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СИТУАЦИОННЫЕ ЗАДАЧИ ПО ПАТОЛОГИЧЕСКОЙ ФИЗИОЛОГИИ

Учебно-методическое пособие
для иностранных студентов, обучающихся на английском языке

COLLECTION OF SITUATIONAL TASKS ON PATHOLOGICAL PHYSIOLOGY

The educational-methodical work
for foreign students educates in English language

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INTRODUCTION. GENERAL DOCTRINE ABOUT DISEASE. HEREDITY AND PATHOLOGY

Task 1

Laboratory animal (for example a mouse, a rat) is placed in a small pressure chamber. During 2–3 min air is pumped out from the pressure chamber, in that case pressure is lowering up to 170–180 mm hg (23–24 kilopascal). In 0,5–1 min of its stay in the rarefied atmosphere the animal shows the anxiety features: touches paws, scratches its muzzle, runs on the pressure chamber; through 2–3 min there are clonic tonic convulsions, urination, animal lays on one side, there are rare deep «sighs» (terminal respiration «gasping»). Soon there is a full respiratory standstill, animal perishes. Duration of its life in the rarefied atmosphere is 3–4 minutes

Questions

1. The animal in the given experiment has undergone to action of which pathogenic factors?
2. Which out of specified factors could cause the developed pathological process (hypobaric hypoxia)?
3. How is it possible to check up experimentally pronounced assumption?

The decisions

1. General hypobaria and oxygen partial pressure suppression.
2. Imperfection of oxygen and general hypobaria.
3. Create experimental models in which the specified factors render separate influence.

Task 2

Air is pumped out from a pressure chamber up to 30–20 mm hg then the pressure chamber is filled with pure oxygen up to normal atmospheric pressure. We quickly place there an experimental animal having slightly opened a door of the pressure chamber and immediately encapsulate the chamber again. Further we act in the same way as in the task1.Then we do animal's condition supervision. At the outset it has rough reaction, then animal sits quietly and also there aren't marked any pathological phenomena. Through 8–10 min experience is stopped and animal is taken from the chamber. Its normal behavior and condition ascertains.

Question

What conclusions, allowing to approach to the answer on the question 2 of previous tasks, is possible to make on the basis of results of the given experiment?

The decision

Hypobaria does not lead to the pathological process development in case of normal oxygen partial pressure, as in the previous experiment. It is possible to assume, that the basic operating factor is an imperfection of oxygen or its jointed action with general hypobaria.

Task 3

Pressure chamber is filled up with earlier prepared gas mix consisting of 95% of nitrogen and 5% of oxygen in case of normal atmospheric pressure. The experimental animal is placed there and a weak jet of the specified gas mix is continue to pass (oxygen partial pressure in such mix equals about 37 mm hg). In 10–15 min convulsions develop, and there is a respiratory standstill. Answering questions will you consider results of all the specified experiments?

Questions

1. What is the reason of the acute hypobaric hypoxia development and animal's death?
2. What role does hypobaria play in the development of the given form of hypoxia and its outcome? By what pathophysiological term the similar factors are designated?

The decisions

1. Low maintenance of oxygen in inhaled air.
2. Hypobaria in this case is the factor aggravating action of the reason. Such factor is designated as «condition» (risk factor).

Task 4

The following experiment is lead on three mice. The mouse № 1 is exposed to physical activity (swimming in an aquarium, temperature of water nearby 30°C); in 5 minets in the same aquarium the mouse № 2 is placed; after 5–10 sec both animals are taken out from water, they are placed in the pressure chamber together with the mouse № 3 (intact) and air is pumped out from the pressure chamber similarly the task № 1. In 3–4 mines the intact mouse deceased, the mouse № 2 deceased in 6–7 min, the mouse № 1 maintains stay in the rarefied atmosphere during 15 mines then experience stops and the mouse extracted from the pressure chamber does not show any attributes of vital ability impairment.

