МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
Харківський національний медичний університет

DISTURBANCE OF BLOOD AND LYMPH CIRCULATION. INFRACTION OF TISSUE FLUID. INFLAMMATION. DISEASES OF THE IMMUNE SYSTEM. COMPENSATORY ADAPTATION PROCESSES. REPAIR

Manual for practical classes in pathomorphology for English-speaking medical students

ПОРУШЕННЯ КРОВООБІГУ, ЛІМФООБІГУ ТА ТКАНИННОЇ РІДИНИ. ЗАПАЛЕННЯ. ПАТОЛОГІЯ ІМУННОЇ СИСТЕМИ. КОМПЕНСАТОРНО-АДАПТАЦІЙНІ ПРОЦЕСИ. РЕГЕНЕРАЦІЯ

Методичні вказівки до занять з патоморфології для студентів медичних вузів з англійською мовою навчання

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Порушення кровообігу, лімфообігу та тканинної рідини. Запалення. Патологія імунної системи. Компенсаторно-адаптаційні процеси. Регенерація : метод. вказ. до занять з патоморфології для студентів мед. вузів з англ. мовою навчання / упоряд. І. В. Сорокіна, В. Д. Марковський, І. В. Корнейко та ін. – Харків : ХНМУ, 2016. – 28 с.

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Foreword

Pathomorphology, one of the most important medical subjects is aimed at teaching students understanding material basis and mechanisms of the development of main pathological processes and diseases.

This manual published as separate booklets is devoted to general pathological processes as well as separate nosological forms. It is intended to the English-medium students of the medical and dentistry faculties. It can be used as additional material used both for home and individual work in class. It can also be used to master the relevant terminology and its unified teaching.

The manual is based on the syllabuses in Pathomorphology for Medical Students (2015).

For a practical class of 2 hour duration the following time calculation is recommended:

1. Determining the primary level of the knowledge – 5 min.
2. Independent work of the students – 50 min.
3. Determining the final level of the knowledge – 20 min.
4. Checking the protocols of the practical class and attestation of the students – 15 min.

The suggested Manual allows to organize the teaching process in the proper way.

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Lesson

Subject: Disturbance of blood circulation, arterial and venous hyperaemia, anaemia, stasis, haemorrhage, plasmorrhagia. Disturbance of lymph circulation. Infraction of tissue fluid content

Validation of the subject: the knowledge of disturbances of blood- and lymph circulation, infraction of tissue fluid content in tissues is necessary for successful mastering of the material from general (inflammation, tumors) and special pathomorphology (cardiac, pulmonary diseases, those of a digestive tract, kidneys, sex organs and infectious pathology) and for formation of clinical mentation of the future doctor, because all the specialists meet blood circulation disturbances in their practice.

Objective of the lesson: to study causes, mechanisms of development, morphologic manifestation, the significance for the organism and outcomes of different types of blood circulation disturbances. To explore special terminology. The students of Medical faculty should pay attention to the clinical significance of hyperemia, which appear after anaemia after paracentesis has been performed. The foreign students are known about the possibility of stases in brain vessels in malaria and about some peculiarities of bleeding in the countries with hot climate (continuation, frequency of bleeding by diapedesis and arrosion of the vascular walls with a great amount of blood-sucking insects).

Visual aids

Annotated tables:
– classification of blood circulation deviations;
– lymphatic system: functions and types of lymph-circulation insufficiency;
– morphology of lymphatic system insufficiency;
– disturbance of tissue fluid content.
Coloured tables:
– "nutmeg" liver;
– brown induration of the lung;
– different types of haemorrhages;
– liver blood supply.
Slides:
– "nutmeg" liver;
– punctate cerebral haemorrhages;
– stases in capillaries of the brain.
Macrospecimens:
– "nutmeg" liver;
– brown induration of the lung;
– chronic ulcer of the stomach with vessel erosion at the bottom;
– punctate and massive cerebral haemorrhages;
– punctate haemorrhages under the epicardium, endocardium and in dura mater;
– cephalohematoma;
– cardiac liver cirrhosis;
– cyanotic induration of kidneys and spleen.
Microspecimens:
– # 1 – "nutmeg" liver;
– # 11 – punctate cerebral haemorrhages;
– # 12 – stases in capillaries of the brain.
Electronograme:
– brown induration of the lung.

Questions to control basic knowledge:

1. Is stasis a result of venous plethora?
2. Name the pathologic processes, which may cause haemorrhage with vascular wall rupture:
   A. Vascular aneurysm.
   B. Enzyme exposure on vascular wall.
   C. Mechanical vessel injury.
   D. Enhancement of vascular wall penetrability.
3. Name the processes which develop in the liver when venous hyperemia occurs:
   A. Plethora of the portal vein branches.
   B. Plethora of the central veins.
   C. Atrophy of liver beams.
   D. Inflammatory infiltration of the stroma.
   E. Lipid degeneration of hepatocytes.
4. Name the processes, which provide intracapillary aggregation of erythrocytes:
   A. Increase of vascular wall penetrability.
   B. Increase of erythrocyte superficial potential.
   C. Decrease of erythrocyte superficial potential.
   D. Increase of large-dispersive blood proteins fractions.
   E. Arterial plethora.
   F. Venous plethora.
   G. Ischemia.
5. What types of hyperemia are related to: 1 – vacant hyperemia and 2 – hyperemia after anaemia:
   A. Skin hyperemia after cup application.
   B. Hyperemia after an exit out of caissons.
   C. Hyperemia of abdominal cavity after removal of ascitic fluid.
   D. Hyperemia of organs after an elimination of large tumors.

Answers: 1 – yes; 2 – a, c; 3 – b, c, d, e; 4 – a, b, d, f, g; 5. 1) a, b, 2) c, d.

Stages of individual work in class

Study and describe macrospecimen:

"Nutmeg" liver. Pay attention to the organ size, its consistency and the color at section. Why was the liver named "nutmeg" liver? What diseases result in such pathologic process? Name the stages of congestive liver fibrosis morphogenesis.

Brown induration of the lung. Characterize the organ consistency. Explain the origin of the term "brown induration of the lung" and morphogenesis of brown induration of the lung.

Cyanotic induration of kidneys. Pay attention to the size, consistency and colour of the organs. Explain etiology and morphogenesis of cyanotic induration.

Cyanotic induration of the spleen. Pay attention to the size, consistency and colour of the organs. Explain etiology and morphogenesis of cyanotic induration.

