Ministry of Public Health of Ukraine
National O.O. Bohomolets Medical University

Pathomorphology department №2

STUDY GUIDE
OF THE PRACTICAL CLASSES COURSE

Methodical recommendations
for student's independent work during practical class preparing

GENARAL PATHOLOGY

from discipline Pathomorphology

TOPIC 1. ***The object and taks of Pathomorphology. Methods of investigation for pathological studies. Stages of development in Pathomorphology. Damage. Dystrophy. General information.***

Actuality of the problem.

PATHOLOGY is the study (logos) of suffering (pathos). Pathomorphology is a discipline involving both basic science and clinical practice and is devoted to the study of the structural and functional changes in the cells, tissues, and organs that underlie "diseases". The discipline of pathomorphology forms a vital bridge between initial learning phase of preclinical sciences and the final phase of clinical subjects. Pathomorphology studies cause of the disease (etiology), the mechanisms of its development (pathogenesis), the structural alterations induced in the cells and organs of the body (morphological changes), and the functional consequences of the morphologic changes (clinical significance). It also studies the reasons and mechanisms of death - tanathogenesis, pathomorphosis (variability of diseases), pathology of treatment (jatrogenic pathology, i.e. the diseases caused by wrong medical tactics).

Methods of pathomorphological researches: autopsy, biopsy, research of operating material, experimental modeling. We use the following methods of research: macroscopic, microscopic (with the help of a light, electronic, luminescent microscope), histochemical and immunohistochemical. With the help of these methods of research we can know: "what changes and in what sequence they develop, what causes of them, and also what outcomes". Aim of studies. Study the main methods of morphology's research; learn the description's schema of the macro- and micropreparations, to explain the significance of the pathology.

Aim of studies.

Study the main methods of morphology's research; learn the description's schema of the macro- and micropreparations, to explain the significance of the pathology.

Tasks of the studies:

1. To explain the role of pathological anatomy as sciences, fields of medicine and educational object. To master the methods of research of pathomorphology.
2. To analyze making stages of pathomorphology and payment of scientists in development of world pathomorphology.
3. Get acquaint with the help of the teacher with the basic forms of work in the department of pathomorphology. Trace basic stages of preparation and conducting of biopsy research (undersection of the biopsy and operative material, its fixing, preparation of the paraffinic cuts, their coloring, study of sections and formation pathohistological diagnosis), acquaints with apparatus, which are used for preparing of the biopsy.
4. Acquaints with the modern methods of pathomorphological diagnostics: common-histological, immunohistochemistry, computer morphometry, and express diagnostic of operative material.
5. In the electron-microscopic laboratory acquaints with the modern tools of ultra-structural analysis (electronic microscopic investigations, histochemistry, radioautography), trace basic stages of preparation of material for research.
6. Acquaints with the method of conducting an autopsy in the sectional hall, clinical-anatomic analysis, formation of the pathological diagnosis and conclusions about the cause of death.

Questions for self-studying:

1. Pathomorphology: its maintenance, tasks, objects of research, place in the medical science and practical health protection, relations with other sciences.
2. Tools of pathological anatomy. Biopsy: determination, purpose, basic kinds according to the methods and time of realization, clinical value.
3. Autopsy: modern tasks and methods of conducting, clinical value.
4. Modern understanding of humoral, cellular and molecular aspects of pathology. Dialectical unity of structure and function in development of pathological process.
5. Knowledge of the pathological process and diseases. Etiology, pathogenesis and pathomorphosis.
6. Organ-pathological, syndromological and nosologycal principles of classification of diseases.

7. Diagnosis: principles of constructions, notion about the basic disease, its complications, direct and immediate cause of death.
8. Periods of tanathogenesis. Early signs of clinical and biological death. Morphological signs of biological death and postmortem changes.
9. History of development of pathological anatomy. Works by Morgani, Rokitansky, Virhov. Theory of cellular pathology and its importance for the medical science.

Practical skills:

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Self-check materials:

1. The most important kind of pathologist's activity is:
   A. participation of medical conference
   B. establishment of diagnosis in one's life
   C. embalming of body
   D. taking of section material for research
   E. notice of case report
2. Basic direction of pathological development is:
   A. clinical
   B. structural
   C. laboratory and diagnostic
   D. clinicoanatomic
   E. macromicroscopic
3. The problem of the bioptic researches is
   A. writing of clinical epicrisis
   B. writing of anatomic epicrisis
   C. construction of differential diagnosis
   D. writing of clinicoanatomic epicrisis
   E. discovering of primary cause of death
4. The kind of biopsy is:
   A. exophitic
   B. foliaceus
   C. incisional
   D. endophitic
   E. correlative
5. Dissection of body start from:
   A. dissection of head
   B. dissection of organs of neck
   C. dissection of organs of abdominal cavity
   D. examination of body
   E. acquaintance with case report

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). -Simferopol: 2 ed. CSMU, 2002- P. 222.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 1994-1400
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 980p.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993.- С . 687.
7. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – 648 с.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. – М., 1986. - 648 с.

TOPIC 2: ***Morphology of reversible and irreversible cell and tissues damage. Protein, fatty and carbohydrate intracellular accumulation. (Parenchymal degenerations)***.

Actuality of the problem.

Intracellular accumulations (parenchymal degenerations or dystrophies) are the accumulation of abnormal amounts of various substances in the cells.

Parenchymatous degenerations occur in functional cells such as: cells of a liver, kidneys, a myocardium and are characterized by accumulation of proteins, fats and carbohydrates in their cytoplasm. It is accompanied by decrease (reduction) of function of enzyme systems and occurrence of structural changes in cells.

Knowledge of these processes is necessary for understanding of the pathogenesis of the diseases and for the clinic-anatomical analysis of the autopsy.

Aim of studies. Learn the morphological features of the intracellular accumulations; to explain the causes and mechanisms of their development; to estimate outcomes and determine the significance for organism.

Tasks of the studies:

1. To interpret morphology of stereotyping and specific injury of cellular organelles and cellular-interstitial cooperations.
2. To explain morphology of reversible and irreversible damage of cells and tissues.
3. To explain the intracellular mechanisms of trophics and causes of their disturbances.
4. To interpret morphology of intracellular accumulation of proteins, carbonhydrates, lipids and their consequences.
5. Learn the classification of the intracellular accumulations according to prevalence of morphological changes, to the prevalence of that or another type of metabolism, to the influence of genetic factors and to the spreading of the process.

Questions for self-studying:

1. Pathology of cell as an integrative concept.
2. Pathology of cellular nucleus, of mytosis, chromosomal aberrations and chromosomal diseases.
3. Stereotyping injury of ultrastructures in reply to the varied influencing.
4. Pathological changes of cellular membranes and cells during the damage of cytolemma, endoplasmic reticulum, Goldgy complex, mitochondria, lysosomes, peroxisomes.
5. Pathological changes of the cytoskelet (microfilaments, microtubules). Specific changes of ultrastructures: "diseases" of receptors, lysosomal, mitochondria, peroxisomal "diseases".
6. Intracellular accumulations: causes, morphological mechanisms of development (infiltration, transformation, decomposition, perverted synthesis).
7. Classification: according to prevalence of morphological changes in specialized parenchymatous or stromal elements (parenchymatous, stromal-vascular and mixed);
8. Classification: according to the prevalence of that or another type of metabolism (proteins, lipids, carbohydrates, minerales);

9. Classification: according to the influence of genetic factors (hereditary and acquired) and to the spreading of the process (diffuse and local).
10. Intracellular accumulations of proteins: hyaline-droplet, balloon (hydropic) and keratinous degenerations. Morphologic characteristics, causes and pathogenesis.
11. Intacellular accumulations of lipids (fatty dystrophies): fatty degeneration of the myocardium, liver, kidneys. Morphologic characteristics, causes, pathogenesis. Steatosis.
12. Intracellular accumulations of carbohydrates. Degenerations associated with disorders of glycogen's metabolism. Morphologic characteristics, causes, pathogenesis of glycogen metabolic disorders in diabetes mellitus.
13. Colloid dystrophy. Morphologic characteristics, pathogenesis. Cystic fibrosis.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1."Fatty degeneration of the Myocardium ("Tiger's Heart")". Pay attention to the organ's size, expansion of the chambers, soft texture. Characterize the appearance of the sectioned myocardium, pay attention to the greenish-yellow color. Describe the appearance from endocardial side.

What morphological changes develop in cardiomyocytes and intracellular organelles?

2."Lipoid nephrosis". Pay attention to the organ size, flabby texture and white color of the parenchyma. Such kidney is called "large white Kidney".

How do you characterize the type of the sectioned tissue? What are the causes of such changes?

3."Fatty degeneration of the Liver". Pay attention to the organ size, flabby texture, yellowish-ochre color of the parenchyma on the cut. Such liver is called *"Goose Liver"*.

In what cases such changes may be? What are possible outcomes?

4."Fatty degeneration of the Liver ("False Nutmeg Liver")". Pay attention to the organ size, flabby texture. The liver looks lumpy coloration with appearance yellowish-gray spots on the brown background.

How do you characterize the type of the sectioned tissue? What are the causes of such changes?

Slides for drawing and describing in album:

Slide 1 Squamous cell carcinoma with keratinization (ought to be drawn)

The groups of keratinized cells can be found in the center of squamous cell carcinoma's areas. These cell's complexes here and there look like rose color homogenous round forms ("canceromatous perls").

Slide 2. Fatty degeneration of the Liver (ought to be drawn)

Small optically empty vacuoles are diffusely seen in the cytoplasm of hepatocytes. They are created on the place of fatty droplets, which had been soluted with alcohol during preparation of the slide.

Slide 3. Kidney in Diabetes Mellitus (ought to be drawn)

The red color granules of glycogen can be found with large magnification in the epithelial cells of Henley's loops and in the lumen of kidney's tubules.

Slide 4. Keratinized dystrophy of an epidermis (ought to be drawn)

It is seen an excess of keratin material in keratinizing layer of skin epidermis. It looks as bright pink broad layer on the surface of the epidermis.

Slide 5. Hyaline-droplets degeneration of Kidney (ought to be drawn)

Epithelial cells of renal tubules are increased. Cytoplasm of these cells contains large bright pink hyaline-like includes.

Slide 6. Colloid (mucoid) carcinoma of the Stomach

Atypical enlarged transparent tumoral epithelial cells ("signet ring" cells) produce abundant mucus (colloid) and die in it.

Self-check materials:

1.External examination of a newborn revealed dry dull pale skin with uneven surface and presence of gray scaling plates. Which type of degeneration is this pathology associated with?

A. Hydropic
B. Hyalin-drop
C. Horny*
D. Fibrinoid swelling
E. Mucoid swelling

2.Autopsy of the patient who had been ill with leukemia and died of increasing chronic anemia revealed an enlarged heart, dull, flabby, pale gray myocardium. There were yellow plaques and bands under the endocardium. Which pathologic process is observed in the heart?

A. Vacuole degeneration
B. Hyalin-drop degeneration
C. Mesenchymal fatty degeneration
D. Parenchymal fatty degeneration*
E. Functional hypertrophy

3.Microscopic study of the biopsy material from the female patient who suffers from diabetes mellitus has revealed that the epithelium of narrow and distal segments of the tubules is high with light foamy cytoplasm. Staining with Best's carmine revealed red grains in the cytoplasm of the epithelium and tubules. Which parenchymatous dystrophy is present?

A. Protein
B. Fat
C. Hyalin-drop
D. Mucous
E. Carbohydrate*

4.Autopsy of the patient who had suffered from hypertension disease revealed considerable enlarged flabby heart with widened cavities. The myocardium was dull, clay-like, with white strips from the side of the myocardium which were more pronounced in the papillary muscles and trabeculas of the heart ventricles (tiger's heart). Which parenchymatous dystrophy was present?

A. Fat*
B. Horny
C. Mucous
D. Protein
E. Carbohydrate

5.Microscopy of the kidneys from the dead patient who had suffered from chronic glomerulonephritis showed enlarged epithelial cells of the renal tubules, their cytoplasm was filled with vacuoles with transparent fluid, the nucleus was displaced to the periphery. Which parenchymatous dystrophy was present?

A. Protein
B. Horny
C. Hyalin drop
D. Hydropic *
E. Fatty

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). -Simferopol: 2 ed. CSMU, 2002- P. 222.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 1994-1400
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TOPIC 3 : ***Morphology of reversible and irreversible cell and tissues damage. Extracellular accumulation of fat, carbohydrate and protein. (Stromal -vascular degenerations).***

Actuality of the problem.

Extracellular accumulations or mesenchymal (stromal-vascular) degenerations of the proteins, lipids, carbohydrates develop in the connective tissue as a result of metabolic disturbances in it. Proteinous mesenchymal degenerations occur as mucoid swellings, fibrinoid changes, hyalinosis. These pathological processes are successive stages of disorganization of the connective tissue.

Knowledge of these processes is necessary for understanding of the pathogenesis of the diseases and for the clinic-anatomical analysis of the autopsy.

Aim of studies. Learn the morphological features of the extracellular accumulations; to explain the causes and mechanisms of their development; to estimate outcomes and determine the significance for organism.

Tasks of the studies:

1. To explain the extracellular mechanisms of trophics and causes of their disturbances.
2. To interpret morphology of the extracellular accumulation of proteins, carbonhydrates, lipids and their consequences.
3. Learn the classification of the extratracellular accumulations according to prevalence of morphological changes, to the prevalence of that or another type of metabolism, to the influence of genetic factors and to the spreading of the process.
4. Study the mechanisms of the various types of mesenchymal degenerations.
5. Learn the morphology and functional manifestations of the mucoid swelling, hyaline changes, amyloidosis and fatty growth.

Questions for self-studying:

1. Extracellular accumulations: causes, morphological mechanisms of development (infiltration, transformation, decomposition, perverted synthesis).
2. Call the definition, classifications, causes and mechanisms of the development of mesenchymal (extracellular) degenerations.
3. Call types of proteinogenic mesenchymal (extracellular) degenerations. Describe morphological signs of the mucoid swelling, and hyaline changes. What stages of the disorganization of connective tissue do you know? What functional significance of hyaline changes takes place?
4. Call chemical nature of amyloid. What types of amyloidosis take place?
5. Describe morphological signs of amyloidosis. What functional significance of amyloidosis takes place?

6. Call causes and mechanisms of fatty growth. Common obesity: causes, pathogenesis, morphologic characteristics; classification.
7. Cachexia. Causes, pathogenesis, morphological features.
8. Lipomatosis and partial lipodystrophy.
9. Stromal-vascular carbohydrates degenerations associated with metabolic disturbances of glycoproteins and mucopolysaccharides. Mucopolysaccharidosis.

