunodeficiency is always accompanied by the development of opportunistic infections and in the final stage, most often Kaposi's sarcoma and malignant B-cell lymphoma. The occurrence of infectious diseases depends on the type of immunodeficiency. Decreased number of T cells predisposes to the development of

infectious diseases caused by viruses, mycobacteria, fungi. B-cell deficiency predisposes to the development of purulent bacterial infectious diseases

The occurrence of malignant neoplasms may be associated either with a violation of the immune response aimed at removing malignant cells, or with the nominal stimulation of the damaged immune system, when the normal control of cell proliferation is violated.

LECTURE 6

REGENERATION. STRUCTURAL BASIS OF PHYSIOLOGICAL ADAPTATION OF ORGANS AND CELLS. MORPHOLOGY OF CELL ACCOMMODATION PROCESSES. COMPENSATOR-ADJUSTMENT PROCESSES.

Regeneration- restoration of structural elements of fabric instead of the lost ones. In the biological sense, regeneration is an adaptive process produced during evolution and inherent in all living things. Restoration of structure and function can occur by cellular or intracellular hyperplastic processes. On this basis, there are cellular and intracellular forms of regeneration. The cellular form of regeneration is characterized by cell proliferation by mitotic and amitotic pathways; for intracellular form of

regeneration, which can be organoid and intraorganoid - increase in the number (hyperplasia) and size (hypertrophy) of ultrastructures (nucleus, nucleolus, mitochondria, ribosomes, Golgi complex) and their components. The intracellular form of regeneration is universal because it is inherent in all tissues and organs. However, the structural and functional specialization of organs and tissues in phylogeny and ontogenesis "selected" for some mainly cellular form, for others - mainly or exclusively intracellular, for others - both forms of regeneration to the same extent. The advantage of one or another form of regeneration in the relevant organs and tissues is determined by their functional purpose, structural and functional specialization.

Morphogenesis of the regenerative process consists of two phases - proliferation and differentiation. These phases are especially well expressed at the cellular form of regeneration. In the proliferation phase, young, undifferentiated cells multiply. These cells are called cambial cells, stem cells and progenitor cells. Each tissue is characterized by its cambial cells, which differ in the degree of proliferative activity and specialization; however, a single stem cell can be the progenitor of several cell types (hematopoietic stem cell, lymphoid tissue, some cellular connective tissue).

In the phase of differentiation, young cells mature, their structural and functional specialization takes place. The same change in hyperplasia of ultrastructures by their differentiation underlies the mechanism of intracellular regeneration.

The development of the regenerative process depends on a number of general and local conditions or factors. Common factors include age, constitution, diet, metabolism and hematopoiesis; to local - the state of innervation, blood and lymph circulation in the tissue, the proliferative activity of its cells, the nature of the pathological process.

There are three types of regeneration: physiological, reparative and pathological.

Physiological regeneration occurs throughout life and is characterized by constant recovery of cells, fibrous structures and the main substance of connective tissue. There are no structures that do not undergo physiological regeneration. Where the cellular form of regeneration dominates, cell regeneration takes place. Thus, there is a constant change in the integumentary epithelium of the skin and mucous membranes, the secretory epithelium of the exocrine glands, cells lining the serous and synovial

membranes, cellular elements of connective tissue, erythrocytes, leukocytes and blood platelets, and others. In tissues and organs where the cellular form of regeneration is lost, intracellular structures are restored. Along with the restoration of cells and subcellular structures, biochemical regeneration is constantly taking place, ie the restoration of the molecular composition of all body components.

*Reparative, or restorative, regeneration*observed in various pathological processes that lead to damage to cells and tissues. The mechanisms of reparative and physiological regeneration are the same; reparative regeneration is nothing but enhanced physiological. However, due to the fact that reparative regeneration is excited by pathological processes, it has qualitative morphological differences. Reparative regeneration can be complete or incomplete. Complete regeneration, or restitution, is characterized by filling the defect with tissue identical to the dead; it develops mainly in tissues where cellular regeneration predominates. Incomplete regeneration, ie healing of scar tissue, hypertrophy occurs as an expression of the regenerative process, so it is called regenerative; in it - the biological meaning of reparative regeneration.

It is a question of pathological regeneration in those cases when for one reason or another there is a distortion of regenerative process, disturbance of change of phases of proliferation and differentiation. Manifestations of pathological regeneration are excessive or insufficient formation of regenerative tissue (hyper- or hyporegeneration), as well as transformation in the process of regeneration of one type of tissue into another, excessive regeneration of peripheral nerves and excessive callus formation with fracture growth, slow healing of wounds and metastases. chronic inflammation. Pathological regeneration mostly develops in violation of the general and local conditions of regeneration (innervation disorders, protein and vitamin starvation, chronic inflammation, etc.).

Pathological regeneration is observed in cases when there is a violation of the phases of cell proliferation and differentiation.

Pathological regeneration is manifested either in excess or insufficient formation of regenerating tissue, as well as transformation during the regeneration of one type of tissue in another (metaplasia). Examples of pathological regeneration are the formation

of a colloid scar on the skin, the formation of callus during the fusion of fractures, sluggish wound healing, metaplasia (transformation) of gastric epithelium into intestinal in chronic gastritis, and so on.

Features of regeneration of separate bodies and fabrics.

*Blood.*The appearance of red marrow in the long tubular bones and their replacement by yellow; appearance of foci of extraosseous (extramedullary) hematopoiesis in the spleen, liver, lymph nodes, mucous membranes, adipose tissue, etc .; sharp inhibition of regeneration. The bone marrow. Has very high plastic properties; restoreswith significant damage.

Lymph nodes. They regenerate well only in cases when the connections between the vessels that bring and take out the lymph are preserved.

Spleen. Regenerates incompletely with scar formation.

Microvessels. Regenerate by budding (the appearance of protrusions on the vessel wall on the sides with the subsequent formation of a lumen in them) or autogenous neoplasm (differentiation of connective tissue cells into endothelium and other elements of the vascular wall).

Large vessels. Regenerates only the intima, and the elements of the middle and outer shells are replaced by connective tissue, which leads to narrowing and obliteration of the lumen of blood vessels.

Adipose tissue. Regenerates due to connective tissue cells, which are converted into fat by the accumulation of lipids in the cytoplasm or due to the nuclear-containing residues of the cytoplasm of fat cells.

*Bone tissue.*In uncomplicated bone fracture (when bone fragments are immobile) there is a primary bone fusion: a preliminary connective tissue callus is formed; after ingrowth and proliferation of osteoblasts the callus is formed; then there is a maturation and formation of the final callus, which differs in its composition from the bone tissue only by the chaotic arrangement of bone beams. After the bone begins to perform its function, the bone tissue is rebuilt, the bone marrow appears, innervation and vascularization are restored. With a complicated fracture (many fragments, mobile bone fragments) there is a secondary bone fusion: first cartilage tissue is formed between the

fragments, on the basis of which bone (previous cartilaginous callus) is built, which later turns into mature bone.

Cartilaginous tissue. Regenerates incompletely with scar formation.

*Smooth muscle tissue.*At insignificant defects - regenerates completely, at considerable - is replaced by a connecting fabric. In this case, the preserved muscle fibers undergo hypertrophy.

*Striped muscle tissue.*Regenerates only while preserving the cell membrane (sarcolemma). If the sarcolemma is damaged, a scar appears at the site of the dead muscle cells, and the nearby intact muscle cells undergo hypertrophy. Sometimes there are satellite cells (cambials) next to the muscle cells and they provide muscle tissue repair.

Epithelium (skin, mucous membranes, mesothelium). Regenerates in most cases completely because it has a high regenerative capacity In disorders of epithelial regeneration, incurable ulcers are formed, which often turn into cancer.

Specialized epithelium of organs (liver, pancreas, kidneys, endocrine glands, alveoli). Regenerates according to the type of regenerative hypertrophy - in the damaged areas the tissue is replaced by a scar, and on the periphery there is hyperplasia and hypertrophy of parenchymal cells.

*Nervous System.*Neurons do not regenerate when damaged. If the membrane is not destroyed, then intracellular regeneration is possible. Neuroglia cells regenerate completely, often with the formation of glial nodules.Peripheral nerves regenerate completely.

Wound healing

Types of wound healing: 1) direct closure of the epithelial cover defect; 2) healing under the scab; 3) wound healing by primary tension; 4) wound healing by secondary tension (after suppuration).

Immediate closure of the epithelial cover defect Is the simplest healing, which consists in "creeping" the epithelium on the superficial defect and closing it with an epithelial layer.

Healing under the scab- is a healing under the crust (scab) of clotted blood and lymph. The crust falls out in 3-5 days, during which time the proliferating epithelium has time to close the defect.

Healing by primary tension observed in wounds with damage not only to the skin but also to the underlying tissue. The edges of the wound should be smooth. The wound is filled with blood clots, a day later these clots are removed (primary cleansing) and the proliferation of granulation tissue begins, which matures in 10-15 days and is covered with epithelium. A tender scar remains at the site of such a wound.

*Secondary tension healing*observed in large wounds, which are accompanied by crushing and necrosis of tissues with the accession of infection. During the first 5-6 days there is a separation of necrotic masses (secondary wound cleansing) and the beginning of the development of granulation tissue, followed by closure of the defect by the epithelium. A rough scar is formed at the site of such a wound.

Sclerosis Is an overgrowth of dense connective tissue, causing diffuse or focal compaction of the organ. In sclerosis, the connective tissue replaces the parenchymal elements of the internal organs or specialized structures of the connective tissue, which causes a decrease or loss of function of the organ or tissue.

*Cirrhosis*Is the expressed sclerosis of body with its deformation and reorganization.

Scar Is a local area of sclerosis that replaces a wound or area of necrosis.

The trigger for multiple sclerosis is often hypoxia.

Etiology of sclerosis: 1) chronic productive inflammation of infectious-allergic or immunopathological origin, as well as caused by foreign objects; 2) systemic (rheumatic diseases, systemic congenital dysplasias, etc.) and local (colloid, Dupuytren's contracture, etc.) disorganization of connective tissue; 3) necrosis and atrophy of organs and tissues, followed by their replacement by connective tissue.

The mechanism of sclerosis: 1) neoplasm of young connective tissue due to the proliferation of fibroblasts and their production of collagen; 2) transformation of young connective tissue into fibrous.

In reverse, multiple sclerosis is divided into: 1) labile (reversible after the action of a pathogenic factor); 2) stable (irreversible or partially reversible over a long period of time or as a result of treatment); 3) progressive (irreversible under any circumstances).

Adaptation (adaptation) is the processes of life through which the relationship of the organism with the external environment. The device is aimed at preserving the species, so it covers both health and disease.

Compensation is a private manifestation of adaptation, aimed at correcting impaired function in the disease ("self-preservation" in a critical situation).

Adaptive and compensatory reactions of the whole organism, which vary quantitatively and change qualitatively, take place in all its diseases.

At the heart of all compensatory-adaptive processes are two main provisions of living systems: 1) the constancy of storage of form and function under changing conditions of existence (homeostasis); 2) mobility and variability of form and function in the process of adaptation to environmental conditions.

These two properties are fixed in the process of phylogeny and ontogenesis at different levels of organization (molecular, cellular, tissue, organ, system, organism).

At the molecular level of the organization compensatory - adaptive reactions are provided by: 1) qualitative stability of protein metabolism; 2) its wide quantitative fluctuations; 3) the presence of a total plastic reserve of cells (stock of structurally organized proteins, RNA stock, the ability to rapidly synthesize RNA, DNA reproduction); 4) the reversibility of the differentiation of structure and function.

Mechanisms of regulation of the molecular level of the organization of compensatory-adaptive processes: 1) enzymatic; 2) humoral (selective action of a set of metabolites, hormones); 3) nervous.

At the cellular level of the organization compensatory - adaptive reactions are provided by: 1) the general plastic reserve of a cell; 2) a large supply of cells and their ability to alternate work and rest; 3) the ability of the cell to reproduce; 4) their ability to metaplasia.

At the organ level: 1) the stock of functional units of the body; 2) heterogeneity of their functions; 3) the ability to regenerate functional units.

At the system level: quantitative broad fluctuations of structure and function.

All the above levels of organization of compensatory - adaptive reactions ensure the adaptation of the organism as a whole to the environment.

There are 3 phases in their development:

1. The origin of compensation or the phase of formation of compensation. At this point, the functions are sharply strained, metabolism is excited, reserves may be insufficient and at first develop dystrophic changes, hypoxia. This phase is sometimes called emergency.

2. Consolidation phase. Compensatory - adaptive reactions are fully developed. Dystrophic changes decrease, protein begins to be synthesized intensively, the weight and mass of organs increase, function sometimes increases by 50-100-150%.

3. Depletion phase. Exhaustion occurs after hard work always. Sooner or later, but always. Since the resynthesis of ATP is weakened. When all ATP is used, the function stops completely.

Adaptation in pathology can reflect various functional states: functional stress, decrease or disturbance of function of fabric (body). In this regard, it can be manifested by various pathological processes: 1) atrophy; 2) hypertrophy (hyperplasia); 3) organization; 4) tissue restructuring; 5) metaplasia; 6) dysplasia.

Atrophy - lifelong reduction in the volume of cells, tissues, organs with the suspension or cessation of their function, but not every reduction of the organ is atrophy. In connection with the violation in the process of ontogenesis, the organ may be completely absent - agenesis; keep the appearance of early conception - aplasia; not reach full development - hypoplasia. If there is a decrease in all organs and general underdevelopment of all body systems, then talk about dwarf growth.

There are physiological and pathological atrophy. Physiological atrophy is observed throughout human life. Thus, after birth the umbilical arteries atrophy and are subject to obliteration, in the elderly the gonads atrophy, in the elderly the bones, the intervertebral cartilage. Pathological atrophy occurs for various reasons; among which

the most important are malnutrition, circulatory disorders and endocrine glands, central and peripheral nervous system, intoxication. After eliminating the causes of atrophy, if it has not reached a high degree, it is possible to fully restore the structure and function of the organ or system.

Pathological atrophy can be both general and local. General atrophy, or exhaustion, occurs in the form of nutritional exhaustion (starvation or impaired digestion); depletion in cancerous cachexia; depletion in pituitary cachexia; in cerebral cachexia (hypothalamic lesions), as well as in other diseases (chronic infections such as tuberculosis, dysentery, brucellosis, etc.). Characteristic appearance of patients with exhaustion - a sharp weight loss, weight loss, subcutaneous fat is absent; where it is preserved, it has a brownish color (accumulation of lipochrome pigment). Muscles are atrophic, skin is dry, flabby; internal organs are reduced in size. In the liver and myocardium - brown atrophy (accumulation of lipofuscin pigment in cells). In the endocrine glands, atrophic and dystrophic changes differ in intensity depending on the cause of depletion; in the bones - osteoporosis; in the cerebral cortex - foci of dead nerve cells.

Local atrophy occurs for various reasons. There are the following types: dysfunctional; caused by insufficient blood supply; from squeezing; neurotic; under the influence of physical and chemical factors.

Dysfunctional atrophy - occurs due to decreased organ function - muscle atrophy in bone fractures, joint diseases, when limited movement; optic nerve after surgical removal of the eye; the edges of the dental cell after tooth extraction. The intensity of metabolism in the tissues is reduced, they receive insufficient blood and nutrients.

Atrophy from insufficient blood supply occurs due to narrowing of the arteries; insufficient blood flow leads to hypoxia, as a result of which the activity of parenchymal organs is reduced, cell size is reduced. Hypoxia stimulates the proliferation of fibroblasts with the subsequent development of multiple sclerosis. This process is observed in the myocardium, when progressive atherosclerosis of the coronary arteries occurs atrophy of myocardial cells and diffuse cardiosclerosis; at a sclerosis of vessels of kidneys atrophy and shrinkage of kidneys develop.

Compression atrophy can develop even in organs consisting of dense tissue. With prolonged compression there are violations of tissue integrity (usures in the vertebral bodies and in the sternum in contact with the aortic aneurysm. Atrophy from compression occurs in the kidneys with difficulty in the outflow of urine. with this.

Neurotic atrophy is caused by a violation of the connection of the organ with the nervous system, which occurs during the destruction of nerve conductors. Most often, this type of atrophy occurs in striated muscles due to the death of motor neurons of the anterior horns of the spinal cord or nerve trunks that innervate these muscles (in polio, inflammation of the facial nerve).

Atrophy under the influence of physical and chemical factors is quite common. Under the action of radiant energy atrophy is especially pronounced in the bone marrow, genitals. With long-term use of ACTH, corticosteroids, atrophy of the adrenal cortex may occur and their insufficiency may develop.

The appearance of organs in local atrophy is diverse. In most cases, the size of the organs decreases, the surface is smooth (smooth atrophy). Less often, organs such as kidneys, liver, acquire a granular appearance (granular atrophy). With hydronephrosis, hydrocephalus, pseudohypertrophy, the organs are enlarged, but not due to parenchymal elements, but due to the accumulation of fluid or the growth of fat. Sometimes this fiber grows around the atrophied organ (kidney).

The value of atrophy for the body is determined by the degree of reduction of the organ and reduction of its function. If atrophy and sclerosis do not reach a significant degree, then after eliminating the cause that caused the atrophy, it is possible to restore the structure and function, as mentioned above. Under certain conditions, the atrophied organ may even undergo hypertrophy over time.

Hypertrophy (hyperplasia) can be adaptive - an increase in the volume of a cell, tissue, or organ due to cell proliferation or an increase in the number and size of intracellular ultrastructures. Adaptive should include two types of hypertrophy: neurohumoral hypertrophy (hyperplasia) and hypertrophic growths.

Neurohumoral hypertrophy and hyperplasia occur in endocrine dysfunction (hormonal or correlative hypertrophy and hyperplasia). The physiological prototype of

such hypertrophy and hyperplasia, which have adaptive significance, may be hypertrophy of the uterus and mammary glands during pregnancy and lactation. In conditions when ovarian dysfunction occurs, glandular hyperplasia develops in the uterine mucosa, sometimes with cystic enlargement of their lumen - the so-called glandular-cystic endometrial hyperplasia, which is accompanied by irregular uterine bleeding. At atrophic processes in the testicles in the breast of men develops hyperplasia of the glandular lobes, which leads to an increase in the size of the entire gland - gynecomastia. Hyperfunction of the anterior pituitary gland, which occurs in his adenoma, accompanied by an increase in organs and protruding parts of the skeleton - occurs. Correlative hypertrophy and hyperplasia, which occur in response to certain hormonal stimuli, are often the basis for the development of the tumor process.

Hypertrophic growths, which lead to an increase in the size of tissues and organs, occur due to various reasons. They are quite common in chronic inflammation (eg, in the mucous membranes with the formation of polyps), in lymphatic disorders in the lower extremities and lymph stagnation, which leads to the growth of connective tissue (elephantiasis). Hypertrophic growth of adipose and connective tissue occurs with partial or complete atrophy of the organ (false hypertrophy). Thus, with muscle atrophy, adipose tissue grows between their fibers; with atrophy of the kidney increases the growth of adipose tissue around it; at a brain atrophy skull bones thicken; with decreasing blood pressure in the vessels grows and thickens the intima.

All of the above processes of hypertrophic growth of the supporting tissue, filling the place previously occupied by the organ or tissue, are called vacant hypertrophy.

*Organization,*as one of the forms of manifestation of adaptation, represents replacement of the center of a necrosis or a thrombus by a connecting fabric, and also encapsulation. Replacement of the center of necrosis or thrombotic masses with connective tissue (actually the organization) occurs when the masses are subject to resorption and at the same time young connective tissue grows in them, which then turns into a scar. Encapsulation is said in cases when dead masses, animal parasites, foreign bodies are not resorbed, but overgrown with connective tissue and separated from the rest of the body by a capsule. Masses of necrosis are impregnated with lime;

there are petrifications. Sometimes bone tissue is formed in the inner layers of the capsule by metaplasia. Around foreign bodies and animal parasites in the granulation tissue are formed multinucleated giant cells (giant cells of foreign bodies),

The basis of adaptive tissue rearrangement is hyperplasia, regeneration and accommodation. An example of the adjustment is collateral circulation, which occurs when blood flow in the main vessels. At it there is an expansion of a gleam of veins and arteries which depart from the affected main vessel, thickening of walls due to a hypertrophy of muscular and new growth of elastic fibers. The structure of small vessels becomes larger. Adjustment in the bones of the spongy substance is observed when changing the direction of the load on the bone (after fracture, rickets, joint disease). Tissue remodeling occurs in some tissues under changed conditions of their existence. For example, in the lungs, in the foci of atelectasis, the condensed alveolar epithelium acquires a cubic shape due to the cessation of air flow. Nephrothelium, which covers the cavity of the capsule of the renal glomerulus, when excluded from function, becomes cubic. Such changes in the epithelium are called histological accommodation.

Metaplasia - the transition from one type of fabric to another, related type. Metaplasia is most common in the epithelium and connective tissue, less common in other tissues. Reconstruction of one tissue into another is possible within one germ leaf and develops at proliferation of young cells (at regeneration, new growths). Metaplasia always occurs in connection with the previous proliferation of undifferentiated cells, ie is indirect. Heterotopia or heteroplasia should not be mistaken for metaplasia when the epithelium appears out of place due to a developmental defect.

Epithelial metaplasia most often manifests itself in the form of transformation of the prismatic epithelium into squamous with keratinization (epidermal, or squamous epithelial metaplasia). It is observed in the respiratory tract in chronic inflammation, in vitamin A deficiency in the pancreas, prostate, breast, thyroid glands, in the appendix of the testicle in inflammation and hormonal effects. Metaplasia begins with the proliferation of cambial cells, which differentiate in the direction not of prismatic but of multilayered squamous epithelium. The transition of the stratified squamous epithelium without keratinization into cylindrical is called prosoplasia. Possible metaplasia of the

gastric epithelium into the intestinal epithelium (intestinal metaplasia or enterolysis of the gastric mucosa), as well as metaplasia of the intestinal epithelium into the gastric epithelium (gastric metaplasia of the intestinal mucosa).

The term "dysplasia", as a kind of adaptive process, is often used in oncomorphology. They denote significant disorders of epithelial proliferation and differentiation with the development of cellular atypia and violation of histoarchitectonics. Cellular atypia is represented by different size and shape of cells, increase in the size of nuclei and their hyperchromia, increase in the number of figures of mitosis, the appearance of atypical mitoses. Violation of histoarchitectonics in dysplasia is manifested as a loss of polarity of the epithelium, and sometimes those of its properties that are characteristic of a given tissue or organ (loss of histo- or organ-specificity of the epithelium). The basement membrane is not damaged. Thus, dysplasia is not a cellular concept, but a tissue one.

Depending on the degree of proliferation and the state of cellular and tissue atypia, there are three stages (degrees) of dysplasia: I - mild (small), II - moderate (medium), III - severe (significant). Most often, dysplasia occurs in inflammatory and regenerative processes and reflects a violation of cell proliferation and differentiation.

Compensation- reaction of the organism (system, organ, tissues, cells), the manifestation of which is the correction of impaired functions in the disease. The compensatory process proceeds in stages; there are three phases: formation, consolidation and depletion. The phase of formation of compensation, which is also called "emergency" is characterized by the inclusion of all structural reserves and changes in the metabolism of the organ (system) in response to pathogenic effects. In the phase of consolidation, the compensatory capabilities are revealed to the fullest - there is a restructuring of the structure and metabolism of the organ (system), which provides their function in conditions of high load. This phase can last quite a long time. However, depending on many conditions (age of the patient, duration, severity of the disease, the nature of treatment, etc.) develops a lack of compensatory capacity, which characterizes the phase of depletion of compensation or decompensation (eg, decompensated heart disease, decompensated liver cirrhosis). The development of the

phases of the compensated process (formation, consolidation and depletion of decompensation) is due to a complex system of reflex acts of the nervous system, as well as humoral influences. In this regard, in decompensation it is very important to look for its cause not only in the diseased organ, but also outside it, among the mechanisms that regulate its activities.

Morphologically, the compensation is manifested mainly by hypertrophy. At the same time bodies increase in the size, but keep the configuration. The cavity of the organ either becomes wide (eccentric hypertrophy) or decreases (concentric hypertrophy). Structural and functional changes are observed in the cells of the hypertrophied organ, which indicate an increase in the intensity of metabolism. Enhanced function of the hypertrophied organ is due to an increase in the number of specific intracellular formations; moreover, in some cases this process unfolds on the basis of pre-existing cells and leads to an increase in their volume (hypertrophy), in others it is accompanied by the formation of new cells (cellular hyperplasia).

There are two types of compensatory hypertrophy: working (compensatory) and vicarious (substitute).

Working (compensatory) hypertrophy develops with intensive work of the body, with an increase in the volume (number) of cells that determine its specialized function. Working hypertrophy is observed at high load and in physiological conditions (hypertrophy of the heart and hypertrophy of skeletal muscles in athletes and people engaged in physical labor). At diseases the strengthened work of body is necessary in cases of existence in it of defects which are compensated by the strengthened work of parts of body which have kept the structure and function. Working hypertrophy occurs in the heart, gastrointestinal tract, urinary tract and other organs. Cardiac hypertrophy is the most striking example of compensatory hypertrophy and reaches the highest degrees in congenital and acquired heart defects, which are accompanied by stenosis of the atrioventricular orifices and external vascular tracts of the ventricles, hypertension, narrowing of the aorta, sclerosis of the pulmonary vessels, etc. Hypertrophy is mainly the part of the myocardium, which performs the main work in specific conditions of impaired circulation (left ventricle in aortic valve defects; right - in mitral valve

disease). The weight of the heart can be 3-4 times higher than normal weight and reach 900-1000 g. The size of the heart also increases. Myocardial hypertrophy occurs due to an increase in the mass of the sarcoplasm of myocardial cells, the size of their nuclei, the number, size of myofibrils and mitochondria, ie there is hyperplasia of intracellular ultrastructures. The volume of muscle fibers increases. Simultaneously with myocardial hypertrophy there is an accompanying hyperplasia of fibrous structures of a stroma, intramural vascular branches and the nervous system of the heart. Thus, the basis of myocardial hypertrophy are processes that run together in muscle fibers, myocardial stroma, its vascular system and intramural nervous system. Each of them is an integral part of the concept of "hypertrophied heart" and provides its participation in the deployment and maintenance of intensive work of the heart for a long, sometimes long, period.

With compensated myocardial hypertrophy, the length of the heart increases due to the external tract (from the base of the crescentic aortic valves to the most distant point of the apex of the heart); the afferent tract (from the apex of the heart to the place of attachment of the rear sail of the double-leaf valve) does not change. There is an expansion of the heart cavities, which is defined as active compensatory or tonogenic.

The development of compensatory hypertrophy is facilitated not only by mechanical factors that impede blood flow, but also by neurohumoral effects. Full implementation of compensatory hypertrophy requires a certain level of innervation of the heart and hormonal balance. Hypertrophy of the wall of the stomach or intestine occurs above the site of narrowing of their lumen. The smooth muscle layer of their wall is hypertrophied, the functional ability is preserved. The lumen of the cavity above the narrowing is expanded. After some time, the compensation phase is replaced by decompensation due to the failure of the hypertrophied muscle layer. Bladder wall hypertrophy occurs in prostatic hyperplasia (adenoma), which narrows the urethra and other complications of bladder emptying. The wall of the bladder thickens, the side of the mucous membrane shows muscle trabeculae (trabecular hypertrophy).

Vicar (replacement) hypertrophy is observed in the death of one of the paired organs (lungs, kidneys) in connection with the disease or after surgery. Compensation

for impaired function is provided by intensive work of the preserved organ, which is subject to hypertrophy. In terms of pathogenetic nature and significance for the body, vicarious hypertrophy is close to regenerative hypertrophy. A complex role of reflex and humoral influences plays a significant role in its occurrence, as well as at compensatory hypertrophy.

LECTURE 7

ONCOGENESIS. ANATOMO-MICROSCOPIC FEATURES AND TYPES OF GROWTH OF BENIGN AND MALIGNANT TUMORS. MORPHOLOGICAL CHARACTERISTICS OF THE MAIN STAGES OF DEVELOPMENT OF MALIGNANT TUMORS. BENIGN AND MALIGNANT NON-Epithelial (mesenchymal) tumors. SARCOMA: FEATURES OF DEVELOPMENT AND METASTASIS. TUMORS OF FIBROBLASTIC, MYOFIBROBLASTIC AND FIBROHISTIOCYTIC GENESIS. TUMORS OF FAT AND MUSCLE TISSUE, TUMORS OF VESSELS. CLINICAL AND MORPHOLOGICAL NOMENCLATURE OF TUMORS. TUMORS FROM THE EPITHELIUM: BENEFICIAL EPITHELIAL TUMORS, CANCER (FEATURES

OF DEVELOPMENT, METASTASIS, HISTOLOGICAL FORMS). MELANOCYTIC TUMORS.

*Tumor*Is a newly formed heterogeneous tissue, the formation of which is based on the endless proliferation of cells due to changes in their genetic apparatus. The formed tumor differs in the features of its growth, metabolism, interaction with other tissues, is characterized by a certain autonomy in relation to the whole organism, which can be considered as a certain independence of its further development.

The tumor can arise from any tissue that is capable of proliferation, but it does not arise from highly specialized, mature cells. The level of morbidity and mortality from tumors is different, due to the state of ecology, ethnic customs, heredity, and so on. The most important are the following theories of tumor growth: physicochemical theory (carcinogenic theory), virogenetic theory, dysontogenetic, polyetiological theory.

According to physicochemical theory, the main role belongs to the action of physical and chemical carcinogens, ie substances that can cause tumors. Physical carcinogens include: solar, cosmic, ionizing radiation, radioactive substances. Physical carcinogens exert their action through damage to the genome of the cell. The carcinogenic effect of these factors can also be potentiated by the action of other carcinogenic agents - chemical (smoking, aniline, asbestos) and viral (human papilloma virus, Abstein-Barr virus, hepatitis B and C virus). Proponents of viral genetic theory believe that tumors can be caused by so-called oncogenic viruses, which contain DNA and RNA. DNA viruses give malignant transformation of cells in 1: 107 cases, most often they cause infectious diseases (adenovirus, smallpox virus, hepatitis B virus). RNA viruses are more likely to cause malignant transformations of cells, because, leaving the cell, they do not damage its membrane and it does not die, as in the case of DNA viruses. According to dysontogenetic theory, tumors arise from embryonic cell-tissue shifts and malformed tissues under the influence of various provoking factors. Polyetiological theory combines all the other existing factors that can change the genome of a cell and cause its malignant transformation.

On the basis of the marked theories it is possible to formulate patho- and morphogenesis of tumors. Pathogenesis (carcinogenesis) considers the mechanisms of tumor origin, types and mechanisms of blastomatous action of various pathogens.

There are the following stages: the stage of initiation involves changes in the genome of the somatic cell under the influence of pathogenic (carcinogenic) agents; intermediate stage - activation of proto-oncogenes (normal genes of cells) with their transition to oncogenes, which encode the production of oncoproteins as a result of dysfunction of regulatory genes. Activation of protooncogenes is accompanied by suppression of antioncogenes; stage of promotion - there is a tumor transformation of cells with unlimited, uncontrolled growth and tumor formation.

Mechanisms of protooncogene activation: insertion mechanism - the appearance of viral genes in the genome of the somatic cell activates adjacent protooncogenes; chromosomal translocations - are observed in Burkitt's lymphoma, chronic myelogenous leukemia; point mutations; amplification - an increase in the number of copies of the gene.

Morphogenesis is the process of tumor formation and development in morphological mapping. There are two morphogenetic variants of tumors:

The appearance of the tumor is not accidental, but gradually, step by step, in some stages of changes in maternal tissue: precancerous stage; diffuse or focal hyperplasia, dysplasia; stage "cancer in situ" - non-invasive cancer, when the integrity of the basement membrane is preserved; stage of invasive growth - the stage of the formed malignant tumor; metastasis.

Some of the tumors may undergo a stage of benign tumor (cancer of the stomach, colon).

The appearance of the tumor is diverse. Most often it has the form of a node with an uneven surface or has a diffuse shape, in the form of a thickening of the mother tissue, differing from it only in color and consistency.

The size of the tumor depends on its "age", although it matters both the nature of the tumor and the structure of the mother tissue. If the tumor does not have a noticeable

harmful effect on the body, it can reach significant sizes, in other cases the body dies much earlier.

The consistency of the tumor is also different: it is denser (tumors of bone, cartilage, fibrous tissue), then more loose, when the tumor is dominated by the parenchyma over the stroma.

One of the characteristics of tumors is the autonomy of their development, which is relative, because the tumor tissue constantly receives from the macroorganism a variety of nutrients, oxygen, hormones, cytokines that come with the bloodstream. In addition, its growth is affected by the immune system. In other words, the autonomy of the tumor should be understood not as a certain independence of tumor cells from the body, but as their acquisition of self-regulatory properties. In malignant tumors (cancers, sarcomas) autonomy is more pronounced. They grow rapidly, destroying maternal tissue; in benign tumors it is less pronounced, some of them are subject to regulatory actions of the body, grow slowly without destroying maternal tissue. In both cases, the cells switch to the autocrine mechanism of regulation of their development, producing growth factors or cancer proteins - analogs of growth factors.

The structure of tumors varies depending on what tissue they are formed from, what is the nature and direction of their growth. There are organoid and histoid types of structure. In the first case, the tumor consists of clearly defined two elements: the parenchyma and stroma. They are not isolated from each other, but are closely related biologically and histogenetically. Nutrition of the parenchyma depends on the state of blood supply through the vessels of the stroma, on the other hand, the parenchyma affects the state of the stroma (the number and nature of the stroma depend on the nature and condition of the parenchyma). Otherwise, in some tumors, the stroma may not be pronounced and is represented only by vessels with a small amount of connective tissue (histoid type of structure)

Tumor development is characterized by considerable diversity. However, it always grows on its own, that is, due to the reproduction of its own cells, no matter what size and prevalence it reaches. As a rule, no new cells are involved in the growth process. In some cases, there is a neoplastic transformation within the tumor field.

There are different types of tumor growth - expansive, infiltrative, exophytic, endophytic, unicentric, multicentric. At expansive growth (characteristic of benign tumors) destruction of surrounding fabrics is not observed, growth goes with gradual separation of a tumor and emergence of the capsule separating a tumor from maternal fabric. Invasive (infiltrative) growth, on the contrary, is characteristic of malignant tumors. It is characterized by destruction of surrounding tissues (histolysis). However, invasive growth does not always coincide with the malignancy of the tumor - there is a group of so-called semi-malignant tumors that grow infiltratively, but do not metastasize, and are morphologically mature forms. Due to invasive growth, malignant tumors are fused with the surrounding tissues and are therefore clinically immobile. Their boundary with the maternal part is blurred.

The rate of tumor growth depends on its type. Immature (malignant) tumors, which mainly consist of parenchyma, grow quite rapidly, while mature, as well as tumors with a relatively developed stroma, grow quite slowly. Tumor growth rate is one of the most important signs of tumor malignancy, because it depends on the degree of germination and destruction of surrounding tissues. Therefore, we can say that the fastest growing malignant tumors, the elements of which are as mature as possible. Factors such as inflammation, puberty, pregnancy, stress, etc. may be of some importance for growth rate. Invasion is most often observed in the direction of the least resistance: in the interstitial fissures, along nerve fibers, blood and lymphatic vessels. Exophytic growth is the expansive growth of a tumor into an organ cavity. At the same time it can fill a significant part of it (cancer of the stomach, intestines, bronchi). Endophytic growth is an infiltrative growth of a tumor deep into the wall of an organ. At the same time from the outside it can be imperceptible and is shown only on a section, in the form of fabric which sprouts a body wall. At emergence of a tumor from one embryo speak about unicentric character of its growth, at growth of a tumor from several tumor embryos speak about multicentric character of growth. In the latter case, there are several tumor nodes in one organ (chondroma of the fingers), in other cases we can talk about the same type of tumors that occur simultaneously or gradually in different parts of the body completely independently of each other. Such tumors are

almost always systemic in nature, ie occur in certain body systems (numerous skin tumors - lipomatosis; nervous system - neurofibromatosis or Recklinghausen's disease, hemoblastosis, etc.). In addition, the simultaneous formation of several tumors in the same patient (dimorphic tumors) is possible.

One of the important signs of tumors is their progression, ie the tendency towards constant clonal evolution of tumor cells. It is determined that most tumors arise from a single cell of a single tumor embryo, ie have a monoclonal growth pattern. Over time, the tumor becomes more heterogeneous, ie there are a variety of cell clones that "provide" various signs of a growing malignant tumor (recurrence, metastasis, invasive growth, atypism).

Atypism is one of the most important features of the tumor, which determines the origin of the tumor, its morphology, place in the qualification scheme, features of clinical manifestations and prognosis. This feature underlies such manifestations of tumor growth, which were previously combined with the terms anaplasia and cataplasia, which are used to this day.

Morphological atypism tumors can be tissue and cellular. Tissue atypism is characterized by a violation of tissue interactions characteristic of normal tissues or organs. It is based on violations of the relationship between the parenchyma and stroma, as well as changes in the size and shape of tissue structures. Cellular atypism at the optical level is characterized by polymorphism or, conversely, monomorphism of cells, nuclei and nucleoli, hyperchromatosis, violation (increase) of the karyoplasmic index due to increased nucleus size, asymmetric hypo- and hyperchromic mitoses, and others. Cellular atypism is sometimes so pronounced that it is impossible to establish the histogenesis of the tumor, and when it reaches the extreme degree of cataplasia, there is a monomorphism of tumor cells. The appearance of infinite cell proliferation in the tumor,

At the ultrastructural level, morphological atypism is characterized by changes in the nucleus and cytoplasm of the tumor cell. In the nucleus there is a violation of the structure and location of chromatin in the form of clusters under the karyolemma: the amount of heterochromatin (contains inactive DNA) in relation to euchromatin

(contains active DNA) increases. In nuclei there are various inclusions (bubbles, intussusception of a karyolema), the sizes of nucleoli increase. In the cytoplasm, the number of mitochondria decreases, large organelles appear, the number of ribosomes increases, and the number of karyolema contacts with organelle membranes increases.