Questions

1. What distinctions in stability of animals to hypoxia are installed in the given experiment?
2. What mechanisms can underlie observable distinctions of reactance of animals concerning hypobaric hypoxia?
3. Whether influence of hypothermia, arising in case of evaporation of water from the moistened surface of body, in conditions of hypobaria on stability to hypoxia?

The decisions

1. The mouse № 1 is the most steady (physical activity), the intact animal is the least steady.

2. Mechanisms of the general adaptable process. Firstly the mechanisms leading to decrease in consumption of oxygen by tissues and increase in its delivery to it.

3. In this case hypothermia, connected with evaporation of water from the body surface, is a condition, also capable to raise («in crisscross manner») stability of organism to hypoxia.

Task 5

Experiment is lead on 3 mice.

The mouse № 1 is narcotize subcutaneously by introduction of urethane in a doze of 1,5 g/kg. This animal is used in experience after the deep narcosis development.

Mice № 2 for 10 min before the experience is entered CNS stimulator phenamine in a doze of 0,0025 g/kg.

The mouse № 3 serves as a control.

All three animals place in a pressure chamber and air is pumped out similarly experience in the task №1.

The mouse № 2 perishes on the second minute of stay in the pressure chamber, in which atmospheric pressure is 170 mm hg, the mouse № 3 perishes on the fourth minute; the mouse № 1 is alive on 15 min of hypobaria then it is extracted from the pressure chamber. After awakening from narcosis signs of the vital ability impairment are not found out in this animal.

Questions

1. What features of change of the experimental animals organism resistance change in relation to hypobaric hypoxia in case of action narcotic and CNS exciting drugs?

2. What are the possible mechanisms of the experimental animals reactance change?

The decisions

1. The mouse entered phenamine is posses the least resistance, and the narcotized animal posseses the greatest resistance.

2. Change of reactance of organism is mainly connected with change of stability of brain to hypoxia. It is defined by its functional condition and a level of impellent activity of animals.

Task 6

Will you carry out the comparative analysis of two situations:

Situation A

During the climbing of group of climbers on top of the Everest at height of 6500 m above the sea level one of climbers has lost his consciousness. Inhalation of oxygen through a mask has improved his condition, the consciousness was restored. However because of weakness and convulsions in muscles he

could not continue climbing and he was transported to the base camp at height of 3000 m above sea level where his condition was normalized gradually.

Situation B

During the flight on height of 10 000 m encapsulation of plane cabin has occur. For continuation of flight on this height the pilot has passed to breath oxygen through a mask, but his state of health remains bad, and he has been compelled{forced} to make emergency landing.

Questions

1. What was the reason of the pathological condition development in that and in other case?
2. Why has oxygen inhalation in one case improved condition, and in other it appeared inefficient?

The decisions

1. In the first case the reason was a hypobaric hypoxia, in the second-fast decompression.
2. In the first case inhalation of oxygen was effective as the reason which has caused loss of consciousness was eliminated, in the second case breath of oxygen was inefficiently as as a result of fast decompression gas micro-embolism has developed.

Task 7

Healthy woman who's father is sick of hemophilia A, and mother is healthy, has addressed in genetic consultation with the question: is the danger of occurrence of this disease occurrence in her grandsons great? Husband and three of their children — the son and two daughters — are healthy.

Questions

1. What is the type of inheritance and than what is the reason of the hemophilia A development?
2. Whether development of the lethal form of the given pathology is liable?
3. Is a probability of this disease occurrence in grandsons on filial line great?

The decisions

1. Hemophilia A is inherited on the recessive X-linked type. This form of pathology is connected with deficiency of the VIII factor of blood coagulation.
2. The lethal form is probable in case of decrease in the VIII factor level in blood up to 0–1% in relation to average norm, sub-lethal — up to a level of 1–5%.
3. The probability of the hemophilia A occurrence in grandsons of the woman on the filial lineequals zero, on the affiliated line: 6,25% — genotypically and phenotypically sick grandsons; 6,25% — genotypically sick grand daughters (phenotypically all grand daughters are healthy).