Practical work students do at class:
Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1.“Amyloidosis of the Spleen (Sago Spleen)”. Pay attention to the dimensions of organ, its size, color, texture, appearance of surface on the section.
Indicate the nature of process, localization of amyloid. Define this process; indicate the stages of morphogenesis. Name specific microscopic staining for amyloid.
2.“Amyloidosis of the Spleen (Lardaceous Spleen)”. Pay attention to the dimensions of organ, its size, color, texture, the width of cortical layer, the appearance of surface on the section.
Indicate the nature of process, localization of amyloid. Indicate the difference between “sago” and “lardaceous” spleen.
3.“Amyloidosis of the Kidney (“Large greasy Kidney”)”. Pay attention to the dimensions of organ, its size, color, texture, appearance of surface on the section. Cortex layer is broad, pale-yellow, compacted.
Indicate the nature of process, localization of amyloid. Name the diseases, which can result amyloidosis of the kidney. What is the result of it?
4.“Lipomatosis of the Aorta”. Note the localization, size, shape, color of the aorta.
What are the causes of such changes? What possible outcomes may be?
5.“Adipose Heart”. Determine the dimensions of the organ. Pay attention to the quality of the fat under the epicardium. Pay attention to the growth of fatty tissue in the heart wall on the section, more developed in the right portions.
Characterize the type of dysfunctional fatty metabolism. Name the etiology and mechanisms of development of the general obesity, its significance, and outcome.
6.“Hyaline change in the Spleen’s capsula”(“Glazed Spleen”). Pay attention to the organ enlargement, changes in color of capsula, texture of organ tissue, appearance of surface on the section.
What are the causes of such changes?
7.Sclerosis and hyalinosis of Mitral valve (Rheumatic defect of the heart). Pay attention to the leaflets of the valve are thickened, firm, rigid, deformed and loss their transparency; the greater thickening along the line of closure is seen. Chordae tendineae are thickened and shortened.
What are the causes of such changes?
8.Amyloidosis of Liver (“Lardaceous Liver”). Pay attention to the organ enlargement. The cutting surface looks as pale, waxy-like and greasy-brilliance masses.
Indicate the nature of process, localization of amyloid. Define this process; indicate the stages of morphogenesis.

9.“Glazed Spleen” (Hyalinosis of capsule of Spleen)”

The capsule of the spleen is thickening. In some places sugar-glazed-like coverings of whitish-gray color are noted. Such changes are found out usually in cases of chronic inflammatory processes within the abdominal cavity.

What type of stromal-vascular degeneration takes place?

Slides for drawing and describing in album:

Slide 1. Hyaline change in the spleen’s vessels

The arterioles at the center of lymphoid follicles have narrow lumen and thicken homogenous walls of pink color.

Slide 2. “Lardaceous” Spleen (ought to be drawn)

Amyloid is located in spleen’s pulp across the reticular fibers. It is colored in red color with eosin. Lymphoid elements of pulp are kept here and there. The follicles are kept; amyloid is absent in their structure.

Slide 3. Amyloidosis of Kidney (stain by Congo-red)

Amyloid has red color. It is seen as small pink color clods in glomeruli and pink color fibers in stroma. Amyloid is deposited under tubular epithelium and leads to its atrophy and thickening. Besides, amyloid can be found in the walls of small vessels, where it is also located under epithelial layer.

Slide 4. Simple obesity of the heart (ought to be drawn)

Masses of adipose tissue can be found between muscle fibers. These masses look like large optically empty vacuoles. Muscle fibers are suppressed and atrophic.

Slide 5. Mucoid swelling of leaflet of Mitral Valve in rheumatic fever (toluidin-blue-staining)

The tissue of leaflet lost its fibrillary structure due to swelling and homogenization of collagen fibers and is colored in violet colour in contrast with normal dark-blue stained tissue (phenomenon of metachromatism).

Slide 6. Hyalinosis of arteries of Spleen.

The arterioles in the centers of lymphoid follicles look as thickened homogenized eosinophilic masses.

Slide 7. Fibrinoid swelling of atrerial wall in intestine in periareritis nodosa.

In submucosa of intestine the walls of small arteries lost their clear structure due to infiltration by fibrinoid and look as homogenized eosinophilic masses. The perivascular inflammative infiltrates are seen.

Self-check materials:

1.Skin biopsy of the patient with allergic vasculitis demonstrated a thickened homogenic, pyroninophilic vascular walls at Brachet’s reaction, PAS-positive, stained yellow with picrofucsin. Name the type of mesenchymal degeneration.

A. Fibrinoid swelling*
B. Amyloidosis
C. Mucoid swelling
D. Hyalinosis
E. Lipidosis

2.A woman aged 68 has been suffering from fibrous cavernous pulmonary tuberculosis for 20 years. In the recent years, the signs of chronic renal failure have been noted. Intravital test for amyloid in the kidneys is positive. Which form of amyloidosis is present in this case?

A. Primary systemic
B. Secondary systemic*
C. Limited (local)
D. Family congenital
E. Senile

3.The patient who had suffered from hypertension disease died of brain hemorrhage. Microscopy of the arteriole walls supplying this area of the brain showed that they are homogenic, eosinophilic, PAS-positive. Which substance is responsible for the changes in the walls of the vessels?

A. Lipohyalin

B. Amyloid
C. Complex hyalin
D. Simple hyalin*

4.Histology of the deformed mitral valve revealed marked basophilic reaction at staining with hematoxylin-eosin of the connection tissue, staining with toluidin blue showed metachromasia reaction. Which changes in the connective tissue can be revealed by these reactions

A. Amyloidosis
B. Fibrinoid swelling
C. Hyalinosis
D. Mucoid swelling*
E. Fibrinous necrosis

5.Autopsy of the man revealed the signs of rheumatic heart defect, i.e. thickened deformed cartilage-like valves with luster surface. Which process is present in the valves:

A. Amyloidosis
B. Fibrinoid necrosis
C. Fibrinoid swelling
D. Hyalinosis*
E. Degenerative calcification

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). -Simferopol: 2 ed. CSMU, 2002- P. 222.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 1994-1400
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Topic 4. ***Pathology of pigments. Mineral metabolism disturbance.***

Actuality of the problem.

Pigments are colored substances, some of which are normal constituents of cells where as others are abnormal and collect in cells only under special circumstances. Pigments are generally classified into two broad categories: endogenous pigments, which are normal constituents of cells and tissues, and exogenous pigments introduced into the body from without. Impairment of metabolism of the endogenous pigment may lead to various pathological processes, especially: hemosiderosis, hemochromatosis, jaundice, melanosis, etc.

Minerals play an active role in metabolic processes of the human organism. They are components of structural elements of cells, enzymes, hormones, vitamins, and pigments. Therefore in medical practice the most frequent are disturbances in the metabolism of calcium, copper, potassium, and iron.

Knowledge of these processes is necessary for understanding of the pathogenesis of some diseases and for the clinic-anatomical analysis of the autopsy.

Aim of studies. Study the mechanisms of development, morphology and outcomes of the impairment of metabolism of the endogenous and exogenous pigments. Estimate the consequences of metabolism's impairment of calcium, copper, and iron in organism.

Tasks of the studies:

1. Know classifications of endogenous and exogenous pigments.
2. Explain and estimate role of hemoglobinogenous pigments in organism.
3. Tell apart about these processes according to morphological features.
4. Study the mechanisms and morphologic features of the various types of jaundice. Give examples.
5. Know classifications, mechanisms of development and appearance of calcification. Give examples.
6. Learn the morphology, functional manifestations and complications of the stone's formation in different organs.

Questions for self-studying:

1. Classification of endogenous pigment and exogenous pigments.
2. Metabolic disturbance of iron and hemoglobinogenic pigments. Metabolism and pathogenic action of iron, formation of anabolic and catabolic ferritin. Toxic forms of ferritin: causes and effects of their formation.
3. Classification of hemoglobinogenic pigments. Disorders of hemoglobin-derived pigments metabolism: hemosiderosis, hemochromatosis, hemomelanosis. Mechanisms of their development. Evolution of bruise according to changes of pigments
4. Types of jaundice: Intrahepatic jaundice (hepatocellular jaundice), posthepatic jaundice (obstructive jaundice, hemolytic, prehepatic jaundice (hemolytic jaundice); mechanisms of their development and morphological features.
5. Porphyria: causes, morphological and clinical manifistatiopns.
6. The proteinogenous pigments: classification, role of proteinogenous pigments in the physiology and pathology.
7. Disorders of proteinogenous pigments metabolism. Morphological description of hypopigmentation (leucoderma, vitiligo, albinism) and hyperpigmentation (diffuse and local melanosis, nevus). Addison's disease.
8. Disorders of nucleoproteins metabolism. Gout and gout arthritis: classification, etiology, pathogenesis, stages and morphological characteristic of changes of joints, clinical manifestations, complications, outcomes. Gout nephropathy. Clinical-morphological manifestations.
9. The lipidogenous pigments: classification, biological role of lipofuscin, lipofustcinosis.
10. Disorders of mineral metabolism. Mineral dystrophies, their types. Disorders of copper metabolism. Hepatolenticular degeneration (Wilson's disease).
11. Disorders of calcium metabolism – calcinosis. Types of calcifications (dystrophic, metastatic and metabolic calcification). Causes, pathogenesis and morphological characteristics.
12. Causes and mechanisms of the formation of stones. Types of stones. Consequences of stones formation.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process

correspond to	outcomes

Macropreparations:

1. "Hemosiderosis of the Spleen in hemolytic disease of newborn". Pay attention to the shape of organ, its size, color, texture, appearance of surface on the section. Indicate the nature of process.
What are the causes of such changes?
2. "Brown induration of the Lung". Pay attention to the shape of organ, its size, color, texture, the appearance of surface on the section.
Why are the lungs firm and brown? What type of hemosiderosis takes place? In what cases else such changes take place?
3. "Brown atrophy of the Myocardium". Pay attention to the size, shape, and quantity of subendocardial fat, color of the cardiac muscles.
What are the causes of such changes? Why is the heart brown?
4. "Gallstones". Pay attention to the size of gallbladder. Describe the color of the stones, their size and surface.
Name the stones of the bile duct according to their chemical composition.
5. "Renal stones". Pay attention to the appearance of the stones, their shape, size and surface. Pay attention to the changes in renal tissues.
What are possible complications of renal stones?
6. "Stones of the Urine Bladder". Pay attention to the appearance of the stones, their shape, size, color and surface.
What are the causes of such changes? What are possible outcomes?
7. "Metastasis of melanoblastoma in the Skin, Larynx, and Liver". Pay attention to localization, size, shape, condition of boundary between metastases and surrounding tissue.
What pigment is present in metastasis?
8. "Icteric necrotic nephrosis". Pay attention to size and shape of kidney; to note the state of renal tissue on section: structure, color, and thickness of cortex and medulla.
What pigment deposits in kidney? Call the cause of its deposition.
9. "Hemorrhage in the Brain (hematoma)". Pay attention to localization, size, shape, color, and consistency of the hematoma. Describe boundaries of the hematoma.
What pigment deposits in hematoma? What type of hemosiderosis takes place?
10. "Pigment nevus". Pay attention to the size, color, texture, appearance of surface and state of surrounding skin.
What pigment deposits in nevus?

Slides for drawing and describing in album:
Slide 1. Ghon's focus (ought to be drawn)
It is an area of caseation necrosis with massive petrification. This focus is separated from the lung tissue with fibrotic capsule (incapsulation).
Slide 2. Local hemosiderosis of ovarium (ought to be drawn)
In ovarium stroma visible yellow-brown pigment (hemosiderin), follicular cyst, fibrous tissue and white bodies.
Slide 3. Skin in gout (ought to be drawn)
The salts of uric acid are accumulated in derma in the manner of amorphous masses or needle-like crystals. The reactive proliferation of giant multinuclear foreign body cells around a postponing of uric salts is noted.
Slide 4. Yellow softening of the Brain (ought to be drawn)
The glial macrophages with the granules of yellow-brown pigment in cytoplasm accumulate around the area of necrosis (softening of brain tissue – pink color) on the border of saved tissue.
Slide 5. Skin in Addison's disease (ought to be drawn)

In the basal layer of epidermis the melanocytes carrying the brown-black pigment (melanin) are seen.

Slide 6. Hemosiderosis of the Spleen in leukemia (Prussian blue reaction)

The excessive amount of hemosiderin as intracellular as free locating amongst the tissues is noted everywhere within the Spleen. The granules of iron-containing hemosiderin is colored to greenish blue color because of Prussian blue reaction in which colorless potassium ferrocyanide is converted by iron to blue-greenish ferric ferrocyanide.

Slide 7. Kidney in gout

The salts of uric acid are accumulated in tissue of Kidney in the manner of amorphous masses or needle-like crystals. The reactive proliferation of giant multinuclear foreign body cells around a postponing of uric salts is noted.

Slide 8. Intradermal nevus

There are clear visible nevus cells in derma of skin. Several cells contain black-brownish granules of melanin. Hear follicles and sebaseous glands are also visible.

Slide 9. Metastatic calcification of the Lung

There are many locations of calcium in the basemant membrane of alveolar walls in lung. They are violet color.

Self-check materials:

1. The patients with hypernephroid cancer of the kidney with multiple metastases developed bronze coloring of the skin, weakness, hypotension, adynamia. Which pigment is responsible for the changes in the color of the skin:
   A. Melanin*
   B. Hemosiderin
   C. Porphyrin
   D. Lipofuscin
   E. Biliverdin
2. Gastroscopy revealed an ulcer with dense herders and black-brown bed in the gastric mucosa. Microscopy revealed black-brown pigment on the necrotic layer in the ulcer bed. Which pigment is it?
   A. Porphyrin
   B. Hydrochloric hematin*
   C. Bilirubin
   D. Ferritin
   E. Hemosiderin
3. After a snake bite a woman developed hemolytic anemia, in spite of the intensive therapy the patient died on the 7th day. The autopsy showed brown spleen, bone marrow and lymph nodes. Microscopy revealed Pearls- positive pigment in the cytoplasm of macrophages of these organs. Which pigment was present in the tissues?
   A. Hematoidin
   B. Hematin
   C. Lipofiiscin
   D. Bilirubin
   E. Hemosiderin*
4. Histological study of the organs from a woman aged 42 who had had breast cancer with multiple metastases to the spine revealed small-foci calcifications in the lungs, kidneys, gastric mucosa, heart, walls of the arteries. Which type of calcification is most probable?
   A. Metastatic
   B. Dystrophic *
   C. Generalized interstitial
   D. Focal interstitial
   E. Metabolic
5. Autopsy of the patient who died of cancer cachexia demonstrated atrophy of the skeletal muscles, diminished heart and yellow-brown liver. Microscopy revealed small perinuclear grains of brown Perls-

negative pigment in the cytoplasm of the myocardiocytes and hepatocytes. Metabolism of which pigment is disturbed most probably?

A. Lipofuscin*
B. Hemosiderin
C. Hematoidin
D. Bilirubin
E. Hemomelanin

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 17-23.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 28-31.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 30-38.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993.- С . 76-89.
7. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 55-75.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. – М., 1986. - С. 43-53.

TOPIC 5: ***Cell and tissues injury. Necrosis and apoptosis. Sings of death. Fundamentals of Thanatology. Death, determination, signs of death.***

Actuality of the problem.

Necrosis and apoptosis are irreversible cell injuries. Necrosis is cellular death in the living body in the disease. Apoptosis is a programmed (physiological) death of the cell in the living body. These pathological processes were accompanying a lot of diseases, which are very often meeting and also they are selfish diseases. Research of the mechanisms, morphology of necrosis and apoptosis is important task in practical medicine because it may help to diagnose and treat the different diseases.

Aim of studies. Study the morphological features of necrosis and apoptosis; to explain the causes and mechanisms of their development; estimate outcomes and determine the significance for organism.