Biochemically atypismmanifested by a number of metabolic features in tumor cells. Tumor tissues are rich in cholesterol, glycogen and nucleic acids, glycolytic processes predominate over oxidative ones, which is accompanied by the accumulation of lactic acid.

Histochemical atypism reflects both morphological and biochemical features of the tumor. It is characterized by the fact that in cells there are various histochemical changes in the activity of various enzymes, accumulation and redistribution of glycoaminoglycans, proteins and lipids. Specific enzymes have been detected in individual tumors, which is important for differential morphological diagnosis.

Antigenic atypism characterized by antigenic diversity of antigenic composition of the tumor. There are: antigens of viral tumors, antigens of tumors caused by carcinogens, tumor-specific antigens, embryonic antigens, heterogeneous antigens.

Functional disorders in tumor cells depend on the degree of morphological and biochemical atypia. More differentiated tumors retain the functional features of the cells of the mother tissue. low-differentiated lose, as a rule, the functions of maternal tissue (organ), which can have adverse consequences (tumors of the adrenal glands, pancreas).

Any tumor first forms a so-called primary node. Benign tumors remain in the form of a slow-growing nodule. Malignant tumors, on the contrary, due to invasive growth penetrate into lymphatic and blood vessels, their cells are transferred to other organs, where secondary nodes (metastases) are formed, which are hematogenous, lymphogenic, implantation, perineural. The process of metastasis is cascading and manifests itself in the form of separate stages: invasion of tumor cells into the lumen of the vessel; transport of tumor embolus; adhesion of cells on the surface of the endothelium and exit into the perivascular space (extravasation); formation of secondary nodes (metastases).

All tumors can be classified according to the two most common principles: clinical-anatomical and histogenetic.

*According to the clinical and anatomical principle*distinguish between mature, homologous or benign tumors and immature, heterologous, or malignant tumors (cancers and sarcomas). Benign tumors consist of more differentiated tissue with signs of tissue (rather than cellular atypism), grow mainly expansively (with the exception of so-called tumors with locally destructive growth, or semi-malignant tumors of blood vessels, cartilage, fibrous tissue, etc.). metastasize. As a rule, necrosis (decay) is seldom observed in these tumors, however sometimes there is an amyloidosis or a hyalinosis of a stroma, hemorrhages. Malignant are tumors that consist of undifferentiated tissue with signs of cellular and tissue atypism, they are characterized by infiltrative growth, metastasis, recurrence, and necrosis (decay) with the development of bleeding and hemorrhage.

On the basis of the histogenetic principle distinguish tumors of benign and malignant character:

1. Organospecific epithelial tumors
2. Organ-specific epithelial tumors
3. Mesenchymal tumors
4. Tumors of melanin-forming tissues
5. Tumors of the nervous system and meninges
6. Tumors of the blood system
7. Teratomas.

Thus, the problem of tumors is one of the most pressing in modern medicine. This is due to the high frequency of their spread and the lack of clear ideas in various aspects of the problem (etiology, patho- and morphogenesis, classification, etc.).

In recent years, some trends in the epidemiology of various tumors have been identified. For example, there is an increase in cancer morbidity and mortality in all countries of the world; cancers begin to appear in all age groups, although most often - after 50 years; revealed gender differences in the incidence of certain forms of cancer among men and women; as well as the structure of morbidity and mortality from cancer

is constantly changing due to the increase in the incidence of some diseases and the decrease in the incidence of others.

Non-epithelial tumors

Non-epithelial tumors include neoplasms of mesenchymal and neuroectodermal origin. This is the most numerous and diverse group of histological structure of tumors. In the late 1940s, according to a prominent American oncologist, APStout, many of these tumors, located between the epidermis and the skeletal system, were separated into a separate group called "soft tissue tumors." Twenty years later, the term was adopted in all countries of the world and taken by the WHO as the basis for the international classification of tumors. To date, this group of soft tissue tumors has 115 separate nosological forms of tumors and tumor-like processes.

The group of tumors of mesenchymal origin differs in a special number of different histological variants of structures. Mesenchyme in ontogenesis gives rise to connective tissue, blood vessels, muscles, musculoskeletal tissues, serous membranes, which under certain conditions can be a source of tumors.

Soft tissue tumors.

Soft tissue classifications are complex and ambiguous. Like all tumors, soft tissue neoplasms are classified by histogenesis, degree of maturity and clinical course:

1. Tumors of fibrous tissue: mature, benign (fibroma, dermoid); immature, malignant (fibrosarcoma).

2. Tumors of adipose tissue: mature, benign (lipoma, hibernoma); immature, malignant (liposarcoma, malignant hibernoma).

3. Tumors of muscle tissue (smooth and striped): mature, benign smooth muscle (leiomyoma); mature, benign from striated muscles (rhabdomyoma); immature, malignant smooth muscle (leiomyosarcoma); immature, malignant of striated muscles (rhabdomysarcoma).

4 Tumors of blood and lymphatic vessels: mature, benign (heme, lymphangioma, hemangiopericytoma, glomusangioma); immature, malignant (heme, lymphangioendothelioma, malignant hemangiopericytoma).

5. Tumors of synovial tissues: mature, benign (benign son oma); immature, malignant (malignant synovioma).

6 Tumors of mesothelial tissue: mature, benign (benign mesothelioma); immature, malignant (malignant mesothelioma).

In addition to soft tissue tumors, non-epithelial tumors include neoplasms of melanin-forming tissue and bone, which are divided into bone-forming and cartilaginous: of which mature, benign - chondrosteoma, immature, malignant - chondroosteosarcoma.

Mature, benign tumors of the connective tissue itself.

Fibroma is a mature tumor made of fibrous connective tissue. Occurs in all age groups with equal frequency in men and women. Localized more often between the epidermis and bone in the subcutaneous fat, in the tendons and fascia of the upper and lower extremities, torso. In the internal organs, this tumor is extremely rare.

The fibroid has the form of a node with clear boundaries, dense or soft consistency, depending on the histological structure, in section pinkish-white with pronounced fibrousness.

Microscopically, the fibroid is represented by bundles of connective tissue fibers that have different lengths and thicknesses, located in different directions. Polymorphism of fibroblasts is weakly expressed, nuclei are hyperchromic.

Depending on the predominance of cellular or fibrous components, there are two types of fibroids: dense with dominance of collagen bundles over cells and soft, consisting of loose fibrous connective tissue with a large number of cells.

Clinically, the fibroid grows slowly, has no general effect on the body, if not localized in vital organs, its course is benign. The probability of malignancy is small. The exception is soft fibroids, which often recur. Some authors refer to mild fibroids as differentiated fibrosarcomas.

Desmoid (desmoid fibroma) is a connective tissue neoplasm that histologically resembles a fibroid. Differs in infiltrative growth. Tissue and cellular atypism are weakly expressed. Occurs mostly in women after childbirth. In rare cases, it is observed

in men and children. Depending on the location, there are: abdominal desmoid (when localized in the thickness of the anterior abdominal wall); extraabdominal desmoid.

Abdominal desmoid is relatively benign, not prone to malignancy. Extraabdominal desmoid or aggressive fibromatosis is common at a young age in both men and women. Localized in places of aponeurosis and fascia on the extremities, shoulder girdle, buttocks. It is characterized by rapid aggressive infiltrative growth, despite the absence of a large number of mitoses. Often relapses, often malignant.

Malignant tumors of the connective tissue itself

Fibrosarcoma is an immature malignant tumor of fibrous connective tissue. Fibrosarcomas are relatively rare tumors. In the past, they were the most common non-epithelial malignancies. After Stout's proposal, fibrosarcomas were considered only those malignant tumors that produce mature collagen types I or III and do not form other structures. Many tumors, which were considered fibrosarcomas, were classified as synovial sarcomas, malignant histiocytomas, leiomyosarcomas. Tumors are most often localized on the thigh, shoulder, torso.

Fibrosarcoma can grow as a nodule and as an infiltrate

Microscopically, it consists of immature fibroblast-like cells and collagen fibers. There are differentiated and poorly differentiated fibrosarcomas.

Differentiated fibrosarcomas are characterized by pronounced polymorphism and hyperchromia of the nuclei. Low-differentiated fibrosarcomas are characterized by monoformism, dyschromia and hypochromia of the nuclei, and many atypical mitoses. The two most unfavorable prognostic signs of fibrosarcoma are hypochromia of the nuclei and foci of myxomatosis. Fibrosarcomas metastasize mostly hematogenously to the lungs, less often to the liver, then lymphogenically to regional lymph nodes. The prognosis for low-grade fibrosarcomas is much worse (about 50% of patients die in the first five years).

Mature, benign tumors of adipose tissue.

Lipoma is one of the most common soft tissue tumors. It is more common in women of all ages. It can occur wherever there is adipose tissue. It can rarely be localized in the internal organs. Often there are multiple.

Lipoma often has the appearance of a node of partial structure (many layers of connective tissue), soft-elastic consistency, yellow, in appearance reminiscent of adipose tissue. When localized between the muscles can be indistinctly separated, simulating infiltrative growth. Can reach large sizes (over20 cm in diameter), especially in retroperitoneal localization.

Microscopically the tumor is mainly constructed as normal adipose tissue and differs from it by different sizes of lobules and fat cells. Due to the presence of a large number of layers of dense fibrous connective tissue indicates fibrolipoma. A sufficient number of vessels in the tumor in some cases allows us to talk about angiolipoma.

Clinically, in most cases, lipoma is benign. However, due to multicentric growth, recurrences may occur due to incomplete removal of the tumor field. At retroperitoneal localization malignancy of a tumor is quite often noted.

Hibernoma - mature benign tumor of brown fat. It is more common in women of all ages. Brown fat is usually found in humans in the embryonic period. Microscopically, brown fat cells are distinguished by the presence in the cytoplasm of many fatty vacuoles, which give it a frothy appearance, the nuclei are located in the center of the cell.

Hibernoma is most often localized on the neck, back, thighs, abdominal wall, in the mediastinum, ie in places where normal and embryogenesis contains brown fat.

It has the shape of a node of lobular structure, brown.

Microscopically consists of polygonal and round cells, they form lobes that are separated by thin layers of connective tissue. The cell nuclei are located centrally, containing a single nucleolus. The cytoplasm is fine-grained, eosinophilic or foamy (multilocular fat cells). The chemical composition of fat differs even in one cell. Cholesterol is often detected, which is clearly visible in polarized light.

Hibernoma does not recur or metastasize.

Immature, malignant tumors of adipose tissue.

Liposarcoma - immature malignant tumor of adipose tissue. Tumors are more common in men of all ages. It most often occurs in the soft tissues of the thigh, lower

leg and retroperitoneal region. The tumor can reach large sizes, and its weight can reach several kilograms.

Liposarcoma is a nodule or conglomerate of nodules with infiltration of surrounding tissues. The consistency is dense, the incision surface is juicy, variegated - with foci of mucus, hemorrhage and necrosis. It is often white, juicy, reminiscent of "fish meat".

Microscopically sharply expressed tissue and cellular polymorphism. It consists of lipoblasts of varying degrees of maturity, there are giant cells with chimeric nuclei. Based on the dominance of certain cell forms that make up the tumor, there are: highly differentiated liposarcoma; polymorphic (low-grade) liposarcoma.

The latter has the most malignant course. Because liposarcomas can often be multiple, developing simultaneously or sequentially in one or different parts of the body. Most variants of liposarcoma are clinically slow and rarely metastasize. Some of them, such as round-cell liposarcoma, do not differ in course from other sarcomas - they grow rapidly, recur and metastasize mainly hematogenously to the lungs.

Malignant hibernoma - immature, malignant tumor of brown fat. Tumor location, sex and age of patients coincide with similar indicators for hibernoma.

Macroscopically malignant hibernoma resembles liposarcoma. When localized under the skin is often covered with ulcers.

Microscopically characterized by a pronounced polymorphism of multilocular cells that have a polygonal shape. There are many giant mononuclear and multinucleated cells with basophilic homogeneous and fine-grained cytoplasm. There are few mitoses.

Very rarely metastasizes - mainly to the lungs by hematogenous route.

Tumors of muscle tissue (smooth and striped).

Leiomyoma - Mature, benign tumor of smooth muscle. Occurs at any age in both men and women.

The leiomyoma is localized in the skin (from the muscles that lift the hair, from the vessel wall), in the uterus, in the muscular membrane of the gastrointestinal tract.

Macroscopically the tumor is a clearly separated node of dense consistency, fibrous in section. The size of the tumor is very variable, sometimes the leiomyoma can reach the size30 cmand more. Often leiomyomas are multiple or isolated, or form a conglomeration of nodes.

Microscopically leiomyoma formed from spindle-shaped tumor cells that form bundles going in different directions. At special methods of research in a cytoplasm myofibrils come to light. Sometimes the nuclei in fibroids form rhythmic structures, so-called polysad structures, which are an indicator of tumor growth. With a predominance of connective tissue component talk about fibroids. The more connective tissue in the tumor, the slower it grows. With a sufficient number of vessels, the tumor is called angioleiomyoma. The epithelioid leiomyoma is distinguished by the shape of the cells. All variants of leiomyomas are benign. Uterine fibroids are of the greatest clinical importance. Uterine leiomyomas often occur in women aged 30-50 years. According to the histological picture, they more often have the structure of fibroids.

Depending on the location in the uterus, there are leiomyomas: submucosal; intramural (in the thickness of the muscle wall); subserous.

Intramural fibromyomas are almost asymptomatic, with submucosal localization often in the clinic there are frequent minor bleeding, sometimes possible severe uterine bleeding that requires surgery. Subserously located nodes can compress the ureters with the development of hydronephrosis, pyelonephritis. In the postmenopausal period, the reverse development of tumor nodes is described. It is necessary to know that the rapid growth of the tumor during this period indicates the possible malignancy of the tumor.

Leiomyosarcoma (malignant leiomyoma)- immature malignant tumor of smooth muscle tissue. Localized more often in the gastrointestinal tract, mostly in the colon, then - in the retroperitoneum, in the soft tissues of the extremities, in the uterus. It is more common at a young age, very rare in children.

Macroscopically more often has the form of a knot which can reach in diameter more 30 cm. Infiltrative growth is not always obvious.

Microscopically there are two variants of leiomyosarcoma - highly and poorly differentiated. Highly differentiated is very difficult to distinguish microscopically from

leiomyomas. The most important differential feature is the presence of many atypical mitoses. Low-grade leiomyosarcomas are characterized by a sharp cataplasia of tumor cells, the appearance of giant cells, a pronounced polymorphism.

Leiomyosarcomas metastasize early and widely, mainly by hematogenous means, giving multiple metastases to the liver, lungs, and often to the brain. Sometimes metastases can be detected in the clinic earlier than the main tumor. Especially at its retroperitoneal localization and localization in a large intestine.

Rhabdomyoma is a mature, benign tumor of the striated muscles. Rare. Described in all age groups, more often in children and newborns. Localized on the head, neck, torso, upper and lower extremities. Rhabdomyomas of the tongue, heart and female genitals are distinguished separately.

Macroscopically may take the form of a node and infiltrate.

Microscopically tumor cells copy different degrees of differentiation of muscular elements of different shapes - large oval, striate. Transverse striation is difficult, mainly in elongated striated cells. Glycogen is found in the cytoplasm of cells. Figures of mitosis are absent.

Clinicallyrun benign, except for rhabdomyomas of the heart and tongue, which are the cause of death of patients.

Rhabdomyosarcoma - immature, malignant tumor of striated muscles. It is more common than rhabdomyomas. In children, rhabdomyosarcoma is one of the most common tumors, second only to nephroblastoma (Wilms' tumor) and neuroblastoma. It is localized in the thickness of the muscles of the lower, less often - the upper extremities, in the retroperitoneal tissue, mediastinum, face, neck, nasopharynx, urogenital organs.

Macroscopically the tumor is a node up to 20 cm and more.

Microscopically characteristic polymorphism due to the fact that tumor cells copy in their structure embryonic muscle cells at different stages of embryogenesis and have significant cataplasia. To make a diagnosis, techniques are used to detect transverse streaks in the cytoplasm of cells, electron microscopy to detect myofibrils, and immunohistochemical typing using monoclonal antibodies.

Rhabdomyosarcoma has a high degree of malignancy. Often recurrent, gives multiple hematogenous metastases to the liver and lungs.

Tumors of blood and lymphatic vessels.

Hemangiomas - mature, benign tumor of the vessels. Some of these tumors are defects in the development of the vascular system of a tumor-like nature, some - to true blasts. Depending on which vessels copy the tumor, there are the following types of hemangiomas: capillary; venous; cavernous; arterial.

*Capillary hemangioma*Is a neoplasm with proliferation of endothelial cells and the formation of atypical capillaries. Localized most often in the skin, mucous membranes of the gastrointestinal tract. It is often plural. It is more common in female children.

Macroscopically represented by a red or bluish node with a smooth or hilly surface, in section has a porous structure. If the tumor is localized in the skin, when pressed, the node becomes white.

Microscopically the tumor consists of branched vessels of the capillary type with a narrow lumen, which is not always filled with blood. The endothelium is swollen, hyperchromic. Capillaries can form indistinctly separated particles, which gives the impression of infiltrating growth.

Cavernous hemangioma- neoplasm, which consists of chimeric cavities such as sinusoids of different sizes, which are interconnected. It is most common in the liver, gastrointestinal tract, brain.

Macroscopically has the appearance of a crimson-cyanotic node clearly separated from the surrounding tissues, which resembles a sponge in section.

Microscopically consists of thin-walled cavities (cavities) covered with a single layer of endothelial cells and filled with blood.

Arterial angioma - is a conglomerate of developed arterial vessels, among which there are areas resembling a capillary hemangioma.

Venous hemangioma- microscopically represented mostly by vessels of the venous type, next to which there are vessels of the capillary and atrial type. Located deep in the soft tissues between the muscles.

Glomusangioma (Barre – Masson tumor)- mature benign tumor of vascular origin (myoarterial glomus). Occur with equal frequency in both men and women, mostly mature.

Macroscopically there are two types: solitary glomusangioma; multiple disseminated (familial glomusangioma).

It is more common in the form of a single node with a diameter of 0.3-0.8 cm, soft consistency, grayish-pink color. Favorite localization in the hands and feet, mostly on the toes, in the area of the nail bed. Clinically manifested by sharp pain due to the large number of nerve endings.

Microscopically consists of slit-like vessels of the sinusoidal type, which are covered with endothelium and surrounded by clutches of epithelioid cells and resemble glomus cells.

Hemangiopericytoma - tumor of vascular origin, in which along with the formation of blood vessels is the proliferation of perivascular cells (Zimmerman's pericytes). Occurs at any age, often in children. As a rule, it has a benign course. May recur in a few years. At a certain localization, for example, in the retroperitoneal region, on the upper extremities, head and neck, regardless of the maturity of the cells that make up the tumor, can metastasize. Therefore, Stout and other authors suggest considering different variants of hemangiopericytoma as "potential malignant tumors."

Lymphoangioma - tumor of the lymphatic vessels. It is more common in children as a malformation. It is localized mostly in the mucous membrane of the oral cavity, retroperitoneal space, mesentery. Cystic and cavernous variants of a tumor structure meet more often. The microscopic structure is similar to the structure of hemangiomas.

Hemangioendothelioma - Many authors consider it the most malignant tumor. It is more common in the age of 30-50 years, but can often occur in childhood. It is most often localized in the skin, soft tissues of the extremities, torso, head, less often in the internal organs.

Macroscopically is a node to 10 cmin diameter, lobular structure, in places with infiltrative growth. Nodes are soft, juicy, pink or red with foci of necrosis.

Microscopically the tumor is composed of atypical, randomly anastomosing vessels lined with several layers of atypical endothelial cells. Expressed cellular polymorphism, hyperchromia of nuclei. Hemangioendothelioma metastasizes extensively, mostly hematogenously to the lungs, bones, liver. Metastases to regional lymph nodes can be observed.

Lymphangioendothelioma - similar in structure to hemangioendothelioma. Often occurs on the background of chronic lymphostasis.

Tumors of synovial tissue.

Synoviomas occur more often at the age of 30-40 years, mainly in men.

Macroscopically it has the appearance of a dense node in size 5 cmand more, uniform in section, white-pink. Localized on the extremities in the joints (knee, forearm, fingers and toes).

Microscopically, the tumor is polymorphic, there are cracks and cysts of different sizes, lined with oval, cubic, prismatic cells, resembling cells of the glandular epithelium. In addition, there are spindle-shaped cells that form a swollen stroma. They are also polymorphic. There are single giant multinucleated cells. Because the morphological and biological features of synoviomas often do not match, and morphologically mature tumors can be malignant, today most authors believe that all synoviomas should be considered malignant, regardless of the degree of maturity.

Tumors of the mesothelium.

Mesothelioma - Mature, benign tumor, is relatively rare, has the structure of fibroids, rich in cellular elements, so it is called fibrous mesothelioma.

Macroscopically, it is a clearly separated node that grows slowly, often in the visceral pleura, dense, layered in section.

Malignant mesothelioma - this rare tumor develops from mesothelial cells, mainly in the pleura, but can also be observed in the peritoneumand pericardium. Almost all patients with malignant mesothelioma have a history of working with asbestos.

Macroscopically the tumor has the form of a dense infiltrate, 2- 3 cmand more, on serous membranes. In the pericardium and omentum may have the form of indistinctly separated nodes with a villous surface.

Microscopically the tumor resembles adenocarcinoma or hemangioendothelioma. The most common epithelioid mesothelioma of tubular or papillary structure.

Histological verification of both mature and immature mesothelioma is very difficult. An accurate diagnosis can be made by immunohistochemical typing using monoclonal antibodies, as well as the method of tissue culture.

Cyst-forming and cartilaginous tumors.

Chondroma- mature benign tumor, which copies the morphology of mature hyaline cartilage. It is more often localized in the phalanges of the fingers, wrist bones, but can also be found in the large tubular bones (thigh, shoulder, tibia) and in the lungs. Occurs in all age groups, but more often in children. Clinically it grows slowly over the years.

Macroscopically Chondroma is a node of lobular structure, dense, blue and white, resembling cartilage.

Microscopically the tumor has the structure of mature hyaline cartilage. Cellular atypism is weakly expressed. Cartilage cells vary sharply in size, with one, and sometimes two, small nuclei, arranged randomly in typical lacunae, separated from each other by a greater or lesser amount of the main substance of the hyaline type. The value of the tumor is determined by its location. For example, when located in the bronchi, it can cause pulmonary atelectasis.

Osteoma - mature, benign bone tumor. The predominant location of osteomas is the skull bones, especially the paranasal sinuses. Osteoma in the tubular bones is rare. Most often it is manifested in childhood.

Macroscopically has the appearance of a knot, the consistency is denser than normal tissue. In the paranasal sinuses, they are sometimes multiple, growing as a polyp on the leg. In relation to the bone, the osteoma may be periosteal, cortical or endosteal. In most cases, osteomas are diagnosed accidentally by X-ray.

Microscopically osteomas are divided into compact and spongy. Compact osteoma consists almost entirely of bone mass, fine-fiber or lamellar structure with very narrow vascular canals. Spongy osteoma is represented by a clear network of bone beams, but arranged randomly. The interbeam spaces are filled with cellular tissue. It has no clear boundaries with the surrounding bone tissue. The combination of multiple osteomas, which are localized in the mandible, skull vault and long tubular bones with intestinal polyposis and soft tissue tumors, is called Gardner's syndrome.

Osteosarcoma Is a collective term that includes immature malignant tumors of bone and cartilage-forming tissue, such as periosteal chondrosarcoma, peri- and intracortical osteogenic sarcoma, malignant osteoblastoma. It is necessary to know that for verification of osteogenic tumors X-ray inspection is obligatory. Thus, the diagnosis is X-ray morphological. The age of patients ranges from 6 to 60 years, 50% are patients under 30 years. Radiologically there is a thinning and destruction of the cortical layer of bone.

Macroscopically variegated tumor - from white-gray to brownish-red color, loose consistency, despite the presence of focal calcification.

Microscopically the main tissue component of the tumor is represented by bone and osteoid structures lined with atypical osteoblasts, with the presence of thin-walled vessels, there are many atypical figures of mitosis. Metastasis is mainly hematogenous, mainly in the lungs.

Tumors of the epithelium.

Epithelial tumors are the most common among tumors. The basis of their classification is the features of histogenesis (type of epithelium), the degree of differentiation and organ specificity.

Depending on histogenesis, there are tumors of the integumentary epithelium (multilayered squamous and transitional) and glandular.

In the course, which is mainly determined by the degree of differentiation, epithelial tumors can be benign or malignant.

Depending on organ specificity, there are organ-specific and epithelial tumors without specific localization.

Organ-specific tumors occur only in certain organs and have characteristic morphological features, sometimes functional (synthesis of characteristic hormones), which distinguish the tumor from other tumors and easily allow (even in the presence of metastases) to establish its origin from a particular organ.

Benign tumors without characteristic localization

*Papilloma.*Benign tumor of the integumentary epithelium (multilayered squamous and transitional). Often occurs in the skin, mouth, bladder, etc. Macroscopically it has a spherical shape on a wide base or on a leg,softor elastic consistency, mobile.

Microscopically, the tumor is a papillary formation of multilayered squamous or transitional epithelium, which separates the basement membrane from the connective tissue stroma with blood vessels. The polarity and complexity of the epithelium is preserved, but there is a thickening of the layers, increased keratinization.

Papilloma can be multiple - laryngeal papillomatosis.

Occasionally the papilloma recurs and becomes malignant (larynx, bladder).

*Adenoma.*Benign tumor of the glandular epithelium. It develops on the mucous membranes covered with glandular epithelium and in the organs. Adenomas of mucous membranes in the form of a polyp are called adenomatous polyps. Adenomas of the gastric mucosa and colon are often malignant. There are the following morphological variants of adenomas: acinar (alveolar), tubular, trabecular, solid, papillary cystadenoma, villous adenoma, fibroadenoma.

Papillary cystadenoma. Macroscopically, the tumor has the appearance of a cystic formation (may be much larger than the ovary) with thin walls and clear fluid inside. The inner surface of the cyst (cysts) is covered with multiple papillae of white-pink color. The tumor is located within the ovary.

Microscopically, the tumor consists of cystic dilated lumens of the glands. Cubic or cylindrical epithelium, which lines the inner surface of the cyst, forms papillary

protrusions, preserves the basement membrane, polarity and complexity. In the ovaries, the tumor has a tendency to malignancy, infiltrating growth and malignancy.

Benign tumors with characteristic localization.

Villi adenoma of the colon. Macroscopically it has the appearance of a large polyp (more than 1 cm) on a stalk or a broad base with a villous surface.

Microscopically, the adenoma is formed by elongated numerous papillae, which are formed by highly differentiated epithelium with a large number of goblet cells. Dysplasia is often noted, the multilineage of the epithelium is determined,atypia appears, goblet cells disappear. In 30% of cases, the tumor becomes malignant.

*Breast fibroadenoma.*Benign tumor, common in women 25-35 years. During pregnancy, the tumor increases (has receptors for progesterone), regresses with age. Malignancy is rare, in 0.1% of cases carcinoma is diagnosed in situ. Macroscopically - dense, mobile, well demarcated, painless node, usually up to 3 cm with slit-like cavities in section. Sometimes it reaches large sizes - a giant fibroadenoma.

Microscopically, the tumor consists of glandular structures (ducts) of various shapes and sizes. The epithelium retains the basement membrane, complexity and polarity. The stroma is well developed and the parenchyma prevails. There are intracanalicular fibroadenoma - a loose stroma, rich in cells grows into the ducts, compresses them and pericanalicular fibroadenoma - fibrous stroma surrounds the ducts and as a result they have the form of round tubes. Often both options are found in the tumor.

Phylloid (leaf-like) tumor refers to stromal tumors and can be benign, borderline and malignant.

Adenomas of endocrine organs.

Characterized by pronounced organ specificity. May be hormonally active and manifest a specific hormonal syndrome or without hormonal activity. Tumors that arise from endocrine cells that belong to the APUD system (amine precursor uptake decarboxilation) and produce biogenic amines or polypeptide hormones are called apudomas.

Apudomas are diverse and are named after the hormones they produce. Apodomas include adenomas of the endocrine glands (pituitary, pineal gland, pancreas), paragangliomas (chromaffin and non-chromaffin (hemodectomy)), carcinoid. Apudomas have a malignant course, the probability of malignancy increases with tumor growth, so they are classified as potentially malignant.

*Carcinoid.*Traditionally, the term is applied to tumors that arise from enterochromaffin cells of the gastrointestinal tract and produce serotonin (biogenic amine). Carcinoids are also called tumors of another location (lungs, pancreas, etc.). It is most common in the appendix and small intestine (30%). May be accompanied by carcinoid syndrome: redness of the skin, watery diarrhea, bronchospasm, non-infectious thromboendocarditis of the valves of the right half of the heart. Macroscopically, the tumor without clear boundaries up to 1 cm, may be larger. In section yellow, located in the submucosal layer, occasionally ulcerated.

Microscopically, the tumor consists of polygonal cells that are located around the capillaries and are separated by groups of connective tissue layers. In cells, a positive Argentofin reaction. Occasionally the carcinoid becomes malignant and may metastasize.

Pituitary adenomas.

*Somatotropic adenoma*consists of eosinophilic cells that produce somatotropin (growth hormone). Children develop gigantism, adults - acromegaly (enlargement of the arms, legs, jaws, nose, internal organs; accompanied by hyperglycemia, osteoporosis, and hypertension).

*Corticotropic adenoma*consists mainly of basophilic cells that produce adrenocorticotropic hormone (ACTH). Causes the development of Itsenko-Cushing's disease, which is accompanied by hypercorticism.

Prolactinoma consists mainly of chromophobic cells, in women it causes amenorrhea and galactorrhea, in men - impotence and sometimes galactorrhea.

Adenomas of the pancreasarise from islet cells.

Insuloma develops from beta cells, produces insulin, has a trabecular or tubular structure, is accompanied by hypoglycemic syndrome.

Glucagonoma develops from A-cells, produces glucagon, has a trabecular structure, causes hyperglycemic states and secondary diabetes.

Gastrinoma develops from G-cells, produces gastritis (causes hyperplasia of parietal cells of the gastric mucosa and stimulation of hydrochloric acid production, has a trabecular structure, is accompanied by Solinger-Ellison syndrome, which is characterized by multiple recurrent gastric ulcers in the duodenum and duodenum. .

Vipoma develops from D-cells, produces vaso-active intestinal peptide, has a solid trabecular structure, develops watery diarrhea, hypoglycemia and achlorhydria (pancreatic cholera or Werner-Morrison syndrome). Malignant course in 80% of cases.

Pheochromocytoma(chromaffin paraganglioma) arises from the chromaffin cells of the adrenal medulla, if the tumor arises from extra-adrenal chromaffin tissue, it is called paraganglioma. The tumor produces adrenaline and noradrenaline, causes secondary hypertension, in 10% of cases malignant.

Syndrome of multiple endocrine neoplasia (MEN) - a number of genetic syndromes that are accompanied by the development of multiple endocrine tumors, mainly apud.

Malignant epithelial tumorscalled cancer or carcinoma. Among tumors are diagnosed most often. Usuallyassociated with precancerous conditions, previous changes in the epithelium: metaplasia, dysplasia, hyperplasia. Epithelial dysplasia progresses from mild to moderate and severe, causing carcinoma in situ and subsequently invasive cancer that grows in the surrounding tissues. Carcinoma in situ is an intraepithelial tumor that does not extend beyond the basement membrane. As for the cervix, in many cases it is not possible to distinguish severe dysplasia from carcinoma in situ, so these conditions were combined under the name CIN 3 (cervical intraepithelial neoplasia 3) and chose a single treatment tactic. Carcinoma does not metastasize in situ.

The cancer metastasizes mainly lymphogenically, the first metastases occur in regional lymph nodes, then hematogenous and implantation metastases may occur.

*Squamous cell carcinoma.*It develops from a multilayered flattened epithelium. In the lungs occurs as a result of metaplasia of the bronchial epithelium. There may be varying degrees of differentiation. Highly differentiated cancer is characterized by the formation of "cancer pearls", keratin is absent in low-grade cancer and keratin is determined intracellularly in a moderately differentiated form.

*Adenocarcinoma (glandular cancer).*It develops from the prismatic epithelium of mucous membranes and organs, is characterized by the presence of glands. Has varying degrees of differentiation. The smaller the degree of differentiation, the fewer glands are detected in the tumor. A special form of low-grade adenocarcinoma is cutaneous adenocarcinoma with abundant stroma and nest cluster of hyperchromic cells with pronounced atypism. The consistency of the tumor is cartilaginous.

Undifferentiated cancer(it is impossible to determine from which epithelium the tumor originates, without special diagnostic methods). Small cell cancer occurs in the stomach, lungs (hormonally active, so it can be attributed to apudoma) and other organs. Large cell carcinoma occurs in the stomach and lungs. Squamous cell carcinoma is most common in the stomach. Medullary cancer is most common in the breast. Stroma is scanty, atypical cells are large, nuclei with well-defined nucleoli, cell boundaries are not pronounced, there is necrosis. Among the numerous mitoses, atypical mitoses are identified. The tumor reaches largesize, soft, white-pink colorin section, the surface of the tumor is smooth. Undifferentiated cancer with scurrilous type of growth occurs mainly in the stomach.

Cancer with specific localization in the organs. Examples of cancers with pronounced organ specificity are clear cell kidney cancer and chorionic carcinoma.

Light cell kidney cancer. The most common form of renal cell carcinoma, which develops from the epithelium of the tubules. Men 40-60 years are more often ill. Metastasizes hematogenously, the first metastases are detected in the lungs. Characteristic is the growth of the tumor in the renal vein and spread along the vena cava to the heart. The tumor has the form of a node with clear boundaries, which are formed by a pseudocapsule. In section, the tumor is variegated, yellow with hemorrhages. Microscopically, the tumor is composed of atypical cells with small

hyperchromic nuclei and optically empty (light) cytoplasm, which form solid alveolar structures, has many vessels of the sinusoidal type, hemorrhage. When stained with Sudan 3, lipids in the cytoplasm of cells are determined.

Chorionic carcinoma. A malignant tumor that develops from a trophoblast. Occurs in women after childbirth, abortion, on the background of destructive vesicular drift. Localized in the uterus, but ectopic location outside the uterus is possible and vision develops in men. The tumor metastasizes hematogenously to the lungs, liver, brain, etc. Hemorrhages occur in metastases, which explains the hemoptysis at the location of the tumor in the lungs. Tumorhas the appearance of a soft knot dark-red color. The tumor consists of atypical small cytotrophoblast cells and large syncytial formations (Langhans cells), stroma is not defined, many hemorrhages. The tumor is hormonally active, produces chorionic gonadotropin (CHG), an increase in its level in urine and blood is a diagnostic criterion. Immunohistochemically, HG can be detected in cellstumors. Due to the presenceelevated levels of hCG may be changes in the genitals: decidual reaction of the endometrium, hyperplasia of the mammary glands, ovarian cysts. With adequate chemotherapy and no metastases, the 5-year survival rate is 100%.

Melanocyte tumors.

The source of tumors of this group are melanocytes - cells of neuroectodermal origin, which are located in the basal layer of the epidermis, hair follicles, most mucous membranes covered with multilayered squamous epithelium,softmeninges, in reticular and irises. Melanocytes contain a brownish-black pigment, which is detected by the Argentofin reaction by Fontano-Mason.

Melanocytes form freckles, lentigo, melanocyte nevus, melanoma.

Freckles -focal pigmentation,relatedwith increased synthesis of melanin during hyperinsolation.

Lentigo -pigmentedspots that are associated with melanocyte hyperplasia in the epidermis.

Melanocyte nevus -congenital or acquired pigment formation that appearsat 2-6 years and has a tendency to spontaneous regression with age.

Melanoma-malignant tumor of melanocytes, is 4% of skin tumors.Most often occurs in women 30-50 years on the skin of the lower extremities, head and neck. Installedconnection of skin melanoma with insolation. Most melanoma is formed de novo and occasionally from existing pigment formations. Pigmented formations with a high probability of malignancy include Hutchinson's spot, dysplastic nevi, congenital giant nevi.

Phases of melanoma growth.

1. Phase of radial (horizontal) growth. The tumor grows within the epidermis and does not spread to the dermis. Lymphohistiocytic infiltration is determined in the papillary layer of the dermis. This stage can be considered as in situ. The tumor does not metastasize, its removal causes complete recovery.

2. Vertical growth phase (late stage). The tumor spreads to the dermis and subcutaneous tissue. Lymphogenic and hematogenous metastasis are characteristic.

The main variants of melanoma.

*Malignant lentigo-melanoma.*The skin is affected in places of insolation. The long period has a radial growth phase. Often develops with Lentigo maligna but is characterized by invasion into the dermis of atypical, polymorphic or spindle cell melanocytes, has a low degree of malignancy.

*Superficial melanoma.*The most common option. Localization - limbs, torso. It has the appearance of spots or plaques from pink to brown. The tumor is non-invasive, consists of monomorphic atypical melanocytes, which form a cluster of pediatric cells (large cells with vacuolated cytoplasm) - horizontal growth. The foci of invasion into the dermis, often surrounded by cellular infiltrate and fibrous tissue (vertical growth), are also identified. The radial form of growth which can last till 10 years prevails.

*Nodular melanoma.*It begins with the vertical growth phase. Has the worst prognosis. Occurs at any age on any area of skin. It has the appearance of a blue-black plaque, a nodule of brown-black or brown color, sometimes with ulceration. The tumor consists of polymorphic cells that contain melanin granules. Numerous mitoses are characteristic. The tumor infiltrates the dermis and adjacent areas of fat. Intraepidermal spread of the tumor in its edges is not pronounced. Hematogenous and lymphogenic

metastases appear early, which have the appearance of brown-black tumor nodules with clear boundaries.

*Acral lentigorous melanoma.*The most typical localization - palms, soles, mucous-epidermal areas of the mouth, nose, anus. Most often occurs in the Negroid race. Characteristic is the proliferation of large chimeric cells containing melanin with invasion into the papillary layer of the dermis, surrounded by inflammatory infiltrate.

The prognosis of melanoma is determined by the stage (metastasis), the level of invasion (depth of germination), the thickness of the tumor.