Chronic stomach ulcer complicated with bleeding. Describe the outlook of the bottom and margins of the stomach ulcer, specify the localization of arrosioned vessel, large blood clots from a stomach cavity, which found at autopsy.

Heart rupture in myocardial infarction. Determine the shape of the rupture, its margins condition and colour, blood clots in the pericardium cavity. Name the mechanism of bleeding development, the term denoting a blood agglomeration in pericardium cavity, the cause of patient death when such pathologic process occurs.

Haemorrhages into dura mater and brain tissue. Pay attention to localization, size and colour of the haemorrhages. There is a changes in colour of the haemorrhages, what does it caused by? Name the mechanisms of haemorrhage development in these specimens.

Cephalohematoma. Pay attention to haemorrhages localization and size. Give the definition and name possible outcomes of this pathologic process.

Cardiac cirrhosis of the liver. Describe the outlook of the organ, its capsule, colour on the section, excessive development of the stroma in the portal tracts. As an outcome of what process has this pathology developed?

Study, draw and describe the microspecimens.

 # 1 – "nutmeg" liver (stained with hematoxylin and eosin). Under low magnification determine the condition of the central veins and interbeam capillaries lumen, under high magnification study the outlook of the liver beams in the center of the lobule and periphery, paying attention to the volume decrease (atrophy) in the beams in the lobule center and to the presence of lipid degeneration in hepatocytes in the peripheral part of the lobule.

 # 11 – punctate cerebral haemorrhages (stained with hematoxylin and eosin). At low magnification find punctate haemorrhages localized mainly around small capillaries in the brain tissue.

 # 12 – stases in capillaries of the brain (stained with hematoxylin and eosin). At low and high magnifications find and study the plethoric capillaries. Pay attention to the fact, that erythrocytes lie in capillaries like column of coins ("sludge"-phenomenon).

Study the ellectronograms: *brown induration of the lung*

Pay attention to the great number of the siderophages and collagen fibers in the periendothelial area.

Krok questions:

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 peritoneum.

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

2. An autopsy of a foetus, who died from intranatal asphyxia owing to an acute disturbance of the uteroplacental circulation, revealed microfocal perivascular petechial haemorrhages in the pia mater, under the epicardium and under the pleura. Name the mechanism of an impairment in the walls of vessels which most probably resulted in the haemorrhages.

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

3. Transmural myocardial infarction in the patient was complicated with progressive acute left ventricle insufficiency. What is the most typical for this state?

*A. Edema of the lungs.** *D. Arterial hypertension.*
B. Cyanosis. *E. Ascites.*
C. Edema of the extremities.

Questions to control the knowledge:

1. Classification of blood circulation disturbances.
2. Definition of arterial plethora, types of general and local arterial plethora, their significance for the organism.
3. What are the types of general and local venous plethora? Their morphologic characteristic and outcome.
4. Morphogenesis of congestive liver fibrosis and brown induration of the lungs.
5. Definition of anaemia, causes and outer conditions of a local anaemia development, its types and significance for the organism.
6. Stases, causes and mechanisms of their development, significance for the organism.
7. Name the terms of bleeding and hemorrhage, development mechanisms of the latter, significance for the organism. Latin terminology.
8. Types of lymphatic system insufficiency, their morphologic manifestations and significance for the organism.
9. Infraction of a tissue fluid content, types of hypostases.

Terminology

Homeostasis, hyperemia, cyanosis, plethora, erythraemia, anaemia, hypoxia, stasis, bleeding, hemorrhage , haemorrhagic infiltration, haemorrhagic diathesis, hematoma, cephalohematoma, bruise, petechias, ecchymoses, insult, apoplexy, hemothorax, hemopericardium, hemoperitoneum, haematuria, haemocephalia.

Practical habits and skills

The students are to be able to diagnose cardial insufficiency; to use bleeding and hemorrhage terminology in clinics.

Revise the word-building elements:

hyper-excessive
a-absence
hypo-decreased

-emia-blood condition
-osis-pathologic condition
-oma-tumor

cyano-blue
erythro-red
oxo-oxygen
hemo-blood
hemato-blood
cephalo-head
homeo-constant
stasis-control, stop

Lesson

Subject: Disturbance of blood circulation. Thrombosis. Embolism. Infarct

Validation of the subject: the knowledge of this type of pathology is necessary for the better fixation of material from previous lessons (degenerations and necrosis) and also for successful studying the basic parts of special pathological anatomy (cardiac and rheumatic diseases, those of the digestive tract, liver, kidneys, sex organs, gestation and antenatal period, infectious diseases and war traumas).

Objective of the lesson: to learn the etiology, pathogenesis, classification, morphologic manifestations, possible outcomes and significance of thromboses, embolism and infarcts for the organism. The knowledge of these pathologic processes is necessary for the physicians of all specialties for their timely prevention.

Visual aids

Annotated tables:
– disturbances of blood circulation – thrombosis;
– types of embolism.
Coloured tables:
– anemic infarct of the spleen;
– infarcts of kidneys;
– haemorrhagic lung infarct;
– myocardial infarction;
– types of thrombi;
– pulmonary thromboembolism;
– embolism of pulmonary vessels with amniotic fluid;
– zones of infarct localization in organs;
– embolus moving;
– blood coagulation.

Slides:
– thrombophlebitis;
– haemorrhagic lung infarct;
– organization and vascularization of a thrombus.
Macrospecimens:
– parietal thrombus in aorta in atherosclerosis;
– obturating thrombus in the aorta bifurcation area;
– thrombosis of varicose veins;
– chronic heart aneurysm with parietal thrombus;
– obturating thrombi of arteries with canalization;
– thromboembolism of the pulmonary artery;
– haemorrhagic lung infarct;
– myocardial infarction with the wall rupture and packing of the pericardium;
– acute myocardial infarction;
– ischemic infarct of spleen;
– ischemic infarct of kidneys with haemorrhagic crown;
– small ischemic infarcts of kidneys;
– ischemic and haemorrhagic infarcts of brain.
Microspecimen
– # 4 – thrombophlebitis;
– # 7 – haemorrhagic infarct of the lung;
– # 6 – organization and vascularization of a thrombus.
Electronograme:
– three stages of thrombus formation

Questions to control basic knowledge:

1. Can an embolus move against the blood stream?
2. Name the composite parts of hyaline thrombus:
   A. Leukocytes.
   B. Erythrocytes.
   C. Thrombocytes.
   D. Precipitous plasma proteins.
   E. Cholesterol.
3. Give the definition of infarct:
   A. Intravital blood coagulation in vascular lumen/
   B. Necrotic focus, which develops as a result of blood circulation arrest.
   C. Organ degeneration under deviated venous outflow.
   D. Pathologic process resulting from disturbance of interrelation of coagulating systems.
4. Enumerate the origins of pulmonary thromboembolism:
   A. Thrombi from veins of general system.
   B. Thrombi from the left atrium.
   C. Thrombi from the right heart chambers.
   D. Thrombi from hemorrhoid veins.
   E. Thrombi from the right auricle.