Tasks of the studies:

1. Explain the role of necrosis and apoptosis in organism.
2. Know the terminology and definitions these processes.
3. Know the classification of necrosis according to its causes and mechanisms of influence of pathogenic factor.
4. Learn the morphology and functional manifestations of necrosis and apoptosis.
5. Explain the morphologic features of the various types of necrosis and to estimate their functional significance.
6. Study the signs of death, postmortem changes.

Questions for self-studying:

1. Definition of necrosis as local cellular death. Conception of paranecrosis, necrobiosis and autolysis.
2. Causes, mechanisms of development and morphological characteristics of necrosis and apoptosis; morphological differences between necrosis and apoptosis. Peculiarities of necrosis in children.
3. Classification of necrosis according to its causes (traumatic, toxic, trophoneurotic, allergic, vascular) and mechanisms of influence of pathogenic factor (direct and indirect).
4. Clinical and morphological types of necrosis: coagulative (dry), liquefactive (wet), fatty, caseous, gangrene, infarction and sequester. Their characteristics. Significance of necrosis and its consequences.

5. Immune elimination of cells: morphological manifestations. Phagocytosis: definition, main cell-phagocytes, microscopic manifestations of phagocytosis.
6. Death, signs of death, postmortem changes. Causes of death. Natural death, violent death and death because of the disease.
7. Clinical and biological death. Tanathogenesis and signs of death. Postmortem changes, their morphological characteristics. Early and late signs of biological death and death of reanimating patient.
8. Conception of tanathogenesis and reanimatology. Pathology of reanimatology (jatrogenic pathology).
9. Causes, molecular-metabolic and structural mechanisms of stopping of activity of vitally-important organs at the natural course of disease. Nearest consequences of stopping of work of heart, lungs, brain, kidneys and liver.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Gangrene of the Foot". "Atherosclerotic gangrene of the Foot". Pay attention to the changes in the color, surface of skin, extent of necrotic tissue, texture.

What is gangrene? Call the causes of gangrene.

2. "Gangrene of the Intestine". Pay attention to the changes in the color, surface of intestinum, extent of necrotic tissue, texture.

What causes may lead to gangrene of intestinum?

3. "Ischemic infarction of the Spleen". To note the localization, size, shape, color of the area of necrosis

What type of necrosis takes place and what are the causes and mechanisms, which caused its development?

4. "Ischemic infarction of the Kidneys". To note the localization, size, shape, color of the necrotic area.

What type of necrosis takes place and what are the causes and mechanisms, which caused its development?

5. "Tuberculoma of the Lung". To note the localization, size, shape, color of the area of necrosis.

What type of necrosis takes place and what are the causes and mechanisms, which caused its development?

6. "Caseouse pneumonia in tuberculosis''. Pay attention to the changes in the color, size and texture of necrotic tissue in the lung.

What type of necrosis takes place? Call other diseases with this type of necrosis.

7."Ischemic infarction of Spleen" The wedge-shaped fragment of whitish tissue the apex of which is directed towards the gate of organ and the basis of which is directed towards the capsule, is seen in the background of dark-red spleen.

What type of necrosis takes place?

Slides for drawing and describing in album:

Slide 1. Coagulative necrosis of skeletal muscles in aseptic gangrene (ought to be drawn)

The muscles fibers are in condition of cytolysis, their nuclei are absent. Stroma is edematous.

Slide 2. Ischemic infarction of the Spleen (ought to be drawn)
The area of necrosis is bordered from saved tissues by zone of hyperemia and leukocytic infiltration (demarcation zone). The necrotic zone looks as homogenized pinkish masses, the nuclei of cells are absent.
Slide 3. Necrotic nephrosis (ought to be drawn)
Nephrocytes of proximal ducts are enlarged in sizes, their nuclei aren't defined (karyolysis); the nuclei of nephrocytes of distal ducts are saved. Glomeruli are saved.
Slide 4. Gangrene of the Appendix
Zone of necrosis is characterized by lysis of cells as homogeneous pinkish masses. Leukocytic infiltration is seen in serosa. Edema, dilation of vessels is visible too.
Slide 5. Tuberculoma of the Lung
It is an area of pinc color masses without any structure but with many dark blue grains (the result of caryorhexis and caryopycnosis). The dark violet areas of petrification can be found. The necrotic area is surrounded with fibrotic capsule.
Slide 6. Acute pancreonecrosis
Steatonecrotic areas in pancreas are pale. There is small leukocytic infiltration and lumps of bile pigments around necrotic foci. Fibrous stroma of pancreas looses its fibrillarity.

Self-check materials:

1. Liver biopsy of a woman with viral hepatitis revealed hepatocytes with balloon degeneration Councilmen's bodies in the sinusoid capillaries which, according to electron microscopy, are cell fragments surrounded by a cellular membrane, contained densely positioned organelles as well as nuclei fragments. Which process can be suggested by Councilmen's bodies?
   A. Necrosis
   B. Necrobiosis
   C. Apoptosis*
   D. Paranecrosis
   E. Degeneration
2. Histological study of an enlarged lymph node of the patients with tuberculosis showed irregular small chromatin grains in the focus of caseous necrosis. Which pathological process caused grain formation?
   A. Karyolysis
   B. Nuclear pyknosis
   C. Mitotic activity of the nuclei
   D. Karyorrhexis*
   E. Apoptosis
3. Autopsy of a man who had suffered from gastric cancer showed soft tissue necrosis in the zone of the sacrum, buttocks and calcaneus. Which is a most probable etiology of necrosis?
   A. Traumatic
   B. Toxic
   C. Trophoneurotic*
   D. Allergic
   E. Vascular
4. A patients with tuberculosis died of cardiopulmonary insufficiency. Autopsy revealed acute tuberculosis sepsis with multiple miliary necrotic tubercles in all organs.
Which is a most probable etiology of necrosis?
   A. Trophoneurotic
   B. Toxic*
   C. Traumatic
   D. Vascular
   E. Allergic
5. The patient with atherosclerosis developed gangrene of the lower extremity. The study of the vessels of the amputated extremity showed an obturating thrombus in the ileac artery. Which is the main etiological factor in this case?
   A. Trophoneurotic
   B. Traumatic

C. Toxic
D. Vascular*
E. Allergic

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 24-33.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 14-21.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 11-28.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 76-89.

TOPIC 6: ***Circulatory disorders: ischemia, hyperemia, hemorrhage, bleeding, stasis, plasmorrhagies. Disturbances of lymph circulation.***

Actuality of the problem.

Hemodynamic disturbances are considered under 2 broad headings: disturbances in the volume of the circulating blood (hyperemia and congestion, hemorrhage and shock) and circulatory disturbances of obstructive nature (thrombosis, embolism, ischemia and infarction). Research of the mechanisms, morphology of pathological processes in blood and lymphatic system may help to diagnose and treat the different diseases. These hemodynamic disturbances often are causes or complications of other diseases and in the majority of cases can become the cause of death. Different types of hemodynamic disorders accompany practically all known diseases; therefore study of these processes is important task in practical medicine.

Aim of studies. Study the morphological features of hemodynamic disturbances and their complications; to explain the causes and mechanisms of their development; to estimate probable outcomes and determine the significance for organism.

Tasks of the studies:

1. Know the terminology and definitions of hemodynamic disturbances.
2. Learn the morphology and functional manifestations of hemodynamic disturbances.
3. Study the causes, mechanisms of development, morphologic characteristics of hyperemia and congestion.
4. Study the causes, mechanisms of development, and morphologic characteristics of ischemia.
5. Explain the morphologic features of the lymphodynamic insufficiency. Study the causes, mechanisms of development, and morphologic characteristics of edema.

Questions for self-studying:

1. Conception of general and local hemodynamic disorders, their intercommunication, classification. Hyperemia. Arterial hyperemia: causes, types, morphology.
2. Congestion (venous hyperemia): general and local; acute and chronic.
3. Changes in organs in acute congestion (asphyxia of fetus and newborn; acute cardiac insufficiency). Their consequences.
4. Morphological changes in organs in chronic congestion (chronic cardio-vascular insufficiency). Morphogenesis of congested sclerosis.
5. Ischemia. Causes, types, morphology and consequences.
6. Hemorrhage: causes, types, morphology, consequences, significance for organism. Hemorrhagic diathesis.
7. Clinical-pathomorphological pecularietes features and consequences of postischemic-reperfusion damages of organs.

8. Plasmorrhagia. Causes, mechanisms of development, morphologic characteristics.
9. Morphological manifestations of disturbances of lymph circulation.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Cyanotic induration of the Spleen". Pay attention to the size, consistency and color of the organ.

Explain etiology and morphogenesis of cyanotic induration.

2. "Cyanotic induration of the Kidneys". Pay attention to the size, consistency and color of the organ.

Explain etiology and morphogenesis of cyanotic induration.

3. "Brown induration of the Lung". Pay attention to the size, consistency and color on the cut surface.

Explain the origin of the term "brown induration of the lung" and morphogenesis of brown induration of the lung.

4. "Nutmeg Liver". Pay attention to the size and consistency of the liver, color on the section.

Why liver is called "nutmeg"? What diseases can lead to formation of "nutmeg liver"?

5. "Congestion in the Stomach". The walls of stomach are enlarged, dark color.

What pathological processes take place? Name possible outcomes in this case.

6."Cephalohematoma". Pay attention to hemorrhage's localization and size, describe boundary of hematoma and condition of surrounding tissue.

Give definition and name possible outcomes of this pathologic process.

7. "Hemorrhage in the Brain (hematoma)". Pay attention to localization, size, shape, color, and consistency of the hematoma. Describe boundaries of the hematoma.

Give definition and name possible outcomes of this pathologic process.

8."Hemorrhage in trunk of the Brain ". Pay attention to hemorrhage's localization, size and color. Describe boundary of hemorrhage and condition of surrounding tissue.

Give definition and name possible outcomes of this pathologic process.

9. "Chronic peptic ulcer of the Stomach with arrosion of vessel". Pay attention to the cutting surface of stomach, size and localization of the ulcer and character of arrosional vessel.

What are the causes of such changes? What are the possible outcomes?

10. "Tamponade of cavity of the Pericardium". Pay attention to the cavity of pericardium. It is filled by flat brownish clots which were formed due to hemorrhage within the cavity in result of rupture of myocardium.

What are the causes of such changes? What are the possible outcomes?

Slides for drawing and describing in album:

Slide 1. "Nutmeg" liver (ought to be drawn)

The capillaries in the central areas of lobules are dilated and filled with blood. The emigrated erythrocytes are under hemolysis. The liver's beams here and there are thinned or absent. The brown pigment hemosiderin locates in the cells.

Slide 2. Brown induration of the lung (ought to be drawn)

The alveolar macrophages with the presence of hemosiderin in their cytoplasm can be seen in the alveolar spaces. Interalveolar septa are thicken because of the dilation of their capillaries and proliferation of the septal cells. The growth of the connective tissue takes place between lobules.

Slide 3. Cyanotic induration of the spleen

The hyperemia of the organ with the development of connective tissue takes place. Capsule and trabecules are thickening.

Slide 4. Petechial hemorrhages in the brain tissue (ought to be drawn)

The small clusters of erythrocytes are seen here and there in the brain tissue. These blood clusters surround small vessels like muffs. The walls of vessels are saved. The spots of hemorrhages around small vessels with saved walls are the result of diapedesis of erythrocytes.

Slide 5. Inflammative hyperemia of the Lymph node

Small vessels of Lymph Node are dilated and filled with erythrocytes.

Self-check materials:

1. A patient with hepatic cirrhosis developed a collapse and hyperaemia of the peritoneum after removal of 10 litres of ascitic fluid from his abdominal cavity. Determine the kind of arterial hyperaemia of the perito

A. Inflammatory
B. Hyperaemia after anaemia*
C. Vicarious
D. Collateral
E. On the ground of an arteriovenous shunt

2. An autopsy revealed a diverse big liver with a picture of a nutmeg on section. In the lumens of the hepatic veins there were parietal thrombi. Name the kind of a circulatory disturbance in the liver.

A. General venous plethora
B. Anaemia
C. Haemorrhage
D. Local venous plethora*
E. Bleeding

3. An autopsy revealed a diverse big liver with a picture of a nutmeg on section. In the lumens of the hepatic veins there were parietal thrombi. Name the kind of a circulatory disturbance in the liver.

A. General venous plethora
B. Local venous plethora*
C. Anaemia
D. Haemorrhage
E. Bleeding

4. An autopsy of a male, who died from a profuse bleeding after numerous gunshot injuries, revealed large accumulation of coagulated blood in the soft tissues of his left thigh with an impairment of the structure of the muscles. Which of the processes listed below was the most probable?

A. Haemorrhagic infiltration
B. Microfocal haemorrhage (petechia)
C. Bruise
D. Ecchymoses
E. Haematoma*

5. A male patient, who suffered from a chronic gastric ulcer, developed a gastric bleeding. Indicate the mechanism of the impairment of the vascular wall which most likely could result in a haemorrhage.

A. Rupture
B. Erosion*
C. Spasm
D. Diapedesis
E. Oedema

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). -
Simferopol: 2 ed. CSMU, 2002- P. 33-39.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 93-98.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby
Company. - Toronto - Philadelphia, 1990. - P. 128-130.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 90-96.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 106-115.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 66-79.

TOPIC 7: *Disturbances of hemostasis. Thrombosis, DIC. Embolism. Shock. Infarction.*

Actuality of the problem.

Thrombosis and embolism also can lead to serious clinical manifestations and are accompanied by occlusion of vessels, ischemia and infarction. These hemodynamic disturbances often are causes or complications of other diseases and in the majority of cases can become the cause of death. Therefore, the study of these pathological processes has big clinical significance. Knowledge of the mechanisms of development, morphologic manifestations, may help to diagnose the disease, prevent the spread of probable complications and treat them.

Aim of studies. Study the morphological features of hemodynamic disturbances (thrombosis and embolism) and their complications (infarction, disseminated intravascular coagulation); to explain the causes and mechanisms of their development; to estimate outcomes and determine the significance for organism.

Tasks of the studies:

1. Know the terminology and definitions of hemodynamic disturbances (thrombosis and embolism, Infarction, DIC-syndrome).
2. Learn the morphology and functional manifestations of thrombosis and embolism, Infarction, DIC-syndrome.
3. Study the causes, mechanisms of development, morphologic characteristics of thrombosis, outcomes and significance for organism.
4. Study the causes, mechanisms of development, and morphologic characteristics of the various types of embolism.
5. Learn the morphology and functional manifestations of infarction.
6. Explain the morphologic features of the disseminated intravascular coagulation syndrome.

Questions for self-studying:

1. Thrombosis: clinical - morphologic manifestation, significance and consequences of thrombosis.
2. Local and general factors of creation of thrombus.
3. Thrombus: definition, types and morphological characteristics, distinguishing features of arterial and venous thrombi
4. Syndrome of disseminated intravascular coagulation (DIC).
5. Embolism. Causes, types, morphologic characteristic, consequences, significance of embolism.
6. Orthograde, retrograde and paradoxical embolism.
7. Thromboembolism of pulmonary artery.
8. Infarction: definition, types, morphological features and outcomes.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation.	1. To indicate used staining method for the

2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Thromboembolism of pulmonary artery". Pay attention to character and consistence of thrombotic masses. Describe the localization of thromboembolus, size, and color.

Name the most frequent origin of pulmonary thromboembolism. Characterize the mechanism of death under pulmonary thromboembolism.

2. "Obturated thrombus of "vena cava inferior". Pay attention to shape, color, consistency and localization of thrombus into lumen of vessel.