POTOMORPHOLOGY OF DISEASES

LECTURE 8

TUMORS OF HEMOPOETIC AND LYMPHOPROLIFERATIVE TISSUE.

Special pathological anatomy studies the material substrate of the disease, ie is the subject of nosology. Nosology (from the Latin noso - disease and logos - doctrine) - the doctrine of disease, involves knowledge of the etiology, pathogenesis, manifestations (clinical and morphological) and consequences of the disease, classification and nomenclature of diseases, variability (pathomorphosis), as well as diagnosis, principles treatment and prevention.

The disease is understood as a violation of the vital functions of the organism under the influence of a certain cause. The essence of the disease is solved in ecological terms (from the Greek. Oikos - home, housing), ie in terms of disturbed normal relationships between the body and the environment. This interpretation of the disease developed in the second half of the XIX century. Prominent Russian clinician OO Ostroumov - considered the disease as a violation of normal human life with the conditions of its existence in the environment. S.P. Botkin believed that the disease is a reaction of the body to the harmful effects of the environment.

K. Bernard defined the disease as a violation of the physiological balance of the body. Interpretation of the disease in ecological terms allows us to put forward the following theoretical provisions that must be taken into account when studying the disease:

1. The disease is not brought from outside, but is a process of coexistence of the human body with the environment - the conflict of man with the circumstances of his life and work. Therefore, the opposition of the disease to health is not justified. Both are only forms of coexistence of the human body with the environment.

2. In the etiology of the disease the leading role belongs to external causal factors.

Internal causal factors, especially hereditary factors of the disease, in the distant past had their external causes.

3. Disease as a new quality in the life of the organism develops on a physiological basis. From this it should be recognized that the study of pathogenesis is based on the analysis of physiological processes, which in the disease acquire only a different quality.

4. In the manifestations of the disease, in addition to damage (fracture according to IP Pavlov) under the influence of a certain cause, adaptive and compensatory reactions, which are an integral part of the pathogenesis, are clearly presented.

5. Clinical manifestations of the disease are not morphological derivatives at all, but the ratio of destructive processes (damage) and recovery processes (repair, adaptation, compensation), reflecting either the predominance of the latter over the former (recovery), or the lack of the latter (disease progression, transformation into a chronic state) (DS Sarkisov, 1988).

6. The ratio of structural changes and clinical manifestations of the disease in different periods are not the same (DS Sarkisov, 1988): in the first formation of the disease structural changes in organs and tissues, due to activation of adaptive and compensatory processes, prevent its clinical manifestations (asymptomatic preclinical period)), in the recovery period, on the contrary, the normalization of impaired functions occurs earlier than the restoration of the damaged structure, ie morphological manifestations of complete recovery in comparison with clinical delays (asymptomatic postclinical period).

7. The division of diseases into organic and functional in our time is not carried out, because any functional disorder finds its material (structural) expression.

8. The disease may undergo a certain evolution, ie change (pathomorphosis).

The variability of the disease can be natural (natural pathomorphosis) or induced by man (induced pathomorphosis).

Classifications of diseases take into account the following features:

1. Etiological, which allows to divide diseases into hereditary (congenital) and acquired, and the latter - non-infectious and infectious.

2. Anatomical and topographic, ie localization of the main focus of damage. In this regard, there are diseases of organ systems (diseases of the cardiovascular system), organs (cell diseases) and tissues (connective tissue diseases).

3. Common pathogenetic mechanisms, based on which there are allergic, autoimmune and rheumatic diseases.

4. The common socially mediated influence on the body of environmental factors that underlie the origin of occupational diseases, geographical and military pathology, etc.

5. The common forms of development and course of the disease allow to distinguish between the most acute, acute, subacute and chronic, as well as cyclical and acyclic diseases.

6. Gender and age, which are guided by the selection of women's, men's and children's diseases, as well as diseases of old age. At classification of diseases their nomenclature is observed.

Diseases of the blood systemare the content of clinical hematology, the founders of which in our country are II Mechnikov, SP Botkin, M.I. Arinkin, OI Крюков, I.O. Cashier. These diseases develop as a result of disorders of regulation of hematopoiesis and hematopoiesis, which is reflected in the composition of peripheral blood. Therefore on the basis of data of studying of structure of peripheral blood it is possible to judge approximately a condition of hematopoietic system as a whole. Yes, we can talk about changes in red and white sprouts, as well as blood plasma in both quantitative and qualitative terms.

Changes in the red sprout of the blood system may involve a decrease in hemoglobin and red blood cell count (anemia) or an increase (true, true polycythemia or erythremia); violation of the shape of erythrocytes - erythrocytopathy (microspherocytosis, ovalocytosis) or hemoglobin synthesis - hemoglobinopathy or hemoglobinosis (thalassemia, sickle cell anemia), (hemoblastosis). Equally, we can also talk about an increase in the number of platelets (thrombocytosis) or a decrease (platelet cytopenia) in the peripheral blood, as well as changes in their quality (thrombocytopathy).

Changes in blood plasma mainly affect its proteins. Their number may increase (hyperproteinemia) or decrease (hypoproteinemia); may change the quality of plasma proteins, then talk about dysproteinemia.

The most complete picture of the state of the hematopoietic system is given by the study of bone marrow puncture (sternum) and trepan biopsy (iliac crest), which are widely used in hematology. Diseases of the blood system are extremely diverse. The most important are anemia, hemoblastosis (tumors that arise from hematopoietic cells), thrombocytopenia and thrombocytopathy.

Changes in the white germ of the blood system affect both leukocytes and platelets. The number of leukocytes in the peripheral blood may increase.

Tumors of the blood system or hemoblastosis are divided into two groups:

leukemia - systemic tumor diseases of hematopoietic tissue;

lymphoma - regional tumor diseases of hematopoietic and / or lymphatic tissue.

Classification of tumors of hematopoietic and lymphatic tissue:

I. Leukemia is a systemic tumor disease.

A. Acute leukemia: 1) undifferentiated; 2) myeloblastic; 3) lymphoblastic; 4) plasmoblastic; 5) monoblastic (myelomonoblastic); 6) erythromyeloblastic; 7) megakaryoblast.

B. Chronic leukemia.

Myelocytic origin: 1) chronic myeloid; 2) chronic erythromyelosis; 3) erythremia; 4) true polycythemia (Wakez-Osler syndrome).

Lymphocytic origin: 1) chronic lymphocytic leukemia; 2) lymphomatosis of the skin (Cesarean section); 3) paraproteinemic leukemias: a) myeloma; b) primary macroglobulinemia (Waldenstrom's disease); c) heavy chain disease (Franklin's disease).

Monocytic origin: 1) chronic monocytic leukemia; 2) histiocytosis (histiocytosis X).

II. *Lymphomas* - regional tumors.

Lymphosarcoma: lymphocytic, prolymphocytic, lymphoblastic, immunoblastic, lymphoplasmocytic; African lymphoma (Burkitt's tumor). Fungal

mycosis. Cesarean section. Reticulosarcoma. Lymphogranulomatosis (Hodgkin's disease).

Leukemia is a systemic tumor of the hematopoietic tissue

Leukemia(leukemia) are characterized by systemic progressive growth of hematopoietic cells of tumor origin - leukemic cells. First, tumor cells grow in the hematopoietic organs (bone marrow, lymph nodes, spleen), then they are hematogenously displaced to other organs and tissues, forming leukemic (leukemic) infiltrates around blood vessels, in their walls; in parenchymatous elements dystrophy, atrophy develop and then they perish. Tumor cell infiltration is diffuse (leukemic infiltration of the spleen, liver, kidneys, mesentery), which causes a sharp increase in organs and tissues or focal - in the formation of tumor nodules that germinate the capsule of organs and adjacent tissues. Quite often tumor nodules appear on the background of diffuse leukemic infiltration, however,

Leukemia is characterized by the appearance of leukemic cells in the peripheral blood.

Continuous growth of leukemic cells in organs and tissues, "flooding" of blood with them leads to anemia and hemorrhagic syndrome, severe degenerative changes in parenchymal organs. In leukemia due to suppression of immunity develop severe ulcerative-necrotic changes and complications of infectious nature - sepsis.

The etiology of leukemia and tumors are closely related, because the tumor origin of leukemia is not in doubt.

Among the mutagens should be mentioned viruses, ionizing radiation, some chemicals.

The importance of viruses in the development of leukemia has been shown in animal experiments. In humans, it has been demonstrated in cases of acute endemic T-lymphocytic leukemia (HTLV-I retrovirus), hair cell leukemia (HTLV-II retrovirus) and Burkitt's lymphoma (Abstein-Barr DNA virus).

It is also known that ionizing radiation can cause the development of leukemia (radiation or radiation leukemia), and the frequency of mutations depends directly on the dose of ionizing radiation. After the atomic explosion in

Hiroshima and Nagasaki, the number of patients with acute and chronic leukemia among those irradiated increased 7.5 times.

Chemicals that can cause leukemia include dibenzanthracene, benzpyrene, methylcholanthrene, ie blastomogenic substances.

The pathogenesis of leukemia is associated with the activation of cellular oncogenes (protooncogenes) under the influence of various etiological factors, which leads to impaired proliferation and differentiation of hematopoietic cells with sequential malignant transformation. In humans, increased expression of a number of proto-oncogenes has been registered: ras (chromosome 1) - in various leukemias; sis (chromosome 22) - in chronic leukemia; tus (chromosome 8) - in Burkitt's lymphoma.

The importance of hereditary factors in the development of leukemia is emphasized by the familial nature of the disease. When studying the karyotypes of leukemic cells, changes in the set of their chromosomes are detected - chromosomal aberrations. In chronic myeloma leukemia, for example, there is a constant decrease in the autosome of the 22nd pair of chromosomes of leukemic cells (Ph '- chromosome or Philadelphia chromosome). Children with Down's syndrome also have a Ph 'chromosome, and leukemia is 10-15 times more common among them.

Thus, the mutational theory of leukemia pathogenesis is the most plausible. The development of leukemia is subject to the rules of tumor progression. The change of monoclonality of leukemic cells by polyclonality underlies the appearance of blast cells, their eviction from the bone marrow and the progression of the disease - blast crisis.

Depending on the degree of increase or decrease in the peripheral blood of the total number of leukocytes, including leukemic cells, there are leukemic (tens and hundreds of thousands of leukocytes in 1 μl of blood); subleukemic (not more than 15,000–25,000 in 1 μl of blood), leukopenic (decrease in the number of leukocytes, but leukemic cells are detected) and aleukemic (no leukemic cells in the blood) variants of leukemia.

Depending on the degree of differentiation (maturity) of blood tumor cells and the nature of the course (malignant or benign) leukemia is divided into acute and chronic.

Acute leukemia is characterized by proliferation of undifferentiated or poorly differentiated blast cells ("blast" leukemia) and malignancy; for chronic leukemia - proliferation of differentiated leukemic cells ("citric" leukemias) and relative benign course.

Given the histo (cyto) genesis of leukemic cells, histo (cyto) genetic forms of both acute and chronic leukemia are distinguished. In recent years, due to new ideas about hematopoiesis, the histogenetic classification of leukemia has undergone significant changes. A fundamental feature of the new hematopoietic scheme is the selection of classes of precursor cells of different hematopoietic sprouts.

On the basis of modern ideas about hematopoiesis among acute leukemias the following histogenetic forms are distinguished: undifferentiated, myeloblastic, lymphoblastic, monoblastic (myelomonoblastic), erythromyeloblastic and megakaryoblastic. Undifferentiated acute leukemia develops from progenitor cells of the first three classes, which are devoid of morphological signs of belonging to a particular series of hematopoiesis. Other forms of acute leukemia come from class IV progenitor cells, ie blast cells.

*Chronic leukemia*depending on the number of maturing cells of hematopoiesis, from which they arise, are divided into: 1) leukemia of myelocytic origin; 2) leukemia of lymphocytic origin; 3) leukemia of monocytic origin. Chronic leukemias of myelocytic origin include: chronic myeloid leukemia, chronic erythromyelosis, erythremia, true polycythemia. Chronic leukemias of lymphocytic origin include: chronic lymphocytic leukemia, cutaneous lymphomatosis (Cesarean's disease) and paraproteinemic leukemias (myeloma; primary Waldenstrom's macroglobulinemia; Franklin's heavy chain disease). Leukemias of monocytic origin are monocytic (myelomonocytic) leukemia and histiocytosis (histiocytosis X).

The pathological anatomy of leukemias is peculiar and concerns both acute and chronic forms. There is a certain specificity of their various types.

Acute leukemia. The diagnosis of acute leukemia is possible only when blast cells are found in the bone marrow (point from the sternum). Sometimes their number is 10-20%, but then in the trepan of the iliac bone are clusters of many dozens of blasts. In acute leukemia, both in the peripheral blood and in the myelogram, the so-called leukemic failure is found - a sharp increase in the number of blasts and single mature elements in the absence of transient maturing forms.

Acute leukemias are characterized by the replacement of bone marrow with young blast elements and their infiltration of the spleen, liver, lymph nodes, kidneys, brain and its membranes, other organs, the degree of which varies depending on the form of leukemia. The form of acute leukemia is established by cytochemical examination of blast cells. Bone marrow aplasia and pancytopenia may develop during treatment of patients with acute leukemia with cytostatic drugs.

Acute leukemia in children has some features. Compared with acute leukemia in adults, they are much more common and are characterized by a higher prevalence of leukemic infiltration in both hematopoietic and non-hematopoietic organs (except the gonads). In children more often than in adults, leukemias with nodular (tumor-like) infiltrates are observed, especially in the area of the thymus gland; acute lymphoblastic (T-dependent) leukemia is more common; less often - myeloblastic leukemia. Special forms of acute leukemia in children are congenital leukemia and chloroleukemia.

Acute undifferentiated leukemia. This form of leukemia is characterized by infiltration of the bone marrow, spleen, lymph nodes, lymphoid formations (tonsils, group lymphatic and solitary follicles), vessel walls, kidneys and other organs by undifferentiated hematopoietic cells. Leukemic infiltration in such leukemias is monotonous; the spleen and liver are moderately enlarged. The bone marrow of flat and tubular bones is red, juicy, sometimes with a gray tinge. In connection with leukemic infiltration of the mucous membrane of the oral cavity and tonsils there is necrotic gingivitis, tonsillitis - necrotic sore throat. Sometimes secondary infection joins leukemia, then undifferentiated acute leukemia runs as a septic disease.

Leukemic infiltration of tissues and organs is often associated with the phenomena of hemorrhagic syndrome, the development of which can be explained not only by the destruction of leukemic cells of vascular walls, but also anemia, platelet dysfunction due to bone marrow replacement by undifferentiated hematopoietic cells. Hemorrhages occur in the skin, mucous membranes, internal organs, often in the brain.

Patients with this form of leukemia die from cerebral hemorrhage, gastrointestinal bleeding, necrotic ulcerative complications and sepsis.

Acute myeloblastic leukemia(acute myelogenous leukemia). In this form of acute leukemia, there is infiltration of bone marrow, liver, spleen, kidneys, rarely lymph nodes and skin by tumor cells of the myeloblastic series with cytochemical features: they find glycogen, sudanophilic inclusions; show a positive reaction to peroxidase, anaphthyl esterase and chloroacetate esterase.

The bone marrow becomes red or grayish, sometimes it acquires a putrid hue (pyoid bone marrow). The spleen and liver due to leukemic infiltration increase, but slightly; the same changes occur in the lymph nodes. Blast cell infiltration is quite characteristic not only of the bone marrow, spleen and liver, but also of the mucous membrane of the gastrointestinal tract, in connection with which necrosis occurs in the oral cavity, tonsils, pharynx, stomach. Both diffuse and focal (tumor) infiltrates are found in the kidneys. In 1/3 of cases leukemic infiltration of the lungs develops ("leukemic pneumonitis"); in 1/4 cases - leukemic infiltration of the meninges ("leukemic meningitis"); sharply expressed hemorrhagic diathesis. Hemorrhages are observed in mucous and serous membranes, internal organs. Patients die from bleeding,

In recent years, active treatment of patients (cytostatic drugs, antibiotics) has significantly changed the picture of acute undifferentiated and myeloblastic leukemia. Numerous necrosis in the oral cavity and pharynx are rare, hemorrhagic diathesis has decreased. However, due to increased life expectancy, patients with acute leukemia are more likely to have extraosseous changes such as "leukemic pneumonitis" and "leukemic meningitis". In connection with the treatment of patients with cytostatic drugs, cases of necrotic-ulcerative changes in the gastrointestinal tract are more common.

Acute promyelocytic leukemia. This form of leukemia differs from other acute leukemias by acute course, malignancy and significant hemorrhagic syndrome (thrombocytopenia, hypofibrinogenemia). Leukemic cells that infiltrate organs and tissues are characterized by the following morphological features: nuclear and cellular polymorphism, accumulation of pseudopodia and glycosaminoglycan granules in the cytoplasm. Almost all patients with this form of leukemia die from hemorrhage into the brain or from gastrointestinal bleeding.

*Acute lymphoblastic leukemia*occurs much more often in children (80% of cases) than in adults. Leukemic infiltrates predominate in the bone marrow, lymph nodes, lymphatic system of the gastrointestinal tract, spleen, kidneys and thymus. The bone marrow of spongy and tubular bones is crimson-red, juicy. The spleen is sharply enlarged, juicy, red. Significantly enlarged lymph nodes due to infiltration of their lymphoblastic cells; at autopsy they are white-pink, juicy. The thymus gland, which can reach gigantic sizes, has a similar appearance. Sometimes leukemic infiltrate extends beyond the gland and spreads to the anterior mediastinum, squeezing the organs of the thoracic cavity.

In this form of leukemia, leukemic infiltrates consist of lymphoblasts, the characteristic feature of which is the accumulation of glycogen around the nucleus. Lymphoblasts belong to the T-system of lymphopoiesis, which may explain the rapid settlement of blasts in the T-dependent areas of the lymph nodes and spleen, and the increase in the size of the latter simultaneously with leukemic infiltration of the bone marrow. Lymphoblastic infiltrates of metastatic origin outside the lymphatic tissue can be considered a sign of leukemia progression. Such infiltrates are especially common in the membranes and substances of the brain and spinal cord, called neuroleukemia.

Acute lymphoblastic leukemia can be treated with cytostatic drugs. 90% of sick children manage to obtain a stable long-term (5-10 years) remission. Without treatment, the course of this form, like other acute leukemias, progresses: anemia increases, hemorrhagic syndrome develops, there are complications of infectious origin.

Acute plasmoblastic leukemia. This form of acute leukemia arises from B-lymphocyte progenitor cells capable of producing immunoglobulins; this ability is

preserved in tumor plasmoblasts. They form and then secrete pathological immunoglobulins - paraproteins, so acute plasmablastic leukemia should be attributed to paraproteinemic hemoblastosis. Plasmoblastic leukemic infiltration is found in the bone marrow, spleen, lymph nodes, liver, skin; a significant number of plasmoblasts are found in the peripheral blood.

Acute monoblastic (myelomonoblastic) leukemia is almost indistinguishable from acute myeloblastic leukemia.

*Acute erythromyeloblastic leukemia.*This is a rather rare form (1–3%) among all forms of acute leukemia, in which erythroblasts and other nuclear cells of erythropoiesis, as well as myeloblasts, monoblasts and undifferentiated blasts grow in the bone marrow. Due to the suppression of hematopoiesis there are anemia, leuko-and thrombocytopenia; the spleen and liver are enlarged.

Acute megakaryoblastic leukemia. One of the rarest forms of acute leukemia, which is characterized by the presence in the blood and bone marrow, along with undifferentiated blasts, also megakaryoblasts, distorted megakaryocytes and platelet accumulations; the number of platelets in the blood increases to 1,000 - 1,500 * 109 / liter.

Chronic leukemia.

Chronic leukemias of myelocytic origin. Such forms of leukemia are diverse in origin and morphological changes, however, the main place among them is occupied by chronic myeloid leukemia, chronic erythromyelosis, erythremia and true polycythemia.

Chronic myeloid leukemia(chronic myelosis). This form of leukemia occurs in two stages: benign monoclonal and malignant polyclonal. The first stage, which takes several years, is characterized by progressive growth of neutrophilic leukocytes with a shift to myelocytes and myeloblasts, enlargement of the spleen. Bone marrow cells in this stage of leukemia morphologically and in the ability to phagocytosis do not differ from normal, however, they contain the so-called Ph-chromosome (Philadelphia), which occurs due to the deletion of chromosomes of the 22nd pair. In the second stage, which lasts for 3 to 6 months (terminal stage), the monoclonality changes to polyclonal. As a result, blast forms (myeloblasts,

rarely erythroblasts, monoblasts and undifferentiated blast cells) appear, the number of which increases both in the bone marrow and in the blood (blast crisis).

At the autopsy of the dead from chronic myeloid leukemia in the terminal stage are changes in the bone marrow, spleen, liver, lymph nodes and blood. The bone marrow of flat bones, pineal glands and diaphyses of tubular bones is juicy, gray-red or gray-yellow purulent (pyoid bone marrow). Histological examination of the bone marrow reveals promyelocytes and myelocytes, as well as blast cells. There are cells with distorted nuclei and altered cytoplasm, the phenomena of karyopyknosis and karyolysis. Reactive osteosclerosis is possible in bone tissue. Blood is gray-red; internal organs are anemic.

The spleen is sharply enlarged, sometimes occupying almost the entire abdominal cavity; its weight reaches 6-8 kg. At autopsy, it is dark red, sometimes with ischemic heart attacks. Spleen tissue is replaced by leukemic infiltrate mainly from myeloid cells, among which blasts are visible; atrophied follicles; find multiple sclerosis and hemosiderosis. Leukemic blood clots are found in blood vessels.

The liver is significantly enlarged (its weight reaches 5-6 kg). The surface is smooth, the tissue at the autopsy is gray-brown. Leukemic infiltration predominates along the sinusoids, less often in the portal tract and capsule. Fatty dystrophy in hepatocytes; sometimes hemosiderosis is possible.

Lymph nodes are significantly enlarged, soft, gray-red color with leukemic infiltration. The same infiltration is observed in the tonsils, group and solitary lymphatic follicles, intestines, kidneys, skin, sometimes in the brain and meninges (neuroleukemia). A significant number of leukemic cells appear in the vessels, which form leukemic stasis and blood clots and infiltrate the vessel wall. Such changes in blood vessels can cause heart attacks and hemorrhages. Quite often in chronic myeloid leukemia are manifestations of autoinfection.

A group related to chronic myeloid leukemia consists of osteomyeloleukemia and myelofibrosis, in which, along with signs of myeloid leukemia, bone marrow is replaced by bone or connective tissue. In such cases, the process is characterized by a long benign course.

Treatment of patients with cytostatic drugs changes the morphological manifestations of chronic myelogenous leukemia. Along with the suppression of leukemic infiltration foci and the development of fibrosis in their place, there is a rejuvenation of cell forms, the appearance of metastatic foci and tumor growths or bone marrow aplasia and pancytopenia.

Chronic erythromyelosis- a rather rare form of leukemia. It is a tumor of the red and white sprouts of hematopoietic tissue, in which erythrokaryocytes, myelocytes, promyelocytes and blasts grow in the bone marrow, spleen and liver. Much of these cells are found in peripheral blood. Sharply expressed splenomegaly. In some cases, myelofibrosis (Vagan's form of chronic erythromyelosis) joins.

Erythremia. This form of leukemia mostly occurs in the elderly and is characterized by an increase in the mass of erythrocytes in the peripheral blood, ie the pleura. The number of platelets and granulocytes also increases, blood pressure rises, there is a tendency to thrombosis, splenomegaly. In the bone marrow there is a growth of all sprouts, but mainly erythrocyte. The process takes a long time benign, but often ends in transformation into chronic myelogenous leukemia with foci of leukemic infiltration in the organs.

All internal organs are full-blooded with the formation of blood clots in both veins and arteries. The fatty marrow of the tubular bones becomes red; the spleen sharply increases. There is hypertrophy of the heart, especially the left ventricle. In the spleen, kidneys, liver in the early stage of erythremia there are foci of extramedullary hematopoiesis with a significant number of megakaryocytes, and in the late, during the transformation of the process into myeloid leukemia - foci of leukemic infiltration.

Real polycythemia (Vakez-Osler disease) is close to erythremia in many morphological features.

Chronic leukemias of lymphocytic origin. These forms of leukemia are divided into two groups: the first is chronic lymphocytic leukemia and adjacent lymphomatosis of the skin (Cesarean section); the second - paraproteinemic leukemias.

Chronic lymphocytic leukemia. It is common in middle-aged and elderly people, in some cases - in members of one family; arises from B-lymphocytes and has a long benign course. The number of leukocytes in the blood increases sharply (up to 100 * 109 / l), among them lymphocytes predominate. Leukemic infiltrates of tumor lymphocytes are most pronounced in the bone marrow, lymph nodes, spleen and liver with a consistent increase in these organs. Tumor B-lymphocytes produce almost no immunoglobulins. In this regard, in chronic lymphocytic leukemia sharply suppressed humoral immunity, patients often have complications of infectious origin. This form of leukemia is characterized by the development of autoimmune reactions, especially autoimmune hemolytic and thrombopenic conditions.

Against the background of benign chronic lymphocytic leukemia are possible: blast crisis, generalization of the process that leads to death, but more often patients die from infectious diseases or complications of autoimmune origin.

At autopsy, morphological changes are found in the bone marrow, lymph nodes, spleen, liver and kidneys.

The bone marrow of flat and tubular bones is red, but in contrast to myeloid leukemia in the diaphyses of the tubular bones among the red bone marrow there are cells of yellow color. At histologic research in a bone marrow find centers of tumor cells. In emergencies, all myeloid bone marrow tissue is displaced by leukemic lymphocytic infiltrates, leaving only small islets of myeloid hematopoiesis.

Lymph nodes of all areas of the body are sharply enlarged and form large soft or dense packets. At autopsy, they are juicy, white-pink. The tonsils, group and solitary lymphatic follicles of the intestine, which are also white and pink juicy tissue, increase. Enlargement of lymph nodes and formations is associated with their leukemic infiltration, which leads to a sharp violation of the structure of these organs and tissues; quite often lymphoblasts infiltrate the capsule of the nodes, as well as adjacent tissues.

The spleen reaches a considerable size, its weight increases to 1 kg. At autopsy, the tissue is red, fleshy; follicles are preserved or lost in the pulp. Leukemic lymphocytic infiltrates occur primarily in follicles, which become

enlarged and interconnected. Later, lymphocytes grow in the red pulp, vessel walls, trabeculae and capsule.

The liver is enlarged, dense; on autopsy light brown with small grayish-white nodules on the surface. Leukemic lymphocytic infiltration occurs along the portal tracts. In hepatocytes - protein and fat dystrophy.

Kidneys of considerable size, dense, gray-brown. Leukemic infiltration so dramatically disrupts the structure of the kidneys that it is even impossible to distinguish its layers.

Leukemic infiltration involves many organs and tissues (myocardium, mediastinum, serous and mucous membranes). It is not only diffuse but also focal, forming nodes of considerable size.

Changes inherent in chronic lymphocytic leukemia are supplemented by infectious complications, such as pneumonia, as well as manifestations of hemolytic conditions - hemolytic jaundice, general hemosiderosis and diapedetic hemorrhage.

It should be borne in mind that in addition to the common lymph node involvement, moderate enlargement of the spleen and liver in chronic lymphocytic leukemia, there are cases when only some groups of lymph nodes (mediastinum, mesentery, cervical, inguinal) are sharply enlarged. In such cases, they can compress neighboring organs (heart, esophagus, trachea and bronchi; portal vein and its branching with the development of portal hypertension and ascites).

Lymphomatosis of the skin, or Cesarean section. This is a peculiar form of chronic lymphocytic leukemia, which is characterized by infiltration of tumor T-lymphocytes, primarily skin. Consistently, the bone marrow is involved in the pathological process, the number of leukocytes in the blood increases, specific cells appear (Cesarean cells); peripheral lymph nodes and spleen increase.

Paraproteinemic leukemias. This group of leukemias includes tumors that develop from cells of the B-lymphocyte system (precursors of plasma cells), the function of which is associated with humoral immune responses. The main feature of paraproteinemic leukemias, which are also called malignant immunoproliferative diseases, is the ability of tumor cells to synthesize homogeneous immunoglobulins or their fragments - paraproteins (monoclonal

immunoglobulins). Immunoglobulin pathology causes both clinical and morphological peculiarities of paraproteinemic leukemias, which include myeloma, primary macroglobulinemia (Waldenström) and heavy chain disease (Franklin).

Myeloma- a fairly common disease, which was first described by OO Rustitsky (1873) and Kaler (1887). In this disease, tumor cells of the lymphoplasmocytic series grow - myeloma cells both in the bone marrow and beyond. Bone marrow myelomatosis leads to bone destruction.

Depending on the type of cells that grow, there are plasma cells, plasmoblastic, polymorphic cell and small cell myeloma. Polymorphic and small cell myeloma belong to low-differentiated tumors. Myeloma cells secrete paraproteins, which are found in the blood and urine of patients, as well as in the myeloma cells themselves. In myeloma, various types of pathological immunoglobulins are biochemically isolated from blood serum and urine. There are several biochemical variants of myeloma (A-, D-, E-myeloma, Bence-Jones myeloma). Bence-Jones protein, found in urine, is a type of paraprotein produced by myeloma cells; it penetrates freely through the glomerular filter of the kidneys because it has a low molecular weight.

Most myeloma is of aleukemic type, but sometimes the appearance of myeloma cells in the peripheral blood is possible.

In morphological examination, depending on the type of myeloma infiltrates that appear in the bone marrow and in the bones, there are diffuse, diffuse-nodular and multiple-nodular forms of myeloma. The diffuse form of myeloma is when diffuse myeloma infiltration of the bone marrow is combined with osteoporosis. In the diffuse nodular form on the background of diffuse myelomatosis of the bone marrow, tumor nodules appear, in the multiple nodular form there is no diffuse myeloma infiltration.

The growth of myeloma cells is more often observed in flat bones (skull bones, ribs) and spine, less often - in the tubular (shoulder, thigh), which is accompanied by destruction of bone tissue. In the centers of myeloma cell growth in the central canal of the osteon or in the bone beam under the endost, the bone substance becomes fine-grained, then thins; osteoclasts appear in it, then the

endost peels off. Gradually, the entire bone beam turns into a so-called liquid bone and is completely resorbed; osteon channels become wide. "Axillary resorption" of bone develops, which explains the characteristic myeloma osteolysis and osteoporosis - the formation of smooth, as if stamped defects in the absence or insufficient bone formation. The bones become brittle, which can explain their frequent fractures in myeloma.

In addition to the bone marrow and bones, myeloma infiltration is also observed in the internal organs (spleen, liver, kidneys, lungs, lymph nodes).

Some changes in the body in myeloma are associated with the secretion of paraprotein by tumor cells. These include: 1) amyloidosis (AL-amyloidosis); 2) deposition in tissues of amyloid-like and crystalline substances; 3) the development of paraproteinemic edema or paraproteinemia of organs (paraproteinemia of the myocardium, lungs, paraproteinemic nephrosis), accompanied by their functional insufficiency. Among paraproteinemic changes, paraproteinemic nephrosis or myeloma nephropathy, which can cause the death of 1/3 of myeloma patients, is important. At the heart of paraproteinemic nephrosis is the "clogging" of the kidneys with Bence-Jones paraprotein, which leads to sclerosis of the brain and then the cortical substance and kidney shrinkage (myeloma shrunken kidneys). In some cases, paraproteinemic nephrosis is combined with renal amyloidosis.

At a myeloma illness in connection with accumulation of paraproteins in blood, protein stasis in vessels develop a peculiar syndrome of the increased viscosity and a paraproteinemic coma.

Due to the immunological insecurity observed in patients with plasmacytoma, inflammatory changes (pneumonia, pyelonephritis) occurring against the background of tissue paraproteinosis and are a manifestation of autoinfection.

Primary macroglobulinemia- a rare disease, which was first described by Waldenström in 1944. It is one of the types of chronic leukemia of lymphocytic origin, in which tumor cells produce and secrete pathological macroglobulin - IgM. In this disease there is an increase in the spleen, liver, lymph nodes, which is associated with leukemic infiltration; bone destruction is rare. Quite a typical

hemorrhagic syndrome as a consequence of hyperproteinemia, increased blood viscosity, functional impairment of platelets, slowing of blood flow and stasis in small vessels. Complications such as hemorrhage, paraproteinemic retinopathy, paraproteinemic coma, possible amyloidosis often occur.

*Heavy chain disease*described by Franklin in 1963. In this disease, tumor cells of the lymphoplasmocytic series produce a kind of paraprotein corresponding to the Fc fragment of the IgG heavy chain (hence the name of the disease). In this disease there is an increase in lymph nodes, liver, spleen due to infiltration of their tumor cells. Bones do not change, bone marrow damage is not required. Patients die from the accession of infectious diseases (sepsis) due to hypogammaglobulinemia.

Lymphomas - regional tumor diseases of hematopoietic and lymphatic tissue

This group of diseases includes: lymphosarcoma, fungal mycosis, Cesarean section, reticulosarcoma, lymphogranulomatosis (Hodgkin's disease).

By origin, lymphomas can be B-cell and T-cell; the classification of lymphomas offered by Lucques and Collins is based on it. According to this classification, B-cell lymphomas can be: small cell (B), centrocytic, immunoblastic (B), plasma lymphocytic, and T-cell lymphomas - small cell (T), from lymphocytes with twisted nuclei, and immunoblastic (T) fungal mycosis and Cesarean section. In addition, there are unclassified lymphomas. According to this classification, both small cell and immunoblastic lymphomas can develop from either B- or T-cells. Only from B-cells develop centrocytic and plasmolymphocytic lymphomas and only from T-cells - lymphoma from lymphocytes with twisted nuclei, fungal mycosis and Cesarean section.

Lymphomas do not have any features in comparison with leukemias. It should be emphasized that in the current treatment of patients with cytostatic drugs, some lymphomas (lymphosarcoma) often "complete" the terminal stage of leukemia. However, they are able to "transform" into leukemia. These data indicate that the division of tumors of the blood system into "diffuse" and "regional", necessary to determine the nosology, from the standpoint of oncogenesis is quite conditional.

Each lymphoma has its own morphological features.

Lymphosarcoma- a malignant tumor that arises from lymphoid cells. In this tumor, morphological changes occur in the lymph nodes, mainly mediastinal and epigastric, less often - inguinal. Sometimes the tumor develops in the lymphatic tissue of the gastrointestinal tract, spleen and other organs. Initially, the tumor is limited to several lymph nodes; they increase sharply, interconnected in packages that compress the adjacent organs and tissues. Nodes are dense, gray-pink at autopsy, with areas of necrosis and hemorrhage. In the future there is a generalization of the process, ie lymphogenic and hematogenous spread with the formation of multiple metastases in the lymph nodes and other organs - lungs, bones, skin. Tumor cells such as B- or T-lymphocytes, prolymphocytes, lymphoblasts and immunoblasts grow in the lymph nodes.

Depending on this, the following histo (cyto) -logical variants of lymphomas are distinguished: lymphocytic, prolymphocytic, lymphoblastic, immunoblastic, lymphoplasmocytic, African lymphoma (Burkitt's tumor). Tumors that consist of mature lymphocytes and prolymphocytes are called lymphocytomas; from lymphoblasts and immunoblasts - lymphosarcomas.

Among lymphosarcomas, African lymphoma or Burkitt's tumor deserve special attention.

Burkitt's tumor- is an endemic disease that occurs among the population of Equatorial Africa (Uganda, Nigeria, Guinea, Bissau); episodic cases are possible in other countries. Children aged 4-8 years are more often ill; the tumor is localized in the upper or lower jaw, as well as in the ovaries; less often - in the kidneys, adrenal glands, lymph nodes. Quite often there is a spread of the tumor to other organs. The tumor consists of small lymphocyte-like cells, among which there are large, with a light cytoplasm macrophages, which gives the impression of a kind of "starry sky". The occurrence of African lymphoma is associated with the herpes virus, which was found in the lymph nodes of patients. Virus-like inclusions are found in tumor lymphoblasts.

Fungal mycosis- relatively benign T-cell lymphoma of the skin, related to the so-called lymphomatosis of the skin. Multiple tumor nodules consist of proliferating large cells with a significant number of mitoses. Plasma cells, histiocytes, eosinophils, and fibroblasts are also found in the tumor infiltrate.

Tumor nodules are soft, protrude above the surface of the skin, resemble the shape of a fungus, easily covered with ulcers. Such nodes are found not only in the skin, but also in mucous membranes, muscles, internal organs. Previously, tumor development was associated with fungal mycelial invasion, hence the erroneous name of the disease.

Cesarean section- T-lymphocytic lymphoma of the skin with leukemia; refers to lymphomatosis of the skin. Bone marrow damage, the appearance of tumor cells in the blood, which is observed in Cesarean section, were the basis for its attribution in some cases to chronic lymphocytic leukemia.

Lymphocytic infiltration of the skin ends with the formation of tumor nodules on the face, back, legs. Atypical mononuclear cells with crescent-shaped nuclei, Cesarean cells, are found in tumor infiltrates of the skin, bone marrow, and blood. Sometimes a slight tumor infiltration of the lymph nodes, spleen, kidneys, liver.

Reticulosarcoma- malignant tumor consisting of reticular cells and histiocytes. The main histological feature of reticulosarcoma from lymphosarcoma is the production by tumor cells of reticular fibers that entwine reticulosarcoma cells.

Lymphogranulomatosis(Hodgkin's disease) - a chronic recurrent, rarely acute disease, in which tumor growth occurs mainly in the lymph nodes.

According to morphological features, isolated and widespread lymphogranulomatosis is distinguished: In isolated (local) lymphogranulomatosis, pathological changes occur in one group of lymph nodes. More often it is cervical, mediastinal or epigastric; less often - inguinal, which increase in size and grow together into packages. At first they are soft, juicy, gray or gray-pink, at the autopsy with a blurred pattern of construction. Later, the nodes become dense, dry, with foci of necrosis and sclerosis. Primary localization of the tumor is possible not only in the lymph nodes, but also in the spleen, liver, stomach, lungs, skin. With widespread (generalized) lymphogranulomatosis, the growth of tumor tissue is found not only in the foci of primary localization, but also far beyond them; at the same time, first of all, the spleen increases. At autopsy, its pulp is red with multiple white-yellow foci of necrosis and sclerosis; it acquires a motley

"porphyry" appearance ("porphyry spleen"). Some researchers explain the development of generalized lymphogranulomatosis by tumor metastasis from the primary tumor site.