5. Enumerate the types of embolism according to the nature of the embolus:
   A. Thromboembolism. *D. Cellular embolism.*
   B. Embolism with blood flow. *E. Paradoxical embolism.*
   C. Lipid embolism. *F. Tissue embolism.*
6. Name 1 – local, 2 – general factors of thrombus formation:
   A. changes of blood quality. *C.* slowing down of blood flow.
   B. vascular wall damage. *D.* disturbance in coagulative and anticoagulative blood systems.

Answers: 1 – yes; 2 – b, c, d; 3 – b; 4 – a, c, d, e; 5. a, c, d; 6. 1) b, c, 2) a, d.

Stages of individual work in class

Study and describe macrospecimens:

Parietal thrombus in the aorta with atherosclerosis. Thrombus outlook, its relation to the vascular wall and the lumen, its colour, condition of aorta intima. Enumerate general and local conditions of thrombus formation. Name possible outcomes of this process.

Obturative thrombus in the aorta bifurcation area with atherosclerosis. Condition of the aorta intima, its relation to the vascular wall and lumen, its colour. Give the definition of thrombosis. Name possible outcomes of this process.

Thrombosis of varicose veins. Pay attention to a numerous nodular round diverticuli of the vein walls. With what substance are these diverticuli filled? Name the possible outcomes of this process.

Chronic heart aneurysm with parietal thrombus. Characterize: a) the sizes of the heart, b) thickness of the left ventricle. Describe the aneurysm: a) its localization, b) the outlook, c) the wall thickness, d) the content of the aneurysm. What process preceded its development? What are the conditions of thrombus formation in aneurysm?

Thromboembolism of pulmonary artery. Describe the localization of thromboemboli, their size, colour. Name the most frequent origin of pulmonary thromboembolism. Characterize the mechanism of death under pulmonary thromboembolism.

Haemorrhagic infarct of the lung. Describe: a) the colour of the surface, b) the colour of the place infarct, of its shape and localization. Name the causes of lung infarct: a)…, b)…, c)… and its auspicious and inauspicious outcomes.

Acute myocardial infarction. Characterize: a) the colour of the focus of alteration, b) localization. What is the reason of crown colour at the peripheral region of necrosis? Enumerate the types of myocardial infarction according to the localization. Name the causes of myocardial infarction: a)…, b)…, c)… and its outcomes: a)…, b)…, c)… .

Ischemic cerebral infarct. Characterize: a) the colour of the focus of alteration, b) its localization, c) causes of cerebral infarct. Name the outcomes and significance for the organism.

Study, draw and describe the microspecimens

 # 4 – <u>thrombophlebitis</u> (stained with hematoxylin and eosin) – at low magnification find inflammation infiltration in the vein wall, the place of thrombus connection, pay attention to the constituent parts of the thrombus – leukocytes, fibrin, erythrocytes, agglutinated masses of thrombocytes; determine the type of a thrombus according to the relation with the lumen. Enumerate general processes of thrombus formation. Name possible consequences of thrombosis.

 # 7 – <u>haemorrhagic lung infarct</u> (stained with hematoxylin and eosin). At low magnification find a focus of necrosis in the lung; in this focus alveoles are filled with blood, interalveolar septi have necroses. Pay attention to the presence of pigmented macrophages in the peri-infarct zone (in the alveoles and stroma of the lung). Name the characteristics of lung infarct and its possible outcomes.

 # 6 – organization and canalization of a thrombus (stained according to van-Gieson). At low magnification of a microscope find a vessel of arterial type with obturating thrombus; in a mass of thrombus find newly-created vessels, covered by endothelium with erythrocytes at the lumen.

Study the ellectronograms: *three stages of thrombus formation*

Pay attention to localisation and structure of thrombus mass into the lumen of vassal.

Krok questions:

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

2. A 65-years-old patient suffered by thrombophlebitis of the deep veins of both legs has died suddenly. Autopsy was showed free lying dry friable red masses with a dull crimped surface within the truncus pulmonalis and bifurcation of the lung artery. What process within the vessels did pathologist find?

*A. Thromboembolism.** *C. Tissue embolism.* *E. Hemangioma.*
B. Thrombosis. *D. Postmortem clot*

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

Questions to control the knowledge:

1. Definition of thrombosis, embolism, infarct.
2. General and local circumstances and mechanism of thrombus-formation.
3. Types of thrombi, their difference from postmortem blood clots.
4. Outcomes of a thrombi – auspicious and inauspicious.
5. Causes of infarcts in different organs.
6. Types of infarcts and mechanisms of their development.
7. Outcomes of infarcts in different organs (heart, lung, kidneys, spleen).
8. Three general ways of embolus movement in the blood stream.
9. Definitions of retrograde and paradoxical embolism.
10. Mechanisms of embolus development.
11. Types of embolus according to their nature.
12. Diagnosis of air embolism on dissection.
13. Significance of embolism to the organism.

Terminology

Thrombosis, thrombophlebitis, thromboarteritis, thrombo-endocarditis, spherical thrombus, dilatating thrombus; orthograde, retrograde and paradoxical embolus, thromboembolism, thromboembolic syndrome; infarcts: white, red, white with haemorrhagic crown.

Practical habits and skills

To achieve an ability of diagnosing thrombosis of vessels and heart cavities, embolism and infarcts in different organs according to macro- and microspecimens; to differentiate thrombophlebitis and phlebothrombosis.

Revise the word-building elements:

endo – inside
thrombo – clot
phlebo – vein
arterio – artery
cardio – heart
embolo – embolus

– osis – pathologic condition
– itis – inflammation

Lesson

Subject: Acute (exudative) inflammation

Validation of the subject: As many pathological process and diseases are inflammatory in character, understanding the subject is essential for future studies in general pathological anatomy and also when studying case histories (respiratory system, gastrointestinal tract, liver and especially infectious diseases).