Task 8

Pregnant woman has addressed in the genetic consultation. She has informed, that her sister by mother (they have different fathers) suffers from phenylketonuria. In husbands family there were marriages between close relatives, but anyone of children weren't suffer from phenylketonuria. Examination of the woman and her husband hasn't revealed deviations in condition of their health.

Questions

1. Is danger of the phenylketonuria development is great?
2. What is the possible mechanism of the phenylketonuria occurence?
3. What is the pathogenesis of base manifestations?
4. How early recognition of this illness in newborns is carried out?
5. Whether preventive of the phenylketonuria development in children is possible?

The decisions

1. Phenylketonuria is inherited on the autosome-recessive type. If husband is not the carrier of the mutant gene the probability to be ill in descendants is practically close to zero.
2. In basis of pathogenesis of the majority of cases of disease — loss of ability to synthesize phenylalanine-4-monoxigenase, transforming phenylalanine in tyrosine.
3. Clinical manifestations of phenylketonuria are: oligophrenia, pathological reflexes, epileptic attacks. The other name of the given disease is phenylpiruvic oligophrnia. The reasons of the oligophrenia development precisely are not established; damage of nervous cells by products of phenylalanine metabolism, probably, phenylpiruvate is supposed. Disbalance of amino acids in the CNS may be important.
4. Definition of phenylalanine level in plasma of blood, phenylpiruvate in urine since 4–6 months.
5. Development of disease will be prevented if reception of phenylalinine with food is considerably lowered. It is recommended to adhere to such diet constantly.

Task 9

In genetic consultation Z. has informed, that her sister has heavy form of sickle-cell anemia and she and her husband are practically healthy. Z. interests, whether danger of this disease occurrence in her children is great.

For this question answer Z. and her husband were examined with the aim of determination of types of Hb. Research has shown, that in Z's erythrocytes.: HbA — 70% and HbS — 28%; in husband's erythrocytes: HbA — 98% and HbS — 0%.

Questions

1. What is a type of sickle-cell anemia inheritance?

2. What is a probability of birth of children, suffering with sickle-cell anemia? Is there a probability of birth of children, healthy phenotypically, but having the abnormal gene in genotype coding HbS?

3. Whether the probabilities of phenotypical (clinical) manifestation of the given disease depend on sex of the future children of the woman Z?

4. In what cases is it possible to expect dangerous to life aggravation of this disease current?

The decisions

1. S-hemoglobin pathology is the autosome pathology, it is inherited on the prepotent type.

2. Itself Z. unlike her sister doesn't have sickle-cell anemia, and she is only the carrier of HbS gene. In this case all her children will be phenotypic healthy, but 50% of children will contain abnormal genes.

3. It is not connected.

4. In conditions of hypoxia when dissociation of oxihemoglobin amplifies (for example, during stay in high-mountainous district or in case of lobar pneumonia, in case of big physical activity, under action of narcosis).

Task 10

Research of different diseases frequency occurrence among monozygotic and dyzigotic twins has revealed, that frequency has made for:

a) Schizophrenia (monozygotes = 87%; dyzigotes = 4%).

b) Scarlet fevers (monozygotes = 94%; dyzigotes = 95%).

c) Poliomyelitis (monozygotes = 44%; dyzigotes = 39%).

Questions

1. What are Holtsinger factors of heritability equal for each disease?

2. What is a role of hereditary and environmental factors in occurrence of the specified disease?

3. Whether is it possible to change «relative density» of influence of the given factors on occurrence of these and other diseases? If you answer yes, will you explain the way? If you answer no, will you explain why?

The decisions

1. The Holtsinger factor of heritability *(H)* characterizes a role of genotype in development of monogenic or polygenic disease.

Factor H is counted under the formula:

$$\mathbf{H = [(K_{mz}-K_{dz})/(100-K_{dz})]\times 100\%}$$

Where:

100 % is a concordance of monozygotic twins.