Name the morchologic type of thrombus.

3. "Chronic cardiac aneurysm with thrombosis". Pay attention to the brown thrombotic masses, their localization on the surface of chronic cardiac aneurysm.

What are the causes of such changes? What are the possible outcomes?

4. "Embolic purulent nephritis". Pay attention to the size of the kidney, its shape, color, consistency. Note numerous areas of reddish color. It's secondary nephritis appearing due to septic embolism.

Give definition and name possible outcomes of this pathologic process.

Slides for drawing and describing in album:

Slide 1. Red thrombus (ought to be drawn)
The lumen of the vein is filled with fresh masses of red thrombus with fibrin and erythrocytes.

Slide 2. Intertrabecular mixed thrombus in atrium (ought to be drawn)
The red color areas are the areas of crowded erythrocytes. Blue color areas – leukocytes; purple color – thrombocytes and fibrin.

Slide 3. Cancer embolism of the lymphatic vessels of liver (ought to be drawn)
Solid accumulations or like glandular foci of cancer cells locate in most liver triads, especcialy between vein, artery and bile ductus, but sometimes in the lumens of lymphatic vessels.

Slide 4. White thrombus (ought to be drawn)
The thrombus contains fibrin in form of firm fibrillar pinkish masses or thin fibers similar to network. There are leukocytes and lymphocytes among the fibrin. Thrombocytes look as pale granular agglutinated homogenized masses.

Slide 5. Organization and recanalization of thrombus (ought to be drawn)
The lumen of artery is obliterated by thrombus.Fibrillar connective tissue with multiple clefts and young vessels, brownish granules of hemosiderin are visible in thrombus.

Slide 6. Mixed thrombus
Thrombotic masses contain pinkish fibrin, leukocytes, and erythrocytes with hemolysis. Agglutinated masses of thrombocytes are visible among fibers of fibrin.

Slide 7. Embolism of hepatic lymphatics by tumorous cells (ought to be drawn)
There are complexes of intensively painted carcinomatous cells in the lumens of lymphatic vessels.

Slide 8. Septic thrombus within splenic artery
Mixed thrombus with accumulation of leukocytes and surrounding small cavities- areas of thrombotic lysis, can be found in the lumen of splenic artery. The wall of artery is infiltrated by leukocytes.

Self-check materials:

1. A 52-year-old woman has a history of urinary tract infections. Recently, one of these episodes was complicated by acute pyelonephritis involving her kidneys. She became septic, and a blood culture grew Escherichia coli. She developed severe hypotension. She had purpuric areas on her skin. A stool for occult

blood was positive. She had a prothrombin time of 50 sec (control 12), partial thromboplastin time of 100 sec (control 25), platelet count of 20,000/microliter, and D- dimer of 4 microgm/mL. These findings are most characteristic for which of the following conditions:

A. Hemophilia A
B. Von Willebrand disease
C. Antiphospholipid syndrome
D. Disseminated intravascular coagulation *
E. Acute fulminant hepatitis

2. A male patient with multiple fractures of his long tubular bones suddenly died under the phenomena of acute pulmonary insufficiency. An autopsy did not reveal any pathological changes in the internal organs. Microscopically, there were some diffuse sudanophilous inclusions in the lumens of small branches of the pulmonary artery and capillaries. What kind of embolism was the most probable?

A. Thrombembolia
B. Air
C. Tissue
D. Fat*
E. With foreign bodies

3. An autopsy of a 70-year-old male, who suffered from hypertensive disease and died of a disturbance in the cerebral circulation, revealed in his brain stem some cavity which was 2 cm in diameter and filled with blood clots. Name the mechanism of the impairment of the vascular wall which most likely could result in a haemorrhage.

A. Rupture*
B. Spasm
C. Erosion
D. Oedema
E. Diapedesis

4. Following an injury of his cervical veins, a male suddenly died under the phenomena of an acute respiratory insufficiency. An autopsy revealed that his right heart cavities were distended and contained some foamy liquid blood, the major veins contained the blood of the same kind. Microscopically, the lumens of small branches of the pulmonary arteries and capillaries revealed numerous embolic masses. Which of the kinds of embolism listed below was the most probable?

A. Tissue
B. Gaseous
C. Thrombembolia
D. Air*
E. Fat

5. An autopsy of a woman, who died from acute myocardial infarction, a thrombus in a vein of her left shin was found out. A microscopic study of the thrombus revealed that it was substituted with a connective tissue having some cracks and channels with an endothelial lining. Indicate the most probable outcome of the thrombosis.

A. Aseptic autolysis
B. Petrification of the thrombus
C. Organization and canalization of the thrombus*
D. Septic autolysis
E. Transformation into thromboembolism

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 40-47.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 98-121.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 130-133.

4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 96-108.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 115-132.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 79-89.

TOPIC 8: ***Inflammation. Types of inflammation. Cells involved in inflammation. Exudative inflammation. Morphology of exudative inflammation.***

Actuality of the problem.

Inflammation is fundamentally a protective response whose ultimate goal is to rid the organism of both the initial cause of cell injury and the consequences of such injury, the necrotic cells and tissues. Acute inflammation is the immediate and early response to an injurious agent. The account of acute inflammation given above is based on local tissue responses. However, acute inflammation is associated with systemic effects. Knowledge of these processes is necessary for understanding of the pathogenesis of the diseases and for the clinic-anatomical analysis of the autopsy.

Aim of studies. Study the morphological features of the acute; to explain the causes and mechanisms of it development; to estimate outcomes and determine the significance for organism.

Tasks of the studies:

1. Explain the role of inflammation in organism.
2. Know the terminology of inflammation.
3. Tell apart the inflammatory processes of alteration, exudation and proliferation.
4 Learn the morphology and functional manifestations of different types of exudative inflammation, their outcomes.

Questions for self-studying:

1. Definition. Essence and biological significance of inflammation.
2. Causes and mechanisms of development of inflammation.
3. Phases of inflammation, their morphological features.
4. Classification of Inflammation.
5. Morphological patterns of acute inflammation.
6. Classification of exudative inflammation.
7. Suppurative inflammation. Types of supurative inflammation (abscess and phlegmon). Outcomes and complications.
8. Fibrinous (pseudomembranous) inflammation. Croupous and diphtheric inflammation. True and false croup. Examples of diseases.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Abscess of the Lung at child". Pay attention to the appearance of the abscess walls and the content of the cavity.

Which type of the inflammation is it? Name the causes of the purulent inflammation and its outcome.

2. "Croupous pneumonia in the stage of grey hepatization". Describe the appearance of the lungs, aeration, pleura state, the character of exudates.

Call the etiological factors, the outcomes of the inflammation and possible complications.

3. "Purulent mediastinitis". Pay attention to the impregnation by exudates; describe color and surface of mediasinum.

In what cases this inflammatory process takes place?

4. "Brain abscess". Pay attention to the appearance of the abscess walls and the content of the cavity.
Which type of the inflammation is it? Name the causes of the purulent inflammation and its outcome.

5. "Purulent meningitis". Characterize the type of inflammation in the pia mater of the brain: swelling, color, condition of sulcus, convolutions and vessels. *What type of inflammatory process takes place?*

6. "Purulent pleuritis". Describe the appearance of the lungs, aeration, pleura state, the character of exudates. *Call the etiological factors, the outcomes of inflammation and possible complications.*

7. "Fibrinous Pericarditis ("cor villosum")". Pay attention to the appearance of the epicardium, its surface. *How do you characterize the type of inflammation?*
What are the causes of such changes? What are the possible outcomes?

8. "Phlegmonous appendicitis". Pay attention to the size, color, and surface of appendix.
Characterize the type of inflammation.

9. "Abscess of the Liver". Pay attention to the appearance of the abscess walls and the content of the cavity. *What type of inflammatory process takes place? What are the causes of such changes?*

10. "Diphtheritic Colitis". The wall of large intestine is thickened with some areas of ulceration. Mucosa is rough, covered by dense fibrinous yellowish-grayish masses, which closely connected with sublying layers. If those masses are come off ulcers appear in their sites.
Characterize the type of inflammation, its complications.

11. "Embolic purulent nephritis". Pay attention to the size, color, and surface of the kidney. *What type of inflammatory process takes place? What are the causes of such changes?*

Slides for drawing and describing in album:

Slide 1. Phlegmonous inflammation of the Thigh (ought to be drawn)
The edema, hemorrhages and diffuse infiltration of the cellular tissue with leukocytes take place.

Slide 2. Fibrinous pericarditis (ought to be drawn)
The pink-purple masses of fibrin with red blood cells, leukocytes are noted on the surface of pericardium.

Slide 3 (345). Fibrinous pericarditis (ought to be drawn)
The pink-purple masses of fibrin with red blood cells, leukocytes are noted on the surface of pericardium.

Slide 4. Acute purulent bronchopneumonia
There are many neutrophils in the lumens of alveoli, bronchi and bronchioles. The small abscesses with necrosis of pulmonary tissue are seen here and there. Hyperemia of vessels is noted.

Self-check materials:

1. For a histological examination, a vermiform process (appendix) was sent. Its size is increased, the serous membrane is dim, plethoric and covered with greyish films, the wall is thickened and some pus is discharged from the lumen. Microscopically, a plethora of the vessels, an oedema of all the layers and their diffuse infiltration by leukocytes are observed. Name the kind of inflammation in the vermiform process.

A. Catarrhal
B. Putrid
C. Mixed
D. Fibrinous
E. Phlegmonous*

2. An examination of a 7-year-old child, who was referred to infectious department with complaints about a sharp pain in his throat, difficult swallowing, an elevated body temperature up to 39°C, an oedema of his neck, revealed that the tonsils were enlarged, their mucosa was plethoric and covered with a large number of

yellow-whitish films which were closely adjacent to the mucosa. An attempt to remove a film results in a deep bleeding defect. What kind of inflammation takes place?

A. Suppurative
B. Serous
C. Croupous
D. Diphtheritic*
E. Haemorrhagic

3. A male was treated for purulent otitis. On the 9th day of his staying at an inpatient department he died from a brain oedema. On autopsy, the temporal region of the left hemisphere revealed a cavity with uneven rough inner edges which was filled with some yellowish-greenish thick dull fluid. The outer wall of the cavity was represented with the cerebral tissue. What pathological process was it?

A. Acute abscess*
B. Colliquative necrosis
C. Phlegmon
D. Empyema
E. Chronic abscess

4. An autopsy of a 58-year-old male, who suffered from croupous pneumonia during his life-time and died of cardiopulmonary insufficiency, revealed 900 ml of some yellow-greenish dull fluid in his right pleural cavity. The pleural leaves were dull and plethoric. Name the ciinical- morphological form of the inflammation in the pleural cavity.

A. Dry pleurisy
B. Empyema*
C. Plegmon
D. Chronic abscess
E. Acute abscess

5. A 63-year-old male patient, who suffered from cancer of the stomach, developed a sharp pain in the epigastric region, tachycardia, loss of consciousness. Some time later the patient died. On autopsy, about 1000 ml of some yellow-greenish dull fluid in the abdominal cavity, as well as greyish thread-like deposits on the visceral and parietal leaves of the peritoneum, were revealed. What kind of inflammation takes place in the peritoneum?

A. Catarrhal
B. Serous
C. Haemorrhagic
D. Productive
E. Fibrinous-purulent*

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 48-54.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 53-64, 74, 82-85.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 67-89, 665-667.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 119-133.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 134-142.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 92-107.

TOPIC 9: ***Proliferative inflammation. Pathology of the immune system. Hypersensitivity reactions and mechanisms. Autoimmune diseases. Immunodeficiency states.***

Actuality of the problem. Proliferative (productive) inflammation is considered to be inflammation of prolonged duration, in which active inflammation, tissue destruction, and attempts in healing are proceeding simultaneously. Proliferative inflammation may have nonspecific and specific morphologic characteristics, therefore knowledges of this topic are necessary in practical medicine because it may help to diagnose and treat such diseases. Immunopathological processes are pathological states, which are associated with disturbances of structure and function of lymphoid tissue. There are a lot of scientific and medical problems, which are connected with immunopathological processes. They are autoimmune diseases, tumors growth (especially malignant tumors), and transplantation and at last - new infection like HIV (human immunodeficiency virus) infection. Research of the immune mechanisms, immune morphology is important task in practical medicine because it may help to diagnosis.

Aim of studies. Study the morphological features of the proliferative (productive inflammation); to explain the causes and mechanisms of it development; to estimate outcomes and determine the significance for organism. Learn the morphological features of injury of the immunocompetent organs; to explain the causes and mechanisms of their development; to estimate outcomes and determine the significance for organism.

Tasks of the studies:

1. Explain the role of proliferative (productive) inflammation in organism.
2. Know the terminology and definitions of the types of proliferative inflammation.
3. Learn the morphology and functional manifestations of granulomatous inflammation, estimate outcomes and significance for organism.
4. Study the morphology of interstitial inflammation.
5. Explain the morphologic features of the various types of chronic inflammation and estimate their functional significance.
1. Explain the role of immune system in organism.
2. Know the components of immune system.
3. Explain the mechanisms of immune reactions.
4. Learn the morphology and functional manifestations of allergic reactions (HIT, HDT), autoimmune diseases, immunodeficiency syndromes.

Questions for self-studying:

1. Definition of proliferative (productive) inflammation, its localization, main morphological types.
2. Mononuclear cell infiltration (local and diffuse).
3. Polyps and condylomas. Causes and morphological appearances.
4. Acute and chronic granulomatous inflammation
5. Granulomas and granulomatous diseases (examples); typical cellular composition of granulomas, their classifications depending on etiology and pathogenesis; morphological appearances depending on the type of immunnologic answer.
6. Histological structure of tuberculous, lepromatous, and syphilitic granuloma.
7. Relationship of productive inflammation with sclerosis and cirrhosis of organs, definition of these processes, their appearances and difference.
8. Components of the immune system. Differences between T and B- Lymphocytes. Central and peripheral organs of immune system, T-and B-dependent zones.
9. Changes of thymus during immunogenetic violations. Involution of thymus.
10. Changes of lymphoid tissue at antigen stimulation.
11. Definition and Classification of immunopathologic processes. Mechanisms of Immunologic Tissue Injury.
12. Type 1 hypersensitivity (anaphylactic type). Causes, mechanisms and morphologic appearances, examples of the hypersensitivity of immediate type.
13. Type 2 hypersensitivity. Causes, mechanisms and morphologic appearances, examples.
14. Type 3 hypersensitivity (immune complex-mediated). Causes, mechanisms and morphological appearance; examples of “immune complex diseases”.

15. Type 4 hypersensitivity (cell mediated). Causes, mechanisms and morphologic appearances, examples of the hypersensitivity of delayed type.
16. Insufficiency of the immunology system: determination, classification, causes of development, and clinic-morphological appearance of primary and secondary immunodeficiency. Examples.
17. Reaction of transplant rejection. Autoimmune diseases. Mechanisms, classifications, morphologic characteristics. Examples.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Polyps of the Stomach". Pay attention to the appearance of polyps, its size, the character of the growth. Name the localization of polyp.

Call other kinds of the productive inflammation.

2. "Miliary pulmonary tuberculosis". Pay attention to the appearance of the nodule and nature of the process. Describe the color, size, and quantity of them.