Objective of the lesson: to study the etiology, pathogenesis and morphology of inflammation. To learn how to determine types of tissue reactions. To know the clinico-anatomical forms, possible outcomes and importance for the organism of alterative and exudative inflammations.

Visual aids

Annotated tables:

– types of inflammation;

– morphological signs of inflammation.

Coloured tables:

– different types of inflammation;

– purulent, brain abscess, fibrinous, hemorrhagic;

– croupous pneumonia (lobar pneumonia);

– morphology of exudation; types of exudative reactions.

Slides:

– fibrinopurulent pericarditis;

– croupous pneumonia;

– purulent leptomeningitis;

– emigration of neutrophilic leukocytes through the vessel walls during inflammation.

Macrospecimens

– fibrinous pericarditis;

– purulent leptomeningitis;

– chronic osteomyelitis with sequestrum;

– brain abscess;

– croupous pneumonia in the stage of grey hepatization;

– diphtheroid colitis;

– hemorrhagic leptomeningitis.

Microspecimens

– # 86 – fibrinopurulent pericarditis;

– # 87 – leptomeningitis;

– # 90 – croupous pneumonia.

Electronograme:

– Inflammation;

– Exudation;

– Emigration of polymorphic cells (leukocytes).

Questions to control basic knowledge:

1) Are labrocytes the main source of inflammatory mediators? Yes or no?
2) Name the types of exudative inflammation:

A. Serous.	*E. Hemorrhagic.*	*I. Catarrhal.*
B. Granulomatous.	*F. Alterative.*	*J. Fibrinoid swelling.*
C. Interstitial.	*G. Purulent.*	*K. Mixed.*
D. Rotten.	*H. Fibrinous.*	

3) Name the types of purulent inflammation:

A. Abscess.	*D. Diaphoretic.*	*G. False croup.*
B. Croupous.	*E. Empyema.*	*H. Furuncle.*
C. Phlegmon.	*F. Carbuncle.*	*I. Panaritium.*

4) Can sclerosis be the outcome of fibrinous inflammation (yes or no)?
5) Give the classification for inflammations: course (acute or chronic) – etiology, dominating tissue reaction:

A. Alterative.	*C. Proliferative.*	*E. Chronic.*	*G. Specific.*
B. Exudative.	*D. Acute.*	*F. Usual (common).*	

Answers: 1) yes, 2) a, d, e, f, h, i, j; 3) a, c, e, f, i, j; 4) yes; 5) d, e; h; i; a, b, c.

Stages of individual work in class

Study and describe macrospecimens:

Fibrinopurulent pericarditis. Describe the macrospecimen, characterize the surface of the epicardium. What is the descriptive name for the specimen? Indicate the causes and outcome; possible clinical determination of pericarditis.

Purulent leptomeningitis. Characterize the stage of haemorrhage in the pia mater of the brain, state of the gyri, sulci, exudative type. What are the causes of the inflammation, its complications and outcome.

Brain abscess. Appearance of the abscess walls and the content of the space. Which type of inflammation is it? Name the causes of purulent inflammation and its outcome.

Croupous pneumonia in the stage of grey hepatization. Describe the appearance of the lungs; aeration, pleura state, the character of the exudate. Etiological factors, the outcomes of the inflammation and possible complications.

Diphtheroid colitis. Describe the macro specimen. Characterize the thickness of the intestinal walls, the types of the film covering the mucous layer. Name the disease and state under which the above inflammation develops.

Study the slides on the stand:

– fibrinous pericarditis
– croupous pneumonia
– purulent leptomeningitis

Study, draw and describe the microspecimens

86 – *fibrinopurulent pericarditis* (stained with hematoxylin and eosin). Describe the layers located on the epicardium surface. Name the cause and outcome of the inflammation.

87 – *purulent leptomeningitis* (stained with hematoxylin and eosin). Describe the state of the pia mater of the brain: its thickness, appearance of the vessels, the character of the exudate, the prevalence of infiltration with leukocytes.

90 – *croupous pneumonia* (stained with hematoxylin and eosin). Pay attention to the homogeneity connected with the involvement of the alveoli in the pathological process. Composition of the inflammatory exudate.

Krok questions:

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

2. An autopsy of a male, who died from progressing cardiopulmonary insufficiency, revealed petechial haemorrhages under the visceral leaf of the pericardium, the surface of the serous coat was dull and diffusely covered with greyish superpositions in the form of a net, hairs and films, there were 200 ml of some dull fluid in the lumen of the pericardium. What kind of inflammation was there in the pericardium?

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

3. 56-year-old patient has suffered from right-side lower-lobar pneumonia with expectoration of mucus with pus. In autopsy in 9–10 segments of the right lung the cavity with dense walls filled with purulent masses, was found. The whitish path comes from the cavity toward the radix of the lung. Microscopically in was established that the cavity is divided from saved lung tissue with thin membrane, which consists of two layers: internal-granulation tissue, and external –connective tissue. What diagnosis is more probable?

*A. Chronic abscess.** *D. Chronic pneumonia.*
B. Pulmonary gangrene. *E. Bronchoectatic disease.*
C. Acute pulmonary abscess.

Questions to control the knowledge:

1) Definition and causes of inflammation.

2) What are the morphological forms of banal inflammation according to the character of tissue reactions?

3) Define alterative inflammation.

4) Types of exudative inflammation according to the character of the exudate.

Terminology

Inflammation, alteration, mediators, exudation, phagocytosis, empyema, pneumonia, abscess, phlegmon, pleurisy, gingivitis, fibrous inflammation, croupous inflammation, diphtheroid inflammation, putrid inflammation, soft phlegmon, hard phlegmon, rotten inflammation, phlebitis, sialoadenitis, meningitis, peritonitis, esophagitis, endometritis, gastritis, salpingitis, rhinitis, tonsillitis, cystitis, myocarditis, lymphadenitis, mastitis, otitis.

Practical habits and skills

Leaning this subject the students are be able to give the definition for inflammation, to explain the mechanism of inflammation, to know its classification and define exudative inflammation, to name the kinds of them.

Revise the word-building elements:

-itis- inflammation
adeno-gland
cysto-urinary bladder
rhino-nose
phlebo-vein
gingivo-gum
meningo-meninges
peritoneo-peritoneum
esophago-esohpagus
metro-uterus
gastro-stomach
salpingo-salpynx
myo-muscle
oto-ear
endo-inside

Lesson

Subject: Chronic (productive) and specific inflammation

Validation of the subject: the knowledge of specific and productive inflammation is necessary to learn a number of units of general course of pathologic anatomy (such as immunopathological processes, regeneration, tumors) and also pathologic anatomy of diseases (infections, autoimmune, rheumatic diseases etc.).