Concordance of monozygotic twins is a % of concordate to the given sign in the given sample of monozygote twins under the relation to all of their population;

Concordance of dizygotic twins is a % of concordate to the given sign in the given sample of dizygotes under the relation to all of their population.

H for schizophrenia = 86,5%.

H for scarlet fever = 40%.

H for poliomyelitis = 8,2%.

2. Knowing factor *H,* it is possible to calculate factor *E* describing the contribution of environmental factors in development of the same diseases under the formula:

E = 100-H.

Thus, for schizophrenia the contribution of the hereditary factor is high in comparison with environmental, and for poliomyelitis — on the contrary is low.

Task 11

Down syndrome allocates 3 cytogenic forms of disease: simple, trisomic, mosaic.

Questions

1. In case of which type is the birth of child with normal intelligence possible?
2. What type often do young parents have? Prove your answer.

The decisions

1. Ability of the normal child birth in case of the mosaic type will be possible when phenotypical polymorphism is observed.
2. More often young parents have mosaic type.

Task 12

In case of given syndrome microgenia, the cleft palate flexis disposition of hands, microphtalmia, the mental development impairment, defects of eyes, organs of digestion, uric syndrome are observed.

Questions

1. What is the name of described syndrome?
2. Trisomy of which pair of chromosomes is observed in this disease?

The decisions

1. Edwards's syndrome.
2. Trisomy of 18 th chromosome.

Task 13

Anomalies of skull and face are observed at birth of child (cheilognatopalatoschisis, moderated microcephalia, defects of scalp), defects of the bone-muscular system, defeat of the CNS (ariencephalia), developmental anomalies incompatible with life leading to death.

Questions

1. What is the name of the given syndrome?
2. Trisomy of what the chromosomes pair is observed in case of such disease?

The decisions

1. Patau's syndrome.
2. Trisomy of 13th chromosomes pair.

Task 14

Karyotype of the given patient is characterized by presence of 3 sexual chromosomes. It is characteristic for high growth, the eunochoid constitution, infringement of spermatogenesis, microrchia, the mentality impairment.

Questions

1. What is the name of the given syndrome?
2. What karyotype of the given syndrome?

The decisions

1. Klainfelter's syndrome.
2. XXY.

Task 15

Patient of 153 sm has the skin fold on neck, neck of «sphinx», primary amenorrhea, and barrenness. There are congenital diseases of heart and kidneys.

Questions

1. What is the name of the given syndrome?
2. What is a karyotype of the given syndrome?

The decisions

1. Turner's syndrome.
2. (45X0)

ETIOLOGY AND PATHOGENESIS OF CELL DAMAGES

Task 1

Hepatomegaly is found out in two infancy monozygotic twins arrived in clinic. Also decreased glucose level in blood plasma on empty stomach (hypoglycemia) is observed. The maintenance of blood plasma glucose in reply to administration of adrenaline increases slightly. Activity of phosphorylase is sharply decreased and the glycogen level is increased.

Questions

1. What pathological process has developed in twins? Prove the answer.
2. What are the possible reasons of this pathological process?
3. What mechanisms of the given pathological condition formation in hepatocytes?
4. What mechanism of hepatomegaly, hypoglycemia and weak hyperglycemic effect occurrence in reply to administration of adrenalin?

Task 2

For the hemolytic anemia experimental modeling phenyl diamide was administrated to mice. And as it is known phenyl diamide stimulates free radical reactions in cells. Decrease in quantity of erythrocytes, presence of free Hb and methemoglobin was revealed in half an hour after phenyl diamide administration in blood of animals.

Question

Explain possible mechanisms of the erythrocytic membranes damage.

Task 3

Cellular effects of the toxic substance which is a part of waste of one chemical manufacture were investigated in the toxicological laboratory. The substance was brought into normal epithelial monoculture in the toxic concentration. Presence of signs of cells damage was estimated every 30 minutes during 3 hours. In 3 hours of incubation 85% of cells destruction was observed.