Microscopic examination of both primary tumor sites (lymph nodes) and metastatic screenings reveals the proliferation of lymphocytes, histiocytes and reticular cells, among which there are giant cells, eosinophils, plasma cells, neutrophils. Proliferating polymorphic cell elements form nodules that are subject to caseous necrosis and sclerosis. The most characteristic feature of lymphogranulomatosis is the proliferation of atypical cells, among which there are: 1) small Hodgkin's cells (similar to lymphoblasts); 2) mononuclear giant cells or large Hodgkin's cells; 3) multinucleated Reed – Berezovsky – Sternberg cells, which quite often acquire gigantic sizes. The origin of the last cells may be lymphocytic, although their macrophage nature cannot be ruled out,

Lymphogranulomatous cells undergo a certain evolution, which reflects the progression of the tumor, while the cellular composition of the cells changes. Using biotic examination (lymph nodes) it is possible to compare histological and clinical features of lymphogranulomatosis. Such comparisons formed the basis of modern clinical and morphological classifications of lymphogranulomatosis.

Clinical and morphological classification. There are four variants (stages) of the disease: 1) variants with a predominance of lymphoid tissue (lymphohistiocytic); 2) nodular (nodular) sclerosis; 3) mixed-cell variant; 4) option with suppression of lymphoid tissue.

The variant with the predominance of lymphoid tissue is a manifestation of the early phase of the disease and its localized forms, which corresponds to the I-1I stages of the process. Microscopic examination reveals only the proliferation of mature lymphocytes and partially histiocytes, which erases the pattern of the lymph node. In cases of disease progression, the histiocytic variant becomes mixed-cell.

Nodular (nodular) sclerosis is characteristic of a relatively benign course of the disease; and initially the process develops in the mediastinum. Microscopic examination reveals the growth of connective tissue that surrounds cell clusters,

among which are Reed-Berezovsky-Sternberg cells, and on the periphery - lymphocytes and other cells.

The mixed-cell variant reflects the spread of the pathological process and corresponds to stages I-III of the disease. Microscopically, they find characteristic features: proliferation of lymphoid elements of different degrees of maturity, giant Hodgkin's cells and Reed-Berezovsky-Sternberg cells; accumulation of lymphocytes, eosinophils, plasma cells, neutrophils; foci of necrosis and fibrosis.

Option with suppression (displacement) of lymphoid tissue occurs in adverse disease and reflects the generalization of lymphogranulomatosis. In some cases, there are diffuse growths of connective tissue, among the fibers of which there are single atypical cells; in others, lymphoid tissue is displaced by atypical cells, among which Hodgkin's cells and giant Reed-Berezovsky-Sternberg cells predominate; sclerosis does not develop.

The variant with displacement of lymphoid tissue by extremely atypical cells was called Hodgkin's sarcoma. Thus, the spread of lymphogranulomatosis is morphologically reflected by a successive change of its three variants: with the predominance of lymphoid tissue, mixed-cell and with the suppression of lymphoid tissue. Such clinical and anatomical variants can be considered as stages of lymphogranulomatosis.

LECTURE 9

ATHEROSCLEROSIS AND ARTERIOSCLEROSIS. CORONARY HEART DISEASE. HYPERTENSION AND ARTERIOSCLEROSIS. HYPERTENSION AND SYMPTOMATIC ARTERIAL HYPERTENSION.

Atherosclerosis - chronic disease, the manifestations of which are focal thickening of the intima of the arteries of elastic and muscular-elastic types, due to the deposition of lipids (lipoproteins) and reactive growth of connective tissue.

Atherosclerosis is one of the types of arteriosclerosis, which includes primary sclerosis with calcification of the middle membrane of the arteries (Menkeberg's mediacalcinosis), arteriosclerosis with hyalinosis of small arteries and arterioles, as well as secondary sclerotic (inflammatory), toxic, allergic. Nowadays, atherosclerosis is the most common vascular disease.

The basis of the disease are various factors that cause disorders of fat metabolism and damage to the intima of large arteries. Risk factors for atherosclerosis include age, hereditary predisposition, hyperlipidemia, hypertension, diabetes, smoking, psycho-emotional overload, and others. Atherosclerosis occurs in almost all age groups, but more cases of clinical manifestations of the disease are observed in the elderly. This frequency increases with each new 10 years of life. Under the age of 40, men get sick much more often than women. After 45-50 years (the period of menopause in women), this figure begins to equalize, and after 70 years, the disease occurs with equal frequency in both women and men. This is primarily due to the non-control of the number of androgens and estrogens with age, hormonal differences in women and men. There is a familial predisposition to the disease due to genetically determined hyperlipidemia, hypertension, diabetes, as well as the nature of nutrition, lifestyle and others. Long-standing hyperlipidemia of primary or secondary origin causes severe atherosclerotic lesions. Hypertension causes an increase in vascular permeability, thereby damaging the walls of blood vessels and triggers other risk factors. The risk of atherosclerosis (especially in women) is significantly increased by smoking and diabetes. way of life, etc. Long-standing hyperlipidemia of primary or secondary origin causes severe atherosclerotic lesions. Hypertension causes an increase in vascular permeability, thereby damaging the walls of blood vessels and triggers other risk factors. The risk of atherosclerosis (especially in women) is significantly increased by smoking and diabetes. way of life, etc. Long-standing hyperlipidemia of primary or secondary origin causes severe atherosclerotic lesions. Hypertension causes an increase in vascular permeability, thereby damaging the walls of blood vessels and triggers other risk factors. The risk of atherosclerosis (especially in women) is significantly increased by smoking and diabetes.

Electron microscopy has shown that in places prone to the development of atherosclerosis, there is an accumulation of phagocytic macrophages - this is one of the early morphological signs of the disease. Endothelial cells in areas of atheromatous plaque formation are prone to high expression of adhesive molecules, including ICAM-1 and E-selectin. Perhaps this is one of the earliest molecular mechanisms of plaque formation. Most progressive atheromatous plaques have infiltrates consisting of macrophages, lymphocytes, and smooth muscle cells surrounded by fibrous tissue. "Growth factors", in particular PDGF, stimulate the proliferation of intimal smooth muscle cells (myointimal cells) and their subsequent production of collagen, elastin and mucopolysaccharides. PDGF is secreted by most cells of connective tissue origin, macrophage and endothelial nature. Experimentally in tissue culture, PDGF has been shown to accelerate the growth of smooth muscle cells and fibroblasts, induce DNA duplication, and thus accelerate cell division. Adhesive molecules promote platelet aggregation, which is accompanied by damage to endothelial cells. Hemodynamic pressure, especially in the branches of blood vessels, promotes platelet adhesion and endothelial damage. Under certain circumstances, the gap between the endothelial cells is widened, and then there are either small or fairly large areas devoid of endothelial cells. Further release of growth factors, such as PDGF, contributes to the further stimulation of proliferation and activation of the secretion of intimal smooth muscle cells. The above relationship between macrophages, platelets,

Rudolf Virchow also emphasized that lipids are an important component of atheromatous lesions. And now it is proven that increasing the level of certain types of lipoproteins significantly increases the risk of atherosclerosis in different people.

It has been shown that an increase in low-weight lipoproteins in the blood, in particular LDL-cholesterol, is the most important and common cause of atheromatous plaque. Cholesterol levels are regulated by both genetic and environmental factors. The mortality rate from atherosclerotic damage to the coronary vessels of the heart is closely related to the level of LDL-cholesterol. The increased risk of cardiovascular disease in England and other northern European countries is associated with high fat content in the diet of the

inhabitants of these countries. In Mediterranean countries, where a lower proportion of saturated fat provides energy, mortality from coronary heart disease is low. However, it was found that the dietary consumption of cholesterol has relatively little effect on its level in plasma. Many cells have receptors that recognize the apoprotein portion of the LDL molecule. The molecular structure of the LDL receptor is determined. The mechanism that controls its synthesis and movement to the cell membrane surface is well studied. Most different molecular anomalies are inherited as an autosomal dominant trait. It was found that the saturation of LDL-cholesterol is particularly increased (over 8 mmol / l) in heterozygous patients, especially in those who are 40-50 years old and have coronary heart disease. Homozygous patients, who are very rare (approximately 1 in 1 million inhabitants), with receptor deficiency, usually die in childhood, adolescence from atherosclerotic lesions of the coronary vessels of the heart. The exact mechanism by which elevated LDL cholesterol accelerates the development of atherosclerosis has not yet been determined. High levels of cholesterol circulating in the blood can increase the cholesterol content in the endothelial membranes. Increasing it in the membrane structures causes a decrease in their elasticity and causes damage. It has now been shown that when LDL cholesterol is oxidized by macrophages adherent to the vascular endothelium, free radicals can damage smooth muscle cells. In addition, chronic hypercholesterolemia contributes to increased endothelial secretion in large numbers of growth factors, such as PDGF.

Also interesting are studies with the metabolism of high molecular weight lipoprotein HDL-cholesterol. HDL-cholesterol is involved in cholesterol transport, traveling from peripheral tissues to the liver. There are several reliable epidemiological studies in the literature that show that high levels of HDL cholesterol in liver cells are associated with a reduced risk of developing atherosclerotic changes in the coronary vessels of the heart. Research in this area is considered promising.

Despite the fact that the content of triglycerides in the blood is a weak risk factor for atherosclerosis, it is necessary to take it into account, because hereditary

abnormalities of lipid metabolism are associated with elevated cholesterol and triglycerides.

Histological studies of atheromatous changes in humans and animals have shown that fibrin and platelets are important components of early damage. Today, there is strong evidence that an increased risk of coronary heart disease (CHD) is associated with an increase in coagulation factors. Blood VII. Early changes in thrombotic formation include platelet activation followed by adhesion to subendothelial collagen. Agents that stimulate platelet activation are collagen, thrombin, thromboxane A2, adenosine phosphate, norepinephrine (ie vasopressor agents). It is now known that these factors stimulate glycoprotein receptors on platelet membranes. The full name of these receptors is platelet glycoprotein IIB / IIIA. Small doses of aspirin, which are prescribed to patients with clinical manifestations of atherosclerotic lesions of the coronary vessels and which undoubtedly have a healing effect, inhibit the action of thromboxane A2. Currently, the search for other methods of inhibiting glycoprotein IIB / IIIA receptors continues.

At atherosclerosis in the intima of the aorta and arteries appear pasty fat-like detritus (athege) and focal growth of connective tissue (sclerosis), which leads to the formation of atherosclerotic plaque, which narrows the lumen of the vessel. Arteries of elastic and muscular-elastic type, ie arteries of large and average caliber are damaged, small arteries of muscular type are involved much less often in process.

There are the following stages of morphogenesis of atherosclerosis: dolipid, lipoidosis, liposclerosis, atheromatosis, ulcer, atherocalcinosis.

The prelipid stage is not determined macroscopically. Microscopically observed: focal damage (up to complete destruction) of the endothelium and increased permeability of the membranes of the intima, causing the accumulation in the inner shell of plasma proteins, fibrinogen (fibrin) and the formation of flat parietal thrombi; accumulation of acidic glycosaminoglycans in the intima, mucoid edema of the inner shell, the appearance of very low and low density lipoproteins, cholesterol, proteins; destruction of elastic and collagen fibers, proliferation of smooth muscle cells.

To detect this stage requires the use of thiazine dyes. Due to the use of toluidine blue (thionine) staining of the drug, it is possible to observe the appearance of violet-red color (the phenomenon of metachromasia) in areas of early disorganization of connective tissue.

*Stage of lipoidosis*characterized by focal infiltration of intimate lipids (cholesterol), lipoproteins, which causes the formation of fatty (lipid) spots and streaks. Macroscopically, such fat spots have the appearance of areas of yellow color, which can sometimes merge and form flat elongated stripes on the surface of the intima, which do not protrude above the surface. In these areas, when using dyes for fats (Sudan III, IV, fat red O and others), lipids are detected. Lipids accumulate in smooth muscle cells and macrophages, which are called foamy, or xanthomic, cells (from the Greek. Hanthos - yellow). Lipid inclusions also appear in the endothelium, indicating infiltration of blood lipids by intimate lipids. There is swelling and destruction of elastic membranes. First of all, fat spots and streaks appear in the aorta and at the branch of its branches, then in the great arteries. The appearance of such spots does not mean the presence of atherosclerosis, because the appearance of lipid spots can be observed in early childhood, not only in the aorta but also in the coronary arteries of the heart. With age, lipid spots, the so-called manifestations of "physiological early lipidosis", in the vast majority of cases disappear and are not a source of further atherosclerotic changes. Similar changes in blood vessels in young people can be found in some infectious diseases.

In liposclerosis, fibroblasts proliferate, the growth of which stimulates the destruction of macrophages (xanthoma cells) and the growth of young connective tissue in the intima. Further maturation of this tissue is accompanied by the formation of fibrous plaque. Macroscopically, fibrous plaques are dense, round or oval-shaped formations of white or yellowish-white color, rising above the surface of the intima. The use of special dyes allows to detect lipids in fibrous plaques. These plaques narrow the lumen of the vessel, which is accompanied by impaired blood flow (ischemia) to the organ or part thereof. Most often, fibrous plaques are located in the abdominal aorta, in the branches extending from the aorta, in the arteries of the heart, brain, kidneys, lower extremities, carotid arteries, and others.

In atheromatosis, the lipid masses located in the central part of the plaque, the adjacent collagen and elastic fibers break down. In the formed fine-grained amorphous mass, crystals of cholesterol and fatty acids, pieces of elastic and collagen fibers, droplets of neutral fats (atheromatous detritus) are found. On the periphery of the plaque are myocytes, macrophages, T-lymphocytes, single leukocytes, in the central part - a large number of xanthoma cells. Atheromatous masses are separated from the lumen of the vessel by a layer of mature, hyalinized connective tissue (plaque cover). In addition, a large number of vessels are formed on the periphery of the plaque, which encourages its further growth due to the influx of lipoproteins and plasma proteins. The progression of atheromatous changes leads to the destruction of the plaque tire. This period is characterized by a large number of different complications. There is a stage of ulceration, accompanied by the formation of atheromatous ulcers. The edges of such ulcers are eroded, uneven, the bottom is formed by a muscular, and sometimes adventitial layer of a vessel wall. The intima defect is often covered with thrombotic layers. As a result of necrosis of the deep layers of the vessel wall, an aneurysm (protrusion of the wall) may form. Often the blood exfoliates the intima from the middle layer and then there are aneurysms that exfoliate. The danger of these complications is associated with the possibility of rupture of the aneurysm or vessel wall at the site of atheromatous ulcers. Atheromatous masses can be washed away by blood flow and form emboli. ulcerative, and sometimes adventitial layer of the vessel wall. The intima defect is often covered with thrombotic layers. As a result of necrosis of the deep layers of the vessel wall, an aneurysm (protrusion of the wall) may form. Often the blood exfoliates the intima from the middle layer and then there are aneurysms that exfoliate. The danger of these complications is associated with the possibility of rupture of the aneurysm or vessel wall at the site of atheromatous ulcers. Atheromatous masses can be washed away by blood flow and form emboli. ulcerative, and sometimes adventitial layer of the vessel wall. The intima defect is often covered with thrombotic layers. As a result of necrosis of the deep layers of the vessel wall, an aneurysm (protrusion of the wall) may form. Often the blood exfoliates the intima from the middle layer and then there are aneurysms that exfoliate. The danger of

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*Atherocalcinosis*characterized by the deposition of calcium salts in the fibrous plaque, ie their calcification (petrification). This is the final stage of atherosclerosis. However, it must be remembered that the deposition of calcium salts can be observed in its earlier stages. The plaques acquire a stony density, the vessel wall at the site of petrification is sharply deformed. Calcium salts accumulate in atheromatous masses, in fibrous tissue, in the intermediate substance between elastic fibers.

Macroscopic stages of atherosclerosis: stage of fat spots or streaks, stage of fibrous plaques, stage of complications due to plaque decay (atheromatous ulcers and thrombotic layers), stage of calcification.

Complications of atherosclerosis: dystrophy and atrophy of the parenchyma, sclerosis of organs and tissues due to hypoxia; heart attacks and gangrene due to obliteration or thrombosis of the artery, or embolism with atheromatous masses or thromboembolism; atherosclerotic wrinkling of the kidney; formation of vascular aneurysms; bleeding; diffuse (small-cell) cardiosclerosis, because due to the decrease in the elasticity of the vessels of the great circle of blood circulation increases the load on the left ventricle, it is hypertrophied and there is a relative insufficiency of blood supply, and therefore hypoxic connective tissue growth.

Clinical and morphological forms of atherosclerosis:

1. Aortic atherosclerosis. The lesion is most pronounced in the abdominal aorta. Often formed aneurysms - limited expansion (explosion) of the vessel wall (Latin aneuryo - expand) with its thinning and crumbly thrombotic masses in the cavity. There are cylindrical, saccular and hernial aneurysms. They are further divided into true and pseudoaneurysms depending on the structure of the

aneurysm wall. Aneurysm rupture, parietal thrombosis, thromboembolism are possible.

2. Atherosclerosis of the coronary arteries of the heart is the basis of coronary heart disease.

3. Atherosclerosis of the arteries of the brain is the cause of cerebrovascular disease. More often develops chronic cerebral insufficiency with atrophy of the cerebral cortex and the development of atherosclerotic dementia. Acute cerebrovascular accident may develop in the form of strokes: ischemic (gray softening of the brain), occasionally hemorrhagic (red softening of the brain). In other words, cerebrovascular disease is formed.

4. Atherosclerosis of the renal arteries. At chronic disturbance of blood circulation in kidneys wedge-shaped sites of an atrophy of a parenchyma with collapse of a stroma and the subsequent development of connecting fabric are dug. Acute renal circulatory disorders lead to the development of renal infarction. A large tubercle of a slightly reduced kidney (atherosclerotic nephrosclerosis or initially shrunken kidney) is formed.

5. Atherosclerosis of the mesenteric arteries. This form can lead to intestinal gangrene, ischemic colitis.

6. Atherosclerosis of the arteries of the lower extremities - affects a. femoralis is manifested by the syndrome of "intermittent claudication", due to atrophy and sclerosis of tissues. Gangrene may develop.

Coronary heart disease (coronary heart disease) - a group of diseases caused by relative or absolute insufficiency of coronary circulation.

This is a cardiac form of atherosclerosis and hypertension, which is ischemic myocardial dystrophy, heart attack or cardiosclerosis.

Acute coronary heart disease (AIDS) includes: angina, sudden coronary death, myocardial infarction.

Acute myocardial infarction lasts 8 weeks (2 months). This is the period of the scarring process of the necrosis zone.

Recurrent infarction occurs 8 weeks after the first acute myocardial infarction, and recurrent infarction occurs within 8 weeks after the first infarction.

The size of the heart attack depends on: the level of occlusion of the coronary artery; the degree of its stenosis; opportunities for collateral circulation; functional state of the myocardium (complications of hypertension).

Localization of myocardial infarction:

1) the most common - in the pool of the envelope of the left coronary artery (posterior wall of the left ventricle and the posterior interventricular septum);

2) less often - in the pool of the enveloping coronary artery (posterior wall of the left ventricle and posterior interventricular septum);

3) occasionally - in the pool of the right coronary artery (right ventricular wall)

Ischemic myocardial dystrophy, or acute focal myocardial dystrophy, develops in relatively short episodes of coronary crisis, when there are characteristic changes in the electrocardiogram in the absence of myocardial necrosis (no increase in the activity of transaminases, lactate dehydrogenase, etc.). The myocardium is flaccid and pale, in areas of ischemia sometimes variegated and swollen. Often a fresh blood clot is found in the coronary artery.

Macroscopically, when treating the myocardial incision surface with a solution of tetrazolium salts, potassium tellurite, areas of ischemia look light on a dark background of unchanged myocardium, because in areas of ischemia the activity of redox enzymes is sharply weakened.

Microscopically find capillary dilatation, stasis and sludge phenomenon of erythrocytes, interstitial tissue edema, perivascular hemorrhage, accumulation of leukocytes on the periphery of the ischemic zone. Muscle fibers lose transverse striation, devoid of glycogen, they are intensely stained with eosin, magenta, pyronine and Schiff's reagent, indicating necrobiotic changes. Stained with acridine orange, they give in a fluorescent microscope not orange but green glow, which allows to distinguish the area of ischemia from the intact myocardium. A large number of contractures are detected by polarization-optics.

Early electron microscopic and histochemical changes reflect a decrease in the number of glycogen granules, a decrease in the activity of redox enzymes (especially dehydrogenases and diaphorases), edema and destruction of mitochondria and sarcoplasmic reticulum. These changes are associated with

impaired tissue respiration, increased anaerobic glycolysis. A complication of ischemic myocardial dystrophy is often acute heart failure, it also becomes a direct cause of death.

Acute myocardial infarction on the first day it is almost not visually revealed - the site of a heart attack of a looser consistence and is a little paler than healthy fabrics, but can be motley because of uneven blood supply.

Demarcation inflammation develops around the area of necrosis, ie a leukocyte shaft is formed, with inflammatory hyperemia of blood vessels and diapedetic hemorrhages. In the area of necrosis perivascularly preserved islets of living cardiomyocytes, and in the area of ischemia, ie along the demarcation line, there is uneven blood supply to the tissue and the lack of glycogen in ischemic cardiomyocytes.

Macroscopically, a white heart attack with a hemorrhagic corolla is detected. Myomalacia of the infarct area (under the action of leukocyte enzymes) with rupture of the heart and tamponade of the pericardial cavity, aneurysm formation is possible.

The organization occurs in the area of demarcation and islets of unchanged myocardium, in the area of necrosis and lasts 7-8 weeks. First, there is resorption of necrotic masses by macrophages, then - the transformation of leukocytes into fibroblasts. The area of necrosis is filled with loose connective tissue, similar to granulation, which matures into scar connective tissue (postinfarction cardiosclerosis). Compensatory hypertrophy of cardiomyositis develops on the periphery of the scar.

Patients die from acute cardiovascular failure, cardiogenic shock, ventricular fibrillation, asystole.

Chronic coronary heart disease is characterized by a wavy course with coronary crises, ie episodic acute coronary insufficiency on the background of chronic relative insufficiency of coronary circulation. Its morphological substrate is coronary atherosclerosis and cardiosclerosis. Cardiosclerosis can be diffuse (small-focal), develops due to chronic myocardial hypoxia, or post-infarction (large-focal), on the basis of which a chronic aneurysm of the heart wall is formed.

Aneurysm - an explosion of the thinned wall of the heart (in the area of the large postinfarction scar after transmural myocardial infarction). Usually the aneurysmal sac is filled with layered thrombotic masses.

Postinfarction cardiosclerosis is a large scar field (as a result of connective tissue necrosis) with compensatory hypertrophy of cardiomyocytes on its periphery.

Diffuse cardiosclerosis is the morphological equivalent of angina pectoris, which is caused by a constant relative insufficiency of myocardial blood supply, ie chronic hypoxia. Which activates collagen synthesis. Macroscopically, multiple, small foci up to 1–2 mm of whitish connective tissue are identified.

A complication of chronic coronary heart disease may be chronic circulatory failure due to decreased contractile function of the myocardium in diffuse cardiosclerosis or delayed residual blood volume in the heart aneurysm; thromboembolism - due to the formation of thromboembolic masses that fill the aneurysmal sac; ruptures of the heart aneurysm with tamponade of the pericardial cavity.

Hypertensive disease. Hypertension is understood as a steady increase in blood pressure: systolic above 140 mm Hg. Art. and diastolic - above 90 mm Hg. In most cases (90-95%) the cause of hypertension is not established. Such hypertension is called primary and is defined as an independent nosological form - hypertension (abroad use the term "essential hypertension"). Hypertension, which is a symptom of another disease, is called secondary or symptomatic. Symptomatic hypertension includes:

Renal (nephrogenic - associated with kidney disease and renovascular - with renal vascular damage).

Endocrine (in disease or Itsenko-Cushing's syndrome; primary or secondary aldosteronism, pheochromocytoma, etc.).

Neurogenic (with increased intracranial pressure due to trauma, tumor, abscess, hemorrhage; with damage to the hypothalamus and brainstem; associated with psychogenic factors).

Others (due to coarctation of the aorta and other vascular abnormalities; increased circulating blood with excessive transfusion, polycythemia, etc.).

Hypertension (GC) -chronic disease, the main clinical manifestation of which is a prolonged and persistent increase in blood pressure.

The main risk factors: hereditary predisposition, chronic psycho-emotional stress, excess salt intake, overweight, smoking, hypodynamics. There are several theories of the occurrence of GC, which indicate the possibility of a defect in any part (pressor and depressor) of the mechanism that determines the normal pressure. The main role in the fixed chronicity of arterial hypertension belongs to kidneys.

By the nature of the GC can be malignant and benign.

Malignant hypertensiondiagnosed occasionally, the level of diastolic pressure exceeds 110-120 mm Hg. May occur primarily or complicate benign hypertension. It progresses rapidly and can cause death in 1-2 years without adequate therapy. The most common patients are men 35-50 years, sometimes up to 30 years.

Small muscular arteries and arterioles undergo fibrinoid necrosis followed by thrombosis, which causes changes in the organs: heart attacks and hemorrhages and renal failure. Bilateral optic nerve edema with retinal hemorrhage. In the kidneys develops malignant nephrosclerosis Farah which is characterized by fibrinoid necrosis of arterioles and arterial loops of glomeruli, edema and hemorrhage. The appearance of the kidneys depends on the duration of the pre-existing benign phase, as a result it can be smooth or nodular. The kidney acquires a variegated appearance due to petechial hemorrhage. Rapid progression causes renal failure and death.

Fibrinoid necrosis of arterioles, edema, hemorrhage develops in the brain.

Benign hypertension.

Hypertensive crisis- a sudden increase in blood pressure due to spasm of the arterioles - can occur at any stage. Spasm of arterioles with corrugation of the basement membrane of the vascular endothelium and its often kiloid location. Plasma impregnation followed by fibrinoid necrosis of the arteriole wall, thrombosis, diapedetic hemorrhage.

*Preclinical stage*characterized by transient hypertension. In arterioles and small arteries hypertrophy of a muscular layer and elastic structures is defined. Moderate compensatory concentric hypertrophy occurs in the heart.

*Stage of common changes in the arteries*characterized by a steady increase in blood pressure. Hyalinosis or arteriosclerosis is defined in arterioles and small arteries of muscular type. Arteriological develops in the vessels of the kidneys, brain, pancreas, intestines, in the retina, the adrenal capsule. Elastofibrosis (hyperplasia and splitting of the inner elastic membrane) and sclerosis develop in larger vessels.

Atherosclerosis acquires specific features. It is more common and involves muscle-type arteries, which is not the case without hypertension. Fibrous plaques are circular rather than segmental in nature, which causes more narrowing of the lumen of blood vessels.

The degree of myocardial hypertrophy increases. Myocardial fatty dystrophy and myogenic dilatation of the heart cavities develop - eccentric myocardial hypertrophy, diffuse small-cell cardiosclerosis, signs of decompensation appear.

Stage of changes of internal organs in connection with changes of arteries and disturbance of intraorganic blood circulation. Secondary organ changes develop slowly. The basis for the changes is the occlusion of blood vessels with circulatory disorders and the development of chronic hypoxia, which leads to atrophy of the parenchyma and sclerosis of the stroma. Hemorrhages and heart attacks occur during a crisis (thrombosis, spasm, fibrinoid necrosis). Characteristic are hemorrhages in the brain, which can be small (diapedetic) or large with the destruction of brain tissue (hematoma). Hematomas usually develop at a rupture of a microaneurysm which arise as a result of hyalinosis and fibrinoid necrosis of vessels, mainly, subcortical kernels and a subcortical layer. As a way out in the brain tissue rusty cysts are formed.

The kidneys develop arteriosclerotic nephrosclerosis, or initially shrunken kidney. The lumen of the vessels is narrowed, the walls are thickened due to hyalinosis. Glomerular collapse, or their replacement by connective tissue and hyaline mass. The tubules are atrophied. Preserved nephrons are compensatory

hypertrophied. The kidneys are significantly reduced in size, their surface is fine-grained. In the section, the cortical and cerebral layers are thinned, the growth of adipose tissue around the pelvis. Arteriosclerotic nephrosclerosis can cause chronic renal failure.

Clinical and morphological forms of GC: cardiac, cerebral, renal.

Cardiac form of GC is the essence of coronary heart disease.

The cerebral form of GC, as well as atherosclerosis of the vessels of the brain is the basis of cerebrovascular diseases.

The renal form of GC is characterized by both acute and chronic changes.

Acute changes are a consequence of arteriolonecrosis which results in acute renal failure. Thrombosis or thromboembolism of the vessels of the kidneys with the development of heart attacks.

Chronic changes develop in the benign course of GC with the development of arteriosclerotic nephrosclerosis.

In benign GC, the cause of death is heart failure, myocardial infarction, stroke or intercurrent disease.

5% of patients are diagnosed with malignant hypertension, the cause of death is renal, heart failure, stroke.

LECTURE 10

SYSTEMIC CONNECTIVE DISEASES WITH AUTOIMMUNIZATION: RHEUMATISM, SYSTEMIC RED Lupus, RHEUMATOID ARTHRITIS, SYSTEMATIC SCLEROMATIC SCLER. ENDOCARDIAL AND MYOCARDIAL DISEASES: CARDIOMYOPATHIES, ENDOCARDITIES, MYOCARDITIS, ACQUIRED HEART DEFECTS

Rheumatic diseasescombine on two grounds: pathogenesis and features of morphogenesis. The pathogenesis is based on immune damage (antibodies, immune complexes, cytotoxic T cells that appear during the implementation of immune responses directed against their own antigens). Antibodies can be directed against a single organ or tissue, resulting in local damage. Antibodies can react with antigens of many tissues, causing damage to many organs.

For the development of rheumatic diseases, the presence of chronic focal infection is important (β-hemolytic group A streptococcus, mycoplasmas, measles viruses, Epstein-Barr, Coxsackie, etc.).

Rheumatic diseases are systemic diseases associated primarily with the autoimmune mechanism of damage. Impairments of immune homeostasis at the tissue level are realized by immediate-type hypersensitivity reactions (GNT) with the development of exudative-necrotic changes and delayed-type hypersensitivity reaction (GST) with the formation of cellular, diffuse or focal (granulomatous) infiltrates.

There is a familial predisposition to some rheumatic diseases. There is an association of autoimmune diseases with HLA, especially with molecules of class 11 GKGS.

Rheumatic diseases are based on systemic connective tissue disorganization (mucoid edema, fibrinoid edema, fibrinoid necrosis, inflammatory cellular reactions or hyalinosis, sclerosis). Mucoid edema is characterized by accumulation in the main substance of the connective tissue of glycosaminoglycans (mainly hyaluronic acid), which promotes vascular permeability and the release of albumin from the blood plasma. There is a so-called chromotropic edema, which is microscopically manifested by the phenomenon of metachromasia with such dyes as toluidine blue, methylene blue, and others. In areas of mucoid edema appears purple-red color, and when stained with hematoxylin there is basophilia. Fibrinoid edema is characterized by more pronounced destruction of the main substance and connective tissue fibers. There is a sharp increase in vascular permeability and the yield of coarse plasma proteins, primarily fibrinogen, which is converted into fibrin. The process is irreversible and ends with fibrinoid necrosis (necrotic masses are impregnated with plasma proteins and fibrinogen), hyalinosis and sclerosis.

As a result of damage by circulating immune complexes, generalized vasculitis with fibrinoid necrosis, plasmorrhagia, thrombosis, endothelial proliferation and perithelium is observed. Morphologically detect destructive-proliferative thrombovasculitis, which can be endo-, meso-, peri- and panvasculitis. Generalized vasculitis is characteristic of all rheumatic diseases.

Rheumatic diseases have a chronic progressive wavy course with alternating periods of exacerbation and remission. Features of structural manifestations of these diseases are determined by the degree of damage to connective tissue and blood vessels with a predominant lesion of a particular organ.

Rheumatic diseases include:

Rheumatism - against the background of systemic connective tissue pathology, the heart, musculoskeletal system and CNS suffer the most.

Rheumatoid arthritis - joints (joint capsule, synovial membrane, articular cartilage), stroma of visceral organs.

Ankylosing spondylitis – Marie – Strumpel disease (ankylosing spondylitis) - a predominant lesion of the articular ligament of the spine, as well as the heart and lungs.

Systemic lupus erythematosus - affected blood vessels, skin, joints, as well as visceral organs (kidneys, liver, myocardium).

Systemic scleroderma - affected vessels (vasculitis) of the skin, muscles, joints, kidneys, heart ("Sclerodermic kidney", heart).

Dermatomyositis - skin (dermis) and muscles (cross-striped and smooth).

Nodular periarteritis - adventitial membrane of arterioles and veins, manifested by dystrophy and sclerosis in the internal organs, up to heart attacks, and hemorrhages.

Sjogren's syndrome - skin lesions, xerophthalmia, xerostomia.

Rheumatism (Sokolsky-Buyo disease) - a common infectious-allergic disease associated with sensitization of the body β-hemolytic streptococcus A, characterized by systemic connective tissue lesions with a predominant localization of pathology in the cardiovascular system in predisposed individuals (7-15 years), continuous recurrence with features of autoaggression.

Scheme of typical development of rheumatism (with the selection of three periods according to Nesterov):

Streptococcal infection (often sore throat) and the I period of sensitization of the body by streptococcal infection, ie the latent period, which is 2-4 weeks, when the production of antistreptococcal antibodies and the formation of the immune complex. Period II - hyperergic reaction: due to damage by immune

complexes, as well as the reaction of cross-reaction of antibodies from AG-connective tissue, prostheses cleave glycoprotein complexes of connective tissue, maintaining long-term autoimmune inflammation with granulomatosis (type GST. Clinical period II. - period of recurrence of the process Morphological substrate of rheumatism - systemic progressive disorganization of connective tissue and specific proliferative cellular response, especially in the endocardium and vessels of the microcirculatory tract.

Mucoid edema is a superficial reverse disorganization of connective tissue with the release of acidic glycosaminoglycans (KGAG), which cause metachromasia, as well as increase vascular permeability, causing the impregnation of tissue with plasma proteins. The result is a transition to fibrinoid edema and necrosis.

Fibrinoid swelling and necrosis - irreversible disorganization of connective tissue with the formation of a complex complex of fibrinoid, culminating in fibrinoid necrosis.

Cellular reactions (granulomatosis). The cycle of granuloma development lasts up to 6 months.

Phase I - accumulation of macrophages in the lesion;

Phase II - "blooming" ("mature") granuloma - macrophages fan-shaped around fibrinoid masses;

Phase III - granuloma, "withering" - the cell decreases due to lysis of fibrinoid masses by macrophages, fibroblasts appear;

Phase IV - "scarring granuloma", - complete resorption of fibrinoid by macrophages, scarring of the organ

Nonspecific cellular reactions develop in the form of lymphohistiocytic infiltration of interstitial tissue of internal organs or vasculitis in the microcirculatory tract.

Clinical and anatomical forms of rheumatism: cardiovascular (rheumatic endo-, myo- and pancarditis); polyarthritic (rheumatic polyarthritis); cerebral (small chorea) - movement disorders due to damage to the vessels of the brain; nodular (nodular rheumatism) - granulomas in the subcutaneous tissue, aponeurosis, tendons, fascia and muscles.

At endocarditis dystrophic changes (mucoid and fibrinoid hypostasis), necrosis and proliferative cellular reaction (granulomatosis) of an endocardium are observed. According to the localization, there are parietal, valvular and chordal endocarditis. Chordal endocarditis, accompanied by thickening and shortening, deformation of the chord, causes deformation of the atrioventricular sash. There are 4 types of valvulitis: diffuse - initial, characterized by diffuse lesions of the connective tissue of the valve leaflets (with the development of granulomas and subsequent sclerosis); acute warty - dystrophic, and then - necrotic-proliferative reactions in the connective tissue of the valve, accompanied by endothelial damage (along the free edge of the sash) and thrombotic layers; fibroplastic - as a consequence of diffuse or acute warty endocarditis, manifested by scarring of the valve, ring fibrosis, ie stenosis of the atrioventricular orifice, as well as the fusion of the valve leaflets; reverse warty - foci of repeated fresh connective tissue disorganization and repeated endothelial ulcers on the background of scarring of the valve, deformation and fusion of its valves with subsequent thrombotic layers.

Myocarditis with rheumatism there are two types - granulomatous and exudative, and the latter type of myocarditis can be both focal and diffuse.

In granulomatous (productive) myocarditis, rheumatic granulomas form in the perivascular connective tissue, causing perivascular cardiosclerosis. The usual localization is the left atrium, the auricle of the right atrium, the posterior wall of the left ventricle and the interventricular septum.

At focal interstitial exudative myocarditis insignificant focal lympholeukocyte infiltration and single granulomas are observed. The latent current is characteristic.

Diffuse interstitial exudative myocarditis is characterized by lymphoid infiltration of the cardiac stroma with single granulomas that cause diffuse cardiosclerosis. The myocardium is flaccid, the cavities are dilated.

Rheumatic pericarditis by the nature of inflammation can be serous, fibrinous or serous-fibrinous. The result - intrapericardial adhesions, obliteration of the pericardial cavity, and in the case of calcification of the exudate, which is organized - "armored" heart.

Rheumatic carditis (rheumatic heart disease) is characterized by simultaneous lesions of two heart membranes - endo- and myocardium, pancarditis - lesions of all heart membranes simultaneously (and endo-, and myo-, and pericardium).

Rheumatic vasculitis is systemic.

Arteritis and arteriolitis: specific changes (granulomatosis in the walls of blood vessels), which ends in sclerosis in the form of nodular thickenings, ie arteriosclerosis with uneven stenosis.