The foreign students of the medical faculty are to pay attention to productive (granulomatous and interstitial) as well as specific inflammation.

Objective of the lesson: to study the etiology, pathology, classification and morphological types of productive and specific inflammations, as well as possible complications, outcomes and significance for the organism.

Visual aids

Annotated tables:
– differential diagnosis of tuberculosis and syphilis;
– dynamics of the tissue reactions in tuberculosis;
– manifestation of tuberculosis in the tissue;
– primary syphilis;
– hereditary syphilis.
Coloured tables:
– syphilis;
– tuberculous granuloma;
– tissue reactions in tuberculosis;
– scheme of interrelations of the cells in the field of inflammation in tuberculosis;
– manifestation of tuberculosis in the lungs;
– lepra (lepromatous type, "lion face", undifferentiated type);
– hepatic echinococcosis.
Slides:
– cardiosclerosis;
– portal hepatocirrhosis;
– syphilitic mesaortitis;
– miliary pulmonary tuberculosis.
Macrospecimens:
– unicameral hepatic echinococcosis;
– multicameral hepatic echinococcosis;
– cysticercosis of the brain;
– cardiosclerosis;
– portal hepatocirrhosis (Laennec's cirrhosis);
– condyloma;
– polyp of the intestinum tenue;
– syphilitic mesaortitis;
– miliary pulmonary tuberculosis;
– hepatic solitary gummas;
– lobular liver in syphilis;
– maceration of fetus.
Microspecimens:
– # 96 – atrophic portal hepatocirrhosis;
– # 109 – miliary pulmonary tuberculosis;
– # 125 – syphilitic mesaortitis**;**
– # 138 – multicameral hepatic echinococcosis;
– # 137 – unicameral pulmonary echinococcosis;
– # 139 – muscular trichinellosis;
– # 97 – cardiosclerosis.
Electronograms:
– Pirogov-Langchans giant cell;
– lepromatous granuloma;
– Wirchoff lepra cell.

Questions to control basic knowledge:

1. Is productive inflammation characterized by proliferation of cellular elements of the histogenetic and hematogenic origin? (yes or no).
2. From which organs can interstitial inflammation originate:

A. Spleen.	*D. Brain.*	*G. Lung.*
B. Stomach.	*E. Liver.*	*H. Eye.*
C. Heart.	*F. Kidney.*	*I. Intestinum crassum.*

3. On what does the changes of tissue reaction during specific inflammation depend?
   A. Increase in hormonal activity of the endocrine glands.
   B. Influence of the nervous factors.
   C. Immunological reconstruction of the organism.
4. Name the types of tuberculous tubercle according to the cellular structure:

A. Lymphoidocellular.	*C. Giant-cell.*	*E. Epitheliocellular.*
B. Plasmocellular.	*D. Monocytocellular.*	*F. Compound.*

5. Morphological changes which characterize the following forms of lepra: 1) lepromatous, 2) tuberculous, 3) intermediate:
   A. Proliferation of the macrophages, formation Pirogov-Langchans giant cells, accumulation of lymphocytes,
   B. Unspecific cellular reaction around the vessels and appendages of the skin, small nervous trunks,
   C. Appearance of Wirchoff lepromatous cells,
   D. Lepromatous diffuse infiltration in the skin.

Answers:1 – yes; 2 – c, e, f, g; 3 – c; 4 – a, c, e, f; 5 – 1) c, 2) a, 3) b.

Stages of individual work in class

Study and describe macrospecimens:

Cardiosclerosis. Characterize the appearance of the organ and name the pathological process. Name the pathological process, which precedes diffuse cardiosclerosis. What is the cause of death in pronounced cardisclerosis?

Portal hepatocirrhosis (micronodular). Define appearance of the organ, its surface, colour, condition of the capsule and describe the section surface. Point out the pathological process, which preceded formation of the connective tissue. Possible outcome.

Unicameral hepatic echinococcosis. Describe the cavity shape, its internal layer, cyst contents. The appearance of external layer of the cyst side. Name the sequence of changing the tissue reaction to the zone of parasitical inculcation.

Multicameral hepatic echinococcosis. Pay attention to the form of Echinococcus, its condition. Describe the appearance on section. Name the type of the productive inflammation, which develops around the animal parasite and foreign body.

Condyloma. Characterize the appearance of condyloma, its sizes. Describe the character of the growth. Name the localization of condyloma. Kind of the productive inflammation.

Polyp of small intestine. Describe the appearance of the intestine from the side of the tunica. Name the type of productive inflammation and possible complications, outcomes.

Miliary pulmonary tuberculosis. Characterize the appearance of the nodule and the nature of the process. Describe the colour, size, quantity of them. Give the definition with the regard of the character of pathological process and its morphological form, etiology and degree of the prevalence. Name the way of pathogen dissemination. Translate the term "miliary". In what forms of tuberculosis is it observed? Possible outcomes of granuloma; the causes of death.

Syphilitic mesaortitis. Pay attention to localization of the pathological process with the regard of the aorta part. Describe the appearance of the aorta in the place of localization of pathological process. Pathogenesis of the disease. Name the figurative name of the changing aorta intima in the place of direct injury and the kind of pathological process (which underlie in the aorta changing), its form with the regard of etiology and morphology. In which period of syphilis do you observe these changes? Name the possible complication.

Hepatic solitary gummas. Pay attention to the heterogeneous hepatic appearance. Define the form of the gumma, its colour, periphery of the gumma. Give the definition of the term "gumma" with the regard of the character of the pathological process, its morphological form, etiology and degree of the prevalence. Translate the term "solitary". In which period does syphilis develop in the gummas? Name the outcomes. Explain the essence of the changes in the liver.

Lobular liver in syphilis. Characterize the appearance of the organ. Name the changes preceding the development of lobular liver.

Maceration of the fetus. Describe the outlook of the fetus. Characterize the skin of the fetus. Name the form of syphilis and the cause of death.

Study, draw and describe the microspecimens

 # 96 – atrophic portal hepatocirrhosis (stained with hematoxylin and eosin). Name the organ. Describe the degree of the development of connective tissue, indicate the localization in respect to the structure of the organ. Explain the importance of the term "micronodular hepatocirrhosis". Name the pathological process causing development of connective tissue. Explain the meaning of the term "cirrhosis".