Questions

1. What morphological and biochemical criteria (signs) can be offered for an estimation of reversible (A) and irreversible (B) epithelial cells damages in the given experiment?
2. The result sequence of pathological changes in a cell and their mechanisms, being based on the offered criteria of the cells condition estimation.

Task 4

Peroxidase positive granues are revealed into neutrophils, monocytes of peripheal blood and bone marrow in patient M at age of seven. Also noncomplete phagocytosis, photophobia and reccurent purulent diseases, nystagmus are observed in the patient.

Questions

1. Specify, with what pathology of cellular organelles the given impairment is connected?
2. Specify the reason and mechanisms of the given syndrome.
3. How do we refer the given syndrome?

Task 5

The given syndrome refers to the hereditary pathology of lungs. It is characterized by a triad, which includes visceral inversion, bronchiectasis and sinusitis.

Questions

1. How do we refer the given syndrome?
2. With what organelles pathology does the given syndrome associate?

Task 6

Deficiency of carnitine in various organs and tissues is observed in the given pathology. Clincal manifestations of the given syndrome: myopathy, disorders of liver and brain functions.

Questions

1. Specify, with what cellular organelles pathology the given syndrome is associated?
2. How we refer the given pathology?

Task 7

What morphological types of lysosomes (primary lysosomes, secondary lysosomes, residual bodies) do not participate in endocellular digestion? Prove the answer.

Example of the task decision

One of the lysosomal pigments is formed in nervous and parenchymatous cells by autophony. The given pigment collects with the years, therefore it is named «ageing pigment».

Questions

1. How the given pigment is named?
2. In what pathological conditions there is an accumulation of that pigment in organism?
3. What are the modern functions of the given pigment?

The decisions

1. The given pigment is named lipofuscin.
2. Lipofuscin accumulates in poisonings, influences of medicinal substances, deficiency of vitamin E, hypoxia.
3. Now lipofuscin is carried to the category of cellular organelles, containing granules — cytosomes or carotinosomes. Lipofusin function is an oxygen deposition.

LOCAL DISORDERS OF BLOOD CIRCULATION

Task 1

The puncture of abdominal cavity for removing of ascitic liquids was spent to the 68 years old patient suffering from the chronic hepatitis and cirrhosis of the liver. The patient has complained of weakness, dizziness, nausea on 15-th minute of procedure after removal of 5 L of liquids, but procedure has been continued. Patient has lost consciousness after removing more than 1,5 L of liquids. The consciousness was restored in some minutes after rendering the urgent help. But the patient still complains on strong weakness, dizziness and nausea.

Questions

1. What was the given mistake at carrying out of procedure to the given patient?
2. What is the mechanisms of the faint development in case of the ascitic liquid removal?
3. What are possible mechanisms of compensation of the brain blood circulation frustration in a similar situation?
4. Why compensatory mechanisms of blood circulation system have appeared ineffective in the given patient?

Task 2

At polyclinic reception the 56 years old man has complained of fast fatigue and the gastrocnemius muscle pain during the walking. Pain stops after the walking stopping (a symptom of «an intermittent claudication»), the chill legs, the legs numbness feeling, «crawling of ants» and pricking (paresthesia) in rest. The patient smokes much (from youthful age), his trade is connected with the periods of long cooling (outside work during autumn — winter time). During physical examination: pale feet, dry and cold feet skin, crumbled nails, pulse is not probed on the posterior dorsal pedal artery and on the posterior tibial artery. The preliminary diagnosis is «the obliterating endarteritis».

Questions

1. What form of regional blood circulation impairment is available for the patient? What are it's characteristic signs.
2. What are the mechanisms of its development in the given patient?
3. What negative consequences of blood circulation impairment are possible in the patient?
4. What are the most probable mechanisms of the presented symptoms development in the given situation?

Task 3

The blood-flow of the hip muscles was researched in a dog with denervated limbs up to and in 30secoonds after the temporary discontinuance (3 min) of blood-flow in it. The temporary discontinuance of blood-flow was caused by imposing of pneumatic cuff on hip muscles and creation of the pressure 200 mm in it.