Give the definition with the regard of the character of the pathological process and its morphological form, etiology and degree of the prevalence. Translate the term "miliary". In what forms of tuberculosis is it observed? Call the possible outcomes of granuloma; the causes of the death.

3. "Echinococcus of the Liver". Pay attention to cavity, shape, and its internal layer, cyst contents. Describe the appearance of the external layer of the cyst side.

Name the sequence of changing the tissue reaction to the zone of parasitical inculcation.

4. "Mesaortitis in Syphilis". Pay attention to the localization of the pathological process with regard of the aorta part. Describe the appearance of the aorta in the place of the localization of the pathological process.

Give the definition with the regard of the character of the pathological process and its morphological form, kind of the productive inflammation. To call the etiological factors, the outcomes of the inflammation and possible complication.

Slides for drawing and describing in album:

Slide 1. Productive caseous lymphadenitis (ought to be drawn)

In the tissue of lymph node numerous tubercles (tubercular tumors) are seen. They consist of caseous necrosis surrounded with epithelioid cells among which the giant Langhans-type cells and some lymphocytes can be found.

Slide 2. Scleroma

In rhinoscleroma of nose, the granuloma (scleroma) consists of the plasma cells, epithelioid cells, lymphocytes, and hyaline sphere. Large macrophages with light cytoplasm containing Klebsiella rhinoscleromatis (Mikulicz's cells), sclerosis and hyalinosis take place.

Slide 3. Leproma

In tuberculoid leprosy, the epidermis contains confluent granulomas composed of macrophages, plasma cells, and leprous Virhov's cells. Leprous Virhov's cells (or leprosy cells) refer as large foamy macrophages within fatty vacuoles containing leprous mycobacteriums.

Slide 4. Proliferative inflammation around echinococcus of the Liver
The area of the liver's tissue with destructive rose color shined chitinous membrane and surrounded necrotic tissue are seen. In peripheral areas crowded lymphocytes, plasma cells, fibroblasts and single "giant cells of the foreign bodies" can be found. In the outside – fibrous capsule.
Slide 5. Kidney in periarteritis nodosa (ought to be drawn)
In some small arteries the areas of fibrinoid necrosis of intima and media (homogeneous mass of rose color) takes place. The walls of the most arteries are thickening because of the proliferation of the cells of subendothelium layer and sclerotic changes. The adventitia of some arteries is infiltrated with lymphocytes with admixture of polymorphonuclear leukocytes. The lumen of the vessels is narrowing.
Slide 6. Liver in the hemolytic disease
Here and there the foci of extramedullar blood creation appear around interbeams capillaries. The small clods of brown pigment hemosiderin are
seen in the cytoplasm of hepatocytes.
Slide 7. Hashimoto thyroiditis (ought to be drawn)
Lymphoid tissue with numerous lymphoid follicles with clear light centers is seen in parenchyma of Thyroid.
Slide 8. Synovial joint's tissues with rheumatoid arthritis (ought to be drawn)
Granulation villous tissue is infiltrated by plasma cells, lymphocytes, contains sclerotic vessels with hyalinosis of their walls.

Self-check materials:

1. A microscopic examination of the tissue dissected from some postoperative infiltrate revealed granulomata with giant multinucleate cells around the suture material. What kind of granulomata did they belong to ?
   A. Tuberculous
   B. Rheumtic
   C. Lepromatous
   D. Foreign-body*
   E. Mycotic
2. An examination of a renal biopsy revealed some mostly perivascular and periglomerular lymphocytic, plasmacytic and macrophagal infiltration of the interstice against a background of its sclerosis. Name the most probable kind of inflammation.
   A. Productive diffuse
   B. Productive focal*
   C. Granulomatous
   D. Exudative diffuse
   E. Exudative focal
3. A microscopic examination of the aorta in a male, who died from a rupture of its aneurysm, revealed in the medial coat of the aorta some foci of destruction of elastic fibres and an inflammatory infiltrate consisting of lymphoid and plasma cells around the «vasa vasorum». Which of the diagnoses listed below was the most probable?
   A. Tuberculosis
   B. Atheroscleros
   C. Syphilis*
   D. Leprosy
   E. Rheumatism
4. An autopsy of a 60-year-old male revealed numerous whitish miliary nodules in the lungs and liver. A microscopic examination revealed granulomata with foci of necrosis in their centre and epithelial, lymphoid, plasma cells, as well as macrophages and a large number of Pirogov-Langhans cells on the periphery. Indicate the granuloma which corresponds to the description.
   A. Macrophagal
   B. Phagocytoma

C. Epitheliocellular
D. Giant cell*
E. Foreign-body

5. A 46-vear-old male patient complains of difficult nasal breathing. A biopsy of his thickened nasal mucosa revealed Mikulicz's cells, clusters of epithelioid cells, plasmacytes, lymphocytes, hyaline balls. What is your diagnosis?

A. Scleroma*
B. Adenovirus rhinitis
C. Allergic rhinitis
D. Rhinovirus infection
E. Meningococcal nasopharyngitis

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 55-60.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 75-82.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 89-94, 333-345.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 133-138.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 147-151, 513-516.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 108-124.

TOPIC 10: *The processes of adaptation and compensation. Regeneration and reparation. Sclerosis.*

Actuality of the problem. As explained earlier, cells must constantly adapt, even under normal conditions, to changes in their environment. These *physiologic adaptations* usually represent responses of cells to normal stimulation by hormones or endogenous chemical substances. *Pathologic adaptations* may share the same underlying mechanisms, but they provide the cells with the ability to modulate their environment and perhaps escape injury. Cellular adaptation, then, is a state that lies intermediate between the normal, unstressed cell and the injured, overstressed cell.

Knowledge of these processes is necessary for understanding of the pathogenesis of the diseases and for the clinic-anatomical analysis of the autopsy.

Aim of studies. Study the morphological features of adaptive and compensative processes; to explain the causes and mechanisms of their development; to estimate outcomes and determine the significance for organism.

Tasks of the studies:

1. Explain the role of adaptive and compensative processes in organism.
2. Know the terminology and definitions of these processes
3. Distinguish the processes of hypertrophy, hyperplasia and atrophy.
4. Learn the morphology and functional manifestations of atrophy, hypertrophy and hyperplasia.
5. Study the mechanisms of the various types of regeneration.
6. Explain the morphologic features of the various types of regeneration and estimate their functional significance.
7. Study the mechanisms, morphological features of the wound healing.

Questions for self-studying:

1. Importance of adaptation and compensation.

2. Atrophy: definition, essence, causes, types, macro- and microscopical signs. Examples of the physiologic and pathologic atrophy.
3. Hypertrophy and hyperplasia: causes, types and macro- and microscopical manifestations, their resemblance and difference. Examples of hypertrophy and hyperplasia.
4. Phases of development of adaptive-compensative processes. Morphological features of the compensation and decompensation in the heart due to cardiac insufficiency.
5. Regeneration: essence and the biological meaning, definition, morphogenesis (proliferation and differentiation of cells), types.
6. Physiologic regeneration. Examples of physiological regeneration of organs and tissues.
7. Pathologic regeneration. Causes, examples.
8. Particularities of the regeneration of the connective, vascular and bone tissues and some parenchymatous organs.
9. Reparative regeneration: determination, essence, types, morphological features in myocardium and liver. Importance of restitution and regenerative hypertrophy.
10. Metaplasia and dysplasia: causes, morphological signs, clinical significance. The difference from tumorous and proliferative processes.
11. Morphology of processes of organization in the damaged tissue: sclerosis, cirrhosis, incapsulation, petrification, and formation of cysts.
12. Wound healing. Morphology of healing by first (primary) and secondary intention.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

Slide 1. Granulation tissue (ought to be drawn)

The parallel vessels can be seen here and there. Between them leukocytes and immature cells of connective tissue are located.

Slide 2. Glandular hyperplasia of the Endometrium

The glands of endometrium have corkscrew-like twisting forms. The pictures " gland into gland" can be found in cross-cuts. Parallely the proliferation of endometrial stroma takes place.

Slide 3. Metaplasia of bronchial epithelium into squamous cell epithelium (ought to be drawn)

Cilliary epithelium transforms into squamous cell epithelium as the result of chronic inflammation and regeneration.

Slide 4. Epidermization of cervix's erosion

At the edge of erosion the proliferative basal cells of squamous cell epithelium grow under columnar epithelium. During differentiation this proliferative epithelium transforms into squamous cell epithelium.

Slide 5. Postinfarctional scar (paunch) in myocardium (ought to be drawn)

A massive area of fibrotic tissue can be found in the heart muscle. This area is the result of organization of necrotic focus.

Slide 6. Hypertrophy of the Myocardium

The muscle fibers are thicken; their nuclei are enlarged and hyperchromic; the hardened stroma also takes place. These changes are strongly expressed in subendocardial areas.

Slide 7. Glandular hyperplasia of the Endometrium (ought to be drawn)

The glands of endometrium have corkscrew-like twisting form. The pictures "gland into gland" can be found out in cross-section. At the same time the proliferation of endometrial stroma with edema and hyperemia takes place.

Slide 8. Granulation tissue in the bed of chronic intestinal peptic ulcer (ought to be drawn).

In the bed of chronic intestinal peptic ulcer multiple capillaries with ordering contain eruthrocytes. There is soft connective tissue with lymphocytes, plasma cells and fibroblasts between them. Surfice of granulations is covered by fibrin, in some places it is with epithelisation.

Slide 9. Metaplasia of bronchial epithelium with chronic bronchitis (ought to be drawn)

Respiratory epithelium of a large bronchus is changed in squamos cell epithelium. Hyperplasia of mucous glands, hyperemia of vessels in submucosa are visible too.

Slide 10. Atrophy (aging involution) of the Ovary

Fibrous connective tissue, fat tissue, athretric follicles and yellow bodies are noted. Hyaline changes and sclerosis develop in the vessels walls.

Slide 11. Amputatious neuroma (picrofuxin-staining)

Nervous fibers (yellowish color) and collagen fibrils (red color) form tumor-like node.

Slide 12. Hypertrophy of the Myocardium

Muscle cells are thickened. Their nuclei areincreased, hyperchromatic; frequently they have irregular shape. Stroma of myocardium is hardened and fibrosing.

Self-check materials:

1. Ten years ago a male patient's right lung was removed because of a tumour, since then the capacity of his left lung has increased by 50 %. What process has developed in the left lung?

A. Vicarious hypertrophy*
B. Neurohumoral hypertrophy
C. Atrophy
D. Work hypertrophy
E. Hypertrophic vegetations

2. An autopsy of a male patient, who died from hypertensive disease, revealed an enlarged heart weighing 600 g, with a thickened left ventricular wall up to 2 cm and a dilated cavity of the left ventricle. Name the kind of an adaptive reconstruction in the heart.

A. Eccentric atrophy
B. Concentric hypertrophy
C. Vicarious hypertrophy
D. Eccentric hypertrophy*
E. Vicarious hypertrophy

3. An autopsy of a male, who suffered from hypertensive disease for a long period of time, revealed a sharply enlarged heart weighing 800.0 g. Name the kind of compensatory hypertrophy of the heart.

A. Hypertrophic vegetations
B. Vicarious
C. Neurohumoral
D. Work*
E. Vicarious

4. As a result of falling down, a small abrasion formed of the knee of a child and some time later it epitheliaized completely without formation of any scar. What form of regeneration took place in this case?

A. Physiological
B. Restitution*
C. Substitution
D. Pathological
E. Intracellular

5. A 20-year-old male patient with a posttraumatic variceal dilation and thrombosis of the subcutaneous vein in the middle third part of the shin underwent its surgical removal. Histologically, an obstructive thrombus was found in the lumen of the vein with growing of a connective tissue into the thrombus from the side of the vascular wall. What process did the changes in the thrombus result from?

A. Organization*
B. Reconstruction
C. Canalization
D. Revascularization
E. Repair

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 61-69.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 44-49, 85-91.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 41-44, 94-108.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 170-193.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 164-183.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 135-159.

TOPIC 11: *The general information about tumors. Nomenclature and morphological features of tumors from the epithelium without organ-specific localization.*

Actuality of the problem. Oncologic processes are pathological states, which are associated with disturbances of structure and function in organisms and may lead to death. The term **"neoplasia"** means new growth; the new growth produced is called "neoplasm" or "tumor". However, all "new growth" is not neoplasms since examples of new growth of tissues and cells also exist in the processes of embriogenesis, regeneration on repair, hyperplasia and hormonal stimulation. Neoplastic cells lose control and regulation of replication and form an abnormal mass of tissue. Research of the etiology, mechanisms, morphology, secondary appearance of the tumors is important task in the practical medicine because it may help to diagnose and treat these diseases. In clinical practice the knowledge of the oncomorphology is necessary for the comparison of the clinical dates with the result of the biopsy research and postoperative materials, and also for the clinic-anatomical analysis of the autopsy.

Aim of studies. Receive the notion about the essence of tumors and the principle of the classification. Learn the etiology, morphogenesis, growth; morphological features of tumors and estimate the outcomes (complications) and determine the significance for organism.

Tasks of the studies:

1. Explain the role of the oncologic processes in organism.
2. Know the definition of neoplasia and terminology.
3. To interpret the modern concepts of etiology (cancerogenesis) and pathogenesis of benign and malignant tumors.
4. To interpret the pre-tumors (pre-cancerous) states and changes, their essence and morphology.
5. To interpret the general morphologic features of benign and malignant tumors.
6. To interpret a morphogenesis and histogenesis of tumors.
7. Know the histogenic classification of tumors and the morphological classification is based on differentiation of the tumor cells.
8. To explain mechanisms (metastatic cascade) and routes of metastasis.
9. To explain the major clinical-pathological manifestations of tumorous growth.

Questions for self-studying:

1. Risk factors of of tumor growth. Influencing of geographical areas, factors of environment.
2. Modern theories of carcinogenesis. Influencing of senescence of human. Heredity: inherited tumors syndromes, family forms of neoplasia, syndromes of RNA broken reparation.
3. Pre-tumors (pre-carcinomatouse) states and changes, their essence, morphology.
4. Biology of tumor growth. Morphogenesis of tumors. Tumor's angiogenesis. Progression and heterogeneity of tumors. Features of cellular population in tumor focus.
5. Nomenclature and principles of classification.
6. Stages of carcinogenesis. Carcinogenic agents and their co-operation with cells. Major groups of chemical carcinogens. Radiation carcinogenesis. Viral carcinogenesis.Histogenesis (cytogenesis) and differentiation of tumors.
7. Basic properties of tumor. Structural features, parenchyma and stroma of tumor.
8. Tumor's cytomorphology (Differentiation and Anaplasia). Morphology of cellular and tissue atypia (homo- and heterological tissue).
9. Types of tumor growth: expansive, infiltrating and appositional; exophytic and endophytic.
10. Major clinical-pathological appearance of tumor growth. Description of the neoplastic process. Local influence of tumor.
11. Metastasis: types, conformities to the law, mechanisms. Metastatic cascade.
12. Disturbance of homeostasis of organism. Secondary changes in a tumor. Cancer cachexia, paraneoplastic syndromes.
13. Role of biopsy in oncology.
14. Clinical-morphological appearances.
15. Antitumor immunity. Antigens of tumors. Immune supervision. Antitumor effector mechanisms (cellular and humoral).
16. Dysplasia: staes, morphological features, clinical significance, their role in cancerogenesis.
17. Contrasting Features of Benign and Malignant Tumors.
18. Clinical aspects of neoplasia, effect of tumor on host.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Fibromyoma of the Uterus". Pay attention to appearance of the tumor: size, color, shape, presence of the nodules, localization, type of growth; flexibility of the tumor; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. Call the most frequent localization, outcomes and significance for organism.