 # 109 – miliary pulmonary tuberculosis (stained with hematoxylin and eosin). Name the organ. Characterize the pathological process in the lung. Describe the structure of tuberculous granuloma. Indicate the meaning of the term "miliary". Name the outcomes of granuloma with regard to immunological state of organism.

 # 125 – syphilitic mesaortitis (stained according to van-Gieson). Name the vessel where the pathological process takes place. Indicate the localization of the inflammatory infiltrates, degree of its prevalence. Name the form of inflammation according to the morphology, etiology, localization. Describe the cellular structure, presence of the vessels. Characterize the condition of elastic framework at staining with fuchseline. Name the outcomes. Name the complications and the cause of death.

Study the demonstrative microspecimens

– # 138 – *multicameral hepatic echinococcosis*

– # 137 – *unicameral pulmonary echinococcosis*

– # 139 – *muscular trichinellosis*

– # 97 – *cardiosclerosis*

– **Study electronograms:**

Find the distinctive features of Pirogov-Langchans giant cell, Lepromatous granuloma and Wirchoff lepra cells.

Krok questions:

1. A microscopic examination of the myocardium in a male, who died from cardiac decompensation, revealed sclerosis of the perivascular connective tissue and its diffuse infiltration by lymphocytes, macrophages, plasmacytes and solitary neutrophils. Which of the listed kinds of inflammation was the most probable?

A. Interstitial productive.* *C.* Alterative. *E.* Exudative focal.
B. Granulomatous productive. *D.* Exudative diffuse.

2. In a woman, who suffers from chronic gonorrhoea, some whitish papillary vegetations resembling cauliflower were found out on the vulval mucosa, on the border with the skin. A microscopic examination revealed vegetation of the stratified squamous epithelium and the underlying stroma with its diffuse lymphoplasmacytic infiltration. Which of the pathological processes listed below was the most probable?

A. Papilloma. *C.* Pointed condylomata.* *E.* Dermatofibroma.
B. Adenomatous polyp. *D.* Fibroma.

3. During the microscopic examination of bioptic fragment of the skin the granulomas were found out containing epithelioid cells, surrounded with T-lymphocytes. Between the epithelioid cells the solitary giant polynuclear Langhan′s cells located. There were areas of caseous necrosis in the center of some granulomas. Blood vessels were absent. What disease do such changes characterize?

*A. Tuberculosis.** *C. Leprosy.* *E. Hodgkin's disease.*
B. Syphilis. *D. Rhinoscleroma.*

Questions to control the knowledge:

1. Definition of "productive inflammation".
2. Classification of productive inflammation.
3. Characteristics of granulomatous inflammation, peculiarity of its course with regard to immunologic state of the organism.
4. The outcome of granulomatous inflammation.
5. Morphologic peculiarities of productive inflammation with formation of polyp and pointed condylomas.
6. Outcomes of productive inflammation.
7. Importance of productive inflammation for the organism.
8. Etiology, clinico-morphological signs of specific inflammation.
9. Peculiarities of tissue reactions in syphilis and tuberculosis.

10. Types of tissue reaction caused by Mycobacterium leprous, clinico-anatomic forms.
11. Description of the inflammation caused by glanderous bacilli.
12. Morphological description of scleroma, its basic signs.
13. Significance of specific inflammation for the organism.

Terminology

Proliferation, productive inflammation, polymorphocellular, round-cell, macrophage, epitheliocellular, giant-cell, plasmocellular infiltrates, interstitial, granulomatous, sarcoma granuloma, sarcoidosis, Pirogov-Langchans giant cell, polyps, pointed condylomas, papilloma, sclerosis, hyalinosis, cirrhosis, specific inflammation, miliary tuberculosis, solitary tubercles; acinous, nodular, lobular, segmental, cavern of ulcer; cicatrix; incapsulation, calcification, gumma, leproma, Wirchoff cell, scleroma, Treponema pallidum, Mikulich cell, glanders, karyorrhexis.

Practical habits and skills

The students are to differentiate the kinds of productive and specific inflammation.

Revise the word-building elements:

poly – many
macro – large
in – inside
morpho – shape
phago – to eat
scro – flesh
sclero – hardening
karyo – cell
– oid – resembling
– oma – tumor
– osis – pathologic condition
– orrhexis – rupture

Lesson

Subject "Diseases of the Immune system"

Validation of the subject: the knowledge of this type of pathology is necessary for better fixation of basic topics either of general or special pathological anatomy, and also while studying therapy, pediatrics, infectious diseases and other clinical subjects. For the foreign students of medical faculty, it is necessary to know secondary immune deficiency and autoimmune diseases; it is necessary to pay special attention to primary immune deficiencies.

Objective of the lessons: to study morphologic changes in deviations of immunogenesis, the character of changes in central and peripheral lymphoid organs, reaction of hypersensitivity of immediate and delayed types as well as autoimmune diseases and immunodeficiency syndromes.

Visual aids

Annotated tables:
– central and peripheral organs of immune system;
– autoimmune diseases;
– prime immunodeficiency syndromes.
Coloured tablets:
– structure of the spleen;
– structure of the lymphatic node.
Slides:
– allogenic cells surrounded by lymphocyte-killers;
– plasmatic cells;
– theories of immunity;
– most important differential signs of T- and B- lymphocytes;
– the role of thymus in the immune response;
– immunity and tumors;
– T- and B- lymphocytes;
– classification of immunodeficiency states.
Macrospecimens:
– kidney in lupus nephritis;
– thymus in thymicolymphatic state;
– Hasimoto's goiter.
Microspecimens:
– # 8 – acidental thymus involution;
– # 10 – Hasimoto's goiter.
Electronograms:
– plasmatic cell at antigen stimulation;
– reaction of hypersensitivity of immediate type: sensitized lymphocyte.

Questions to control basic knowledge:

1. Is thymus a peripheral organ of immune system?
2. Name phases of cellular immune reaction:
   A. Sensitization of T-lymphocytes.
   B. Afferent link.
   C. Proliferation and blastic transformation of T-lymphocytes.
   D. Reaction of sensitized lymphocyte with antigen.
3. What diseases are autoimmune ones:
4. Name the types of tuberculous tubercle according to the cellular structure:
   A. Rheumatism. *C. Rheumatoid arteritis.* *E. Scleroderma.*
   B. Hasimoto's goiter. *D. Lupus erythematoses.* *F. Hypertension.*
5. Name central (1) and peripheral (2) organs of immunogenesis:
   A. Spleen. *B.* Thymus. *C.* Appendix. *D.* Lymphatic nodes.
   Answers: 1 – no; 2 – a, c, d; 3 – a, b, c, d, e; 4 – 1) b, 2) a, c, d.