Capillary with "rheumatic endotheliosis", ie endothelial proliferation.

Venulitis is accompanied by thrombosis and warty growths on the venous valves.

Rheumatic polyarthritis, which affects large joints, in the acute period is manifested by synovitis (granulomatous nature), proliferation of synoviocytes and the accumulation of aseptic serous-fibrinous exudate in the joint cavity. With the development of granulomatous inflammation periarticularly and along the tendons, large nodules are formed (nodular form of rheumatism).

Cutaneous manifestations of the nodular form of rheumatism occur in the form of erythema on the extensor surface of the legs and forearms (periarticularly, above the nodes in the subcutaneous tissue).

Nodular (nodular) form of rheumatism is characterized by granulomatous inflammation with subsequent sclerosis in the form of "nodes" in the aponeurosis (parietal and occipital), fascia, tendons, periosteum and periarticular tissues.

*Cerebral form of rheumatism*is a manifestation of rheumatic vasculitis, which causes dystrophy and focal necrosis of neurons. Hemorrhages are also possible. In children, small chorea - a consequence of damage to the striatal system (dystrophy and atrophy in the cells of the striatal body, subthalamic nuclei and cerebellar cortex).

The consequence of rheumatic endocarditis is thickening and deformation of the valve leaflets and chords, which causes atrioventricular valve insufficiency; stenosis of the fibrous ring and fusion of the sash - to stenosis of the atrioventricular orifice, ie heart defects are formed. Rheumatic myocarditis ends with cardiosclerosis and decreased myocardial contractile function. Warty

endocarditis can be complicated by thromboembolism with heart attacks of the kidneys, spleen, brain, retina, gangrene of the extremities.

Rheumatic polyserositis can lead to obliteration of cavities. Death occurs from thromboembolism, or more often from decompensation of heart disease.

Children usually develop mitral valve insufficiency. In rheumatism in adults, both mitral valve insufficiency and stenosis of the atrioventricular orifice are formed as a result of sclerotic deformation of the fibrous ring of the heart and the fusion of deformed mitral valve leaflets. Along with the mitral valve, rheumatism can also affect the aortic valve.

Rheumatoid arthritis - chronic systemic connective tissue disease with progressive joint damage such as erosive-destructive polyarthritis.

Damage to connective tissue (mainly joints) is a consequence of immunopathological processes (autoaggression). Attention is paid to the role of viral infection, especially Epstein-Barr virus, which has the ability to disrupt the synthesis of immunoglobulins. The cause of immunocomplex damage in rheumatoid arthritis is considered to be a violation of the regulation of the immune response due to an imbalance in the function of T- and B-lymphocytes (deficiency of the T-lymphocyte system, leading to activation of B-lymphocytes and uncontrolled synthesis of plasma IgG cells). IgG in rheumatoid arthritis is altered, has autoreactivity, resulting in the production of antibodies of the IgG and IgM classes (rheumatoid factors). At interaction of rheumatoid factors and IgG immune complexes which initiate a number of chain reactions (activation of system of coagulation, system of complement,

The pathological process develops mainly in the joints and periarticular tissues. The inflammatory process in the synovial membrane becomes chronic and is accompanied by destruction of cartilage with the subsequent development of fibrous and bone ankylosis. The process is staged.

The early stage is characterized by increased vascular permeability, edema, plethora, mucoid edema, fibrin loss and the development of fibrinoid foci. In vessels - productive vasculitis, thrombovasculitis with predominant damage to venules. Hyperplasia of synovial villi occurs. Synoviocytes in the process of

proliferation sometimes occupy a palisade-like arrangement in relation to the layers of fibrin.

The next stage is characterized by the growth of granulation tissue in the subsynovial layer, rich in blood vessels, lymphoid and plasma cells. There is a focal, often perivascular, location of lymphocytes that form lymphoid follicles with light centers and plasma cell response at the periphery. Granulation tissue growing from the edges of the synovial membrane crawls on the cartilage in the form of a panus. Cartilage is destroyed with the formation of patterns, cracks and sequesters, which are immersed in the subchondral bone. There is dryness, granularity of the cartilaginous surface, yellowness, sometimes complete destruction of the articular surfaces.

In the final stage of maturation of granulation tissue leads to the fact that the damaged joint surfaces are covered with fibrous tissue, converge, the joint space narrows, fibrous adhesions are formed. Simultaneous growth of bone beams with their transition from one end of the joint to the other leads to the formation of fibro-bone ankylosis.

Rheumatoid arthritis characteristic of rheumatoid arthritis is limited or merges in the form of foci of fibrinoid necrosis, surrounded by large histiocytes with pyroninophilic cytoplasm; sometimes there is an impurity of giant multinucleated cells. Next to the periphery of the nodule are lymphoid and plasma cells, fibroblasts, neutrophils. A fibrous capsule with newly formed vessels is formed around the nodule. Nodule formation ends in sclerosis, often with the deposition of calcium salts.

Vasculitis in rheumatoid arthritis, as in other rheumatic diseases, are generalized. Vessels of all calibers are affected, but small vessels of skin, skeletal muscles, internal organs are more frequent. Productive vasculitis and thrombovasculitis are very common.

Heart damage (rheumatoid carditis) with the development of connective tissue foci of fibrinoid, nonspecific exudative-proliferative reactions, characteristic rheumatoid nodules, damage to muscle fibers of dystrophic nature, vascular changes and sclerosis as a possible result of all processes. According to

the frequency of damage in the first place is the pericardium, then the myocardium and endocardium.

Damage to the lungs and pleura is most often manifested by dry pleurisy with a slight fibrinous exudate. The organization of fibrin causes the formation of adhesions. In lung tissue, the process develops according to the type of chronic interstitial pneumonia, focal or diffuse pneumosclerosis, accompanied by the formation of rheumatoid nodules.

The kidneys in rheumatoid arthritis are encoded in 60% of cases. The lesions are various: amyloidosis, glomerulonephritis (membranous or membranous-proliferative), nephrosclerosis, chronic interstitial nephritis, acute and subacute pyelitis, angiitis. The most common manifestation is amyloidosis, the development of which is due to the appearance of a clone of amyloidoblasts under the action of prolonged antigenic stimulation in conditions of suppression of cellular immunity.

Amyloidosis can also affect the liver, gastrointestinal tract and other internal organs.

Complications are associated with the formation of subdislocations and dislocations of small joints, limited mobility, fibrous and bone ankylosis, osteoporosis, renal amyloidosis.

Death often occurs from renal failure due to amyloidosis or from concomitant diseases - pneumonia, tuberculosis and others.

Systemic lupus erythematosus (SLE) is a chronic polysyndromic disease mainly of young women and girls, which develops against the background of genetically determined imperfections of immunoregulatory processes, which leads to uncontrolled production of antibodies to their own tissues and their components with the development of autoimmune and immunocomplex chronic inflammation.

Among the environmental factors that provoke the detection of SLE, excessive insolation, as well as hypothermia, stressful situations, physical overload, and others are generally recognized. It is also a hereditary predisposition - it is more common in the presence of certain types of HLA - DR2, DR3, B9, B18. Hormonal factor: more common in young women (high estrogen

levels). Some drugs may play a role. There are indirect data on the role of chronic viral infection (increase in titers to a number of RNA and DNA viruses).

The decisive role in the pathogenesis is played by immune disorders in the form of a lack of T-suppressors, the predominance of T-helper T-lymphocytes and increased activity of B-lymphocytes. SLE is characterized by the development of an immune response to the components of the nuclei and cytoplasm of cells - antinuclear antibodies, especially to native (double-stranded) DNA, which are found in 50-60% of patients.

In SLE, there is a systemic disorganization of connective tissue with a predominance of fibrinoid changes and generalized damage to the vessels of the microcirculatory tract. A feature of SLE is a pronounced pathology of cell nuclei, especially mesenchymal, which is manifested by their deformation, depletion of chromatin content, karyopyknosis, karyolysis, karyorexis. Impurities of chromatin material to fibrinoid gives it a basophilic hue when stained with hematoxylin and eosin. Accumulation of chromatin material in the tissues and lumen of blood vessels, the formation of hematoxylin cells and "lupus" (LE) cells is considered pathognomonic for SLE. Hematoxylin bodies have approximately the size of the nucleus, round-oval, unstructured, their density is less than that of the normal nucleus, when stained with hematoxylin and eosin, they have a color from purple-red to pink-blue, give a positive reaction when stained with Felgen. Lupus cells are formed as a result of phagocytosis by leukocytes and macrophages of cells with damaged nuclei.

The most typical in SLE are erythematous rashes on the face in the cheekbones and back of the nose ("butterfly"). These rashes are of great diagnostic value. Histologically, some atrophy of the epidermis, the phenomenon of hyperkeratosis with the formation of keratotic plugs. Hyperkeratosis in the area of hair follicles leads to atrophy and hair loss. In the dermis, disorganization of connective tissue with fibrinoid changes, single hematoxylin bodies, productive and productive-destructive changes, pronounced pathology of nuclei in infiltrate cells, vascular endothelium. Deposition of IgG and IgM at the site of dermo-epidermal junction has not only diagnostic but also prognostic value, because it

correlates with the clinical and laboratory activity of the process and the presence of kidney damage.

Damage to the serous membranes is observed in 90% of patients. The pleura, pericardium, and peritoneum are especially often damaged.

Joint damage - arthritis (synovitis) - is observed in 80-90% of patients, usually in the form of migrating arthralgias or arthritis, less often - persistent pain with painful contractures. Affected mainly small joints of the hands, radial, ankle. A biopsy of the synovial membrane reveals acute or subacute synovitis with a poor cellular response, expressed by pathology of the nuclei and hematoxylin bodies. In the articular cartilage and bone tissue of the pineal gland there are changes in the tinctorial properties of the main substance, dystrophic changes in chondrocytes and osteocytes, up to necrosis, but without the lush and active granulation tissue that destroys cartilage. A number of patients may develop deformity of small joints, accompanied by muscle atrophy. The joint syndrome is usually accompanied by myalgia, myositis.

Damage to the cardiovascular system is very characteristic of SLE (about 50% of patients). With lupus carditis, all the membranes of the heart are damaged (rarely at the same time); usually inflammation of individual membranes or their successive involvement in the process is registered. Pericarditis is the most common sign of SLE. Massive exudate is rare. Atypical Liebmann-Sachs warty endocarditis, previously considered only a pathological finding, is now, thanks to the method of echocardiography, diagnosed much more often, is the most characteristic sign of SLE and belongs to the category of signs of high disease activity. It is characterized by layering of thrombotic masses not only on the edge of the valve leaflets, but also on its surface, as well as in the transition of the valvular endocardium to the parietal. Endocarditis in SLE is characterized by dystrophy and death of the endothelium and the formation on the surface of a pink unstructured mass with an admixture of nuclear detritus, or the presence of thrombotic masses containing large amounts of fibrin. There is one or another degree of sclerosis of the parietal and valvular endocardium, sometimes with the formation of mitral valve insufficiency, which is diagnosed in the clinic.

Myocarditis in SLE is usually focal in nature, the infiltrates contain histiocytes, mononuclear cells, plasma cells, and sometimes leukocytes.

Lung damage. The lungs are compacted, the incision surface has a mirror luster, in the place of the root there is heaviness and reticulation of lung tissue. Microscopically, there is a diffuse thickening of the alveolar septa due to fibrinoid edema, infiltration of their lymphocytes, proliferation of septal cells. On the inner surface of the alveoli are hyaline membranes (fibrinoid material). In the system of the microcirculatory tract - destructive-productive vasculitis. The combination of changes causes the development of alveolar-capillary block and respiratory failure. Secondary infection often joins, up to the formation of abscesses.

Damage to the CNS and peripheral nervous system in the form of alternative-exudative meningoencephalomyelitis and alternative-productive radiculitis, neuritis, plexitis are caused mainly by vasculitis. SLE is characterized by scattered foci of micronecrosis with localization in the subcortical nuclei. It is clinically manifested by astheno-vegetative syndrome, polyneuritis, lability of the emotional sphere, sometimes delusional states, auditory or visual hallucinations, epileptiform seizures, and others.

Kidney damage (lupus nephritis, lupus nephritis) is a classic immunocomplex extra- and intracapillary glomerulonephritis, observed in 50% of cases. Clinically, there are different variants of kidney damage - isolated urinary syndrome, nephritic and nephrotic; in patients treated with corticosteroids and cytostatics - pyelonephritis. Typical lupus nephritis is characterized by the phenomenon of "wire loops", fibrinoid deposition in the loops of the glomeruli, hyaline thrombi, the formation of hematoxylin cells. Nonspecific signs are thickening and splitting of the basement membranes of the glomerular capillaries, proliferation of glomerular cells, sclerosis of capillary loops, the formation of adhesions (synechiae) between the capillaries and the glomerular capsule. The recurrent nature of SLE gives the kidneys a colorful appearance with the presence of acute and chronic changes. In the tubules, especially twisted, there are varying degrees of dystrophy, in the lumen - cylinders with a basophilic tinge. Lymphoid and plasma cell infiltrates are in the stroma. Renal biopsy is of the greatest importance in recognizing the lupus nature of glomerulonephritis.

Damage to the spleen and lymph nodes - there is generalized lymphadenopathy, enlargement of the spleen and liver, pathognomonic changes in the spleen (atrophy of lymphoid follicles, severe plasmatization, the development of concentric perivascular sclerosis (the phenomenon of "bulbous shedding of the appendix") on amyloid).

The liver can be involved in the pathological process, which is expressed by infiltration of the stroma by lymphoid, plasma cells, macrophages. Fatty liver dystrophy, as well as coagulation necrosis of hepatocytes are often detected.

The most dangerous complications are associated with kidney damage - the development of their insufficiency on the background of lupus nephritis. Complications of steroid and cytostatic therapy are purulent infections, "steroid" tuberculosis, hormonal disorders.

Death most often occurs from renal failure (uremia) or infection (sepsis, tuberculosis).

Systemic scleroderma Is a systemic disease of connective tissue and small vessels, characterized by common fibro-sclerotic skin changes, stroma of internal organs and symptoms of endarteritis obliterans in the form of widespread Raynaud's syndrome.

The etiology of systemic scleroderma is unknown. In the development of systemic scleroderma is important work associated with prolonged cooling, vibration, polymerization of vinyl chloride. Known immunogenetic markers such as A9, B8 and B27, B40, DR5 (subacute course) and DR3 (chronic course). The central part of the fibrosing process is fibroblast and other collagen-forming cells (vascular wall smooth muscle cells) with increased production of collagen type I and III, fibronectin, connective tissue biopolymers (proteoglycans and glycoproteins). An important factor in the pathogenesis of systemic sclеroderma is a violation of microcirculation due to damage to the vascular wall and changes in intravascular, plasma and cellular properties of blood. As a result, there is excessive synthesis of soluble forms of collagen, endothelial damage and its replacement by smooth muscle collagen-synthesizing cells, increased ability to spasm and hyperplasia of the inner lining of blood vessels. Endothelial damage causes adhesion and aggregation of cellular elements of blood - leukocytes,

erythrocytes and platelets, stasis, intravascular coagulation, microthrombosis. All this is realized by the generalized Raynaud's syndrome (three-phase vasospastic reaction after cooling, agitation, fatigue - pallor, cyanosis, hyperemia). The basis of pathogenesis is unrestrained collagen formation and vascular processes in combination with inflammation. microthrombosis. All this is realized by the generalized Raynaud's syndrome (three-phase vasospastic reaction after cooling, agitation, fatigue - pallor, cyanosis, hyperemia). The basis of pathogenesis is unrestrained collagen formation and vascular processes in combination with inflammation. microthrombosis. All this is realized by the generalized Raynaud's syndrome (three-phase vasospastic reaction after cooling, agitation, fatigue - pallor, cyanosis, hyperemia). The basis of pathogenesis is unrestrained collagen formation and vascular processes in combination with inflammation.

Skin lesions usually occur in stages: the stage of dense edema; stage of induration (sclerosis); stage of atrophy.

Joint syndrome is one of the most common and early signs of systemic scleroderma. There is a decrease in the amount of synovial fluid. The synovial membrane is dense with a pale shiny surface. In the early stages, there is multiple thrombosis of the superficial capillary network, a diagnostic and informative sign - a strip of fibrinoid on the surface of the synovium and edema of the inner lining of blood vessels with concentric narrowing of the lumen.

Heart damage is the main sign of visceral pathology of systemic scleroderma, observed in 2/3 of patients. Macroscopically there is one or another degree of cardiac hypertrophy, dilation of cavities (sometimes with the formation of an aneurysm), thickening and whitishness of the parietal endocardium, marginal sclerosis of the valves, mainly mitral, in the myocardium - cardiosclerosis of various nature: small focal, small focal; on the epicardium there are whitish foci of compaction. Microscopically mucoid and fibrinoid edema mainly in the endocardium, a weak cellular response. Clinical symptoms are caused by atrophy, dystrophy, small foci of cardiomyocyte necrosis and sclerotic processes (perivascular, diffuse interstitial, focal cardiosclerosis).

Pulmonary damage - the main manifestation - pneumosclerosis, which usually develops in the basal lungs and is accompanied by the development of

bronchiectasis and emphysema. The lungs are dense to the touch, heavy, with a well-marked heavy pattern. Two types of sclerosis: cystic (with the formation of subpleural cavities) and compact (large fields of sclerosis and hyalinosis).

Kidney damage. With asymptomatic clinical picture of nephropathy morphologically determine swelling, homogenization, exposure of interparticle vessels, sometimes in combination with pervascular sclerosis, thickening of the interstitium, focal lymphoid infiltration. In severe nephropathy, the substrate of which is a scleroderma kidney, morphologically in the cortical substance there are changes of atrophic and necrotic nature, up to the formation of massive areas of necrosis, in the interparticle arteries - mucoid edema, fibrosis of the wall, proliferation and proliferation. . Carrying arterioles are usually in a state of fibrinoid necrosis. In glomeruli, homogenization and swelling of individual loops, fibrinoid changes, partial sclerosis and hyalinosis. In both cases, there are dystrophic and atrophic changes of the tubules,

Similar morphological changes are found in the gastrointestinal tract, liver.

Neurological symptoms are associated with the development of scleroderma angiopathy, fibrosis and dystrophic changes.

Complications are associated with the insufficiency of those organs or systems in which the most developed sclerotic changes.

Dermatomyositis- a systemic disease characterized by damage to striated and smooth muscles and skin. Only muscles can be affected, and then the disease is referred to as myositis. The viral nature of dermatomyositis is allowed. In some patients, structures similar to paramyxoviruses are found in the cytoplasm of myocytes, which are considered a trigger. There is a connection between dermatomyositis and tumors, and tumor agents may be cross-reacting with muscle antigens, which increases autoaggression. There was an improvement in patients after tumor removal.

The most commonly affected skeletal muscles, muscles of the pharynx, eyes and diaphragm. Skeletal muscles are atrophic: muscles are defined in the form of thin strands with whitish layers, sometimes - with foci of calcification. With exacerbation of the disease, the muscles are swollen, yellow, with foci of necrosis and hemorrhage. Microscopically, dystrophic changes predominate in the muscles,

striation disappears, glycogen content decreases and the activity of enzymes decreases sharply. Part of muscle fibers with signs of coagulation necrosis with active phagocytosis of necrotized areas. In the connective tissue there is edema, focal (sometimes diffuse) infiltration of lymphocytes, macrophages and single leukocytes. Over time, with steadily progressing dermatomyositis in the muscles are determined by massive areas of sclerosis and lipomatosis.

In the myocardium there are signs of focal or diffuse interstitial myocarditis with productive vasculitis, edema of the interstitial tissue and infiltrates consisting of lymphocytes, macrophages and plasma cells. Dystrophy is found in cardiomyocytes. At a chronic course of a dermatomyositis diffuse cardiosclerosis and an atrophy of cardiomyocytes is noted.

Diffuse changes in the form of thickening of interalveolar partitions due to proliferation of septal cells, lymphocytes and macrophages are defined in lungs. Purulent bronchopneumonia can develop, which is often the cause of death.

In the wall of the esophagus, stomach, small and large intestine are determined by dystrophic and atrophic changes of muscle cells, perivascular lymphoid-macrophage infiltrates, sclerosis of the mucous and submucosal layers.

There are primary (idiopathic) and secondary (tumor) forms of dermatomyositis. Morphological manifestations of these forms are identical. The primary form is more common in children and the secondary in adults. After removal of the tumor, there was an improvement in the condition of patients.

With dermatomyositis complications are associated with bronchopneumonia, which develops against the background of weakness of the respiratory muscles. Possible cachexia, cardiovascular failure associated with myocarditis or cardiosclerosis. Quite often there are complications of hormone therapy (bleeding from eroded vessels of gastrointestinal ulcers).

Nodular periarteritis- systemic necrotizing vasculitis by type of segmental damage of arteries of small and medium caliber with the formation of aneurysmal protrusions. The disease mainly affects young men, the incidence is 2-3 cases per 1 million population per year.

Nodular periarteritis develops after acute respiratory (including streptococcal) infections, administration of vaccines and sera, drug tolerance, and

others. Hepatitis B virus is important because 30% of patients have a high titer of HBs antigen and antibodies to it.

In the pathogenesis of nodular periarteritis the main role is played by the processes of immunocomplex inflammation, pronounced hemorheological disorders with the development of DIC syndrome.

Nodular periarteritis mostly begins acutely, less often gradually with general symptoms - fever, tachycardia, muscle pain and rapid weight loss, loss of appetite, sweating.

The most characteristic morphological feature of nodular periarteritis is damage to the arteries of the muscular type of small and medium calibers in the area of their branching. The peculiarity of nodular periarteritis is the simultaneous damage of vascular endothelium (deposition of immune complexes), inner elastic membrane (polymorphic-cellular inflammation - lymphoid cells, macrophages, epithelioid cells, neutrophils, fibroblasts) and perivascular tissue (perivascular tissue). These changes eventually lead to vascular obliteration and the development of heart attacks. A characteristic morphological feature of nodular periarteritis is nodular thickening of the affected arteries, which are most often in the vessels of the kidneys, heart, central nervous system, abdominal organs.

Damage to the vessels of various internal organs determines the clinic. The most common sign of nodular periarteritis is kidney damage (80-90% of patients). Glomerulonephritis (acute and chronic mesangial), as well as renal infarctions, ruptures of aneurysms are often observed in the kidneys. Kidney damage is the most common cause of death in patients with nodular periarteritis.

Damage to the nervous system in 50% of patients is manifested by multiple asymmetric sensory and motor neuritis. This is due to the presence of pathological processes in the vessels that supply a particular nerve. Involvement in the CNS is observed in 25% of patients with nodular periarteritis. Clinically manifested by symptoms of meningoencephalitis, as well as focal brain lesions in connection with intracranial thrombosis, ruptured aneurysms. Eye damage (aneurysms of the fundus arteries, perivascular infiltrates, thrombosis of the central retinal artery) can be one of the early symptoms of the disease.

Abdominal syndrome is observed in approximately 50% of patients with nodular periarteritis.

Acute abdominal pain associated with pathology of the mesenteric arteries, which causes the development of ischemia or intestinal necrosis.

Heart damage is observed in 30-40% of patients. Coronary vessels are most often affected, accompanied by angina attacks, myocardial infarction. Rarely, hemopericardium develops due to rupture of the aneurysm or exudative pericarditis with damage to small vessels.

Sjogren's disease- this disease is characterized by severe xerostomia (dry mouth), xerophthalmia (dry eyes) and xeroconjunctivitis. The disease is more common in middle-aged and elderly women. The main risk factor for Sjogren's disease is considered to be familial predisposition, as well as the connection with certain loci of histocompatibility antigens of the HLA system. The amount of immunoglobulins of all classes increases in the blood. Some patients have antinuclear antibodies and a number of organ-specific autoantibodies to thyroglobulin and gastric lining cells. However, the main feature is the presence of circulating autoantibodies to the epithelial cells of the ducts of the salivary glands. Bilateral damage to the parotid salivary glands is usually observed, but other large and small salivary glands, lacrimal and bronchial glands may be involved in the process.

Salivary glands are enlarged, dense, bumpy, can be fused with the surrounding tissues. Microscopically, there may initially be a slight expansion of the excretory ducts and mild infiltration, mainly lymphocytes and plasma cells. Over time, around the ducts there are pronounced infiltrates, which consist mainly of lymphocytes penetrating between the acinuses. Between the lobes increases the amount of coarse connective tissue. The end of morphological changes is a sharp increase in the number of lymphocytes (sometimes forming follicles), plasma cells, fibrous connective tissue and a decrease in the number of acinuses. Hypersecretion is noted in the surviving glandular cells. Simultaneously with the increase in cellular infiltration, focal proliferation of the epithelium and myoepithelium with the formation of epimioepithelial islets is observed.

Lesions of the salivary glands can also be observed in rheumatoid arthritis, systemic scleroderma and systemic lupus erythematosus. However, an isolated autoimmune process with lesions only around the auricles of the ear salivary glands is also common.

The development of complications is influenced by the development of diseases of the oral cavity (caries, periodontitis, etc.) and malignant lymphomas in the salivary glands.

CARDIOMYOPATHY

Diseases with primary dystrophic changes in the myocardium of non-coronary and non-rheumatic origin. A common feature of cardiomyopathies is a violation of myocardial contractile function as a consequence of dystrophic lesions. Primary cardiomyopathies: hypertrophic, dilated, restrictive. Secondary cardiomyopathies develop in poisoning, intoxication, infections, metabolic diseases, diseases of the digestive system.

*Hypertrophic (constrictive) cardiomyopathy*characterized by myocardial hypertrophy, especially of the left ventricle. Decrease in a ventricular cavity, disturbance of a diastole at usual or strengthened systole.

Non-obstructive or diffuse form is accompanied by thickening of the left ventricular myocardium and interventricular septum. Cardiomyocytes are arranged chaotically.

Obstructive or local form, which is accompanied by hypertrophy of the myocardium of the upper left ventricle and as a consequence - subaortic muscle stenosis. Both forms run without changes of valves and coronary arteries.

Dilated (congestive) cardiomyopathy- diffuse heart disease with dilation of cavities and decreased contractile function. The heart is enlarged in size, spherical in shape. The myocardium is sluggish, with layers of whitish tissue, alternating hypertrophied cardiomyocytes and atrophied. Heart valves and coronary arteries are not changed. Thrombi can form in the heart cavities.

*Restrictive cardiomyopathy (endomyocardial fibrosis).*Rigidity of the walls of the ventricles of the heart (usually the left) with endocardial fibrosis, which interferes with diastolic filling and impairs the function of the atrioventricular

valves. Thickening of the endocardium (up to 5 cm) causes obliteration of the ventricular cavity.

*Secondary cardiomyopathies*regardless of the cause are accompanied by cardiomyocyte dystrophy. Alcoholic cardiomyopathy is of the greatest importance. The heart is moderately hypertrophied with dilation of cavities and parietal thrombi. The myocardium is sluggish, with scars, clay-like. In coronary vessels atherosclerotic lesions are insignificant. At microscopic research - fatty and hydropic dystrophy of cardiomyocytes, atrophy, hypertrophy, lysis of cardiomyocytes and sclerosis. Death occurs from heart failure, thromboembolic complications.

ENDOCARDITIS

Inflammation of the endocardium occurs as a complication, most often infectious diseases (secondary endocarditis), and as an independent lesion (primary) endocarditis.

*Infectious endocarditis*with a characteristic lesion of the heart valves, develops as a hyperergic reaction with damage to the cardiovascular system. The causative agents of infectious endocarditis are staphylococci, streptococci, enterococci. The clinical course can be acute (weeks), subacute (3 months), chronic (years). Bacterial endocarditis is divided into primary infectious (Chornogubov's disease), which occurs on intact valves, and secondary bacterial - on altered valves. Most often, changes occur on the aortic valve in the form of polyposis-ulcerative endocarditis. Thrombotic layers spread to the aorta. The process begins with necrosis around which lymphocytes, histiocytes, macrophages are determined. The organization of blood clots causes deformation of the gills and a heart defect is formed. In vessels, especially a microcirculatory resting place, plasmorrhagia is diagnosed, fibrinoid necrosis of vascular walls. Vascular aneurysms are formed with their subsequent rupture. Hemorrhagic syndrome (petechiae in the skin, mucous and serous membranes, conjunctiva of the eye) is due to significant permeability of the vascular wall. Splenomegaly with heart attacks of various ages. Immunocomplex glomerulonephritis in the kidneys, as well as heart attacks and scars. Peripheral signs of bacterial endocarditis: petechiae in the conjunctiva of the eye at the inner corner of the lower

eyelid(spots Lukin-Libman), nodular thickening on the palms (Osler's nodules), thickening of the nail phalanges ("drumsticks"), hemorrhage into the skin and subcutaneous fat (Jainuel's spots), jaundice. Thromboembolism as a complication can become common - thromboembolic syndrome.

Parietal fibroplastic eosinophilic Leffler's endocarditis. Systemic eosinophilic vasculitis with parietal endocarditis. The course of the disease is acute or chronic. The disease is caused by a bacterial or viral infection. Ventricular endocardial necrosis develops with thrombotic layers, which are organized and cause its thickening (constrictive endocarditis). The process involves the chordal and papillary endocardium (along with the muscles). Mitral and tricuspid valve insufficiency is formed. Internal organs with multiple cellular infiltrates with a predominance of eosinophils. Characteristic thromboembolic complications. Death occurs from acute or chronic heart failure, thromboembolic complications.

MYOCARDITIS

Idiopathic myocarditis is an independent disease. Secondary myocarditis occurs in infectious and infectious-allergic diseases. Idiopathic myocarditis (Abramov-Fiedler) is a malignant infectious-allergic inflammation of the myocardium with a progressive course and often fatal outcome. The course of the disease is acute or chronic, recurrent. Idiopathic myocarditis is characterized by widespread heart disease. The body is enlarged, sluggish, the cavities are stretched with thrombotic layers. In section, the myocardium is variegated, the valves are normal. There are 4 histological types of idiopathic myocarditis.

Dystrophic (destructive) is accompanied by hydropic dystrophy and lysis of cardiomyocytes.

Inflammatory-infiltrative accompanied by serous edema and interstitial inflammation with cellular infiltrate, which consists of lymphocytes, leukocytes, macrophages, plasma cells, as well as giant multinucleated cells.

Mixed - which combines destructive and inflammatory changes.

Vascular - vascular lesions (vasculitis) predominate in the presence of unexpressed destructive and inflammatory changes.

The most common are thromboembolic complications, which can be fatal. The cause of death may be heart failure.

HEART DEFECTS

There are congenital and acquired heart defects. Congenital heart defects occur during the formation of the heart and the vessels departing from it. Acquired heart defects are formed after birth and are characterized by damage to valves and main vessels. They develop in rheumatism, atherosclerosis, syphilis, brucellosis, bacterial endocarditis, trauma.

There are valve insufficiency, when deformed gags do not close the hole between the cavities of the heart, as well as stenosis of the hole. Possible coexistence of valve insufficiency and orifice stenosis is a combined heart defect. A concomitant heart defect may develop if more than one valve is affected.

The first place is occupied by a defect of the mitral valve, the second - aortic.

Acquired heart defects can be compensated and uncompensated.

The cause of death may be cardiovascular failure.

LECTURE 11

DISEASES OF THE DIGESTIVE SYSTEMS (GASTRITIS, PULMONARY DISEASE, STOMACH CANCER, HEPATITIS, HEPATOSIS, CIRRHOSIS OF THE LIVER).

Diseases of the digestive tract differ in the variety of their clinical and morphological features. They include primary independent diseases, as well as other, secondary, which are a manifestation of many diseases of infectious and non-infectious nature, acquired or hereditary origin. At the heart of these diseases can be various general pathological processes, such as alteration, inflammation, hyper- and dysplastic processes, autoimmune disorders and, finally, tumors.

Over the past twenty years, significant progress has been made in understanding the morphological nature of the process of most diseases of the digestive system. These achievements are associated with the ability to obtain and study biopsy material of almost all parts of the digestive tract using modern morphological means of research, such as immunohistochemistry, electron microscopy. Data on early structural manifestations of diseased digestive organs are obtained, which allows to use the results of morphological diagnostics for effective treatment.

Among the diseases of the esophagus are more common diverticula, inflammation (esophagitis) and tumors (cancer).

Diverticulum of the esophagus is a limited blind protrusion of its wall, which consists of all the membranes of the esophageal wall (true diverticulum) or only the mucous and submucosal membranes, which protrude through the slits of the muscular membrane (muscular diverticulum). Depending on the location and topography, there are pharyngoesophageal, bifurcation, epinephral and multiple diverticula, and from the origin - adhesive diverticula, which occur due to inflammatory processes in the mediastinum, and relaxation, which is based on local relaxation of the esophageal wall. Esophageal diverticulum can be complicated by an inflammatory process (diverticulitis).

The causes of diverticulum formation can be congenital (inferiority of connective and muscular tissues of the esophageal wall, pharynx) and acquired (inflammation, sclerosis, scarring, increased pressure in the esophagus).

Esophagitis - inflammation of the esophageal wall occurs secondary to many diseases; rarely - initially; according to the course distinguish between acute and chronic.

Acute esophagitis, which occurs under the influence of chemical, thermal and mechanical factors, a number of infectious diseases (diphtheria, scarlet fever, typhoid), allergic reactions, can be catarrhal, fibrinous, phlegmonous, ulcerative, gangrenous. A special form of acute esophagitis is membranous, when there is a rejection of the cast of the mucous membrane of the esophagus. After deep membranous esophagitis, which develops with chemical burns, scar stenosis of the esophagus is formed.

In chronic esophagitis, the development of which is associated with chronic irritation of the esophagus (exposure to alcohol, smoking, etc.) or circulatory disorders in its wall (venous hyperemia in cardiac decompensation, portal hypertension), the mucous membrane is swollen and full-blooded with areas of epithelial destruction, epithelium, and multiple sclerosis. For specific chronic esophagitis, which occurs in tuberculosis and syphilis, the morphology of the corresponding inflammation is characteristic.

In a special form there is reflux esophagitis, in which inflammation, erosions and ulcers (erosive, ulcerative esophagitis) are found in the mucous membrane of the lower esophagus due to regurgitation of gastric contents (regurgitation, peptic esophagitis). Esophageal cancer most often occurs at the level of the middle and lower third of it, which corresponds to the level of bifurcation of the trachea. It is much less common in the initial part of the esophagus and its transition into the stomach.

Esophageal cancer accounts for 2-5% of all malignancies. The development of esophageal cancer is facilitated by chronic irritation of its mucous membrane (hot coarse food, alcohol, smoking), scarring after burns, chronic gastrointestinal infections, anatomical disorders (diverticula, ectopia of the cylindrical epithelium

and gastric glands, etc.). Among the precancerous changes the most important are leukoplakia and severe dysplasia of the epithelium of the mucous membrane.

There are the following macroscopic forms of esophageal cancer: annular dense, papillary and ulcerative. Annular dense cancer is a tumor that circularly thickens the walls of the esophagus in a certain area and narrows its lumen; at disintegration (destruction) and ulceration of a tumor passability of a gullet is restored. Papillary cancer of the esophagus is similar to fungal cancer of the stomach. It breaks down easily, resulting in ulcers that penetrate into neighboring organs and tissues. Ulcerative cancer is a cancerous ulcer that has an oval shape and extends along the esophagus.

Among the microscopic forms of esophageal cancer, there are in situ carcinoma, squamous cell carcinoma, adenocarcinoma, glandular-squamous cell, glandular-cystic, mucoepidermal and undifferentiated cancer.

Metastases of these tumors are predominantly lymphogenic.

Complications are associated with the growth of tumors in neighboring organs - trachea, mediastinum, stomach, pleura. At the same time esophageal-tracheal fistulas are formed, there is an aspiration pneumonia, an abscess and a gangrene of lungs, a pleural empyema, a purulent mediastinitis; cachexia develops early.

Inflammatory diseases of the stomach - gastritis - occupy a significant place in the clinic of internal medicine. The doctrine of acute gastritis originates from Beaumont's observations of one patient who developed a gastric fistula as a result of a gunshot wound. This patient was an excellent object for lifelong study of the physiology and pathology of the stomach. Through the fistula, it was possible to obtain gastric juice, monitor the digestive process and, finally, see the mucous membrane of the body. When the patient ate poorly chewed food and alcohol or fell ill with fever, the gastric mucosa turned red, swollen, it appeared grayish layers.

These observations are the basis of modern ideas about the high sensitivity of the stomach and its tendency to respond with acute inflammation to various physiological and pathological stimuli.

This stage and subsequent stages in the development of the problem showed that secretory disorders and inflammation in the stomach are two coordinated processes that occur under the influence of the same pathogenic factor.

Moreover, the range of variability of the relief of a normal stomach is very wide, and even more so in neurogenic secretion disorders, so the diagnosis of gastritis by morphological criteria is very difficult. It is especially difficult to distinguish leukocyte infiltration of the gastric mucosa in gastritis from leukocyte infiltration in its normal functional state. Inflammation of the stomach is characterized by the following triad:

1) the predominance of neutrophils over eosinophils,

2) the massiveness of infiltration with the accumulation of leukocytes mainly around blood vessels,

3) destructive-proliferative changes of the integumentary and glandular epithelium and the accumulation of exudate of one type or another (serous, purulent, fibrinous).

The above allows us to conclude that the most reliable method of establishing gastritis is the method of gastric biopsy with careful histological examination of its wall.

Since the time of Beaumont, it is believed that various irritants play a role in the development of gastritis: alcohol, spices (pepper, mustard), medications, poorly chewed food, taken in large quantities. These factors exert their harmful effects, apparently, only in conditions of increased gastric reactivity, because in some individuals the innervation apparatus of the stomach has an increased sensitivity to the perception of local stimuli.

Microorganisms do not play a big role in the development of gastritis, although hematogenous and lymphogenic entry of bacteria into the stomach wall with the development of inflammation is possible in infectious diseases.

Gastritis is divided into acute and chronic. By localization - on the fundus, affecting the body of the stomach, pyloroantral - the original part: the intermediate zone, the pyloric canal and the pylorus; pyloroduodenal area - the pyloric part and the duodenum. Gastritis is subdivided according to the

mechanism of occurrence. There are 2 groups: exogenous and endogenous gastritis. The following types belong to exogenous gastritises:

1) Corrosive gastritis. Caused by the action of caustic acids and alkalis;

2) Alimentary or food gastritis - from errors in diet, from eating very hot food or very cold food, from poisoning by meat or fish stale foods, from excessively fatty foods, alcohol, drugs.