2. "Papilloma of the Skin". Describe the appearance of the tumor, its connection with the skin, type of the growth, color and structure on cut section.

Determine the pathologic process. Call histogenic type of tumor.

3. "Carcinoma of the Esophagus, and the Larynx". Diagnose malignant tumors, describe the appearance: size, color, localization, type of growth; the condition of tumor on cut section.

Name the macroscopic forms and the possible histological types. Call the ways of spreading (possible metastasis). What pre-cancer condition do you know?

4. "Primary hepatocellular carcinoma". Diagnose the tumor, describe the appearance: size, color, localization, type of growth; the condition of tumor on cut section.

Determine the pathologic process. Name the malignant type.

5. "Central bronchogenic cancer of the Lungs". Describe a tumor: size, shape, surface, color, localization (growth of tumor relatively to bronchus's lumen), condition of bronchial wall, and structure on cut. Describe the peribronchial lymphatic nodules.

What histological types of central bronchogenic cancer of the lung take place usually? What changes in the adjacent lung tissue and pleura can be found?

6. **"Liposarcoma".** Describe the tumor: size, shape, surface, color, localization, growth of tumor and structure on cut.

Name the macroscopic forms and the possible histological types. Call the ways of spreading (possible metastases).

7. "Metastases of melanoma in the Kidney, Skin, Intestine, Larynx, Brain tissue, and Liver". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and brain tissue.

What type of metastases takes place?

8. "Metastases of sarcoma in the Lung". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and brain tissue.

What type of metastases takes place?

9. "Hemangioma of the Intestine". Pay attention to appearance of the tumor: size, color, shape, presence of the nodules, localization, type of growth; flexibility of the tumor.

Where is localization of this tumor else?

10. "Retroperitoneal lipoma". Pay attention to the localization and spreading, color, boundary, surface, growth of this tumor.

Determine the pathologic process. Call histogenic type.

11. "Polyposis of the Stomach and Colon". Describe the appearance of the formations: size, color, surface, and quantity, type of growth.

Determine the pathologic process. Name the malignant type.

12. "Breast's Cancer". Pay attention to appearance of the tumor: size, color, shape, presence of the nodules, localization, type of growth; flexibility of the tumor and its attitude to the skin; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. Call the ways of spreading (possible metastases). What pre-cancer conditions do you know?

13. Metastases of cancer in the Liver". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and liver's tissue.

What type of metastases' spreading in liver takes place? Call possible primary location of cancer.

14. "Gastric polyps". Describe the appearance of the formations: size, color, surface, and quantity, type of growth.

Determine the pathologic process. Name the malignant type.

15. "Polyp of the Endometrium". Describe the appearance of the formations: size, color, surface, and quantity, type of growth.

Determine the pathologic process. Name the malignant type.

16. "Metastases of cancer of the Lungs in Liver, Ribs, Scull, and Spinal Column". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and liver's tissue.

What type of metastases in these organs takes place? Call the ways of spreading (possible metastasis).

Slides for drawing and describing in album:

Slide 1. Benign Hyperplasia of the Prostate gland (ought to be drawn).

Number of glands is increased. They are variable in size, shape and location in fibrous-muscular stroma. Hyperplastic glandular epithelium does not have signs of cellular atypism.

Slide 2. Papilloma

The tumor consists of the growing squamous cell epithelium and strongly pronounced connective tissue stroma with vessels. The atypia is manifested because of the presence of papillas and different ratio between parenchyma and stroma. The layers of keratinizing epithelium can be found on the surface of tumor.

Slide 3. Squamous non-keratinizing cell carcinoma of the Cervix (ought to be drawn)

The carcinomatous areas look like fields of polymorphous atypical squamous cells. The tumor's stroma is made up with immature proliferative connective tissue.

Slide 4. Metastases of mucinous carcinoma in the Lung (ought to be drawn)

Vessels and alveoli are filled by large atypical cells with foamy cytoplasm and localization on nuclei in periphery of cells.

Slide 5. Adenocarcinoma of the Rectum

Atypical tumoral glands grow in submucosa of rectum. Carcinomatous cells have pleomorphism and hyperchromatic nuclei. They are located in several layers. Many mytoses are seen here and there.

Slide 6. Infiltrative carcinoma of the Breast (scirrhus) (ought to be drawn)

Solid and tubular complexis of atypical epithelial cells with hyperchromatic nuclei are disorderly located among excessivly developed hyalinosus stroma.

Slide 7. Metastasis of the pulmonary small cell ("oat-cell") carcinoma into the Adrenal (ought to be drawn)

The tumor has clear borders. It consists of small oat-like atypical cells with hyperchromic nuclei. Stroma is seen clearly.

Slide 8. Chorioncarcinoma of the Uterus

The tumor consists of atypical cells of cyto- and syncytiotrophoblast. Stromal elements and vessels are absent. Necrosis, numerous hemorrhages and granules of hemosiderin are seen.

Slide 9. Leiomyoma of the Uterus

Closely adjacent smooth muscle cells are disorderedly located. Fibrous stroma of tumor is irregurarly developed; blood vessels and hyalinosis as homogenous eosinofilic masses are seen in it.

Self-check materials:

1. In 40-year-old patient, the tumor, which grew under skin of spine was resected. The histologic diagnosis: a lipoma. What principle of the tumors' classification did the pathologist use when created his conclusion?

A. Gistogenesis *
B. Of biochemical features
C. Of ultrastructural features
D. Of physico-chemical features
E. Macrostructure of an organ

2. During the laparotomy in 49 year-old male patient, the tumor has been found out in the field of a sigma with growth through all its layers and an occlusion of the lumen of an intestine. The biopsy has been taken and colonostoma has been overlapped. The clinical diagnosis after operation: a cancer of sigma. What kind of tumor is growth in relation to tissues?

A. Infiltrative*
B. Expansive
C. Endophytic
D. Exophytic
E. Multicentric

3. A clinical study is performed with patients who had a diagnosis of breast canacer. Characteristics of the grade, stage, molecular biology, and histologic type are analyzed. Of the following characteristics, which is most likely to be associated with the best prognosis for these patients?

A. Decreased nuclear/cytoplasmic ratio *
B. Increased expression of laminin receptors
C. Increased cathepsin expression
D. Decreased apoptosis
E. Decreased doubling time

4. A 45-year-old healthy woman has a routine check of her health status. She has no chest pain, cough, or fever. A chest x-ray taken and shows a peripheral 2.5 cm diameter ’’coin lesion" in the right mid-lung field. Which of the following biologic characteristics best distinguishes this lesion as a neoplasm, rather than a granuloma?

A. Uncontrolled (autonomous) growth *
B. Recurrence following excision
C. Rapid increase in size
D. Sensitivity to radiation or chemotherapy
E. Necrosis

5. A 55-year-old man dies after a year-long illness. At autopsy the liver contains multiple tumor masses from 2 to 5 cm in size that are mostly firm and tan and that grossly exhibit umbilication with central necrosis. Which of the following statements would best characterize the significance of such an appearance?

A. The neoplasm has an advanced stage. *
B. There is multicentric origin of a benign neoplasm.
C. The neoplasm has a high grade.
D. The primary neoplasm is in the stomach.
E. A carcinogen was the underlying cause for the neoplasm.

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 77-82.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 241-301, 1099.
3. Anderson’s Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 566-610.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 195-199.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 186-196, 201-206, 208-212.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 160-186.

TOPIC 12: ***Organ-specific epithelial tumors.***

Actuality of the problem. Oncologic processes are pathological states, which are associated with disturbances of structure and function in organisms and may lead to death. Research of the etiology, mechanisms, morphology, secondary appearance of the epithelial tumors is important task in the practical medicine because it may help to diagnose and treat these diseases. In clinical practice the knowledge of the oncomorphology is necessary for the comparison of the clinical dates with the result of the biopsy research and postoperative materials, and also for the clinic-anatomical analysis of the autopsy.

Aim of studies. Receive the notion about the essence of tumors and the principle of the classification. Learn the etiology, morphogenesis, growth; morphological features of epithelial tumors and estimate the outcomes (complications) and determine the significance for organism.

Tasks of the studies:

1. Explain the role of the oncologic processes in organism.
2. Know the definition of epithelial neoplasia and terminology.
3. Know the histogenic classification of tumors and the morphological classification is based on differentiation of the tumor cells.
4. Tell apart the benign and malignant epithelial tumors.
5. Learn the morphology and functional manifestations of the benign and malignant epithelial tumors.
6. Learn the morphology and functional manifestations of the benign and malignant epithelial tumors in lungs, stomach, large intestine, uterus and breast, prostate gland.

Questions for self-studying:

1. Epithelial tumors: definition, the nomenclature, principles of the classification.
2. The morphogenesis of epithelial tumors: pre-tumorous processes, and progression of tumors.
3. The characteristic of epithelial tumorous growth.
4. Benign epithelial tumor: types according to histological structure, microscopical and macroscopical features.
5. Malignant epithelial tumor: types according to histological structure, precancerous states, microscopical and macroscopical features of the distinctive types.
6. Metastases: definition, types of spreading. Peculiarities of cancer's dissemination.
7. Clinical aspects of neoplasia, effect of tumor on host.
8. Lung carcinoma: etiology, pathogenesis, classification, morphology, complications, causes of death.
9. Carcinoma of stomach: etiology, pathogenesis, classification, morphology, complications, causes of death
10. Carcinoma of the Prostate gland: etiology, pathogenesis, classification, morphology, complications, causes of death.
11. Carcinoma of large intestine: etiology, pathogenesis, classification, morphology, complications, causes of death.
12. Carcinoma of breast: etiology, pathogenesis, classification, morphology, complications, causes of death.
13. Carcinoma of cervix and body of uterus: pretumoral processes, classification and morphologic appearances.
14. Significance of biopsy in diagnostics of tumors.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Polyposis of the Stomach and Colon". Describe the appearance of the formations: size, color, surface, and quantity, type of growth.

Determine the pathologic process. Name the malignant type.

2. "Central bronchogenic cancer of the Lungs". Describe a tumor: size, shape, surface, color, localization (growth of tumor relatively to bronchus's lumen), condition of bronchial wall, and structure on cut. Describe the peribronchial lymphatic nodules.

What histological types of central bronchogenic cancer of the lung take place usually? What changes in the adjacent lung tissue and pleura can be found?

3. "Peripheral cancer of the Lungs". Describe a tumor: size, shape, surface, color, localization, and attitude to the pleura, state of the surrounding tissue, type of tumor's growth in the pulmonary tissue.

Select the signs of malignization. What is the difference between this tumor and central cancer? Call the possible histological types of the peripheral cancer?

4. "Cancer of the Stomach, Intestine". Diagnose malignant epithelium tumors, describe the appearance: size, color, localization, type of growth; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. Call the ways of spreading

(possible metastases). What pre-cancer condition do you know?

5. "Breast's Cancer". Pay attention to appearance of the tumor: size, color, shape, presence of the nodules, localization, type of growth; flexibility of the tumor and its attitude to the skin; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. Call the ways of spreading (possible metastases). What pre-cancer conditions do you know?

6. "Metastases of cancer in the Liver". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and liver's tissue.

What type of metastases' spreading in liver takes place? Call possible primary location of cancer.

7. "Carcinomatous metastases to the Lung". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and lung's tissue.

What type of metastases' spreading in lung takes place? Call possible primary location of carcinoma.

8. "Chorioncarcinoma of the Uterus". Describe a tumor: size, shape, surface, color, localization (growth of tumor relatively into the lumen), condition of uterus wall, and structure on cut.

Call the ways of spreading (possible metastases). What pre-cancer conditions do you know?

9. "Metastases of chorionepithelioma in the Lungs". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and lung's tissue.

What type of metastases in lung takes place?

10. "Adenocarcinoma of the Uterus". Describe size, shape, and surface of uterus and localization of cancer.Name type of growth in this case.

What are the pretumorous conditions in uterus? Call other histologhical types of carcinoma in uterus.

11. "Fungus cancer of the Stomach". Diagnose malignant epithelium tumors, describe the appearance: size, color, localization, type of growth; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types of gastric carcinoma. Call the ways of spreading (possible metastases). What pre-cancer conditions can be in stomach?

12. "Ulcer - Cancer of the Stomach". Diagnose malignant epithelial tumors, describe the appearance: size, color, localization, type of growth; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. What primary process in these cases takes place? What pre-cancer conditions do you know?

13. "Scirrhous of the Stomach with ingrowth around the Spleen". Diagnose malignant epithelial tumors, describe the appearance: type of growth, texture and size of the wall, color; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. What primary process in these cases takes place?

14. "Infiltrative-ulcerated carcinoma of the Stomach". Diagnose malignant epithelial tumors, describe the appearance: size, color, localization, type of growth; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. What pre-cancer conditions do you know?

Slides for drawing and describing in album:

Slide 1. Intraduct's fibroadenoma of the Breast (ought to be drawn)

The growth of connective tissue is much more pronounced than the growth and branching out of glandular tubules. The connective tissue suppresses the glandular ducts and that's why the lasts whimsically branch out in different directions creating epithelial streaks with numerous protuberances look like antlers.

Slide 2. Schirrus of the Breast (ought to be drawn)

It is undifferentiated malignant tumor. In Brest there are ingrowths of connective tissue (stroma of tumor) in which the large areas of atypical epithelial cells with hyperchromic nuclei and mitoses are visible

Slide 3. Gastric adenocarcinoma (ought to be drawn)

The growth of atypical glandular structures of different shape and size (stretched, round, with irregular outlines, small or large) into mucosa and submucosa of the gastric wall takes place. The carcinomatous

structures are irregularly located in the middle of fibrous tissue. The epithelial cells are atypical too: their nuclei are polymorphous with various maintenance of chromatin and mitoses; the cells have various shape and size; not rare the cells are arranged in some layers.

Slide 4. Adrenal cortical carcinoma

Here is an adrenal cortical carcinoma seen microscopically at high power to demonstrate cellular pleomorphism with nuclear hyperchromatism. Tumor consists of polymorphic mononuclear and multinuclear giant cells with grainy or by a vacuolated cytoplasm and large hyperchromic nuclei. Both benign and malignant endocrine neoplasms demonstrate some degree of cellular pleomorphism, so it is not easy to tell benign from malignant on histologic grounds alone. The larger the neoplasm, the more likely it is malignant, but the best indicators are invasion and metastasis.

Slide 4. Squamous cell carcinoma with keratinization in the Skin (ought to be drawn)

A numerous accumulations of atypical squamous epithelial cells are located in derma. Polymorphism, and mitoses of cells are seen. Appearance of keratinizing islands, so-called "carcinomatous pearls" (pink color) amongst atypical tumorous cells takes place.

Slide 5. Adenocarcinoma of the Large intestine (ought to be drawn)

The growth of atypical glandular structures of different shapes and sizes (stretched, round, with irregular outlines small or large) into mucosa and submucosa of the colon takes place. The atypical cells have diverse shapes and sizes; their nuclei are polymorphous with various maintenance of chromatin and mitoses.