Stages of individual work in class

Study and describe macrospecimens

Kidney in lupus nephritis. Pay attention to the sizes of a kidney, its dappled surface due to hemorrhages. What is the mechanism of their appearance? The outcome of lupus nephritis.

Thymico-lymphatic state. Describe the complex of organs. Pay attention to the enlargement of thymus and solitary follicles of the colon. What organs besides these are changed in this state?

Hasimoto's goiter. Pay attention to the enlarged thyroid. Describe the outlook of macrospecimen. To what group of autoimmune diseases does Hasimoto's goiter belong?

Study, draw and describe the microspecimens

 # 8 – accidental thymus involution (stained with hematoxylin and eosin). At low magnification of a microscope pay attention to the deminished, but inexplicitly expressed thymus lobules, and in the center of gland, absence of abutments beside the cortical and medulla tissue of lobules. Specify at high magnification, reduction in the amount of leukocytes in the cortex; thickness of interlobular fibric shells. What causes an accidental involution of thymus?

 # 10 – Hasimoto's goiter (stained with hematoxylin and eosin). Pay attention to the atrophy of thyroid parenchyma and cellular infiltration of tissue with lymphoid follicles creation. Determine the character of diffuse cellular infiltration; find lymphocytes, plasmatic and reticular cells. What cells dominate in the infiltrate? What is their action on the follicle epithelium?

Study electronograms:

– *plasmatic cell at antigen stimulation*, ×6 000. Pay attention to the enlarged cisterns of endoplasmatic reticulum

– *reaction of hypersensitivity of immediate type: sensitized lymphocyte*, ×23 000. Pay attention to the great amount of lysosomes, big mitochondria in the cytoplasm, and marginal collocation of chromatin in the nucleus.

Krok questions:

1. A study of the thymus of a 5-year-old child, who died from acute destructive staphylococcal pneumonia, revealed a decrease in the weight of the gland down to 3.0 g. On histological examination, a smaller size of the lobules of the gland with a collapse of the stroma, an inversion of the layers, and cyst-like Hassal′s bodies were found out. Which of the diagnoses listed below was the most probable?

*A. Accidental reaction.**
B. Thymomegaly.
C. Hypoplasia of the thymus.
D. Dysplasia of the thymus.
E. Agenesia of the thymus.

2. An autopsy of a 43-year-old female, who suffered from attacks of expiratory dyspnoea during her life-time and died from asphyxia, revealed some dense glass-like mucus in the lumens of the bronchi, their walls were thick, the lungs had foci of an emphysema and atelectases. A histological examination of the

pulmonary tissue revealed some mucus with an admixture of eosinophils in the lumens of small bronchi, sclerosis of the peribronchial connective tissue and interalveolar septa, dilation of the lumens in the alveoli. What mechanism of hypersensitivity formed the basis for the development of asphyxia?

A. Immunocomplex reaction.
B. Cytotoxic reaction.
*C. Reaginic reaction.**
D. Cytolysis owing to lymphocytes.
E. Granulomatosis.

3. In a child, 48 hours after a tuberculin (Mantoux) test, a papule up to 10 cm in diameter formed at the place of an injection of tuberculin. What mechanism of hypersensitivity lay in the basis of the above changes?

*A. Cellular cytotoxicity.**
B. Anaphylaxis.
C. Antibody-dependent cytotoxicity.
D. Immunocomplex cytotoxicity.
E. Granulomatosis.

Questions to control the knowledge:

1. Give the definition of inception of immunopathologic processes.
2. Name central and peripheral organs of immune system, T- and B-dependent zones.
3. What immune reactions do you know? Specify links of immune reactions.
4. Characterize thymus changes at disturbance of immunogenesis.
5. What changes appear in peripheral lymphoid organs at antigenic stimulation?
6. Give the characteristic to reactions of hypersensitivity of immediate and delayed types.
7. Tell the classification of autoimmune diseases, their morphologic characteristics.
8. Name the types and clinical morphologic manifestations of immune deficiencies.

Terminology

Immunopathology, immunomorphology, autoagression, autoallergy, immunogenesis, humoral immunity, cellular immunity, accidental involution of a thymus, thymico-lymphatic state, reaction of hypersensitivity of immediate and delayed types, reaction of rejection of transplantate, syndrome of immunodeficiency, Glantsmann and Riniker syndrome, agammaglobulinemia of swiss type, Loui-Bar ataxia – teleangioectasia, Neseloph's syndrome, Diegorge's syndrome, thymus agenesia, Brouton's syndrome, West's syndrome.

Practical habits and skills

On the basis of the study of morphologic changes in the immune system to be able to diagnose antigen stimulation, immunodeficiencies, differentiate various types of reactions of hypersensitivity. To classify and determine autoimmune diseases correctly.

Revise the word-building element

immuno-protection
patho-disease
morpho-shape

geno-to develop, to produce
auto-self
hyper-increased
a-absence
-logy-science
-emia-blood condition
-ia-state, condition

Lesson

Subject: Compensatory adaptation processes (CAP). Repair

Validation of the subject: the knowledge of compensatory adaptation processes is necessary for learning productive inflammation and tumors and also in applied course, as the processes of compensatory adaptation occur in every disease. This knowledge is important to study all clinical disciplines and for practical activities.

Objective of the lessons: to learn the essence of CAP, the mechanisms of their development, stages and functional role, morphological changes in hypertrophy, hyperplasia, atrophy, regeneration, structural changes of the tissues, metaplasia and organization.

Visual aids

Annotated tables:
– types of regeneration;
– regeneration of separate tissues;
– regeneration of connective tissue;
– hypertrophy;
– atrophy.
Coloured tablets:
– hypertrophy of heart;
– hyperplasia of endometrium;
– atrophy of myocardium and kidneys;
– hydrocephalia and hydronephrosis;
– callus of femur;
– hydrophysical cachexia (Simmond disease).
Slides:
– myocardial hypertrophy;
– glandular hyperplasia of the endometrium;
– pulmonary emphysema;
– granular tissue;
– brown atrophy of liver.
Macrospecimens:
– concentric hypertrophy of heart;
– excentric hypertrophy of heart;
– spleen atrophy;
– gynecomastia;

– internal hydrocephalia;
– hydronephrosis;
– acromegalia;
– pulmonary emphysema;
– elephantiasis of the lower extremity;
– brown atrophy of the heart.