Questions

1. Whether the increase of hip muscles blood-flow will be observed after the cuff removal?

2. Will hyperemia develop? If yes, what type of hyperemia will develop in the given situation?

Task 4

The venous hyperemia has been received by ligation on the lower third of rabbit's femoral vein.

Question

How will blood-flow change in the shin arterial vessels?

Task 5

Whether the sequence and character of functional, metabolic and structural changes in the venous stagnation area are correctly presented on the scheme below? If it is not, what is the mistake?

Difficulty of outflow → decrease in blood-flow rate → decrease in blood pressure in veins and capillaries → narrowing of veins and capillaries → hypocapnia, hypercapnia → oxygen starvation of tissues → tissue metabolic imbalance: acidosis, increase of vascular permeability, atrophic and dystrophic changes in tissue, excess growth of connective tissue.

Task 6

Are the character of functional, metabolic and structural changes in ischemic tissue correctly presented on the given scheme below?

Restriction of arterial blood inflow → oxygen starvation → decrease in efficiency of Krebs cycle → decrease in intensity of anaerobic glycolisis → decrease of structural proteins biosynthesis → the impairment of specific functions → tissue necrobiotic changes.

Task 7

During he experimental modeling of embolism 5 sm3 of air have been injected to the rabbits right femoral vein?

Question

Embolism of what blood circulation circle will occur in this case?

Task 8

Pulmonary embolism has occurred. Specify possible places of the blood clot localization, which has served as a source of thromboembolism occurrence in this case.

Task 9

During post-mortem examination the embolism of the medial cerebral artery was found. Where can be a source of embolism occurrence in this case?

Task 10

In conditions of pulmonary circle vessels systemic fat embolism development acute decrease in arterial pressure happened in dog. Experimental animals died on the first day of the experiment carrying out.

Question

How will animal's condition and term of their survival change if experimental systemic fat embolism is caused after the preliminary vagus overcut?

Task 11

The puncture of abdominal cavity was made to the patient, 48 years old, with a sizeable ascites. After the extraction of 7 L of the ascitc liquid suddenly the patient's condition has worsened sharply: there was dizziness, the faint has developed. The patient's faint has been regarded as manifestation of insufficient brain blood supply as a result of blood redistribution.

Question

About what form of the regional blood circulation impairment, which has caused blood redistribution, the extraction of patient's ascitic liquid has resulted?

Task 12

The hip tumor removal was made to the 52 years old patient. The femoral artery has been injured during section of commissures. The vascular stitch was imposed on the damaged place, the artery pulsation after the vascular stitch imposing is good. Later day after operation strong pains have appeared in the operated limb. Pulse on the foot back side is not palpated, fingers movement is absent. The skin has become pale, cold.

Questions

1. About what form of the peripheral blood circulation impairment the patient's developed symptomatology does testify?
2. What is the probable reason of the regional hemodynamics impairment in this case?

Task 13

The surgical d-bridement of the left hip compound wounds was made to the 14 years old patient. The unpleasant sensation of numbness and temperature fall of the limb have appeared in 6 hours since the surgical d-bridement. Then the increased intensity pain has joined the process. The foot skin became pale. The pulsation on the popliteal artery of the shin and the foot wasn't palpated.

Questions

1. What type of the peripheral blood circulation impairment has developed? What are it possible reasons?
2. What are the mechanisms of above-stated symptoms development?

Task 14

The 16 years old patient was delivered in the traumatology department with the open displaced fracture of the hip's middle third. The operation was made under the endotracheal anesthesia. There was a tachycardia, pulse — 140/minute, the arterial pressure has increased up to 200/130 mm hg. The expressed hyperemia with face covered cyanosis has appeared. The carotids pulse has disappeared, pupils have extended. The physical death was ascertained.

Question

What type of the regional blood circulation impairment might cause the subsequent hemodynamics impairments in the patient?

Example of the task decision

In diver working on the 15 meters depth the signs of cession disease have appeared in 15 minutes: the skin itch, the joints and muscles pains, nausea, the general weakness.