Endogenous gastritis is the most common group. These include the following types:

1) Infectious and toxic gastritis. It is caused by lympho-hematogenous entry of microbial toxins into the stomach. For example, with scarlet fever, influenza, measles.

2) Gastritis in disorders of gastric blood supply. It is otherwise called stagnant or hypoxic gastritis. For example, in decompensated heart disease.

3) Gastritis in intoxications as a result of uremia, burns, thyrotoxicosis.

4) Allergic gastritis with serum sickness, intolerance to certain foods: eggs, strawberries and the like.

5) Peptic erosive gastritis caused by the action of gastric juice on particularly sensitive areas.

In addition, all are divided, both acute and chronic gastritis by the nature of inflammation. Thus, among acute gastritis there are serous - the lightest; serous-catarrhal - mixed with a large amount of mucus to serous exudate; fibrinous, when the mucous membrane is covered with a film of fibrin, and phlegmonous, when one or all of the stomach wall is diffusely infiltrated with leukocytes, a very severe form that can give perforation and peritonitis. These are forms of acute gastritis. The nature of inflammation is mainly exudative.

Chronic gastritis in some cases is associated with acute gastritis, its recurrence; in others, this connection is absent. Chronic gastritis, as well as acute, develops under the influence of gastric mucosa primarily exogenous factors: eating disorders, alcohol abuse, exposure to chemical, thermal and mechanical agents, occupational hazards and others. An important role of endogenous factors is autoinfection (Campylobacter pyloridis), chronic autointoxication, neuroendocrine disorders, chronic cardiovascular insufficiency, allergic reactions,

regurgitation of duodenal contents into the stomach (reflux). An important condition for the development of chronic gastritis may be prolonged exposure to pathogenic factors of exogenous or endogenous nature, which can "break" the usual regenerative mechanisms of constant renewal of the epithelium of the gastric mucosa.

Chronic gastritis can be autoimmune (type A gastritis) and non-immune (type B gastritis).

Gastritis type A (autoimmune gastritis) is characterized by the appearance of antibodies to parietal cells, and therefore the defeat of the fundus of the stomach, where many squamous cells (fundic gastritis); the mucous membrane of the antrum is not damaged; at the same time the high level of gastrinemia is noted. Due to damage to the lining cells, the secretion of hydrochloric (hydrochloric) acid is reduced.

In type B gastritis (non-immune gastritis), antibodies to parietal cells are not found, so the fundus of the stomach is relatively undamaged. The main changes are in the antrum (antral gastritis). There is no gastrinemia; the secretion of hydrochloric acid is reduced only moderately. Type B gastritis, in the pathogenesis of which there are no autoimmune processes, is 4 times more common than type A gastritis.

Guided by the topography of the process in the stomach, there are chronic gastritis - antral, fundal and pangastritis.

Chronic gastritis is characterized by prolonged dystrophic and necrobiotic changes in the epithelium of the mucous membrane, resulting in violations of its regeneration and structural restructuring of the mucous membrane, culminating in its atrophy and sclerosis; cellular reactions of the mucous membrane reflect the activity of the process.

Chronic superficial gastritis is characterized by dystrophic changes of the superficial (pit) epithelium. In some areas it flattens, approaches the cubic and has a reduced secretion; in others - high prismatic, with increased secretion. There is a translocation of additional cells from the isthmus to the middle third of the glands, decreases histamine-stimulated secretion of hydrochloric acid by parietal cells and

pepsinogen by main cells. Own layer (plate) of the mucous membrane is swollen, infiltrated by lymphocytes, plasma cells and neutrophils.

With chronic atrophic gastritis, a new and basic quality appears - atrophy of the mucous membrane, its glands, which determines the development of multiple sclerosis. The mucous membrane becomes thinner, the number of glands decreases. Connective tissue grows at the site of atrophied glands. Preserved glands are arranged in groups, their ducts are dilated, certain types of cells in the glands are poorly differentiated. In connection with mucoidization of glands secretion of pepsin and hydrochloric acid is broken. The mucous membrane is infiltrated by lymphocytes, plasma cells and neutrophils. These changes are joined by the reorganization of the epithelium, and metaplasia undergoes both superficial and glandular epithelium. Gastric fossa resemble intestinal villi, they are lined with bordered epitheliocytes, goblet cells and Panet cells appear (intestinal epithelial metaplasia, "Enterolization" of the mucous membrane). The main, additional (mucous cells of glands) and parietal cells of glands disappear, the cubic cells inherent in pyloric glands appear; so-called pseudopyloric glands are formed. Metaplasia of the epithelium is joined by its dysplasia, the degree of which may vary. Changes in the mucous membrane can be moderate (moderately atrophic gastritis) or severe (severe atrophic gastritis).

A special form of the disease is giant hypertrophic gastritis or Menetrie's disease, in which there is an extremely sharp thickening of the mucous membrane, it takes the form of cobblestones. At morphological research find proliferation of cells of glandular epithelium and hyperplasia of glands, and also infiltration of a mucous membrane by lymphocytes, epithelioid, plasma and giant cells. Depending on the predominance of changes in the glands or interstitium, as well as proliferative changes, there are glandular, interstitial and proliferative variants of this disease.

Signs of chronic gastritis activity allow to distinguish active (exacerbation) and inactive (remission) chronic gastritis. Exacerbation of chronic gastritis is characterized by edema of the stroma, plethora of blood vessels, abrupt cellular infiltration with the presence of a large number of neutrophils in the infiltrate,

sometimes the formation of crypt abscesses and erosions. At remission these signs are absent.

The severity of chronic gastritis can be mild, moderate and severe.

Thus, the basis of chronic gastritis are both inflammatory and adaptive-reparative processes of the gastric mucosa with imperfect regeneration of the epithelium and metaplastic rearrangement of its "profile". Violation of the regeneration of the epithelium of the mucous membrane in chronic gastritis is confirmed by electron microscopic examination of gastrobiopsies. It is established that undifferentiated cells, which are normally located in the deep parts of the gastric pits and cervical glands, in chronic gastritis appear in the gastric ridges, in the body and the bottom of the glands. Signs of premature involution are found in immature cells. This indicates a deep violation of the coordination of the phases of proliferation and differentiation of the glandular epithelium during the regeneration of the gastric mucosa, which leads to cellular atypia, the development of dysplastic processes.

Due to the fact that chronic gastritis clearly reflects the violation of regeneration and structure formation, which leads to cellular atypia (dysplasia), it often becomes the background against which gastric cancer occurs.

The value of chronic gastritis is extremely high. In the structure of diseases of the gastrointestinal profile, it ranks second after peptic ulcer disease. It is important to note that chronic atrophic gastritis with severe dysplasia is often a precancerous disease of the stomach.

Peptic ulcer is a common disease of the digestive system. It is a common chronic, cyclical, recurrent disease. The honorary discovery of a stomach ulcer, according to foreign authors, belongs to the French clinician and anatomist Cruvelle (1829). However, it is fair to note that 12 years before Cruvelle, our compatriot Academician Fedor Uden in 1817 published a thorough treatise on peptic ulcer disease.

XX century is characterized by a steady increase in the incidence of peptic ulcer disease in all countries in the form of chronic ulcers, mainly of the duodenum, especially in the United States. Peptic ulcer disease is much more common in men. Occurs at any age, but most often from 25 to 50 years.

The duodenal ulcer has a maximum frequency at the age of 30 to 40 years. And gastric ulcer - from 50 to 60 years.

Elderly people have a large number of complications.

Pathological changes in peptic ulcer disease are manifested in the form of erosion, acute and chronic peptic ulcer.

Erosions are superficial defects of the mucous membrane that do not reach its own muscular layer. They are often numerous and are formed from petechial hemorrhages inside the mucous membrane. Erosions are easily epithelialized and often disappear without a trace. But erosions can be the focus from which a peptic ulcer later develops. The size of erosion varies from1 mmup to several cm in length. Peptic ulcers differ from erosions in that the defect of the mucous membrane reaches the actual muscular layer, and often spreads to the submucosal membrane. A distinction should be made between acute and chronic ulcers.

Acute ulcer is characterized by a small development of connective tissue in its bottom and edges. The healing process is accompanied by low-intensity scarring and after a few weeks, the ulcer site can not be established. Acute ulcers can be a source of bleeding and perforation.

Chronic (peptic) ulcer is characterized by a large amount of fibrous tissue and more massive cellular infiltration at the base and edges of the ulcer. The ulcer has a round or oval shape, its bottom is white or gray, and an inflammatory shaft is observed around the ulcer. Healing of chronic peptic ulcer is slow and there is a large number of scars, a wide scar field.

Acute ulcers develop more often on the anterior wall of the bulb 12 of the duodenum and most perforations are observed at this location.

90% of chronic duodenal ulcers occur on the anterior and posterior walls of the bulb, 1-2 cm away from the pylorus. 10% of ulcers are localized below the bulb - postbulbar ulcers. Posterior wall ulcers are more prone to scarring and more likely to cause stenosis and penetration into neighboring organs. Ulcers of the anterior wall during healing do not form a deep scar. Postbulbar ulcers in 60% and more penetrate into the pancreato-duodenal artery, giving particularly severe bleeding.

In 25% there are multiple ulcers of the duodenum and are located on the anterior and posterior wall of the bulb. Gastric ulcer can form in any part of it, but the favorite places are a small curvature and antral department. The bottom and large curvature are rarely affected. Acute and chronic ulcers are formed in the stomach, as well as in the duodenum. The diameter of an acute ulcer does not exceed1 cm. The healing process can be very fast, but perforations are common.

Chronic gastric ulcer, which in the classical form is described by Uden, Cruvelle and Shemetov can reach 10 cm in length, but usually its size ranges from 1 to 3 cm.

Usually, chronic gastric ulcers are isolated. Numerous ulcers are observed only in 5-10% of cases.

As for the morphological structure of the ulcer itself, they are divided into simple and penetrating. Simple ulcers are relatively shallow, penetrating reach the serous cover. The muscle layers at the bottom of the penetrating ulcer are completely destroyed. There is a fusion with the neighboring organs and the bottom of the ulcer. Penetrating ulcers are more common than simple ones. Histologically in the bottom and edges of a chronic ulcer multiple development of cicatricial fabric is found. As a result of hypoxia in this tissue accumulates a lot of KMPS. It is a young granulation tissue rich in blood capillaries. Next, closer to the lumen of the stomach, there is a zone of fibrinoid necrosis, and, finally, on the surface of tissue fragments mixed with microbes, mucus, leukocytes, fibrin, hydrochloric acid hematin. Therefore, 4 layers: scar tissue, granulation tissue,

Progressive ulcers are characterized by the development of a necrotic layer, which can reach several millimeters in thickness. In these ulcers, the granulation tissue is fully involved in the detructive process and the layer of fibrinoid necrosis is adjacent to the scar.

At the bottom and edges of the ulcer dramatically altered arterial vessels. They are prone to inflammation and sclerosis with a sharp narrowing of the lumen and the formation of blood clots. Frequent pictures of fibrinoid necrosis of arterial walls, which plays a major role in the occurrence of bleeding. Lympho-venous stasis occurs, which also contributes to bleeding.

Chronic ulcers of the stomach and duodenum are prone to healing, and in women this tendency is more pronounced than in men. The healing process often ends with the development of a scar.

Quite often, peptic ulcer disease develops severe complications, which are the cause not only of suffering and disability, but often fatalities. A study of these projections in large cities shows that among every 100 deaths from various diseases in 2 cases, the cause of death is a complication of peptic ulcer disease.

Depending on which process prevails in the ulcer at the time of complication: necrosis, inflammation or scarring, all complications are divided into complications of ulcerative-destructive origin, ulcerative-inflammatory and ulcerative-scar origin.

Complications of ulcerative-destructive origin include ulcer penetration, ulcer breakthrough | and bleeding from an ulcer. Penetration of the ulcer occurs when the necrotic-destructive process destroys all layers of the stomach wall or duodenum and the bottom of the ulcer is a neighboring organ. Penetration occurs in approximately 30% of all ulcers. Penetration is more common in middle-aged and elderly people with a long history of ulcers. Patients with penetrating ulcers undergo gastrectomy. According to most authors, the localization of a penetrating ulcer of the duodenum is more common than in the stomach. There is the following classification of ulcer penetrations, depending on the organ into which it penetrates.

1. Penetration into parenchymal organs (pancreas, liver, spleen).

2. Penetration into the mesenteric formations (omentum, ligaments).

3. Penetration into the anterior abdominal wall.

4. Penetration into the wall of the cavity (transverse colon, gallbladder) without the formation of a fistula.

5. Penetration into the cavity organs with the formation of fistulas.

6. Penetration of one ulcer into several organs.

7. Multiple | numerous | penetration | several ulcers.

Ulcer breakthrough is open and covered.

In the vast majority of cases, there is an open breakthrough into the free abdominal cavity. Covert perforation of the ulcer is much less common. The

perforation hole (after perforation into the free abdominal cavity) is often covered by a neighboring organ.

The pyloric part of the stomach and duodenum together account for 71% of the total number of perforations. The ulcer is usually localized in the anterior wall. There are also repeated perforations of an ulcer at one patient. More often it is the same ulcer that has not healed, less often another new ulcer. Occurrence of preperforative exacerbation of peptic ulcer disease or perforation itself is associated with alcohol intake, dietary disorders, taking gastric juice with a thick probe, X-ray examination and the like.

Perforations occur in 25 to 50% of cases (in different surgeons). Perforation leads to progressive necrotization of the ulcer floor caused by gastric juice.

Perforation develops peritonitis, which is the most common cause of death from ulcers.

Bleeding from ulcers is | quite a common complication. It is observed from 10 to 15%. Bleeding from gastric and duodenal ulcers occurs in people of all ages, but most often after 40 years.

Sometimes bleeding is the first manifestation of a latent peptic ulcer disease. Recurrent bleeding is especially dangerous.

The location of the bleeding ulcer predominates in the stomach, mainly on its small curvature, where the largest blood vessels pass. Usually patients have vomiting "coffee grounds" and tarry feces. Bleeding often occurs from chronic ulcers, often penetrating, but sometimes from acute ulcers and erosions. The source of bleeding is an artery destroyed by an ulcerative process. Inflammation and fibrinoid necrosis are found in the artery.

At the site of the bottom of the ulcer at autopsy is a destroyed blood vessel, the lumen of which gapes or is filled with a fresh clot.

Complications of ulcerative-inflammatory origin include: gastritis, duodenitis, perigastritis, periduodenitis, inflammatory process of the biliary tract and liver. Very severe complications of this group include purulent, usually phlegmatic, inflammation of the stomach and duodenum. Fibrinous exudate near the ulcer on the serous membrane in perigastritis and periduodenitis undergoes organization, and adhesions, adhesions, even infected.

Complications of ulcerative-scar origin include stenoses of the duodenum, gastric deformity in the form of an hourglass, diverticula.

One of the most common causes of surgical treatment of patients with peptic ulcer disease is pyloro-duodenal stenosis of peptic ulcer origin. These stenoses are usually partial. They are accompanied by a violation of the motor evacuation function of the stomach - food does not pass into the intestine. Narrowing occurs as a result of growth and shrinkage of connective tissue, especially in combination with the contraction of the serous membrane as a result of perigastritis and periduodenitis. The muscular membrane of the stomach in stenosis is hypertrophied, but in the later stages there is an acute enlargement of the stomach with gastrogenic tetany and death.

At cicatricial narrowing of a stomach in a place of a body or in antral department the two-cavity stomach resembling the hourglass form is formed. In the area of the isthmus in most cases, penetrating ulcers persist, which do not heal for a long time, which can give bleeding and perforation.

One of the most serious complications of peptic ulcer disease is malignant degeneration of the ulcer or malignancy of the ulcer. According to the literature of recent years, malignant ulcers occur in the elderly in 6% of cases. May be in children. Cancer develops from the integumentary epithelium during its metaplasia. More often the gastric ulcer of big curvature of a stomach becomes malignant.

Plaque cancer - 1-5% of cases, asymptomatic, detected at autopsy by accident.

Polyposis - 5% of cases, has the appearance of a nodule on the leg. Fungal - 10% type | nodes on a broad basis with erosions, hemorrhages. Ulcerative cancer - 50% of cases - ulcer cancer, ulcer-cancer. Infiltrative-ulcer cancer - cancerous infiltration of the wall, tumor ulcer. Diffuse cancer - 20%, endophytic growth. There are types of cancer: adenocarcinoma, undifferentiated, squamous cell, glandular squamous cell, unclassified. Unclassified (solid, scurrilous, annular-cellular). Metastases: lympho-hematogenous, implantation. Complications - necrotic, inflammatory, perforation, bleeding, peritumorous inflammation, gastric phlegmon, depletion of the patient.

Acute enteritis is an acute inflammation of the small intestine. It often occurs in many infectious diseases (cholera, typhoid, colibacilli, staphylococcal and viral infections, giardiasis, sepsis, opisthorchiasis, etc.), food poisoning (botulism, salmonellosis), poisoning (chemical poisons, poisons).

Known acute enteritis of alimentary (abuse of strong alcoholic beverages, roughage, spices) and allergic (idiosyncrasy to food, drugs) origin.

Depending on the nature of the inflammatory reaction, enteritis can be catarrhal, fibrinous, purulent, necrotic-ulcerative.

In catarrhal enteritis, which is the most common, the intestinal mucosa swells, becomes full-blooded, covered with serous, serous-mucous, or serous-purulent exudate. Swelling and inflammatory infiltration cover not only the mucous membrane but also the submucosa. This causes dystrophy and desquamation of the epithelium, especially on the tips of the villi (catarrhal desquamative enteritis), hyperplasia of goblet cells ("goblet transformation"), small erosions and hemorrhages.

In fibrinous enteritis, more often ileitis, the intestinal mucosa is necrotized and impregnated with fibrinous exudate, resulting in the appearance of gray or gray-brown films on its surface. Depending on the depth of necrosis, the inflammation may be lobar or diphtheria, in which deep ulcers form after the separation of fibrinous films.

Purulent enteritis is characterized by permeation of the intestinal wall with pus (phlegmonous enteritis).

In necrotic-ulcerative enteritis, the destructive processes concern mainly the group and solitary follicles of the intestine, which is observed in typhoid fever, or cover the mucous membrane without connection with the lymphatic system of the intestine. At the same time necrosis and ulcers acquire widespread (sepsis, flu) or focal (nodular periarteritis, allergic vasculitis) character.

In acute enteritis, regardless of the type of inflammatory changes of the mucous membrane, there is hyperplasia and reticulomacrophageal transformation of the lymphatic system of the intestine. Sometimes it is extremely pronounced (cerebral edema of group and solitary follicles in typhoid fever) and causes further destructive changes in the intestinal wall.

In mesenteric lymph nodes, reactive processes are observed in the form of hyperplasia of lymphoid elements of plasmacytic and reticulomacrophageal transformation, and often inflammation.

Complications of acute enteritis include bleeding, perforation of the intestinal wall with the development of peritonitis (typhoid fever), as well as dehydration and demineralization (cholera).

In some cases, acute enteritis becomes chronic.

Chronic enteritis can be an independent disease or a manifestation of other chronic diseases (gastritis, hepatitis, liver cirrhosis, rheumatic diseases, etc.).

At the heart of chronic enteritis is not only inflammation but also a violation of the physiological regeneration of the mucous membrane: proliferation of the crypt epithelium, cell differentiation, their "movement" along the villi and separation from the mucous membrane into the intestinal lumen.

Initially, such disorders are enhanced proliferation of the crypt epithelium in order to "restore" the exfoliated damaged villi enterocytes, but the differentiation of this epithelium into functionally complete enterocytes is delayed. As a result, a significant part of the villi is lined with undifferentiated, functionally defective enterocytes, which die quickly. The villi adapt their shape to a moderate number of epithelial cells - they become shorter, atrophy. After some time, the crypts (cambial zone) are unable to provide a pool of enterocytes undergoing cystic transformation and sclerosis. These changes become the final stage of impaired physiological regeneration of the mucous membrane of the small intestine.

In recent years, changes in the intestinal wall in chronic enteritis are well studied on the material of enterobiopsies. It is shown that the basis of chronic enteritis, as well as gastritis, are the processes of impaired epithelial regeneration, which culminate in atrophy and restructuring of the mucous membrane.

There are two forms of chronic enteritis: without atrophy of the mucous membrane and atrophic enteritis.

For chronic enteritis without atrophy of the mucous membrane is characterized by different thickness of the villi and the appearance of club-shaped thickenings of their distal parts, where there is destruction of the basement

membranes of the epithelial lining. The cytoplasm of enterocytes lining the villi is vacuolated (vacuolar dystrophy). The activity of redox and hydrolytic (alkaline phosphatase) enzymes of the cytoplasm of such enterocytes is reduced, which indicates a violation of their adsorption capacity. Between the enterocytes of the apical parts of the villi appear adhesions, "arcades", which, apparently, is associated with the formation of surface erosions; the stroma of the villi is infiltrated with plasma cells, lymphocytes and eosinophils. The cellular infiltrate descends into crypts which happen cystically expanded; the infiltrate separates the crypts and reaches the muscular layer of the mucous membrane.

Chronic atrophic enteritis is characterized primarily by shortening of the villi, their deformation, the appearance of a large number of fused villi. In shortened villi there is a collapse of argyrophilic fibers. Enterocytes are vacuolated, alkaline phosphatase activity is reduced in the brush border; there is a significant number of goblet cells, cystic enlargements are very common, there is infiltration of their lymphocytic elements and replacement by growths of muscle and collagen fibers.

With prolonged severe chronic enteritis may occur anemia, cachexia, hypoproteinemic edema, osteoporosis, beriberi, endocrine disorders, malabsorption syndrome.

Enteropathies are chronic diseases of the small intestine, which are based on hereditary or acquired enzyme disorders of enterocytes (intestinal enzymopathy). Decreased activity or loss of certain enzymes is accompanied by insufficient absorption of those substances that are normally broken down by these enzymes. As a result, there is a syndrome of impaired absorption of certain nutrients.

Among enteropathies there are: 1) disaccharide deficiency (alactasia); 2) hypercatabolic hypoproteinemic enteropathy (intestinal lymphangiectasia); 3) non-tropical sprue (idiopathic, endogenous, sprue-celiac disease, including gluten enteropathy).

Whipple's disease (intestinal lipodystrophy) is a rather rare chronic disease of the small intestine, which is characterized by malabsorption syndrome, hypoprotein and hypolipidemia, progressive lethargy and exhaustion and weight loss.

The inflammatory process in colitis mainly affects the cecum (typhoid), transverse colon (transversion), sigmoid (sigmoiditis) or rectum (proctitis), and in some cases extends to the entire intestine (pancolitis). Inflammation can be both acute and chronic.

Acute colitis is an acute inflammation of the colon. There are infectious, toxic and toxic-allergic colitis. Infectious colitis includes dysentery, typhoid, colibacilli, staphylococcal, fungal, protozoan, septic (tuberculous, syphilitic); to toxic - uremic, sulem drug; and to toxic-allergic - alimentary and coprostatic.

There are the following forms of acute colitis: catarrhal, fibrinous, purulent, hemorrhagic, necrotic, gangrenous, ulcerative.

In catarrhal colitis, the intestinal mucosa is full-blooded, swollen, on its surface there is an accumulation of exudate, which in its composition is serous, mucous, purulent. Inflammatory infiltrate is not only in the mucous membrane, but also in the submucosa, where hemorrhages often occur. Dystrophy and necrobiosis of the epithelium are combined with desquamation of the superficial epithelium and hypersecretion of glands.

Fibrinous colitis depending on the depth of necrosis of the mucous membrane and the penetration of fibrinous exudate is divided into lobar and diphtheria.

Purulent colitis is characterized by phlegmonous inflammation (phlegmonous colitis, phlegmon of the colon). In cases where hemorrhages occur in the intestinal wall, there are areas of hemorrhagic impregnation, it is hemorrhagic colitis.

In necrotic colitis, necrosis occurs not only in the mucous membrane, but also in the submucosa. Gangrenous colitis is a variant of necrotic.

Acute ulcerative colitis usually completes diphtheria and necrotic changes in the wall of the colon. In some cases, such as amebiasis, ulcers in the colon appear at the beginning of the disease.

Complications of acute colitis: bleeding, perforation and peritonitis, paraproctitis with pararectal fistulas; sometimes acute proctitis turns into chronic.

Chronic colitis - chronic inflammation of the colon is primary or secondary. In some cases, it is genetically related to acute, in others - such a connection is not observed.

Chronic colitis, as well as acute, occurs under the influence of infectious, toxic and toxicoallergic factors. Of great importance is the time during which factors continue to operate in conditions of increased local (intestinal) reactivity.

Morphological changes in the wall of the colon in chronic colitis, studied on biopsy material, do not differ from the changes that occur in chronic enteritis, although in colitis more pronounced inflammatory processes that are associated with dysregenerative and end in atrophy and sclerosis of the mucous membrane. Depending on the emerging changes, there are: chronic colitis without atrophy of the mucous membrane and chronic atrophic colitis.

In chronic colitis without atrophy of the mucous membrane, the latter is swollen, dull, granular, gray-red or red, often with multiple hemorrhages and erosions; prismatic epithelium flattened, desquamated; in crypts the number of goblet cells increases. The crypts themselves are short and extended. The own plate of a mucous membrane in which hemorrhages meet, is diffusely infiltrated with lymphocytes, plasma cells, eosinophils which quite often get into a muscular cover.

The degree of inflammatory infiltration can be different - from moderate focal to sharply diffuse with the formation of abscesses in the crypts (crypt abscesses) and ulceration.

Chronic atrophic colitis is characterized by flattening of the prismatic epithelium, a decrease in the number of crypts, hyperplasia of smooth muscle elements. The mucous membrane is dominated by histiolymphocytic infiltration and growth of connective tissue; in some cases there are ulcers with epithelialization and scarring.

Possible complications of colitis are parasigmoiditis and paraproctitis, sometimes hypovitaminosis due to changes in the intestinal flora and impaired vitamin synthesis.

Nonspecific ulcerative colitis (idiopathic ulcerative colitis, ulcerative proctocolitis) is a chronic recurrent disease based on inflammation of the colon

with suppuration, ulceration, hemorrhage, with successive sclerosis and wall deformity. This disease is quite common and is most common in young women.

Crohn's disease is a chronic recurrent disease of the gastrointestinal tract, which is characterized by nonspecific granulomatosis, necrosis and scarring of the intestinal tube wall, which is quite rare.

This disease was previously understood as a nonspecific granulomatous lesion of only the terminal part of the small intestine, so it was called terminal (regional) ileitis. It was later found that the changes characteristic of this disease can occur in any department of the gastrointestinal tract. New descriptions of Crohn's disease of the stomach, colon, appendix, etc. have appeared.

Appendicitis - inflammation of the appendix, which is accompanied by a characteristic clinical syndrome. From the above it follows that in clinical and anatomical terms, not every inflammation of the appendix (tuberculosis, dysentery) can be interpreted as appendicitis. Appendicitis is a common disease that requires surgery.

There are two clinical and anatomical forms of appendicitis: acute and chronic; each of them has a certain morphological characteristic.

Acute appendicitis. Depending on the morphological changes and the type of inflammation, the following morphological forms of acute appendicitis are distinguished: 1) simple; 2) superficial; C) destructive (phlegmonous, apostematous, phlegmonous-ulcerative, gangrenous). These forms are a morphological reflection of the phases of acute inflammation of the appendix, culminating in destruction and necrosis. This inflammatory process occurs within 2-4 days. Changes characteristic of acute simple appendicitis develop in the first hours after the onset of the attack. They are accompanied by circulatory and lymphatic disorders in the form of stasis in capillaries and venules, edema, hemorrhage, accumulation of siderophages, as well as marginal leukocytes and leukodiapedesis. Such changes occur mainly in the distal part of the process.

Later, against the background of dyscirculatory changes in the distal part of the appendix, there are foci of exudative purulent inflammation of the mucous membrane, called primary affect (Aschoff). At the apex of such a conical focus, inverted into the lumen of the process, there are superficial defects of the

epithelium. Such morphological changes are characteristic of acute superficial appendicitis, in which the appendix swells, and its serous membrane becomes full-blooded and dull. The changes inherent in simple or superficial appendicitis are reversed, and if they progress, acute destructive appendicitis develops.

At the end of the first day, leukocyte infiltrate spreads throughout the wall of the appendix - develops phlegmonous appendicitis. The size of the appendix increases, its serous membrane becomes dull and full-blooded, fibrinous layers appear on its surface: the wall at the autopsy is thickened, the lumen is filled with pus; mesentery swollen, hyperemic. In cases where multiple small abscesses appear on the background of diffuse purulent inflammation of the appendix, it is apostematous appendicitis; if phlegmonous appendicitis is joined by ulceration of the mucous membrane - about phlegmonous-ulcerative appendicitis. Purulent-destructive changes in the appendix end in gangrenous appendicitis, which is called secondary because it is the result of the spread of purulent inflammation to adjacent tissues (periappendicitis,),

Secondary gangrenous appendicitis should be distinguished from gangrene of the appendix, which develops with primary thrombosis or thromboembolism of its artery. Perhaps that is why the gangrene of the appendix is not quite successfully called primary gangrenous appendicitis.

The appearance of the appendix in gangrenous appendicitis is quite characteristic - it is thickened, the serous membrane is covered with a dirty green, fibrinous-purulent film; its wall is also thickened, gray-dirty, pus is released from the lumen. Microscopic examination reveals significant foci of necrosis with colonies of bacteria in them, as well as hemorrhages and blood clots in blood vessels. Mucous membrane - with many ulcers. The most pronounced destructive changes up to wall perforation and self-amputation are observed in the distal part of the process.

In acute appendicitis, complications are associated with the destruction of the appendix and the spread of pus. Quite often at phlegmonous-ulcerative appendicitis there is a perforation of a wall with consecutive development of peritonitis which can arise also at self-amputation of a gangrenous-changed shoot. If at a phlegmonous appendicitis the proximal department is closed, then the distal

gleam stretches and the empyema of a shoot develops. The spread of pus to the surrounding tissues and the cecum (periappendicitis, peritiflit) is accompanied by the formation of abscesses and the transition of inflammation to the extraperitoneal tissue. Quite dangerous development of purulent thrombophlebitis of the vessels of the mesentery with its spread to the branches of the portal vein with the consistent development of pyelonephritis.

Хронічний аппендицит. Він розвивається після перенесеного раніше гострого аппендициту і характеризується склеротичними та атрофічними процесами, на фоні яких можуть розвинутися запально-деструктивні зміни відростка. Запалення і деструкція змінюються розростанням грануляційної тканини в стінці відростка. При цьому виникає різкий склероз і атрофія усіх шарів стінки, облітерація просвіту відростка; між ним та прилеглими тканинами з'являються спайки. Ці зміни можуть сполучатися з гранулючими та гострими виразками, гістіолімфоцитарною та лейкоцитарною інфільтрацією стінки відростка.

Sometimes during obliteration of the proximal part of the appendix in its cavity accumulates serous fluid and then it turns into a cyst - hydrocephalus develops. If the cyst contains the secretion of glands - mucus, it turns into a mucocele. Sometimes the mucus due to the peristalsis of the appendix collects in spherical formations (myxoglobules), ending in myxoglobulitis of the appendix. At perforation of a wall of a cyst and receipt of mucus together with cells forming it, in an abdominal cavity, implantation of these cells on a peritoneum with development of the changes reminding a tumor - a myxoma (a pseudomyxoma of a peritoneum) is possible.

In cases where the clinical signs of an attack of appendicitis are not due to inflammation, and dyskinetic disorders, it is a false appendicitis. In cases of hyperkinesis of the appendix, the muscular layer of its wall is reduced, the follicles are enlarged, the lumen is sharply narrowed. At atony the gleam is expanded, filled with fecal masses (coprostasis); the wall of the process is thin, the mucous membrane is atrophic.

Among intestinal tumors, polyp and cancer are the most important. A polyp is a common epithelial benign tumor of the intestine. It is usually localized in the

rectum, then the frequency of the next is the sigmoid, cecum and small intestine. The main importance is adematous polyp. Its variety is a villous tumor (papillary adenoma). The tumor is round, soft, pinkish-red, with a villous surface; grows exophytically, has a papillary structure. Cancer can occur in the villous tumor. Diffuse intestinal polyposis is a familial disease.

Cancer occurs in both the small and large intestine. Small bowel cancer is rare and is usually seen in the duodenum at the site of its large so-called fater nipple. The tumor does not reach large sizes, very early causes difficulty in the outflow of bile, which is the cause of subhepatic jaundice complicated by inflammation of the bile ducts. Histologically, it has the structure of adenocarcinoma or undifferentiated cancer.

Colon cancer tends to increase, mortality from it increases. Of the various parts of the colon, cancer is most common in the rectum, less common in the sigmoid, cecum, hepatic, and splenic angles transverse to the colon.

Rectal cancer usually develops against the background of chronic ulcerative colitis, polyposis or chronic fistulas of the rectum, which are considered precancerous diseases.

Depending on the nature of growth, the following macroscopic forms of colorectal cancer are distinguished: 1) exophytic cancer - polypoid and villous form; 2) endophytic cancer - ulcerative and diffuse forms.

In the ampullary department there is a polypoid or villous tumor, as well as ulcerated cancer in the form of a huge ulcer crater with roller-like edges. Diffuse cancer in the form of a whitish dense ring narrowing a gleam of a gut is more often found in rectosigmoid department.

Microscopic types of colorectal cancer include: 1) differentiated dark cell adenocarcinoma; 2) undifferentiated cancer in two variants - annular-cellular and solid.

Exophytic forms often have the structure of differentiated adenocarcinoma, and endophytic - undifferentiated cancer.

Metastasizes rectal cancer to regional lymph nodes and hematogenously to the liver.

Peritonitis, or peritonitis, is often a complication of gastrointestinal diseases: perforation of gastric or duodenal ulcers, intestinal ulcers with typhoid fever, nonspecific ulcerative colitis, dysentery, as well as appendicitis, cholecystitis, acute pancreatitis and.

LECTURE 12

DISEASES OF THE HARD TISSUES OF THE TEETH (CARIES, NON-CARIOUS LESIONS), PULPITIS, PERIODONTITIS, PERIOSTITIS, OSTEOMYELITIS OF THE JAW BONE.

The tooth has a complex structure, it produces a crown, neck, root. The connection of the root of the tooth with the wall of the dental alveolus is carried out by injection - one of the types of syndesmosis. The root of the tooth is held in the alveoli by a ligament, which consists of collagen fibers that diverge in different directions, and is called the periodontium (root membrane, perimeter). Most of the tooth consists of dentin, which is covered with enamel at the site of the crowns, and at the root - a layer of cement. The central part of the tooth has a cavity, which is filled with soft tissue - pulp, and which ends at the top with a hole for the passage of blood vessels and nerves.

Among the diseases of the dental system and oral cavity, the most important are: caries, non-carious lesions of the hard tissues of the tooth, reactive changes in the pulp, pulpitis, periodontitis, periostitis, osteomyelitis of the jaw bones, odontogenic infection, periodontitis, stomatitis, gingivitis, pachloiditis, glossitis, glossitis and glossitis formation of the maxillofacial system, as well as tumors of the salivary glands.

Diseases of the hard tissues of the tooth

Tooth caries is a pathological process that is manifested by demineralization and progressive destruction of the hard tissues of the tooth with the formation of a defect in the form of a cavity. This is one of the most common dental diseases, affecting up to 90% of the world's population. Caries occurs at any age (but most often in adolescents and children) and is equally common in women and men. According to the observations of clinicians, the teeth of the upper jaw are more often affected by caries than the lower, which is due to the fact that the teeth of the lower jaw are better supplied with blood, better cleaned of food residues, which prevents caries. Caries most often affects the first large molars - from the

molars (from the Latin molares - millstone), as they have the greatest stress when chewing. The second place is occupied by the second large molars (molars),

The front teeth of the lower jaw are rarely affected by caries. In large molars, caries usually begins on the masticatory surfaces and enamel wrinkles - fissures, where the enamel layer is much thinner, enamel mineralization is less pronounced (fissure caries), or on the proximal (contact) surfaces. In small molars and incisors, caries begins on the proximal surfaces, on the canines it is localized on the inner surface of the neck (cervical caries). Cement caries is rare.

The causes of caries to this day are insufficiently studied. For a long time, localistic chemical and microbial theories of its origin and development have dominated and have not lost their significance. According to these theories, arising in the oral cavity and during bacterial fermentation of carbohydrates, including lactic acid, dissolve the cuticle of the enamel, destroy the enamel and open the entrance to the bacteria to the dentinal tubules. Penetrating into the dentin, bacteria remove calcium salts from it, softening the dentin, which leads to the destruction of the hard tissues of the tooth.

According to the nature of clinical and morphological manifestations, there are four stages of caries development: the stage of spot, superficial, medium, deep. According to the nature of the course, there are acute and chronic caries.

Stain stage - the early stage of caries. Clinical observations show that the onset of caries is expressed by the appearance on the background of a healthy, shiny enamel surface of a white opaque spot, similar in color to chalk (chalk spot). The permeability of the enamel at this stage increases. The results of morphological and microradiographic studies showed that the pathological process begins with de-mineralization in the subsurface zone of the enamel. First, calcium salts disappear from the interprism substance, and then from the prisms. Interprism gaps are erased, become fine-grained and turn into an unstructured mass. As a result, the enamel loses uniformity and transparency, and later softens. In areas of enamel defect (enamel caries) microbes accumulate and spread along the gaps between the prisms, the stain itself darkens as a result of the presence of dyes in food, as well as under the influence of bacteria (pigmented spot). At this stage, the carious process may subside, accompanied by remineralization and the

enamel dark spot becomes clear. With the progression of caries in the stage of the pigmented spot, the demineralization of the enamel intensifies, in some places the enamel-like border breaks down, and the process can move to the dentin.