Microspecimens:

– # 144 – myocardial hypertrophy;
– # 145 – endometrium glandular hyperplasia;
– # 146 – granular tissue;
– # 22 – pulmonary emphysema.

Electronograms:

– myocardial hypertrophy;
– regeneration of myocardial cell.

Questions to control basic knowledge:

1. Is cellular form of regeneration universal?
2. Do compensatory processes include the following:
   A. Regeneration. *C. Metaplasia.* *E. Atrophy.* *G. Proliferation.*
   B. Hypertrophy. *D. Hyperplasia.* *F. Agenesia.*
3. Definition of hypertrophy is:
   A. Organ decrease in size.
   B. One kind of tissue replaces another.
   C. Enlargement of the organ due to cellular reproduction.
   D. Restoration of the lost structure.
   E. Organ structure replaced by connective tissue.
   F. Enlargement of the organ due to increase of structural unit size.
4. Types of atrophy are:
   A. Physiological. *C. General.* *E. Brown.*
   B. Pathological. *D. Local.* *F. Compensatory.*
5. Organization manifestation is:
   A. Wound healing. *C. Hyperplasia.* *E. Encapsulation.*
   B. Metaplasia. *D. Proliferation.*

Answers: 1 – no; 2 – a, b, d; 3 – f; 4 – a, b, c, d, e; 5 – a, e.

Stages of individual work in class

Study and describe macrospecimens:

Concentric and excentric hypertrophy of the heart. Pay attention to the thickness of the wall and volume of the heart cavity in the both specimens. To what conditions of the heart activity does each of them correspond?

Spleen atrophy. Define the size of the organ and condition of the capsule. What is the evidence of its wrinkling? What is the type of atrophy in this case?

Hydronephrosis. Appearance of the kidney, condition of the pelvis and calyces, thickness of renal parenchyma. Variety of pathology according to prevalence and cause. What kind of macrospecimen correspond to similar processes?

Acromegalia. Pay attention to the size of the skeleton. Which process is in the base of these changes and the cause of them?

Elephantiasis of the lower extremity. The size and the condition of the soft tissues and skin. What is the type of pathology? What is it due to?

Study, draw and describe the microspecimens

 # 144 – myocardial hypertrophy (stained with hematoxylin and eosin). Pay attention to the size of the muscular fibers and stroma quantity at low magnification. At high magnification, find the cytoplasm and nuclei of muscular cells (size, shape, and intensity of color).

 # 145 – endometrium glandular hyperplasia (stained with hematoxylin and eosin). Determine the endometrium thickness, quantity of glands in it, their shape, quantity of cellular elements in the glands and stroma.

 # 146 – granular tissue (stained with hematoxylin and eosin). Define the quantity and degree of vascular differentiation in the tissue. Name the cells according to their construction.

 # 22 – pulmonary emphysema (stained with hematoxylin and eosin). Determine the interalveolar septum thickness, their integrity, sizes.

Study electronograms:

Myocardial hypertrophy. Pay attention to the enlargement and quantity of the mitochondria, myofilaments, size of the nucleus. What kind of processes takes place in intracellular ultrastructures of the muscular fibers?

Regeneration of myocardial cell. Pay attention to the quantity of the myofilaments and size of the nucleus. What kind of regeneration takes place in intracellular ultrastructures of the muscular fibers?

Krok questions:

1. 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.

2. An X-ray film of a male patient, who underwent an operation of bone fragment repositioning after a fracture of his elbow bone with displacement, one month after the surgical intervention revealed a cartilaginous callus. Name the kind of regeneration of the bone tissue.

*A. Secondary osseous consolidation.**
B. Primary osseous consolidation.
C. Connective-tissue callosity.
D. Preceding callus.
E. Final callus.

3. After deep burns of the skin a patient has got a keloid scarring. What kind of pathologic processes do those formations relate to?

*A. Incomplete regeneration (substitution).** *D. Hypertrophy.*
B. Complete regeneration (restitution). *E. Metaplasia.*
C. Atrophy.

Questions to control the knowledge:

1. Concept of the professes of compensatory adaptation and types of them.
2. Definition and types of the regeneration.
3. Regeneration of the connective tissue, bones, vessels.
4. Definition of hypertrophy and its types according to the mechanisms of development.
5. Definition of hyperplasia.
6. Definition and types of atrophy.
7. Definition and types of organization.
8. Types of wound healing.
9. The importance of processes of compensatory adaptation for vital functions of the organism.
10. Basic mechanisms of regulation processes of compensatory adaptation.

Terminology

Regeneration, hypertrophy, hyperplasia, restitution, substitution, concentric hypertrophy, regenerative hypertrophy, excentric hypertrophy, false hypertrophy (pseudo-hypertrophy), vicarious hypertrophy, vacant hypertrophy, atrophy, myogenic dilatation, tonogenic expansion, agenesia, aplasia, hypoplasia, dwarfism, cachexia, brown artophy, hydronephrosis, hydrocephalia, metaplasia, heterotopia, organization, first intention, secondary intention, encapsulation.

Practical habits and skills

The students are to be able to reveal compensation and adaptation processes in the organs and tissues on the basis of the knowledge about morphological sings and the causes.

Revise the word-building elements:

geno – to produce, to develop
hydro – water
topo – place
myo – muscle
cephalo – head
hypo – decreased
hyper – excessive, increased
a – absence
meta – near, beyond
hetero – different
– trophy – nutrition
– plasia – development
– ia – condition
– osis - disease

Навчальне видання

ПОРУШЕННЯ КРОВООБІГУ, ЛІМФООБІГУ ТА ТКАНИННОЇ РІДИНИ. ЗАПАЛЕННЯ. ПАТОЛОГІЯ ІМУННОЇ СИСТЕМИ. КОМПЕНСАТОРНО-АДАПТАЦІЙНІ ПРОЦЕСИ. РЕГЕНЕРАЦІЯ

Методичні вказівки до занять з патоморфології для студентів медичних вузів з англійською мовою навчання

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DISTURBANCE OF BLOOD AND LYMPH CIRCULATION. INFRACTION OF TISSUE FLUID. INFLAMMATION. DISEASES OF THE IMMUNE SYSTEM. COMPENSATORY ADAPTATION PROCESSES. REPAIR

Manual for practical classes in pathomorphology for English-speaking medical students