Questions

1. What is the origin of the developed embolism?
2. What gas do vesicles consist of in the given embolism type?

The decisions

1. Gas.
2. Basically from nitrogen.

ACUTE AND CHRONIC INFLAMMATION. ACUTE PHASE RSPONSE

Task 1

Two workers with the shin's burns in case of autoclave accident have addressed to the enterprise first-aid post. They have presented similar complaints: headache, burning pain, swelling in burnt places. During physical examination there is hyperemic shins, cutaneous edema in victim A, and besides the all listed above (hyperemic shins, cutaneous edema) there are vesicles with the transparent light yellow liquid in victim B. Both victims have received sick-lists and treatment recommendations, but didn't carry it out.

The victim A condition has become normal in 3 day, but the victim B condition has considerably worsened: the widespread edema has developed and burnt places pain has increased; numerous of vesicles with purulent contents (during its bacteriological research Staphylococcus aureus was found) have appeared in the burnt zone; the body temperature was 38,9°C.

Questions

1. What pathological process has developed in victims? Prove the answer. What additional examinations can be done for inflammation process character specification in victims?
2. What are the reasons of various pathological process (processes) current caused by the same factor?
3. What are the mechanisms of symptoms development in the victim B?
4. Why does the noninfectious pathogenic factor (the increased temperature) cause occurrence of vesicles with purulent contents in victim B? Express the assumptions and give it the substantiation.

Task 2

The case histories of traumatology department patients have been studied with the purpose of in-depth pathophysiological analysis of adverse posttraumatic inflammatory process current reasons in patients. The all patients depending on the primary physiological systems and organs impairment has been joined in three groups. The first group patients were with the signs of the liver impairment, the second group patients were with the cardiovascular system impairments (atherosclerosis, hypertonic disease, ect.), the third group elderly age patients were with the various cerebral impairments (the after insult condition, the brain concussion, the brain vessels atherosclerosis, ect.)

Questions

1. How was it justified to join the patients in three specified groups?
2. By what criteria (to the parameters, the diagnostic data) the case histories could be associated for purposeful studying of the adverse inflammatory process current reasons in patients?

Task 3

In case of a drop of mustard oil deposit on the eye mucous of the rabbit the distinctly expressed inflammatory reaction has appeared in 1 hour; reddening of conjunctiva, expansion of the mucous capillaries, edematous mucous.

Question

Will inflammatory reaction develop if the alternating agent is deposits on preliminary anesthetized mucous?

Task 4

The expressed expansion of arterioles, capillaries, venules, increase in number of functioning capillaries and a blood-flow acceleration is noted in Kongein experiment on frog's mesentery.

Question

For what stage of vascular reaction in inflammation the revealed microcirculation changes are characteristic?

Task 5

There is a damage of endothelium vessels and Hagmen's factor activation in the inflammation zone.

Question

What inflammation mediators from the listed below appear in blood as a consequence of this factor activation: prostaglandins, kallidin, histamine, serotonin, complement, plasmin, bradykinin?

Task 6

The edema in a zone of alteration was revealed during the inflammatory process reproduction by a burn in the stopping histamine and serotonin action conditions by usage of proper inhibitors. And also edema was revealed in the similar experiment modification.

Question

What is the inflammatory edema caused by in this case?

Task 7

The inflammation center in rabbits is caused by the intradermal introduction of turpentine in a dose0,1 ml (the rabbits skin is closely cropped in the injection place). In one hour after the injection of the injury agent the intravenous introduction of methylene blue (the stuff). Soon after the introduction the blue coloration was possible to observe in the inflammation zone.

Question

How will you explain the blue coloration of tissues in the inflammation zone in case of the methylene blue introduction (the stuff)?

Task 8

The inflammatory reaction development intensity was researched in experiments on the healthy and anemic rabbits. Inflammation was caused by the xylene application on the abdomen closely cropped skin. The stuff was immediately introduced after the xylene application. According to the time of the stuff entrance to the inflammatory tissue we judged about the inflammatory process development intensity.