In the stain stage, the organic matrix of the enamel is usually preserved, intensely stained with various dyes due to the accumulation of organic matter from saliva. But in the dentin adjacent to the enamel damaged by the initial caries, basophilia decreases, there is a decrease in the content of acidic glycosaminoglycans, fuchsinophilia changes to pyroninophilia, which weakens towards the pulp. Such changes in the tinctorial features of dentin can be considered as a detection of the process of disorganization of collagen structures, which are the organic basis of dentin.

Superficial caries is a process of continued demineralization and decay of enamel, as well as a narrow strip of dentin. Calcium salts disappear from enamel prisms, the interprism space is destroyed, prisms have a more relief appearance, they have a well-defined transverse pattern, which is explained by the uneven dissolution of calcium salts. The prisms are arranged in different order and gradually undergo complete destruction. In the places of the enamel defect, microbes accumulate and begin to spread through the cracks that are still between the whole prisms. With the rapid progression of caries, the process spreads to the dentin. With its slow course (chronic process), the softened area of the enamel remineralizes and hardens again. The accumulation of calcium salts also occurs in the main substance of dentin and in the dentinal tubules. This layer of remineralized dentin,

Secondary caries is a stage of caries progression in which a significant part of the surface layer of dentin is affected. Dental canals are expanded, filled with microbial masses. The odontoblast processes located in them are affected; under the influence of microbes in the tubules develop dystrophic and necrotic changes with disintegration into individual fragments. The sheath that covers the lumen of the tubules on the inside also dies. This facilitates the entry of microbial products into the deeper lumens of the dentin tubules and enhances its demineralization and softening. At this stage of the process, a carious cavity (hollow) is formed. The carious focus has the shape of a cone, which is turned with the tip deep into the

tooth, and the base is turned to its surface. The bottom of the carious cavity, in the case of its traction, reaches the pulp, where the pulp appears.

There are three zones in the area of the bottom of the carious cavity. The first - the area of softened dentin; it has no dentin structure, it is soft, it has no calcium salts, it contains many different microbes. The second is the area of transparent dentin, in which calcified dentin is found, its canals are narrowed, the tissue becomes homogeneous, as a result of which it becomes transparent in relation to intact dentin. The third is the area of replacement and regulatory secondary dentin. It is produced by odontoblasts, has no orderly tubules. The appearance of secondary dentin should be considered as a compensatory reaction that helps to stabilize the process. (OI Abrikosov).

Deep caries is the next progression of the process, when cavities appear in the softened dentin and between the carious cavity and the pulp remains its narrow layer - the bottom of the carious cavity. In the case of penetration of this layer, the carious cavity reaches the pulp and develops its inflammation - pulpitis. Data of microradiography of patients with dental caries show that in all stages of its development it is possible to observe alternation of zones of demineralization, remineralization of enamel and dentin. Enamel mineralization processes occur mainly due to the influx of mineral salts from saliva. Mineralization increases with approach to intact tissues. With deep caries, the most characteristic is the creation of an area of increased mineralization in the area of dentin with the tooth cavity and the abrasion of the pattern on the last stretch of dentin due to demineralization. It is also important to note that during the development of caries there is a decrease in calcium salts in the hard tissues of the tooth, which are preserved, a decrease in the resistance of enamel and dentin, a decrease in phosphatase activity in the teeth. This weakens the mechanism of deposition of calcium phosphates under the influence of phosphatase, which contributes to the progression of caries.

NON-CARIOUS DAMAGE TO HARD TISSUES

Non-carious damage to the hard tissues of the teeth includes wedge-shaped defects and fluorosis.

Wedge-shaped defects- defects of the hard tissues of the tooth, which are located on the vestibular surface of the teeth, most often in the area of the first premolars. Defects are formed in the neck of the tooth and occur due to trophic damage to organic matter of enamel and dentin and in connection with diseases of the gastrointestinal tract and endocrine system. Often these defects accompany periodontitis. The pulp remains closed by secondary, harder dentin, becomes atrophic. Microscopically - the disappearance of cement. The development of a wedge-shaped defect lasts for years.

Fluorosis(hyperfluorosis, spotted enamel) - a disease with damage to many organs and tissues, including teeth, which develops with prolonged and excessive intake of fluoride (from the Latin fluor - fluoride). Occurs in some endemic foci, where the fluoride content in water and food is more than 2 mg / l (norm 0.7-1.2 mg / l).

There are four degrees of fluorosis of teeth:

Grade 1 - very weak damage, in which it is difficult to detect single, small porcelain or chalk-like spots and stripes, which are located on the labial, lingual half of the tooth surface and cover no more than 1/3 of its surface.

Grade 2 - slight damage: visible porcelain and chalk spots and stripes that occupy about half the surface of the tooth crown. There are also pigmented spots, but the damage is localized only in the enamel and does not affect the dentin.

Grade 3 - minor damage: there are drain spots that occupy more than half of the tooth surface. Spots of dark yellow and brown. Not only enamel but also dentin is destroyed.

Grade 4 - severe damage, which creates single and numerous erosions of enamel of various shapes, both colorless and pigmented from yellow-brown to black.

With grade 3 and 4 injuries, there are pronounced mineralization disorders, as a result of which the teeth become brittle, fragile, easily erased and destroyed. Dental fluorosis is one of the manifestations of the disease, which is easily detected during an outpatient examination and is an accurate indicator of the presence of an endemic source of fluoride contamination. In addition to teeth, fluorosis affects many body systems: bone and joint, endocrine, gastrointestinal

tract, sensory organs, CNS. Thus, fluoride is highly toxic to the body. The question of the relationship between fluorosis and caries continues to be studied.

DISEASES OF PULP AND PERIAPICAL TISSUES OF THE TEETH

Under the influence of various external and internal factors in the pulp may be observed disorders of blood and lymph circulation, atrophic, dystrophic, inflammatory changes. They occur due to general metabolic disorders in the body or against the background of local processes (caries, pulpitis, etc.). Among the common factors that affect the condition of the pulp should be identified beriberi and other disorders of nutrition and metabolism that affect the trophism of the body. Disorders of blood and lymph circulation in the pulp also occur due to local and general processes. Thus, anemia, all types of plethora, hemorrhage, thrombosis and vascular embolism can be observed in the pulp. OI Apricot pointed out that in some cases, intrapulp hemorrhage may be the cause of pulpitis.

*Pulp atrophy*primarily affects cells. First, the number of odontoblasts decreases, then the connective tissue cells (pulpocytes). Against the background of cell depletion, the slightly sclerosed connective tissue base of the pulp clearly stands out and acquires a reticular appearance (reticular atrophy of the pulp). Dystrophic changes develop in odontoblasts in the form of their hydropia. At first the vacuoles are small, then their size increases and at the very end they die. Areas of mucoid swelling and fibrinoid swelling of the collagen fibers of the pulp may appear.

There is information that in odontoblasts fatty dystrophy of both cytoplasm, and processes (at caries) can be observed.

*Pulp necrosis*may develop in purulent pulpitis with a closed cavity, when the pulp cavity is combined with a carious cavity, and with the penetration of anaerobic putrefactive flora may develop gangrene of the pulp. The cause of pulp necrosis is radiation, thermal effects, chemicals, including drugs.

*Hyalinosis*can be observed in the walls of blood vessels and collagen fibers, which leads to the depletion of the pulp into cells, the desolation of the lumen of blood vessels. Sometimes small amyloid bodies are found in the pulp in atrophic conditions. Quite often in the pulp there is calcification (petrification of the pulp). The presence of significant accumulations of calcium salts in the pulp disrupts

metabolic processes in it, which is reflected in the condition of the hard tissues of the tooth, and in the presence of caries increases the negativity of its course. In addition to petrifications, denticles are often formed in the pulp.

*Denticles*are round-oval formations, which in some cases are localized freely in the pulp, and in others - parietal, connecting with the dentin of the tooth, or inside the mass of dentin (interstitial denticles). There are highly and underdeveloped denticles. Highly developed denticles are similar in structure to replacement dentin and are formed as a result of the activity of the remaining odontoblasts, similar to the formation of replacement dentin. Underdeveloped denticles are areas of connective tissue calcification, and their appearance is observed in atrophic sclerosed pulp. The appearance of highly developed denticles indicates the occurrence of reactive processes in the tooth tissues due to the increased activity of odontoblasts. Denticles are especially common in chronic pulpitis and periodontal disease.

Intrapulp cysts (single and multiple) occur in the output of various pathological processes in the pulp.

Pulpitis- inflammation of the pulp of the tooth. The causes of pulpitis are various, but the role of infection is the main one, although sometimes it can develop in aseptic conditions. Pulpitis most often complicates moderate and especially deep dental caries, when microbes and their toxins enter the pulp either through dilated dentinal canals or directly through a narrow strip of softened dentin at the bottom of the carious cavity during its penetration. Less often, the infection can enter the pulp through the apical opening of the tooth in periodontitis, periodontitis in the presence of a pathological gingival pocket, very rarely - lymphogenic and hematogenous in sepsis. Pulpitis can be caused by trauma to the tooth, the influence of physical factors, such as thermal - when treating a tooth under an artificial crown, radiation and decompression. Chemical factors, including drugs, which are used during dental treatment and as fillings can also cause the development of pulpitis. The intensity and nature of inflammation in the pulp depend not only on microorganisms and their toxins (association of streptococci and lactobacilli, rarely staphylococci), but also the state of local and general reactivity (sensitization) of the organism. The

inflammatory process in the pulp, as a closed cavity, acquires some features: pulpitis is accompanied by severe circulatory disorders in the pulp tissue, there are venous stasis, stasis, especially pronounced in the acute form of pulpitis. These vascular disorders are largely due to obstructed outflow from the inflamed pulp due to the narrowness of the root canals and the small size of the apical opening. Circulatory disorders adversely affect the vital functions of the structural elements of the pulp,

Depending on the localization, the following types of pulpitis are distinguished: coronal, total, root. The course of pulpitis can be acute, chronic and chronic with exacerbations.

Acute pulpitis has several stages of development. It begins as a focal near the carious cavity and is manifested by serous inflammation (serous pulpitis), in which the pulp is observed hyperemia of the vessels of the microcirculatory tract, especially the venular part, serous edema with a small number of leukocytes. Occasionally there is diapedesis of erythrocytes with the formation of small foci of hemorrhage. Weak dystrophic changes in nerve fibers are revealed. This type of pulpitis can last for several hours. Then joins the pronounced emigration of neutrophils, a large number of which first accumulate around the veins, then penetrating the pulp tissue. Significant dystrophic changes of nerve fibers of pulp with disintegration of myelin are noted. There is a purulent pulpitis, focal or diffuse.

Focal purulent pulpitis has a limited character with the formation as a result of purulent melting of the pulp of the cavity, which is filled with purulent exudate, ie abscess. In diffuse purulent pulpitis, the exudate can fill not only the crown, but also the entire root of the pulp (phlegmon). The pulp is grayish, severely damaged all the structural elements of the pulp with a carious cavity and with the penetration of the anaerobic flora of the oral cavity may develop pulp gangrene. The pulp becomes similar to a black-gray mass with a putrid odor. Microscopically, it is unstructured, sometimes granular in appearance, may contain fatty acid crystals and microbes. Previously, some scientists considered these changes in the pulp as an independent form of acute gangrenous pulpitis, but now this opinion is not shared by dentists. At transition of inflammatory process

to root pulp development of an apical periodontitis is possible. The total duration of acute pulpitis is 3-5 days.

Chronic pulpitis is usually an acute outcome, but can develop unnoticed as a stand-alone form. According to morphological features, the following types are distinguished: fibrous, gangrenous, hypertrophic (granulating).

Fibrous pulpitis is a process in which most of the tooth cavity is filled with connective tissue with a significant amount of collagen fibers, with cellular infiltrates of lymphocytes, plasma cells. Over time, the cellular elements become smaller, collagen fibers are hyalinized, there are petrifications, denticles.

Gangrenous pulpitis can develop from acute after partial death of the pulp. In the part of the pulp that has survived there are signs of serous inflammation.

Hypertrophic (granulating) pulpitis is characterized by chronic productive inflammation. The tooth cavity is filled with granulation tissue, which can sometimes also fill the carious cavity, which connects with the tooth cavity. In these cases, there is a polyp of the pulp. It is soft, red, bleeds easily. Its surface can be ulcerated or epithelialized due to the epithelium of the gums. In this form of pulpitis, lacunar resorption of dentin areas by macrophages with its replacement by osteodentin can be observed. Maturation of granulation tissue leads to multiple sclerosis. Petrifications and denticles may be detected.

Complications and outcomes of pulpitis: depend on the nature of inflammation and its spread. Serous pulpitis can be resorbed if the cause is destroyed. Purulent pulpitis, especially its diffuse form, can end in the death of the pulp with the transition to a chronic form. Chronic pulpitis ends with atrophic, dystrophic, sclerotic processes. Periodontitis is a frequent complication of pulpitis.

*Periodontitis*Is an inflammation of the root tissues of the tooth. By localization in periodontitis, apical (apical), marginal (marginal, ash) periodontitis are distinguished. In the course of periodontitis is: acute, chronic, chronic with exacerbations. Among periodontitis, apical periodontitis is the most important.

Acute apical periodontitis can be: serous, purulent. Among chronic periodontitis apical periodontitis can be: granulating, granulomatous, fibrous.

GUM AND PERIODONTAL DISEASES

Gingivitis- diseases of the mucous membrane of the gums. It is rare as an independent disease, more often as a manifestation of various infectious and toxic-allergic diseases. Is one of the manifestations of stomatitis of various etiologies.

Morphological forms of gingivitis: catarrhal, ulcerative-necrotic, hypertrophic, atrophic. In the course: acute, chronic.

Periodontitis - inflammation of the periodontium with the subsequent destruction of the periodontium, bone tissue of the dental membranes with the formation of ash and periodontal pockets.

The process begins with inflammation of the gums and is manifested by chronic catarrhal or hypertrophic gingivitis. In the lumen of the gingival furrows there are significant accumulations of loose basophilic masses, which create a supra - or subgingival layer, in which you can recognize colonies of microorganisms, groups of squamous epithelial cells, amorphous unstructured detritus. Later, tartar is formed, which contributes to the prolongation of gingivitis. Signs of bone resorption are observed at an early stage. All three types of bone resorption are observed: sinus, smooth and lacunar. The most common is lacunar bone resorption.

There are four degrees of bone resorption of the holes: reduction of the bone edge of the holes is not higher than the root of the tooth, reduction of bone edges reaches half the length of the root of the tooth, the edges of the holes are 2/3 of the root length, complete resorption of bone tissue.

Periodontitis is a chronic disease characterized by the exposure of tooth roots against the background of dystrophic and inflammatory changes in periodontal tissues. Teeth loosen and fall out.

Periodontitis can manifest itself in three forms: with most inflammatory changes, dystrophic changes, mixed form.

Diseases of the salivary glands.

*Sialoadenitis*Is an inflammation of the salivary glands of an infectious nature, in which the infection penetrates from the oral cavity through the ducts or

hematogenously. The parotid glands (mumps) are more often affected. Sialoadenitis can be non-purulent and purulent. In the first interstitial tissue of the gland with edema, permeated with lymphohistiocytic infiltrate with a small number of neutrophils. In purulent sialoadenitis there is a focal or diffuse infiltration of neutrophils with the appearance of abscesses or even phlegmon with the transition to the tissues of the neck.

Tumors of the salivary glands. They make up about 6% of all human tumors.

Adenomas, mucoepidermioid tumor, acinocellular tumor, carcinomas: adenocystic, adenocarcinoma, epidermyoid, undifferentiated, carcinoma in polymorphic adenoma.

Diseases of the tongue, soft tissues of the oral cavity, precancerous changes.

Glossite- inflammation of the tongue, which is observed in various diseases, such as scarlet fever ("raspberry tongue"). When the infection enters through the cracks in the thickness of the tongue, the development of phlegmon is possible. With deficient anemias, many beriberi in the mucous membrane of the tongue develop atrophic changes.

Stomatitis- diffuse disease of the oral mucosa. It can occur with various local effects on the mucous membrane, and more often - as one of the manifestations of various diseases of the body (blood, beriberi, infections, heavy metal poisoning, phosphorus, etc.). Stomatitis manifests itself in the form of alternative, exudative, proliferative inflammation, has an acute or chronic course.

Diseases of the jaws.

Periostitis - inflammation of the periosteum, which can be simple, purulent, fibrous, ossifying and specific (tuberculous, syphilitic).

Simple periostitis usually occurs with trauma to the jaw bones. Tissue edema, periosteal hemorrhage, and small cell infiltrates with single neutrophils appear in the area of injury.

Purulent periostitis occurs as a complication of purulent pericementitis, when pus through the Haversian and Folkman channels of the jaws penetrates the periosteum and accumulates there. Purulent inflammation can spread to the

periosteum through the lymphatic vessels or through the venous tract from the tooth cavities.

Periostitis is more often localized in the area of the alveolar process, less often - in the body of the jaw. The focus of purulent inflammation is usually located on one side of the alveolar process of the jaw, vestibular or internal (lingual or palatine). Often, the hard tissue of the periosteum prevents the spread of the purulent process, resulting in the formation of a subchondral abscess with detachment of the periosteum and the accumulation of pus between it and the bone. At the same time in the adjacent cortical part of the jaw there is a lacunar resorption of bone tissue from the Haversian canals and bone marrow layers. Purulent periostitis can lead to melting of the periosteum and surrounding areassoft tissues and the occurrence of fistulas, which open more often in the mouth and less often through the skin.

Fibrous periostitis is accompanied by thickening of the periosteum and is usually observed as a result of simple periostitis. Bone is sometimes formed in the thickened periosteum, and then it is ossified periostitis. Specific periostitis has features of specific inflammation.

Osteomyelitis- inflammation of the bone marrow of the jaw bones, which is most often observed in the mandible and coincides with the molars in their caries, complicated by progressive purulent pericementitis. Initially, purulent inflammation of the bone marrow cavities of the alveolar process develops. Bone beams in the site of inflammation undergo lacunar or smooth resorption and become thinner. Further, due to thrombosis of blood vessels, there are areas of necrosis of bone tissue, these areas are detached from the bone and bone sequestration is formed, surrounded by purulent exudate and it is located in the sequestral cavity. In the bone tissue, which is preserved on the inside of the sequestration cavity, granulation tissue grows, a biogenic membrane appears, which secretes leukocytes into the sequestration cavity. In the outer layers of granulation tissue develops fibrous tissue, which forms a capsule that separates the sequestral cavity from bone tissue. This is how purulent inflammation develops in the jaw. At the same time purulent melting can occur in any region of a sequestral capsule and periosteum. This causes the formation of a fistula, the

wall of which is covered with granulation tissue. After the release of sequestration and removal of pus, bone regeneration occurs, which leads to the filling of the defect that was created by sequestration inflammation. the wall of which is covered with granulation tissue. After the release of sequestration and removal of pus, bone regeneration occurs, which leads to the filling of the defect that was created by sequestration inflammation. the wall of which is covered with granulation tissue. After the release of sequestration and removal of pus, bone regeneration occurs, which leads to the filling of the defect that was created by sequestration inflammation.

LECTURE 13

TUMORS AND TUMOR-LIKE PROCESSES OF ORAL ORAL AND JAW BONE. ODONTOGENIC AND NEODONTOGENIC TUMORS, PAPILLOMA, CANCER OF ORAL ORGANS, PRE-CANCER CHANGES. NON-Epithelial TUMORS, TUMORS OF THE JAW BONE. JAW CYSTS.

Leukoplakia- keratinization of the oral mucosa in its chronic irritation. The disease has a chronic course, white spots appear on the mucous membrane (at the beginning of the disease) or plaques (with a long course). Spots and plaques are more often localized on the mucous membrane of the tongue.

There are 2 forms of leukoplakia: flat (simple) and warty. Histologically, in the flat form there is a thickening of the multilayered striated epithelium, which occurs due to the expansion of the basal and granular layers, parakeratosis, hyperkeratosis, acanthosis are detected. Acanthotic strands of epithelium penetrate deep into the dermis, where round-cell infiltrates appear. In the warty form, the epithelium thickens due to proliferation and expansion of the basal layer. Significant lymphoplasmocytic infiltrates and sclerosis are found in the dermis.

Papilloma. Benign tumor of the integumentary epithelium (multilayered squamous). Often occurs in the skin, mouth. Macroscopically it has a spherical shape on a wide base or on a leg, soft or elastic consistency, mobile.

Microscopically, the tumor is a papillary formation of multilayered squamous epithelium, which separates the basement membrane from the connective tissue stroma with blood vessels. The polarity and complexity of the epithelium is preserved, but there is a thickening of the layers, increased keratinization.

Papilloma can be multiple - laryngeal papillomatosis. Occasionally the papilloma recurs and becomes malignant (larynx).

Neodontogenic tumors: osteoblastoclastoma, osteoma, osteosarcoma, chondrosarcoma. They can be benign or malignant.

*Osteoblastoclastoma*develops in the thickness of the jaw bones or in the alveolar process, occurs in people more often at the age of 11-30 years, more often in women. By localization in the thickness of the bone of the upper or lower jaw, this tumor causes deformity of the jaw, grows for many years, destroys bone for a long time, but does not go beyond it: with the disappearance of bone in the tumor on its periphery is a bone tumor. the tumor site covers it in the form of a bone shell. The tumor has the appearance of a well-defined dense nodule, in section it is red or brown with white areas and the presence of small and large cysts.

The histological structure of the tumor is very characteristic: its parenchyma consists of a large number of similar small mononuclear cells of oval shape. Among them are giant multinucleated cells, sometimes numerous; erythrocytes are also visible, which are freely located outside the capillaries, forming hemosiderin upon destruction, which gives the tumor a burgundy color. In places among small, mononuclear cells there are bone beams. At the same time, their resorption is observed. Thus, by their function, the cells that make up the tumor parenchyma are osteogenic, with small ones being osteoblasts and multinucleated ones being osteoclasts. Hence the name of the tumor - osteoblastoclastoma.

Osteomas - these are tumors that grow slowly and originate from mature bone tissue and are located in the distal parts of the bone. Most often they appear onlingual surface of the branches of the lower jaw, or on the lower surface of its corner. Surgical removal is indicated for general or local impairment, cosmetic defect.

*Osteosarcoma*develops at the age of 10-25 years, mainly in the lower jaw, is most often the result of injury. An early clinical manifestation of the tumor is "incomprehensible paresthesias." Microscopically it does not differ from osteosarcoma of any localization.

*Chondrosarcoma*develops at any age, most often in 60 years, in the upper jaw with a predominant localization in the area of the incisors. In patientsalso appear “incomprehensible paresthesia ", loosening of teeth.

Lymphoma. Burkitt's β-cell lymphoma can most often develop in the jaw bones. This tumor in 50% of cases is localized in the jaw bones, destroys bone tissue, grows rapidly. Other non-Hodgkin's lymphomas are rare in the jaw bones. Histologically, all these lymphomas are similar to lymphomas of other localizations.

Odontogenic tumors.

Tumors histogenetically associated with odontogenic epithelium include ameloblastoma, adenomatoid tumor, and odontogenic carcinomas.

Ameloblastoma- benign tumor with pronounced local destructive growth. This is the most common form of odontogenic tumor. Histologically distinguish: follicular, plexiform (reticular), acantomatous, basal cell, granulator cell forms. The most common follicular and plexiform forms of ameloblastoma. With non-radical removal of ameloblastoma recur.

*Adenomatoid tumor*most often develops in the upper jaw in the area of the canines in young patients. The tumor consists of odontogenic epithelium, which forms duct-like structures located among the connective tissue, often with the phenomena of hyalinosis.

Odontogenic carcinomas are rare and include malignant ameloblastoma and primary intraosseous carcinoma.

*Malignant ameloblastoma*similar in structure to benign, but it expressed atypism and polymorphism of odontogenic epithelium. It grows faster with pronounced destruction of bone tissue, metastasizes to regional lymph nodes.

Primary intraosseous carcinoma (cancer of the jaws). It is similar in structure to epidermal cancer, but it is assumed that this tumor may develop from islets of the odontogenic epithelium of the periodontal fissure (Malasse islets) or the epithelium of dysontogenetic odontogenic cysts. The tumor grows rapidly, with pronounced bone destruction.

Tumors derived from odontogenic mesenchyme include dentin, myxoma, cementum.

*Dentinoma*rare. Histologically, the tumor consists of tendons of odontogenic epithelium, immature connective tissue and islets of dysplastic dentin.

Odontogenic myxoma- a tumor with locally destructive growth, often recurring after its removal. In contrast to the mix of other localization contains strands of inactive odontogenic epithelium.

Cementoma (cementoma)- a large group of tumors with vaguely defined signs. In tumors, a cement-like substance with mineralization of varying severity is determined.

TUMOR-LIKE DISEASES

Fibrous dysplasia of the jaw bones, cherubism, eosinophilic granuloma, epulis.

Fibrous dysplasia of the jaw bones- a disease that is manifested by the replacement of bone tissue with connective tissue without a capsule, which leads to deformation of bones and face. The disease most often develops in childhood. The lesion may be focal or spread to a large part of the bone. Histologically, in the area of the lesion in the bone is determined by mature connective tissue, among which are small calcareous primitive bone beams and osteoid beams. Occasionally there are also myxomatous areas, cysts, cartilage islands, individual osteoclasts and xanthoma cells, cement-like structures.

Cherubism - familial multiple cystic disease of the jaws. It is considered a type of fibrous dysplasia. The disease begins in early childhood and stops on its own at 12 years old. The lesion is localized mainly in the corners and branches of the lower jaw, less often in the lateral parts of the upper jaw. In the places of defeat on the bones are defined hilly layers, the face gradually acquires a rounded shape and resembles the face of a cherub. Histologically, the growth between the bone beams of connective tissue in the jaw bones is determined. Oxyphilic substance accumulates around the vessels, multinucleated giant cells are identified. Lacunar resorption occurs in bone beams. Primitive bone beams are formed in the newly formed connective tissue, which gradually turn into mature bone.

Eosinophilic granuloma, or Taratinov's disease, occurs in children and young people in various bones, including the bones of the jaws. The disease belongs to the group of histiocytosis X. There are focal and diffuse forms of the disease. In the focal form in the bones determine single areas of bone destruction

without damage to the alveolar process. In the diffuse form, the interdental membranes of the alveolar process are affected by the type of horizontal resorption. Histologically, the lesion site has a large number of monomorphic large cells such as histiocytes and a large number of eosinophils.

Epulis(epulis) - a tumor-like formation in the gums. It is formed at any age, in women more often than men. It is localized mainly near incisors and molars. Prolonged trauma to the gums with an overhanging filling, the edges of a broken tooth, tartar, and a poor quality prosthesis is of great importance in the occurrence of epulis.

Fibromatous epulis- spherical or irregular in shape, located on the vestibular side of the gums, on a wide or narrow base, adjacent to the teeth, can spread everywhere between the interdental spaces on the oral side. Epulis is covered with a mucous membrane of pale pink color, has a smooth or bumpy surface, dense-elastic consistency, painless, non-bleeding, grows very slowly. Microscopically, it is a fibrous tissue with individual bone bars.

Angiomatous epulis is located near the neck of the tooth, the surface is smooth or small, bright red, soft consistency. Bleeding with a light touch. It grows relatively quickly. Microscopically, a large number of vessels and mast cells among the connective tissue.

Among giant cell epulises, a distinction is made between peripheral giant cell granuloma, which develops from gum tissue, and central (reparative) giant cell granuloma, which arises from the bone of the alveolar process.

CYSTS

Jaw bone cysts can be odontogenic and neodontogenic. Neodontogenic cysts are similar to those of other localizations. Odontogenic cysts can be dysontogenetic (primordial and follicular) and inflammatory (radicular).

Primordial cyst(keratocyst) is most often localized in the corner of the mandible or third molar. Sometimes it occurs where the tooth has not developed. The cyst wall is thin, formed by mature connective tissue, the inner surface is lined with multilayered squamous epithelium with pronounced parakeratosis. Islets of odontogenic epithelium may be found in the wall. In the lumen of the cyst a significant number of keratinized cells of the surface layers of the stratified

squamous epithelium. The cyst can be single-chamber and multi-chamber. Some patients have multiple keratocysts in combination with other malformations: multiple non-edible basal cell carcinoma, double rib. After removal, these cysts often recur.

*Follicular cyst*develops from the enamel organ of the tooth that has not erupted. Most often it is associated with the second premolar, third molar, canine of the lower or upper jaw. The cyst is formed in the alveolar edge of the jaws. The cyst wall is thin, formed by connective tissue, the inner surface is lined with multilayered squamous epithelium, in which mucus-producing cells, sometimes keratinized, can be found. In the cavity of the cyst are one or more formed or rudimentary teeth.

*Radicular or basal cyst.*Among odontogenic cysts it is most common. The cyst is formed as a consequence of chronic periodontitis from a complex granuloma and can develop in the area of the root of any damaged tooth. The cyst is twice as common in the upper jaw as in the lower jaw. The diameter of the cyst is from 0.5 to 3 cm. The inner surface of the cyst wall is lined with multilayered squamous non-keratinized epithelium. The wall is formed by mature connective tissue infiltrated by lymphocytes and plasma cells. With exacerbation of inflammation in the wall of the cyst develops acanthosis of the integumentary epithelium with the formation of epithelial strands directed into the wall thickness, leukocytes are determined. In the case of melting of the integumentary epithelium, the inner surface of the cyst is formed by granulation tissue, which can sometimes fill the lumen of the cyst. The cyst often festers. In the wall of the cyst may be cholesterol crystals, xanthoma cells. Exacerbation of inflammation in the cyst may be complicated by the development of odontogenic sinusitis. Large cysts cause bone destruction and thinning of the cortical plate.

Odontogenic cysts of dysontogenetic character can develop odontogenic tumors, rarely cancer.

LECTURE 14

GENERAL CONCEPTS OF INFECTIOUS PATHOLOGY OF HUMAN BEINGS. CLASSIFICATION OF INFECTIOUS DISEASES. INTESTINAL INFECTIOUS DISEASES

Infectious are diseases caused by infectious agents, viruses, bacteria, fungi. At introduction into an organism of simple worms speak about invasive diseases. Some infectious diseases have now been eliminated, many, especially viral ones, still pose a significant threat to the population. In addition, there are still endemic foci of a number of infectious diseases, which at the speed inherent in modern means of transportation, can be easily transferred to other countries. The infectious process is very complex, and its development is determined by the characteristics of the pathogen, such as the reactive state of the microorganism.

Features of the microorganism - the causative agent of infectious disease are determined not only by its structure, chemical structure, antigenic properties, but also the nature of interaction with the host The result of this interaction depends

on the state of the body's defense systems phagocytic (neutrophils and monocytic phagocytes), immunity.

The coexistence of micro- and macroorganisms can be of 3 types: 1) symbiosis - the coexistence of microbes and macroorganisms in favor of each (for example, Escherichia coli in the intestine); 2) commensalism (from the French. Commensal - dining room), in which the microbe and the macroorganism do not interact with each other; 3) parasitism - the life of a microbe due to a macroorganism that leads to the development of the disease. Under the influence of various exogenous and endogenous factors, the relationship between the micro- and macro-organism can be disrupted in favor of the micro-organism, which acquires pathogenic properties. Under these conditions, the indifferent commensal, or harmless symbiont, becomes a parasite and causes disease. Such situations arise at treatment by many drugs, but first of all by antibiotics; which disturb the constant balance of microbial flora.

Most pathogens enter the human body from the environment through the entrance gate, such as through the intestines with food, through the lungs with air, insect bites, through damaged skin or mucous membranes, and so on. In such cases, talk about exogenous infection.

However, the infection can be endogenous, then it is an endogenous infection, or autoinfection.

Different infectious agents cause different tissue reactions, which is especially evident in bacterial and viral infections. Bacteria, having penetrated into the tissues, usually cause inflammation. Viruses, subordinating the host cells to the mechanism of their reproduction (reproduction), can lead to dystrophy and necrosis of cells, as well as to their proliferation and transformation; the reaction is largely secondary.

During the infectious process, regardless of the nature of the pathogen, immune reactions appear, aimed at the destruction and elimination of infection. Circulating antibodies are formed in response to antigenic stimulation of the immune system. The connection of the antigen with the antibody in the presence of complement has antimicrobial and antitoxic effects, provides post-infectious humoral immunity. At the same time, long-term antigenic action in infectious

diseases leads to sensitization of the body, the appearance of hypersensitivity reactions, both immediate and delayed (allergic reactions) type. It follows that tissue damage in infectious diseases can develop not only under the influence of infection, but also in connection with hypersensitivity reactions.

Infectious diseases are characterized by a number of common features:

Each infectious disease has its own pathogen, which is found in the blood or feces of the patient.

The causative agent of an infectious disease has an entrance gate characteristic of each infection.

In infectious disease, there is the formation of primary affect (cells), which usually appears at the entrance gate. The primary affect is the source of inflammation. At lymphogenic distribution of an infection there is an inflammation of both draining lymphatic vessels (lymphangitis), and regional lymph nodes (lymphadenitis). The combination of primary affect, lymphangitis and lymphadenitis in an infectious disease allows us to talk about the primary infectious complex. In some infections it is determined (tuberculosis), in others the process immediately takes a generalized nature (rash and reverse typhus, malaria).

The route of infection from the primary site or complex may be lymphogenic, hematogenous, intracanalicular, perineural, or contact.

Each infectious disease is characterized by local changes that develop in a particular tissue or organ (in the colon in dysentery, in the cells of the anterior horns of the spinal cord in polio, in the walls of small vessels in typhus) and to some extent typical of this disease.

In infectious diseases, a number of general changes develop: skin rashes, vasculitis, hyperplastic processes in the lymph nodes, spleen, bone marrow, inflammatory processes in the interstitial tissue and dystrophic changes in the parenchymal organs.

Infectious disease is often cyclical. In its course there are incubation, prodromal periods and the period of the main manifestations of the disease (phases of increase of symptoms of the disease, exacerbation and its extinction).

Infectious disease can end in recovery, become chronic, be the cause of bacillus. Very often it is accompanied by various complications that can cause death.

Infectious diseases are divided into several features.

On a biological basis: 1) anthroponoses - infectious diseases that occur only in humans; 2) anthropozoonoses - infectious diseases that occur in humans and animals; 3) biocenoses - a group of anthroponoses and anthropozoonoses transmitted through insect bites, which are the place of reproduction of the pathogen. On the etiological basis: 1) viral infections; 2) year-ketsiosis; 3) bacterial infections; 4) fungal; 5) protozoan; 6) parasitic. Infections can be exogenous or endogenous.

According to the mechanism of transmission: I) intestinal infections that occur when the infection enters the digestive tract through the mouth; 2) respiratory tract infections transmitted by airborne droplets; 3) "blood infections" (transmissible) transmitted through blood-sucking arthropods; 4) infections of the outer coverings, fibers and muscles of the body (infection occurs through the action of any infected environmental factors; injury to an infected object); 5) infections with different transmission mechanisms.

By the nature of clinical and anatomical manifestations, there are infections with a predominant lesion: 1) integuments (skin and its appendages, outer mucous membranes), tissue and muscles of the body; 2) respiratory tract; 3) digestive tract; 4) the nervous system; 5) cardiovascular system; 6) blood systems and other tissues of the internal environment of the body; 7) urogenital tract.

By the nature of the course there are infections: 1) acute; 2) chronic; 3) latent (hidden); 4) slow.

Typhoid Is an acute infectious disease, a classic intestinal infection, a typical anthroponosis.

It is caused by Escherichia coli (Salmonella hyphae). The source of infection is a sick person or a bacillus carrier, whose secretions (feces, urine, sweat) contain microbes. Infection occurs when the pathogen enters the digestive tract through the mouth. The incubation period is 10-14 days. In the lower part of the intestine bacilli multiply, secrete endotoxins. From the intestine through the lymphatic system, they enter the group lymph follicles, and then into regional

nodes. After passing the lymphatic barrier, the pathogen enters the bloodstream. Bacteremia develops, especially pronounced during the first Sunday when Escherichia coli can be isolated from the blood (blood culture). Bacteremia is associated with the generalization of infection and the formation of immunity. From the second Sunday, antibodies are detected in the blood by agglutination reaction. 3 bacteremia is associated with the elimination of the pathogen, which from the second Sunday is excreted with sweat, urine, feces, bile. Further reproduction takes place in bile (bacteriocholia) and group lymphatic and solitary follicles. This reaction ends with necrosis of the lymphatic system of the small intestine.

Local changes occur in the mucous membrane and lymphatic system of group lymphatic and solitary intestinal follicles. In those cases when the follicles in the small intestine increase above the surface, they speak of an iliotype, in the large intestine of a colotype, and in the small and large intestines of an iliocolotype. The most characteristic changes are found in plaques of the longitudinal intestine - the iliotype. The changes take place in 5 stages (periods): cerebral swelling, necrosis, ulceration, clear ulcers and healing. Each stage takes about a week of illness.

The first stage is characterized by cerebral swelling of group follicles, furrows and convolutions are formed on their surface, resembling the surface of the brain, in section they are juicy, red. Most proliferating cells, especially monocytes, turn into macrophages that phagocytose typhoid bacilli and are called typhoid cells. These cells extend beyond the group of follicles and mucosa, penetrate the muscle layer and sometimes reach the serous cover. Clusters of these cells form typhoid granulomas.

Similar changes rupture in solitary follicles. Cerebellar swelling in group and solitary follicles, combined with the phenomena of catarrhal enteritis.

The second stage - necrosis of group follicles, which is based on necrosis of typhoid granulomas. Necrosis begins in the superficial layers of group follicles, gradually deepens, sometimes reaching the muscular layer and peritoneum. Around - demarcation inflammation. Dead tissue plaques become greenish. The same changes are observed in solitary follicles.

The third stage is the formation of ulcers as a result of sequestration and rejection of necrotic masses. Ulcers appear in the lower segment of the longitudinal intestine, then in the upper parts.

The fourth stage is the stage of pure ulcers, which have a characteristic appearance: placed along the length of the intestine, the edges are straight, rounded, the bottom is formed by a muscular layer, rarely a serous membrane. At this stage there is a great danger of perforation of the intestinal wall.