Slide 6. Carcinoid of the Lung (apudoma)

Accumulation of monomorphous alveolocytes are divided by connective tissue with multiple vessels. Nuclei with nucleoli of these cells have oval or prolong shape, cytoplasm is light. Atypical mytoses are absent.

Slide 7. Hypernephroma or clear-cell carcinoma of the Kidney

Atypical large empty-looking cells with well defined walls and relatively small round nucleus are noted. Stroma is delicate.

Slide 8. Seminoma of the Testis (spermatocytoma)

Seminoma consists of spermatocytes with differeht stages of differentiantion (small lymphocyte-like cells and large cells with light cytoplasm). Cellular areas are divided by stroma. This variant of seminoma has slow grouth and relatively favorable prognosis

Self-check materials:

1. A histological examination of a scrape from the mucous coat of the uterus made in a female patient, who complained of a disorder in the ovariomenstrual cycle, revealed vegetation of the glandular structures consisting of atypical epithelial cells with hyperchromatic nuclei and pathological mitoses. The changes in the glandular structures were accompanied by an impairment in the integrity of the basal membrane of the cells. Make a diagnosis.

A. Adenocarcinoma*
B. Glandular hyperplasia of endometrium
C. Chorionepithelioma
D. Mucinous carcinoma
E. Dimorphic carcinoma

2. A microscopic examination of a biopsy from a large intestine revealed some tumour made of the columnar epithelium that formed atypical glandular structures of various shapes and size. The epithelial cells were polymorphous and with hyperchromatic nuclei, there were pathological mitoses. What is your diagnosis?

A. Basal cell carcinoma
B. Solid carcinoma
C. Adenocarcinoma*
D. Mucinous carcinoma
E. Carcinoma simplex

3. A male patient, who suffered from chronic bronchitis for a long period of time, revealed a pulmonary tumour, which was closely connected with the bronchial wall and grew in the form of a polyp. Microscopically, the tumour consisted of complexes of polymorphous epithelial cells with a large number of

mitoses. Among the tumour cells there were stratified concentric oxyphilic structures. Name the histological type of the tumour.

A. Mucinous carcinoma
B. Solid carcinoma
C. Nonkeratinizing squamous cell carcinoma
D. Adenocarcinoma
E. Keratinizing squamous cell carcinoma*

4. A histological examination of a biopsy from a uterine cervix revealed that its tissue was covered with a wide layer of the stratified squamous epithelium having foci of proliferation of atypical cells with pathological mitoses, but the basal membrane of the epithelium was not affected. What is your diagnosis?

A. Nonkeratinizing squamous cell carcinoma
B. Keratinizing squamous cell carcinoma
C. Carcinoma in situ*
D. Leukoplakia
E. Epithelial dysplasia

5. A histological examination of some spherical neoplasm located under the surface of the skin, revealed papilliform vegetations of the epithelium with phenomena of acanthosis and hyperkeratinization. The tumour stroma consisted of a large amount of the connective tissue and vessels. What tumour took place?

A. Keratoacanthoma
B. Papilloma*
C. Carcinoma in situ
D. Keratinizing squamous cell carcinoma
E. Nonkeratinizing squamous cell carcinoma

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 85-97.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 720-728, 730-732, 778-783, 1058-1063, 1095, 1099-1 109..
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 566-610.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 232-256.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 186-231.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 160-223.

TOPIC 13: ***Mesenchymal tumors.***

Actuality of the problem. Mesenchymal tumors and tumors derived from melaninproducing tissue are widespread ones, which have very important significance. These tumors have different localization in mesenchymal tissue. It may lead to secondary changes. All sarcomas have hematogenous metastasis and can become the cause of death. Research of the etiology, mechanisms of the development, morphology, secondary appearance of the mesenchymal tumors can help timely to diagnose and treat these diseases. In clinical practice the knowledge of the oncomorphology is necessary for the comparison of the clinical dates with the result of the biopsy research and postoperative materials, and also for the clinic-anatomical analysis of the autopsy.

Aim of studies. Receive the notion about the essence of mesenchymal tumors, the principle of their classification. Learn the pretumorous processes, growth, and morphological features of mesenchymal tumors. Estimate the outcomes (complications) and determine the significance for organism.

Tasks of the studies:

1. Know the terminology of the mesenchymal tumors and tumors derived from melaninproducing tissue.
2. Explain the role of this oncologic process in organism.
3. Know the histogenic classification of mesenchymal tumors and the orphological classification, based on differentiation of the tumor cells.
4. Tell apart the benign and malignant mesenchymal tumors.
5. Learn the morphology and functional manifestations of the benign mesenchymal tumors.

Questions for self-studying:

1. Modern histogenetic classification of mezenchymal tumors.
2. Peculiar properties of the growth and spreading of sarcomas.
3. Connective tissue tumors: benign and malignant, morphological appearances, metastases.
4. Tumors of fatty tissue: benign and malignant, morphological appearances, metastases.
5. Tumors of bone and cartilage: benign and malignant, morphological appearances, metastases.
6. Tumors of vessels: classification, morphologic appearances and spreading. Kaposi's sarcoma.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "Fibromyoma of the Uterus". Pay attention to appearance of the tumor: size, color, shape, presence of the nodules, localization, type of growth; flexibility of the tumor; the condition of tumor on cut section (necrosis and hemorrhages).

Name the macroscopic forms and the possible histological types. Call the most frequent localization, outcomes and significance for organism.

2. "Myxoma". Describe the appearance of the formations: size, color, surface, and quantity, type of growth. *Determine the pathologic process.*

Call histogenic type of tumor.

3. "Liposarcoma". Describe the tumor: size, shape, surface, color, localization, growth of tumor and structure on cut.

Name the macroscopic forms and the possible histological types. Call the ways of spreading (possible metastases).

5. "Metastases of sarcoma in the Lung". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and brain tissue.

What type of metastases takes place?

6. "Hemangioma of the Intestine". Pay attention to appearance of the tumor: size, color, shape, presence of the nodules, localization, type of growth; flexibility of the tumor.

Where is localization of this tumor else?

7. "Retroperitoneal lipoma". Pay attention to the localization and spreading, color, boundary, surface, growth of this tumor.

Determine the pathologic process. Call histogenic type.

8. "Leyomyoma of the Small Intestine". Pay attention to the localization and spreading, color, boundary, surface, growth of this tumor.

Determine the pathologic process. Call histogenic type.

9. "Metastases of melanoma in the Kidney, Skin, Intestine, Larynx, Brain tissue, and Liver". Diagnose anatomic signs of metastases: number of nodules, their shape, color, consistency, the boundary between metastases and brain tissue.

What type of metastases takes place?

Slides for drawing and describing in album:

Slide 1. Giant cell tumor (osteoblastoclastoma) (ought to be drawn)
It is a benign tumor developing in bones and sometimes in tendons. It consists of oval and round cells like fibroblasts. Between these cells the giant multinuclear cells (osteoclasts) can be found.

Slide 2. Polymorphous cell sarcoma (ought to be drawn)
It is a malignant tumor. It has histioid structure. The heavy cell's atypia and polymorphism (different shape and size, various color of nuclei) take place. Besides, the giant multinuclear cells can be found here and there.

Slide 3. Spindle-cell sarcoma.
There are cellular neoplasm composed of radially oriented ("storiform") fibroblasts, showing spindled and polygonal cells; mitoses are not as numerous as in fibrosarcoma. The overlying epidermis is thinned and there often is microscopic extension into subcutaneous fat.

Slide 4. Lipoma
It is a benign tumor. The mature adipose tissue in which the lobules have irregular shape and size can be seen. This neoplasm is so well-differentiated that, except for its appearance as a localized mass, it is impossible to tell from normal adipose tissue.

Slide 5. Angiosarcoma
The tumor is well-differentiated masses of proliferating endothelial cells around well-formed vascular channels, to poorly-differentiated lesions composed of plump, anaplastic and pleomorphic cells in solid clusters with poorly identifiable vascular channels.

Slide 6. Cavernous hemangioma of liver (ought to be drawn)
The tumor consists of cavernous cavities covered by endothelium and containing blood which have different sizes and shape. The border of this benign tumor is seen clearly.

Slide 7. Chondroma (ought to be drawn)
It's benign tumor from hyaline cartilage. Tumorous chondrocytes have similar sizes and shape. They are disposed irregularly in basic substance of cartilage and are divided by connective streaks.

Slide 8. Cavernous hemangioma of the Liver (ought to be drawn)
The tumor consists of cavernous cavities covered by endothelium and containing blood which have different sizes and shape. The border of this benign tumor is seen clearly.

Slide 9. Leiomyoma of the Small Intestine (ought to be drawn)
The bundles of smooth muscles have irregular directions. They can form eight-shaped, ring-like, cross figures etc. The tumorous bundles are divided by thin connective tissue fibers.

Slide 10. Polymorphocellular sarcoma
There is full-blown cellular pleomorphism (variation in size and shape, hyperchromatic nuclei, atypical mytoses) in this tumor. Atypical cells are located disorderly. Areas of necrosis and hemorrhages are visible too. These changes are characterized for pleomorphic type of rhabdomyosarcoma.

Slide 11. Lyposarcoma
The tumor consists of adiposocytes (variation in maturity and size) and lypoblasts. They form lobules different in shape and size. Local grouth of stroma is seen.

Self-check materials:

1. An epidemiologic study is performed to determine risk factors for development of malignant neoplasms. A statistical analysis of pre-existing medical conditions is done. Some pre-existing conditions are observed to precede development of malignant neoplasms, while others do not. Which of the following conditions is most likely to be statistically unrelated to subsequent malignancy?

A. Uterine leiomyomas *
B. Endometrial atypical hyperplasia

C. Chronic alcoholism with hepatic cirrhosis
D. Cervical squamous dysplasia
E. Chronic ulcerative colitis

2. A histological examination of a neoplasm originating from the gastrocnemius muscle revealed some cells which resembled embryonal muscles without any signs of cellular atypism. What is your diagnosis?
A. Rhabdomyoma*
B. Leiomyoma
C. Fibromyoma
D. Hibernoma
E. Rhabdomyosarcoma

3. In a male patient, a visual examination of the skin of his back revealed some spherical tumour, 2 cm in diameter, which was thick in consistency and had clear borders with the surrounding tissues. Microscopically, the tumour consisted of some chaotically interlaced bundles of collagenous fibres and a small number of connective tissue cells. Name the tumour.
A. Leiomyoma
B. Fibroma*
C. Haemangioma
D. Melanoma
E. Lipoma

4. A 65-year-old woman underwent removal of some tumour, 1.0 x 1.0 x 0.8 cm in size, localized under the skin of her thigh. Macroscopically, the tumour had a connective-tissue capsule and was represented on section with a yellowish lobate tissue. Microscopically, there were large cells, which had the sudanophilic cytoplasm and formed lobules separated with connective-tissue layers. Name this tumour.
A. Hibernoma
B. Lipoma*
C. Liposarcoma
D. Fibroma
E. Desmoid

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 82-84.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 241-301, 713, 821-822, 1179-1181.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 566-610.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 199-211, 225-228.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 219-231.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 186-214.

TOPIC 14: *Nomenclature and morphological features of tumors of the nervous tissue. Morphological Features of tumors of the central nervous system and tumors originating from melanin-producing cells.*

Actuality of the problem. Tumors of nervous tissue are widespread ones, which have very important significance. These tumors have different localization in mesenchymal tissue; it may lead to secondary changes. All sarcomas have hematogenous metastasis and can become the cause of death. Research of the etiology, mechanisms of the development, morphology, secondary appearance of the mesenchymal tumors can help timely to diagnose and treat these diseases. In clinical practice the knowledge of the oncomorphology is necessary for the comparison of the clinical dates with the result of the biopsy research

and postoperative materials, and also for the clinic-anatomical analysis of the autopsy. Research of the etiology, mechanisms of the development, morphology, secondary appearance of these tumors can help timely to diagnose and treat these diseases.

Aim of studies. Receive the notion about the essence of tumors of nervous system, the principle of their classification. Learn the pretumorous processes, growth, and morphological features of these tumors. Estimate the outcomes (complications) and determine the significance for organism. Receive the notion about the essence of tumors of infancy and childhood, the principle of their classification. Learn the morphological features of these tumors. Estimate the outcomes (complications) and determine the significance for organism.

Tasks of the studies:

1. Know the terminology of the tumors of nervous tissue and tumors of infancy and childhood.
2. Explain the role of this oncologic process in organism.
3. Know the histogenic classification of tumors and the morphological classification, based on differentiation of the tumor cells.
4. Tell apart the benign and malignant tumors.
5. Learn the morphology and functional manifestations of the benign tumors.
6. Learn the morphology and functional manifestations of the malignant tumors.

Questions for self-studying:

1. Tumors of nervous tissue: classifications, influence in organism.
2. Tumors of CNS: neuroectodermal (astrocytic, oligodendroglial, ependimoglial tumors of choroidal epithelium, neuronal, low-differentiated and embryonic), meningovascular. Morphologic features and features of metastatic spreading.
5. Tumors of the autonomic nervous system.
6. Tumors of the peripheral nervous system.
7. Tumors from cambial embryonic tissues: meduloblastoma, retinoblastoma, neuroblastoma.
7. Value of pre-tumorous changes. Modern histogenetic classification of nevus.
8. Modern histogenetic classification of melanoma. Peculiar properties of the growth and spreading of sarcomas.

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1 To indicate Latin name of a preparation. 2 To describe macroscopic features of an organ (size, color, consistence) 3 To indicate pathological process 4 To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1 To indicate used staining method for the organ tissue. 2 To name both tissue and organ 3 To indicate changes in the tissue of the organ 4 To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

2. " Multiform Glioblastoma". Pay attention to appearance of the tumor: size, color, shape, localization.

What is Multiform Glioblastoma?

3. "Tumor of the Brain with hemorrhage". Describe a tumor: size, shape, surface, color, localization, state of the surrounding tissue.

What classification of CNS tumor do you know?

4. "Xantomatous arahnoidendothelioma (meningioma)". Describe a tumor: size, shape, surface, color, localization, state of the surrounding tissue.
5. "Ependymoma". Describe a tumor: size, shape, surface, color, localization, state of the surrounding tissue.
What is ependymoma?
6. "Craniopharingeoma". Describe a tumor: size, shape, surface, color, localization, state of the surrounding tissue.

Slides for drawing and describing in album:

Slide 1. Multiform Glioblastoma (ought to be drawn)
This glioblastoma multiforme (GBM) demonstrates marked cellularity with marked hyperchromatism and pleomorphism. The cells are located disorderly (cellular chaos), their size and shape are various, from small lymphocyte-like to giant polynuclear. Necroses, hemorrhages and vascular growths are typical. Mitoses and centers of atypical division are frequent. Note the prominent vascularity as well as the area of necrosis at the left with neoplastic cells palisading around it.
Slide 2. Ependymoma
The microscopic appearance of an ependymoma reveals a rosette pattern with the cells arranged about a central vascular space. It is histologically benign. Their processes form a fibrous ring between the body of the cell and the wall of the vessel and over the body of the cell. In the rest of the tumor tissue, the cells are located in mosaic manner. Single and multiple clefts and tubes bedded with cylindrical epithelium are common.
Slide 3. Neuroblastoma
Microscopically, neuroblastoma is a "small round blue cell" tumor with undifirentiated cells with narrow cytoplasm and small nuclei May be false rosettes. Mitoses are numerous. There are a lot of vessels. Histologic variations, as well as staging and cytogenetic characteristics help to determine the prognosis.
Slide 12. Melanoma (ought to be drawn)
It is a malignant tumor. Its cells are polymorphous; they create cellular structures with a large quantity of melanin. Melanoma has dark-brown color.