The fifth stage - healing of ulcers from a number of scars. The plaque tissue is partially or completely restored and becomes only slightly pigmented. You can see the compatibility of two or three stages at the same time. The more proximally the changes are placed, the "younger" they are. Judging by the stage of typhoid fever by the oldest changes in the lower longitudinal intestine.

In the lymph nodes of the mesentery, especially the ileocecal angle, there are changes that develop in the same sequence as in the lymphatic system of the intestine.

General changes in typhoid fever have both typical only for him signs, and characteristic of any infectious disease.

The first include rashes, the formation of typhoid granulomas in various organs, the second - hyperplastic processes in the lymphatic system and dystrophic changes in parenchymal organs.

Typhoid rashes appear on the 7th-11th day on the skin of the torso, on the abdomen. They have a roseola-papular character, disappear when pressed in the papillary layer - vascular hyperemia, inflammatory infiltrates, loose epidermis with hyperkeratosis.

Proliferation of monocytes and histiocytes occurs in the spleen, lymph nodes, bone marrow, gallbladder, kidneys.

The spleen is enlarged 3-4 times, the capsule is tense, dark red, increased scraping of the pulp. Dystrophic changes are found in the myocardium, liver, kidneys, in some cases - cholecystitis.

Among intestinal complications the most frequent and dangerous intestinal bleedings and perforation of an ulcer. Bleeding occurs in the third week and can be fatal. Perforation of the ulcer leads to peritonitis.

Among extraintestinal complications the most important are: pneumonia, purulent laryngeal perichondritis, waxy necrosis of the rectus: abdominal muscles, osteomyelitis, intramuscular abscesses.

The death of patients occurs from complications.

Salmonellosis Are intestinal infections caused by salmonella. Refer to anthropozoonoses.

The pathogenesis is determined by the characteristics of the pathogen, the amount of endotoxins released during the breakdown of salmonella in the intestine. The route of transmission is food.

There are three forms of salmonellosis: intestinal, septic (toxic), typhoid.

Intestinal form develops in food poisoning, it is characterized by a picture of acute gastroenteritis, which leads to severe dehydration (domestic cholera).

The septic form differs in that at insignificant changes in a small bowel (hyperemia, hypostasis, hyperplasia of the lymphatic device) there is a hematogenous generalization of the activator with formation in many bodies (lungs, brain) of metastatic abscesses.

Typhoid form (paratyphoid A and B in the old terminology) resemble typhoid fever. In the intestine, lymph nodes, spleen there are changes similar to typhoid fever, but less pronounced. Intestinal complications are rare. Complications: toxicosis, infectious shock, purulent complications, dysbacteriosis.

Dysentery- acute infectious disease, with a predominant lesion of the colon. It is sewn up by a group of related Shigella bacteria. The most common pathogens are Flexner's and Sonne's shigella.

The source of infection is a sick person, especially one who has suffered from a mild form of the disease and has not consulted a doctor. The route of infection is fecal-oral, through food and water. Flies play a role in infecting food. Known epidemic outbreaks in connection with the infection of products during their manufacture and transportation. Children get sick more often.

As a result of vital activity, microbes have a toxic effect, which leads to characteristic morphological changes in the intestine and to reactive changes in regional lymph nodes. Absorbed from the intestines, toxic products of microbial

breakdown into the blood cause direct damage to tissues and organs of the CNS, especially in children under one year. Circulating in the blood, the toxins return with the bloodstream to the intestinal wall, where there is a repeated reaction of interaction. It can have the character of hyperergic inflammation.

The incubation period for dysentery is up to 3 days. Bacteria find favorable conditions for their development in the epithelial cells of the mucous membrane of the colon. Due to the cytopathic action of Shigella, the cells are desquamated, and the desquamative catarrh of the colon develops. In connection with the release of endotoxin there is a vasoneuroparalytic effect (paralysis of blood vessels, damage to the intramural ganglia of the intestine). Destruction of the epithelium and paralysis of blood vessels, which are associated with increased exudation, determine the change of catarrh by fibrinous inflammation and the development of ulcers in the rejection of fibrinous films.

There are local and general changes. Local changes are divided into 4 stages:

The first stage is catarrhal colitis. The intestinal wall is thickened, the mucosa and submucosa are swollen, the mucosa is hyperemic, a thick layer of mucus is mixed with serous exudate, desquamated epithelium or serous-blood exudate. On the surface of the mucous membrane, foci of necrosis, hemorrhage. The lumen of the intestine is sharply narrowed. The duration of the stage is 2-3 days.

The second stage is fibrinous (diphtheria) colitis. This stage is characterized by more common necrotization of the mucous membrane with the formation of plaques (films) on its surface. Necrosis is deep and captures the entire mucous and submucosal layers, to the muscle. Necrotic masses are permeated with fibrinous exudate with the formation of films tightly attached to the mucous membrane. These films are grayish-green, sometimes brownish-black. Microscopically - necrotic detritus, fibrin, leukocytes. Submucosal, muscular and serous layers of the wall are permeated with serous or serous-hemorrhagic fluid. Around the vessels infiltrates of leukocytes and lymphoid cells. In the cells of blood vessels - fibrinoid necrosis. The lumen of the intestine is narrowed as a result of spasm of the muscular layer.

The third stage - the formation of ulcers, ulcerative colitis, on day 10-12 of the disease. At this stage there are ulcers of different size, depth and shape. The deeper the necrosis, the deeper the ulcers. Ulcers can be on the tops of the folds, and in severe cases, they merge with each other and form a large ulcer surface.

The fourth stage - the stage of healing, lasts for 3-4 weeks of illness. Healing of ulcers is sluggish. Small ulcers regenerate completely, they are covered with epithelium and the glands are restored. Large ulcers are not covered with a mucous membrane for a long time - at the bottom of the growing scar tissue Numerous and rough scars can narrow the lumen of the intestine and deform its inner surface.

Death of patients occurs from intestinal and extraintestinal complications.

Catarrhal form of dysentery, similar to typhoid fever, is more common in children. In this form, pronounced changes in the follicles of the colon and sometimes in the plaques of the lower part of the longitudinal intestine. In lymphoid formations, necrosis and suppuration occur.

In rare cases, anaerobic infection may join dysentery, and then fibrinous-diphtheria inflammation turns into gangrenous decay. This is a very severe so-called gangrenous form of dysentery. The intestine turns black, easily torn, the mucous membrane disintegrates, the process deepens, fibrinoid necrosis is sharply expressed in the walls of the vessels of the small intestine.

Changes in internal organs: sometimes a slight enlargement of the spleen, hyperplasia of the spleen follicles. In the liver, kidneys, myocardium - dystrophic changes.

Intestinal complications are associated with microperforation of ulcers with the development of limited or diffuse peritonitis. This can cause the formation of an abscess or phlegmon of the pelvic tissue - phlegmatic paraproctitis.

Narrowing - strictures of the rectum due to deep scarring of ulcers.

Recurrences of necrotic-ulcerative processes of the intestinal wall with the transition of the disease to a chronic form. Currently, the question of the existence of chronic dysentery is resolved in a positive light and this explains the fears of the disease throughout the year.

Bleeding from dysenteric ulcers is very rare.

Extraintestinal complications: focal pneumonia, purulent otitis, liver abscesses, thrombophlebitis of the portal vein and against this background liver abscess, serous arthritis and synovitis, depletion of the body, edema of the serous cavities, edema of the tissue. In the chronic form of dysentery, amyloidosis develops.

Yersinia enterocolitis Is an acute infectious disease with a predominant lesion of the distal ileum and cecum, with a tendency to generalize the process.

The causative agents are Yersinia enterocolitica and Yersinia pseudotuberculosis, which are gram-negative intracellular bacteria related to Yersinia pestis (the causative agent of plague).

Yersiniosis refers to anthropozoonoses. The source of infection can be patients with yersiniosis, bacteria and animals (rodents, cats, dogs, pigs, cattle and sheep). The disease occurs in all age groups, but more often in children.

Yersinia enterocolitica and Yersinia pseudotuberculosis enter the human body by fecal-oral route through infected vegetables, fruits, meat, milk.

Clinical and morphological manifestations of Yersinia caused by Yersinia enterocolitica and Yersinia pseudotuberculosis are approximately the same, but there are indications that Yersinia caused by Yersinia enterocolitica is clinically more severe and more prone to generalization.

There are two forms: localized (enteritis, enterocolitis in combination with mesenteric lymphadenitis); generalized (enterocolitis in combination with septicemia and lesions of the internal organs).

The pathogen after reproduction in the intestine penetrates into its mucous membrane, mostly in the ileocecal angle. Dominated by terminal catarrhal or catarrhal ulcerative enteritis. The mucous membrane of the terminal ileum is swollen, its lumen is narrowed, in the area of hyperplasia of group lymphoid follicles round ulcers are defined. Yersinia and polymorphonuclear leukocytes are found at the bottom of ulcers. Sometimes the appendix is involved in the process, where changes such as pseudomembranous colitis are detected. Characteristic infiltration of all layers of the intestinal wall by neutrophils, mononuclear cells, eosinophils, plasma cells. The germinal centers of lymphoid follicles increase, numerous mitoses are visible in them, disintegration of lymphocytes is quite often

noted also. Spiteloid transformation of reticular cells of the germinal center of follicles and histiocytes of the mucosal lamina propria is mainly observed. In the central part of such epithelioid granulomas there are accumulations of neutrophilic leukocytes, which break down. The appendix is often involved in the process with the development of acute appendicitis. Significant infiltration by polymorphonuclear leukocytes, eosinophils, histiocytes, sometimes yersinia granulomas from macrophages, epithelioid cells, single giant cells of the Pirogov – Langhans type is found in the wall of the appendix; for granulomas are characterized by karyorexis and purulent melting The appendix is often involved in the process with the development of acute appendicitis. Significant infiltration by polymorphonuclear leukocytes, eosinophils, histiocytes, sometimes yersinia granulomas from macrophages, epithelioid cells, single giant cells of the Pirogov – Langhans type is found in the wall of the appendix; for granulomas are characterized by karyorexis and purulent melting The appendix is often involved in the process with the development of acute appendicitis. Significant infiltration by polymorphonuclear leukocytes, eosinophils, histiocytes, sometimes yersinia granulomas from macrophages, epithelioid cells, single giant cells of the Pirogov – Langhans type is found in the wall of the appendix; for granulomas are characterized by karyorexis and purulent melting

Even more naturally, the lesion of regional lymph nodes is more common than mesenteric. Lymph nodes are enlarged 10-30 times. They are soldered into packages, their tissue is infiltrated by polymorphonuclear leukocytes, eosinophils, histiocytes. Sometimes micro-abscesses surrounded by active macrophages are identified. In some children, mostly with a longer course of the disease among the epithelial cells can be found giant cells such as Langhans. There are granulomas that resemble sexually transmitted granulomas and granulomas "cat scratch disease"

Along with lymphogenic dissemination of the pathogen, its hematogenous (septic) spread is possible with the formation of foci of generalization in the internal organs, which have a structure similar to that described above.

Complications are infectious-allergic in nature. In the early period of the disease, perforation of intestinal ulcers with the development of peritonitis,

jaundice, and pneumonia are possible. In the late period more often find polyarthritis, erythema nodosum, Reiter's syndrome, myocarditis.

The way out is usually agile, but the disease can recur, become chronic. Fatal outcome is observed mainly in the septic form.

Campylobacteriosis is caused by two species of Campylobacter, jejuni and. inches.

Campylobacter is a gram-negative flagellate microorganism. Initially, it was classified as vibrio, but after special cultivation it was identified, and it became known as Campylobacteria, it is often confused with the banal enterobacteria.

In the United States, Campylobacteria is twice as common as Salmonella and four times as common as Shigela. The most common sporadic cases of infection with the use of spoiled war chickens, which are often infected with Campylobacter and Salmonella. Sporadic cases can occur in close contact with infected dogs. Epidemics can develop with the consumption of milk and water infected with Campylobacter.

Due to its peculiar shape in the form of a coma or spiral, campylobacteria are able to penetrate the erythrocyte membrane. Their invasive ability depends on the chemical composition of the cytoplasmic membrane of the host enterocytes, initiate or block this invasion of G-protein or phosphatidinositol-3-kinase.

Possible clinical manifestations of campylobacter infection: banal diarrhea, which does not depend on the invasion; dysenteric diarrhea with blood and mucus in the feces, if the bacteria invade the intestinal epitheliocytes; intestinal fever caused by the penetration of bacteria through the lamina propria of the mucous membrane and into the mesenteric lymph nodes and the development of sepsis.

Inflammation of the mucous membrane of all intestines, from the small intestine to the anus, can be observed. The most common manifestation of campylobacteriosis is enterocolitis with the most typical lesion of the colon, in particular - the colon. Macroscopic changes are uncharacteristic Campylobacter with high frequency are found in the glycocalyx and cytoplasm of the superficial epithelium. In addition, there is infiltration of the superficial epithelium of the intestinal mucosa by neutrophilic leukocytes, areas with ulcers, edema and diffuse infiltration of its own plate by lymphocytes and plasma cells with an admixture of

granulocytes and macrophages. Crypt abscesses and ulcers similar to those seen in chronic ulcerative colitis may also occur.

In the small intestine, the ratio of crypts and villi decreases slightly. Later, epithelial regeneration and lymphatic follicle hyperplasia occur. In the recovery stage there is only a slight lymphoplasmacytic infiltration.

LECTURE 15

TUBERCULOSIS

Tuberculosis is a chronic disease that affects all human organs, most often the lungs.

Tuberculosis remains a fairly common disease. Every year 2-3 million people get tuberculosis and 3-5 million people die every year; the total number of patients reaches 15-20 million, and half of them are over 45 years old. 75% of patients and deaths from tuberculosis are in Asia, Africa and South America, where tuberculosis is classified as an epidemic disease without a tendency to decrease. The fight against tuberculosis is carried out by the World Health Organization in the framework of international cooperation.

Tuberculosis has a number of features that distinguish it from other infections. They are represented by: 1) ubiquity of infection in epidemic, clinical and morphological terms; 2) duplicity of tuberculosis, which, depending on the ratio of immunity and allergies may be a manifestation of infection or disease; 3) polymorphism of clinical and morphological manifestations; 4) chronic wavy course - alternating exacerbations and remission of the disease.

The causative agent of tuberculosis is Mycobacterium tuberculosis, discovered by R. Koch in 1882. There are four types of Mycobacterium tuberculosis: human, bovine, avian and cold-blooded. The first two types are pathogenic for humans. Mycobacteria of tuberculosis are characterized by: optimal growth in conditions of significant oxygen saturation of tissues and at the same time the possibility of growth in an oxygen-free environment (optional anaerobes); pronounced variability of the pathogen - branched, coccygeal, L-forms, which under the influence of chemotherapy can lose the cell membrane and persist in the body for a long time.

The entry of mycobacteria into the body and interaction with it, fogo tissues, organs are the pathogenesis of tuberculosis. The origin, course and consequence of the disease largely depends on the immunological condition and reactivity of the organism. Reactivity determines the unusual variety of clinical and morphological manifestations of tuberculosis, which is one of its striking features as a disease and causes difficulties in clinical diagnosis.

There are three main types of clinical and morphological manifestations of tuberculosis: primary, hematogenous and secondary tuberculosis.

Primary tuberculosis is characterized by: 1) the development of the disease during infection, ie at the first meeting of the body with the infection; 2) sensitization and allergies, immediate hypersensitivity reactions; 3) the predominance of exudative-necrotic changes; 4) a tendency to hematogenous and lymphogenic (lymph node) generalization; 5) a pair of specific reactions in the form of vasculitis, arthritis, serositis, etc.

As a rule, the aerogenic way of infection is observed, the alimentary way is also possible. The disease mainly affects children, but now, thanks to the

successful prevention of tuberculosis in childhood, primary tuberculosis develops in adolescents and adults.

The morphological manifestation of primary tuberculosis is the primary tuberculosis complex. It consists of three components: the lesion in the organ (primary focus, or affect), tuberculous inflammation of the lymphatic vessels (lymphangitis) and tuberculous inflammation of the regional lymph nodes (lymphadenitis).

At aerogenic infection in lungs the primary tuberculous center (affect) arises subpleurally in the most oxygen-saturated segments, most often the right lungs - III, VIII, IX, X (especially often in III). It is the focus of exudative inflammation, and the exudate is rapidly subject to necrosis. There is a focus of caseous pneumonia, surrounded by a zone of personal inflammation. The size of the affect varies: from barely visible microscopically alveolitis to inflammation of the acinus or lobe, and possibly a segment or lobe. Elastic and argerophilic fibers of the lung skeleton are stored for a long time in the caseous masses of the primary affect. The inflammatory process captures the pleura with the subsequent development of fibrinous or serogono-fibrinous pleurisy.

Very quickly, a specific inflammatory process spreads to the lymphatic vessels adjacent to the primary affect - tuberculous lymphangitis develops. It is represented by lymphostasis and the formation of lymphatic vessels in the perivascular swollen tissue of tuberculous nodules.

Then the inflammatory process quickly passes to the regional bronchopulmonary, bronchial and bifurcated lymph nodes, which develop a specific inflammatory process with rapidly occurring caseous necrosis. This is total tuberculous lymphadenitis. Lymph nodes are enlarged several times and at autopsy are caseous masses. Changes in regional lymph nodes are always more significant in comparison with primary affect.

In the tissue of the mediastinum adjacent to the caseous lymph nodes, develops to some extent expressed perfocal inflammation, in the most severe cases, there are even foci of cheesy necrosis.

In alimentary infection, the primary tuberculosis complex develops in the intestine and also consists of three components. In the lymphoid tissue of the

lower part of the jejunum or cecum, tuberculous nodules are formed with necrosis and subsequent formation of an ulcer in the mucous membrane, which is considered as the primary affect. Then there is tuberculous lymphangitis with the formation of nodules along the lymphatic vessels and caseous lymphadenitis of regional lymph nodes in relation to the primary affect. Similarly, the primary tuberculous complex in the tonsil (primary affect in the tonsil, lymphangitis and caseous necrosis of the lymph nodes of the neck), skin (skin ulcer, lymphangitis, regional government lymphadenitis).

There are three options for the course of primary tuberculosis: 1) attenuation of primary tuberculosis and healing of foci of the primary complex; 2) progression of primary tuberculosis with generalization of the process; 3) chronic course.

Attenuation of primary tuberculosis and healing of foci of the primary complex begins in the primary pulmonary foci. First, perfocal inflammation is resorbed, the exudative tissue reaction is replaced by a productive one: a shaft of epithelioid and lymphoid cells is formed around the cell, caseous pneumonia, as if separating the cell from the surrounding lung tissue. Fibrous tuberculous granulomas appear on the outside of this shaft. A capsule is formed around the primary affect, the surface layers of which consist of loose connective tissue with small vessels surrounded by lymphoid-type cells. The inner layer of the capsule, adjacent to the caseous masses, is gradually enriched with fibrous structures and merges with the surface. From the surface layer of the capsule of the primary affect grow vessels, which can reach the inner layers of the capsule and come into direct contact with the caseous masses. The latter are gradually dehydrated, become dense, calcified (petrification). Over time, in the inner layer, which touches the foamed caseous masses, multinucleated cells appear, which are resorbed by these masses. In their place by metaplasia bone beams with bone marrow cells are formed in between the beam spaces. Thus, the petrified primary cell becomes ossified. Such a healed primary cell is called the Gona cell, named after the Czech pathologist who described it. At the site of tuberculous lymphangitis as a result of fibrosis of tuberculous granulomas, a fibrous cord is formed. Over time, in the inner layer, which touches the foamed caseous masses,

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Healing in the lymph nodes proceeds as in the pulmonary center. But due to the large size of the lesion in the lymph nodes, it becomes slower than in the pulmonary center. The focus of caseosis in the lymph node is dehydrated, weighted and ossified.

Calcified foci in the lungs are found in many healthy individuals. At the age of 10 years they are found in 6% of autopsies; from 10 to 15 years - in 25%; from 20 to 30 years - in 45%; and after 40 years - almost everyone. Thus, the penetration of Mycobacterium tuberculosis into the human body leads not only to disease but also to infection, which has a beneficial effect on the formation of immunity and prevents new infections. It is proved that anti-tuberculosis immunity is infectious, non-sterile, ie it is carried out in the body in the presence of weakly virulent mycobacteria. They can be isolated even from the calcified foci of the primary tuberculosis complex. Infants and young children have been vaccinated with BCG vaccine made from attenuated tuberculous mycobacteria for

almost a long time. Mandatory vaccination against tuberculosis has led to a sharp decline in childhood infection in recent years, which has postponed the period of infection of older people, whose defenses are more pronounced. But it should be borne in mind that in caseous calcified and even partially ossified masses accumulate little virulent mycobacteria or their L-forms, which can be active in reducing the body's defenses.

In the intestine at the site of the primary ulcer during healing a scar is formed, and in the lymph nodes - petrification. Their ossification is very slow.

Progression of primary tuberculosis with generalization of the process is manifested in the form of four forms: hematogenous, lymphogenic (lymph glandular), the growth of primary affect and mixed.

Hematogenous form of progression (generalization) develops in connection with the early entry of mycobacteria into the blood (dissemination) from the primary affect or from caseous lymph nodes. Mycobacteria settle in various organs and cause the formation of nodules ranging in size from miliary (millet) - miliary tuberculosis - to large cells the size of a pea or more. In this regard, there are miliary and large focal forms of hematogenous generalization. Particularly dangerous is the shedding of soft meninges with miliary tuberculous nodules with the development of tuberculous leptomeningitis. Sometimes with hematogenous generalization there are single screenings of different sizes in different organs, including in the apex of the lungs (Simon's cells),

Lymphogenic (lymph glandular) form of progression (generalization) in primary tuberculosis is manifested by involvement in the process of specific inflammation of the bronchial, bifurcation, paratracheal, supra- and subclavian cervical and other lymph nodes. Tuberculous bronchoadenitis is especially important in the clinic. In cases where the lymph node packets are similar to a tumor, a tumor-like bronchoadenitis is indicated. At the same time caseosely changed enlarged lymph nodes compress the lumen of the bronchi, which leads to the development of foci of pulmonary atelectasis and pneumonia.

In primary intestinal tuberculosis, lymphogenic (lymph node) generalization leads to an increase in all groups of mesenteric lymph nodes. Tuberculous mesadenitis develops, which dominates the clinical picture of the disease.

The growth of primary affect is the most severe form of progression of primary tuberculosis. It causes caseous necrosis of the perfocal inflammation zone, fresh areas of exudative inflammation are formed around the primary affect, which are subject to necrosis and merge with each other. The primary center from the acenosis is transformed into lobular, then into the drain globular, segmental, lobar - there is lobar-caseous pneumonia. This is the most severe form of primary tuberculosis, which quickly ends in the death of the patient ("transient tuberculosis"). In other cases, the primary focus of globular or segmental caseous pneumonia melts and in its place a primary pulmonary cavity is formed. The process becomes chronic, develops primary pulmonary tuberculosis, which is eastern with secondary fibro-caseous tuberculosis,

Primary intestinal affect increases due to an increase in tuberculous ulcers, usually in the cecum. There are limited tuberculous peritonitis, adhesions, packages of caseous iliocecal lymph nodes. A dense conglomerate of tissues is formed, which is sometimes clinically perceived as a tumor (tumor-like primary intestinal tuberculosis) with a chronic course.

The mixed form of progression at primary tuberculosis is observed at exhaustion of an organism after the transferred acute infections, for example, after measles, at avitaminosis, starvation, etc. In such cases the big primary affect, caseous bronchoadenitis which is quite often complicated by melting of necrotic masses and formation of fistulas (fistulas) comes to light. Numerous tuberculous rashes are observed in the lungs and all organs.

Exacerbation of tuberculosis from healed petrified lymph nodes is manifested by long-term use of steroid hormones and immunosuppressants, which reduce the body's resistance. Massive tuberculous bronchoadenitis with lymphogenic hematogenous generalization, very weak general signs and insignificant cellular reaction develops. This so-called drug (steroid) tuberculosis is considered a manifestation of endogenous infection.

The consequences of progressive primary tuberculosis are different. In adverse cases, the patient's death occurs from the general generalized process and tuberculous meningitis. With a favorable course of the disease and the use of effective drugs, the progression of primary tuberculosis can be stopped, it is

possible to translate the exudative reaction into a productive one, stimulate encapsulation, calcification of primary cells and scarring of its dropouts.

The chronic course of primary tuberculosis appears primarily in cases of slow progression of a specific inflammatory process in the lymph node component of the primary complex with alternating outbreaks and remissions in the healing of the primary affect. At the same time there is a sensitization of an organism - increase in sensitivity to foreign nonspecific influences. Increased reactivity of the organism is clinically manifested by skin tuberculin tests and the appearance of varospecific changes in tissues and organs, which means various mesenchymal cellular reactions in the form of diffuse and nodular proliferation of lymphocytes and macrophages, hyperplastic processes in hematopoietic tissue and arterial tissue, fibrillar tissue dysproteinosis, sometimes even the development of amyloidosis.

Paraspecific reactions of the immediate or delayed type of hypersensitivity in the joints give chronic primary tuberculosis a resemblance to rheumatism and are described as Ponce's rheumatism.

The chronic course of primary tuberculosis is also indicated in cases of formation of the primary pulmonary cavity and development of primary pulmonary tuberculosis.

Hematogenous tuberculosis combines a number of manifestations of the disease, which occurs and develops in the human body after a long time after the primary infection - post-primary tuberculosis. In these cases, we are talking about people who are clinically healthy, but who have a hypersensitivity to tuberculin and who have significant immunity to Mycobacterium tuberculosis. Hematogenous tuberculosis occurs in patients with changes in the form of foci of elimination in various organs or not completely healed foci in the lymph nodes after the primary infection. These foci may remain dormant for a long time, their exacerbation occurs under the influence of any adverse factors in the presence of increased reactivity (hypersensitivity to tuberculin on the background of the developed immunity to mycobacteria). So,

There are 3 types of hematogenous tuberculosis: 1) generalized hematogenous tuberculosis; 2) hematogenous tuberculosis with a predominant

lung lesion; 3) hematogenous tuberculosis with predominant non-pulmonary lesions.

Generalized hematogenous tuberculosis, which is very rare nowadays. Is the most severe form of the disease, with a uniform rash in many organs of tuberculous nodules and foci. In some cases, all organs form necrotic foci without a proliferative or weak exudative reaction (the so-called necrotic type of generalized tuberculosis). This is the most acute tuberculous sepsis. In other cases, there are small (miliary) productive nodules. This form is referred to as acute general miliary tuberculosis. It often ends in meningitis. Occasionally there is an acute general large-cell tuberculosis, which is most often observed in debilitated patients and is characterized by the development in various organs of large (up to1 cm) tuberculosis foci.

In each case of generalized hematogenous tuberculosis, it is necessary to find a source of contamination, usually they can be an unhealed source of primary infection in the lymph nodes, genitals, bones and other organs.

*Hematogenous tuberculosis with a predominant lung lesion*characterized by a large number of inseminations in them, while in other organs they are absent or isolated. In the presence of many small (miliary) nodules in the lungs, we talk about miliary pulmonary tuberculosis, which can be both acute and chronic.

In acute miliary tuberculosis, which is rare, the lungs are swollen, fluffy, they feel like sand grains small nodules, more densely scattered in the upper segments. Often this form of tuberculosis ends in meningitis. With chronic miliary tuberculosis, scarring of the nodules and the development of persistent pulmonary emphysema are possible, in connection with which the load on the heart increases and hypertrophy of the right ventricle (pulmonary heart) occurs. In addition, there is chronic large-focal or hematogenously disseminated pulmonary tuberculosis, which occurs in adults. It is characterized mainly by corticopleural localization of cells in both lungs and productive tissue reaction, development of reticular pneumosclerosis, emphysema of the pulmonary heart and the presence of non-pulmonary tuberculosis.

*Hematogenous tuberculosis mainly with extrapulmonary lesions*arises from the centers-eliminations brought in this or that body by a hematogenous way in

the period of a primary infection. The bones of the skeleton (bone and joint tuberculosis) and the urogenital system (tuberculosis of the kidneys, genitals), skin and other organs are mainly affected. There are focal and destructive forms that have an acute or chronic course, ie forms of tuberculosis become phases of its development.

*Tuberculosis of bones and joints*occurs more often in children, less often - in adults. It develops from the centers of elimination in the bone marrow (tuberculous osteomyelitis). The most common localization is the vertebral bodies: tuberculous spondylitis: the epiphyses of the bones that form the hip (tuberculous coccyx) and knee (tuberculous gonitis) joints. The diaphysis is rarely affected. The synovial membranes are involved in the process of its secondary tissue. in tuberculosis of the bones and joints there is the formation of sequesters, ie areas of dead bone, its destruction, hump formation and deformation of the joints.From bone specific process extends to the soft tissues adjacent to the joints, accompanied by the appearance of swollen abscesses and fistulas.

*Tuberculosis of the kidneys*is usually unilateral, more often develops in young people of puberty, as well as in the elderly. Early cells appear in the cortical layer, as the process progresses, they appear in the papillae of the pyramids, here begins the destructive process with the formation of cavities. Outside the cavities of the interstitium of the renal tissue is infiltrated by lymphocytes, histiocytes with an admixture of epithelioid cells. Closing the lumen of the ureter with caseous masses causes the development of pyonephrosis. Gradually, a specific inflammatory process passes to the urinary tract, bladder, prostate, testicular appendage. In women, the mucous membrane of the uterus, fallopian tubes, and rarely the ovaries are affected.

Hematogenous tuberculosis also affects the endocrine glands, CNS, liver, serous membranes (in these cases, tuberculosis can occur due to the transition of a specific process from the affected lymph nodes).

Secondary, reinfectious, tuberculosis develops in the body of an adult after the primary infection, which provided him with relative specific immunity, but did not shield him from the possibility of recurrence (post-primary tuberculosis). It is characterized by: 1) mainly pulmonary localization of the process; 2) contact and

intracanalicular (bronchial tree, gastrointestinal tract) spread; 3) change of clinical and morphological forms, which are phases of the tuberculous process in the lungs.

There are two theories about the origin of secondary tuberculosis: exogenous origin, ie new infection, and endogenous origin. The fact that anatomical findings make it possible to trace a long chain of cases, from foci of primary infection to the formation of fresh foci of reinfection, allows most researchers to join the theory of its endogenous origin.

There are eight forms of secondary tuberculosis, each of which is a further development of the previous form. In this regard, the forms of secondary tuberculosis are at the same time phases of its development (phase forms). Among the form-phases of secondary tuberculosis are: 1) acute focal; 2) fibrinous-focal; 3) infiltrative; 4) tuberculoma; 5) caseous pneumonia; 6) acute cavernous; 7) fibrinous-cavernous; 8) cirrhotic.

*Acute focal tuberculosis*occurs in people aged 20-25 years and older. Morphologically, it is characterized by the presence in the I and II segments of the right (rarely left) lung of one or two cells. They are called the foci of reinfection of Apricot.

OI Apricot in 1904 first showed that these initial manifestations of secondary tuberculosis consist of specific endobronchitis, mesobronchitis, panbronchitis of the intraparticle bronchus. The specific process of bronchioles passes to the lung parenchyma, resulting in the development of acinous or globular cheesy bronchopneumonia, around which a shaft of epithelioid cells with an admixture of lymphoid and giant Pirogov-Langhans cells quickly forms. A reactive nonspecific process develops in the lymph nodes of the lung root. With timely treatment of the patient, and in many cases spontaneously, the process subsides, the exudative tissue reaction changes productive, foci of kerosene necrosis are encapsulated and petrified, Ashoff-Poole foci of reinfection appear and the process may end.

Fibro-focal tuberculosis- this is the phase of acute focal tuberculosis, when after a period of attenuation of the disease (healing of Apricot cells) the process flares up again. During the healing of Apricot cells there are large enough

encapsulated and partially petrified cells, described by German scientists Aschoff and Poole (Aschoff-Poole cells), they are given importance in the healing process, which is characterized by the appearance of acinous, lobular foci of caseconium. petrified and transformed into ashof-pulevstki. However, the tendency to exacerbation persists. The process remains one-sided, does not go beyond the I and II segments. It should be remembered that in the I and II segments among the accumulated and calcified foci of tuberculosis there are, in addition to Aashof-Pulevsky, also those which were formed from hematogenous screenings during the period of primary infection. They are described by Simon and bear his name. Simonov cells are smaller than Ashof-Pulev cells and are located symmetrically in the apex of the lungs.

*Infiltrative tuberculosis*develops with the progression of acute focal or exacerbated fibro-focal tuberculosis, and exudative changes around the caseous foci extend beyond the lobe or segment. Perifocal inflammation predominates over tricky changes that may be minor. This cell is called the Asman-Redecker infiltrate cell (named after the scientists who first described the X-ray picture). Nonspecific perifocal inflammation can be resorbed, and then during the healing period there are only one or two unresorbed, small caseous foci, which are further encapsulated, and the disease again becomes fibro-focal tuberculosis. In cases where perifocal inflammation covers the entire lobe, talk about the lobe as a special form of infiltrative tuberculosis.

Tuberculosis- a form of secondary tuberculosis, arising as a peculiar phase of the evolution of infiltrative tuberculosis, when perfocal inflammation is resorbed and there is a focus of cheese necrosis surrounded by a capsule. The tubercle reaches 2–5 cm in diameter, is located in the I or II segment, more often on the right. Often during X-ray examination due to clearly defined boundaries it is mistaken for peripheral lung cancer.

Caseous pneumonia, as a rule, is observed at progression of infiltrative tuberculosis therefore caseous changes start to prevail over perfocal. Acinous, globular, segmental kerosene-pneumonic foci are formed, which at the fusion can occupy a larger area of the lungs, even the entire lobe. Lobar character has caseous pneumonia, which develops on the background of the lobite. Caseous

pneumonia is observed mostly in debilitated patients and always against the background of older changes (fibro-focal, infiltrative-pneumonic tuberculosis or tuberculoma). It often occurs in the terminal period of each form of tuberculosis due to the weakening of the body's defenses. The lung in caseous pneumonia is enlarged, dense at autopsy - yellow, on the pleura - fibrinous overlays. Nowadays, caseous pneumonia is rare.

Acute cavernous tuberculosis- a form of secondary tuberculosis, which is characterized by the rapid formation of a decay cavity, and then a cavity at the site of the infiltrate or tuberculoma. The decay cavity occurs after purulent melting and liquefaction of tricky masses excreted with mycobacteria along with sputum. This poses a risk of bronchogenic contamination of the lungs, as well as the release of mycobacteria into the environment. The resulting cavity is usually localized in the I or II segment (in place of the cells from which it was formed), has an oval or round shape with a diameter of 2-5 cm, is combined with a gleam of a segmental bronchus. The wall of the cavity is heterogeneous: the inner layer consists of caseous masses, the outer - of dense due to inflammation of the lung tissue.

Fibrous-cavernous tuberculosis, or chronic pulmonary tuberculosis, arises from acute cavernous tuberculosis in cases of chronic process. The wall of the cavity is dense, has three layers: the inner - pyogenic (necrotic), rich in decaying leukocytes; middle - a layer of tuberculous granulation tissue; external - connective tissue, and among the layers of connective tissue there are areas of atelectasis of the lungs. The inner surface is uneven, with we crossing the cavity of the cavity beams; each beam is an obliterated bronchus or thrombosed vessel. The changes are most pronounced in one, more often in the right, lung. In the I and II segments the changes are older, the pleura is thickened. The cavity occupies one or two segments. There are various foci around it (depending on the type of tissue reaction of bronchiectasis. The process gradually spreads in the apicocaudal direction, descends from the upper segments to the lower both by contact and behind the bronchi, occupying all new areas of the lung. Therefore, older changes in fibrocavernous tuberculosis are observed in the upper lungs, and more recent - in the lower. Over time, the process passes through the bronchi to

the opposite lung. First of all, bronchogenic metastatic foci appear in it in the III segment, where acinar, globular tuberculous foci appear. At their disintegration formation of caverns and the subsequent bronchogenic distribution of process is possible. First of all, bronchogenic metastatic foci appear in it in the III segment, where acinar, globular tuberculous foci appear. At their disintegration formation of caverns and the subsequent bronchogenic distribution of process is possible. First of all, bronchogenic metastatic foci appear in it in the III segment, where acinar, globular tuberculous foci appear. At their disintegration formation of caverns and the subsequent bronchogenic distribution of process is possible.

*Cirrhotic tuberculosis*is considered as a variant of development of fibrocavernous tuberculosis, when in the affected lungs around the cavities connective tissue develops, a linear scar is formed in the place of the healed cavity, numerous bronchiectasis appear. At secondary pulmonary tuberculosis at an intracanalicular or contact way of distribution specific defeat of bronchial tubes, a trachea, a larynx, an oral cavity, intestines can develop. Hematogenous spread is rare, it is possible in the terminal period of the disease with a decrease in the body's defenses. In these cases, tuberculous meningitis, extrapulmonary organ and other lesions are found.

Complications of tuberculosis are various and have already been mentioned in describing some of its forms. With primary tuberculosis, the development of tuberculous meningitis, pleurisy, pericarditis, peritonitis is possible. With bone tuberculosis, the development of sequesters, deformities, soft tissue lesions, abscesses, fistulas is possible. In secondary tuberculosis, the largest number of complications is associated with the cavity: bleeding, breakthrough of the contents of the cavity into the pleural cavity, which leads to pneumothorax and purulent pleurisy (pleural empyema). Due to the long course of the disease, each form of tuberculosis can be complicated by amyloidosis (especially often in fibrinous-cavernous tuberculosis). The cause of death of patients with pulmonary tuberculosis in our time is pulmonary heart failure, bleeding,

In recent years, the clinical and morphological picture of tuberculosis in economically developed countries has changed significantly. The changes are mainly due to social progress, the achievement of drug and antibacterial therapy

and are considered as a natural and induced pathomorphosis. There is a sharp decrease and practical disappearance of progressive forms of the disease - primary tuberculosis, hematogenous tuberculosis, tricky pneumonia. Among the common to all clinicoanatomical forms of modern tuberculosis include a decrease in specific exudative changes and generalization of the process, the strengthening of the nonspecific component of tuberculous inflammation and fibroblastic response.

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