Self-check materials:

1. A 45-year-old male underwent surgical removal of a tumour, 4 x 3 cm in size, from the lateral ventricle of his brain; the tumour surface had small papillae, and it was connected with a vascular plexus. Microscopically, the tumour consisted of villus-like vegetations covered with epithelial cells of the cubical and columnar shape and the monomorphous kind. Which of the tumours listed below was the most probable?
   A. Ependymoma
   B. Ependymoblastoma
   C. Choriocarcinoma
   D. Glioblastoma
   E. Choriopapilloma*
2. A 40-year-old male patient underwent removal of a tumour, 2 cm in diameter, which was localized in the region of the cerebellopontine angle of the brain stem and tended to grow into the auditory meatus. Histologically, the tumour consisted of spindle cells with rod-shaped nuclei; the tumour cells and fibres formed rhythmic structures. Name the kind of the tumour.
   A. Medulloblastoma
   B. Meningioma
   C. Schwannoma*
   D. Oligodendroglioma
   E. Astrocytoma
3. A 26-year-old male patient underwent surgical removal of a tumour, 4 x 5 cm in size, which was surrounded by a capsule and located in the white matter of his brain. Microscopically, the tumour consisted of the stellate and glia cells having various size and located among the glial fibres. Name the tumour.
   A. Oligodendroglioma

B. Astrocytoma*
C. Astroblastoma
D. Glioblastoma
E. Ependymoma

4. A 47-year-old man has had the new onset of headaches for the past 4 months. The headaches are associated with dull pain and seem diffuse, but they are becoming more frequent and prolonged. On physical examination he has no focal neurologic deficits. His memory is intact, MR imaging reveals enlargement of the lateral ventricles. There is a 4 cm homogenous, well-circumscribed mass within the fourth ventricle. Which of the following is the most likely diagnosis?

A. Ependymoma *
B. Astrocytoma
C. Choroid plexus papilloma
D. Meningioma
E. Schwannoma

5. An autopsy of a male, who suffered from frequent fractures of his bones and died from uraemia, revealed phenomena of osteoporosis and multiple smooth-walled defects (as if produced by punching) in the bones of the skull, ribs and spine. A microscopic examination of the bone marrow revealed its diffuse infiltration by tumour cells of the lymphoplasmacytic line. Which of the diagnoses listed below was the most probable?

A. Multiple myeloma*
B. Primary macroglobulinaemia
C. Heavy-chain disease
D. Paget's disease
E. Recklinghausen's disease

6.In a young woman there was found a tumor on facial skin which looks like a blue-black soft node. Microscopically in the tumor there is cellular polymorphism, the tumor consists of fusiform or polymorphic deformed cells. In cytoplasm of most cells there is pigment of yellow-brown color. Your diagnosis*:*

A. Blue nevus
B. Pigmented nevus
C. Epidemic-dermic nevus
D. Melanoma*
E. Dermatofibroma

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 82-84.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 241-301, 713, 821-822, 1179-1181.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 566-610.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 214-225.

TOPIC 15: *Leukemias and lymphomas. Anemias.*

Actuality of the problem. Hemoblastoses are pathological conditions, which are associated with disturbances of structure and function of lymphatic system. Research of the mechanisms, morphology of pathological processes in lymphatic system is important task in practical medicine because it may help to diagnose and treat the different diseases. Anemias, thrombocytopenias, thrombocytopathies and coagulopathies are pathological conditions, which are associated with disturbances of structure and function of blood system. Research of the mechanisms, morphology of pathological processes in blood system is important task in practical medicine because it may help to diagnose and treat the different diseases.

Aim of studies. To learn the morphological features of injury of lymphatic system; to explain the causes and mechanisms of their development; to estimate outcomes and determine significance for organism. To learn the morphological features of injury of the blood system; to explain the causes and mechanisms of their development; to estimate outcomes and determine significance for organism; toexplain principles of classification of nosological forms of diseases.

Tasks of the studies:

1. Explain the role of blood and lymphatic systems in organism.
2. Explain the mechanisms of clinical manifestations, complications, causes of death.
3. Learn the morphology and functional manifestations of different forms of leukemia, lymphogranulomatosis (Hodgkin's disease).
4. Learn the morphology and functional manifestations of different forms of anemias.

Questions for self-studying:

1. Leukemias are the primary tumors growth in bone marrow.
2. Determination, etiology, classification, general clinical-morphologic description of leukemias.
3. Cytogenetic and cytochemical methods of differentiation of cellular variants of leukemias.
4. Acute leukemia: types, stages in course of diseases, clinical-morphologic description, complications, medical pathomorphosis, causes of death.
5. Chronic leukemia: types, stages in course of diseases, clinical-morphologic description, complications, medical pathomorphosis, causes of death.
6. Common description, methods of diagnostics of tumors from plasma cells.
7. Multiple Myeloma: etiology, pathogenesis, morphological description, clinical manifestations, prognosis, causes of death.
8. What mechanism of clinical manifestations, complications and causes of death of leukemia, the signs of leukemia in children do you know?
9. Reactive conditions of lymphatic nodes (histocytosis, angiofollicular hyperplasia of lymphatic nodes).
10. Hodgkin's disease: clinical stages, histological types, morphological description, diagnostic methods, clinical manifestations, prognosis, causes of death.
11. Non-Hodgkin's Lymphomas: common description, localization, prognosis, differentiation and classification.
12. Tumors from T- and B-lymphocytes: kinds, morphological description, immunophenotipic variants, clinical manifestations, prognosis, causes of death.
13. Anemia, definition, classification.
14. Call the clinical-morphological manifestations, diagnostics of anemia by blood loss, complications
15. Clinical-morphological manifestations, diagnostics of anemia caused by impaired red cells production, complications, and causes of death.
16. What are the clinical-morphological manifestations, diagnostics of anemia due to increased rate of destruction, complications, and causes of death?

Practical work students do at class:

Students must be able to learn macro- and micropreparations by use their diagnostic algorithms

Test algorithm for macropreparation diagnosis	**Test algorithm for micropreparation diagnosis**
1. To indicate Latin name of a preparation. 2. To describe macroscopic features of an organ (size, color, consistence) 3. To indicate pathological process 4. To indicate passible outcomes of the pathological process 5. What disease does the pathological process correspond to	1. To indicate used staining method for the organ tissue. 2. To name both tissue and organ 3. To indicate changes in the tissue of the organ 4. To name the pathological process 5. To indicate the pathological process outcomes

Macropreparations:

1. "The Spleen in lympholeukemia". Pay attention to size of the Spleen, color of cutting surface. Indicate normal size and weight of Spleen.

Name the cause of this enlargement.

2. "The Liver in undifferentiated leukemia". Pay attention to size of the Liver, color and architecture of cutting surface.

What microscopical changes in liver can be found out?

3. "Multiple metastatic leukemic infiltrates in Kidney". Describe size, color of cutting surface.

Indicate the pathways of leukemic spread.

4. "Hemorrhage in the Brain". Describe localization, size, shape, and condition of borders and color of hemorrhage.

Indicate the mechanism of its development in leukemia.

5. "Necrotic tonsillitis in leukemia". Pay attention to size, color, and cutting surface of Tonsils.

What type of leukemia can characterize these changes?

6. "Spleen in chronic myelocytic leukemia". Pay attention to increased size and weight of Spleen, thickened capsule, color of cutting surface.

Describe stages of the development of this leukemia.

7. "The Spleen,and the Lung in Hodgkin's disease". Describe size, color of cutting surface, and multiple whitish spots there. Explain origin of these spots.

Name the type of Hodgkin's disease with these changes.

8. "Reticulosarcoma in the Small Intestine". Describe excessively increased lymphoid follicles in the intestinal wall, their size, and color, surface.

Explain causes of death in reticulosarcoma.

9. "Mesenteric lymph nodes in lymphoblastic leukemia". Describe localization of lymph nodes, size, shape, condition and color on section.

Describe stages of the development of this leukemia.

10. "Acute lymphoblastic leukemia. Ulceration of Tongue's mucosa. Necrotic angina". Pay attention to size, color, consistence and surface of tongue.

What pathological changes in others organs may occur?

11. "Lymphoblastic leukemia. Tumorous growth in Intestine". Pay attention to the changes of mucosa. Describe localization of nodes, size, shape, condition and color on section.

What pathological changes in lymphoblastic leukemia else may occur?

12. "Acute lymphoblastic leukemia. Tumorous growth in Mediastinum". Pay attention to the localization of nodules, their size, number, shape, condition and color.

Call the possible causes of death.

13. "Hemosiderosis of the Spleen in hemolytic disease of newborn". Pay attention to size of the Spleen, color and architecture of cutting surface. Indicate the nature of the process.

What microscopical changes inspleen can be found out?

14. "Hemisiderosis of the Liver". Pay attention to size, color, and cutting surface of Livers.

What type of anemia can characterize these changes?

15. "The Spleen in Hemolyitic anemia". Pay attention to increased size and weight of Spleen, thickened capsule, color of cutting surface.

Describe causes and forms of Hemolytic anemia.

Slides for drawing and describing in album:

Slide 1. Liver in chronic lymphoid leukemia (ought to be drawn)

Leukemical infiltrates look like nests and are located in triads.

Slide 2. Lymph node in Hodgkin's disease (ought to be drawn)

Lymph node lost its usual structure and it was replaced with tissue consisting of polymorphonuclear cells. Pay attention to big reticulous cells, small lymphoid cells, endothelial cells, giant Reed-Sternberg cells and eosinophils. The growth of connective tissue takes place here and there.

Slide 3. The Bone marrow of the Thigh in myeloblastic leukemia (ought to be drawn)
The bone marrow looks like immature myeloid tissue. Here and there some adipose cells are kept.
Slide 4. The Liver in chronic myelosis
Inside the lobules, between interbeam's capillaries, the immature myeloid elements are arranged. They look like leukemic infiltrates.
Slide 5. The Liver in undifferentiated leukemia
Among hepatic lobules in triads the nesting proliferation of hemocytoblasts and other immature myeloid cells can be seen.
Slide 6. The Liver in the hemolytic disease
Here and there the foci of extramedullar hematopoesis appear around interbeam's capillaries. The small clods of brown pigment hemosiderin are seen in the cytoplasm of hepatocytes.
Slide № 7. The Liver in chronic myeloleukemia (ought to be drawn)
Leukemic infiltrations are disposed diffusely (portal tracts, intralobular tissue) between hepatocytes. Small myeloid cells are atypical with hyperchromatic nucle, moderate differentiation. Hepatocytes are atrophic.
Slide № 8. The Liver in chronic lympholeukemia (ought to be drawn)
Leukemic infiltrates are disposed locally predominantly in portal tracts. Lymphocytes are atypical with hyperchromatic nuclei.
Slide № 9. The Femoral Bone Marrow in chronic myeloleukemia (ought to be drawn)
Leukemic infiltrates are visible in the place of fat Bone Marrow. Myeloid leukemic cells are small, atypical with hyperchromatic nuclei. Cells of fat Bone Marrow are big, optically empty.
Slide № 10. The Lymph Node in chronic lympholeukemia
Atypical lymphocytes of leukemic infiltrates are disposed in tissue of Lymph Node. Usual structure of Lymph Node is replaced by leukemic tumorous cells.
Slide № 11. Arrosion of artery in the bed of gastric ulcer
The wall of large artery in the bed of progressive chronic peptic ulcer is necrotized. The lumen of artery contains blood clot. Blood in ulcerative defect is visible too.

Self-check materials:

1. A death of a 7-year-old boy resulted from acute posthaemorrhagic anaemia caused by a profuse bleeding from the gastrointestinal tract. A postmortem examination revealed: macroscopically - an anaemia of the internal organs, an enlargement of lymph nodes in different groups, thymomegaly, a moderately manifested hepatosplenomegaly, a bright red bone marrow; microscopically - a hypercellular bone marrow with some monomorphous infiltrate of blast cells, diffuse- focal tumour infiltrates in the liver, spleen, lymph nodes, meninges and substance of the brain. Make a diagnosis for this form of leukaemia.
   A. Acute lymphoblastic*
   B. Acute myeloblastic
   C. Acute stem cell
   D. Acute monoblastic
   E. Acute plasmablastic
2. A 70-year-old male patient with an expressed hepatosplenomegaly and cachexia underwent a diagnostic puncture biopsy of his liver. A histological examination revealed that along the portal tracts there were numerous infiltrates of monomorphous round cells verified as prolymphocytes and B-lymphocytes. What disease are the above changes characteristic of ?
   A. Lymphosarcoma
   B. Acute lymphoplastic leukaemia
   C. Lymphogranulomatosis
   D. Chronic lymphatic leukaemia*
   E. Cesari's disease
3. A male patient, who worked for a long period of time with benzene, develops progressing anaemia and the haemorrhagie syndrome. A biopsy of his breastbone reveals prevalence of a fatty tissue, and there are some small islets of haemopoiesis with solitary cells of myelopoiesis. What is your diagnosis?
   A. Chronic myeloleukaemia
   B. Pernicious anaemia

C. Haemolytic anaemia
D. Hypoplastic anaemia*
E. Aplastic anaemia

4. A histological examination of an enlarged lymph node revealed a proliferation of lymphocytes, histiocytes, reticular cells, acidophilic leukocytes, small and large Hodgkin's cells, multinuclear Reed-Sternberg cells. Which of the diseases Listed below do the described morphological data correspond to?

A. Lymphosarcoma
B. Metastasis of carcinoma
C. Chronic leukaemia
D. Acute leukaemia
E. Lymphogranulomatosis*

5. A patient with acute myeloblast leukemia has developed liver and spleen enlargement, anemia, myeloblasts in peripheral blood. What principal morphological sign allows differing myeloblast leukemia from chronic one?

A. Blast cells in peripheral blood *
B. Thrombocytopenia
C. Pancytopenia
D. Anemia
E. Leukemic collapse

Literature:

1. A.K. Zagorulko. Short lectures on pathology (pathological anatomy). - Simferopol: 2 ed. CSMU, 2002- P. 97-105.
2. Ramzi S. Kotran, Vinay Kumar, Stanley S. Robbins. Robbins Pathologic Basis of Disease, W.B. Saunders Company, USA, 1994 - P. 586-616, 633-648.
3. Anderson's Pathology // Edited by Jonh M. Kissane. The C.V. Mosby Company. - Toronto - Philadelphia, 1990. - P. 153-156, 1375- 1399.
4. Thomas C. Macropathology. - B.C. Decker Inc. - Toronto - Philadelphia, 1990.-355 p.
5. Thomas C. Histopathology. - B.C. Decker Inc. - Toronto - Philadelphia, 198 9.- 386 p.
6. Сорокіна І.В., Яковцова А.Ф. Патологічна анатомія: Підручник.- Х.: Факт, 2004. – С. 262-300.
7. Струков А.И., Серов В.В. Патологическая анатомия. - М.: Медицина, 1993. - С. 235-261.
8. Серов В.В., Ярыгин Н.Е., Пауков В.С. Патологическая анатомия. Атлас. - М., 1986. - С. 224-235.