Question

In what time, longer or shorter, will the skin coloring of the inflammatory center begin in anemic rabbits?

Task 9

The same dose of strychnine was introduced to two rabbits, in which the local inflammation process was caused in one of the hind limbs. At that to one rabbit strychnine was introduced in the inflammatory center and to another out of the inflammatory center. One of the rabbits died because of the strychnine intoxication

Question

What rabbit died because of the strychnine intoxication?

Task 10

If we introduce the Streptococcal culture in the knee joint, the microbial cells will be observed in blood in 24 hours.

Questions

Will the microorganism dissemination rate change, if:

1. The acute knee-joint inflammation process is caused before its introduction?
2. It is introduced in the same time with the causing inflammatory process agent?

Task 11

The virulent streptococcal culture was introduced to two rabbits, the big doses of hydrocortisone were introduced previously to one of them during one week, and aldosterone was introduced to another.

Questions

1. In which rabbit will the inflammatory reaction be more expressed after the microbial agent introduction?
2. In what rabbit is a greater septicemia development possibility?

Task 12

The rabbit with the extracted thyroid gland and the rabbit with thyroid gland hyper function were injured (the rabbits skin injurings have the same size, character and localization).

Question

In which rabbit will the wound healing be faster?

Task 13

The 39 years old patient B has visited doctor because of the revealed few days ago solid painless formation in the left mammary gland.

Objectively: there is a solid formation without clear contours, the rounded shape, in a size 3×4 sm in the top external quadrant of the mammary gland. The formation has solid elastic consistence, palpation of the mammary gland formation is painless, it is not matted together with skin and underlying tissues. The skin over the formation is not changed. Regional lymph nodes are not palpated.

Questions

Are there any signs testifying about the inflammatory origin of the disease in woman? If there are any signs, what are they?

Task 14

There is a 27 years old patient, she is a nursing mother. The left mammary gland pain has appeared in 3 weeks after the childbirth, the breast feeding is painful. On the third day of the disease fever, increase in the body temperature up to 39°C, the increasing left mammary gland pain has appeared.

Objectively the solid formation without clear contours in a size 5×5 sm is palpated in the left mammary gland; this formation is sharply painful at palpation. There are no centers of softening and fluctuation. There is a skin reddening over the formation, the subcutaneous veins dilation in the mammary gland area, the increased regional lymph vessels. At the laboratory examination we revealed: leukocytes 12,4× 10^9 /l, ESR — 35 mm/h.

Questions

Are there any signs testifying about the inflammatory origin of the disease in woman? If there are any signs, what are they?

Task 15

The 32 years old patient complains of the joints aches, the joints deformation, the low grade fever. There is an infectious polyarthritis in anamnesis. There is a frequent acute conditions of the disease.

During the patient's examination we reveal: leukocytes 12,6×10^9 in 1 mcl, ESR — 26 mm/h, the common protein level is 75 g/l. The albumin level is decreased (41%), the alpha — globulin fraction is increased (14,7%). The diphenylamine test is positive. The C-reactive protein test is positive.

Question

Are there any signs testifying about the acute condition of the disease?

Task 16

During the examination of the 12 years old patient B the abdomen cavity liquid accumulation is revealed. Paracentesis is made for the accumulated liquid research. The troubled punctuate is received during the puncture.

The relative density is 1,029. The protein level is 2–0,39g/l. There is a blood corpuscles prevalence in sediment. Neutrophils prevail, among neutrophils there are a lot of degenerative cells. Microbial flora is extra- and intracellular.

Question

What is the character of the liquid taking during the puncture?

Example of the task decision

During the physical examination the liquid accumulation in abdominal cavity is revealed in 27 years old patient B (the patient is a woman). The puncture of abdominal cavity was made for the specification of the ascites development reasons.

The transparent light yellow color punctate was received during paracentesis. The relative density of the punctate is 1,029. The protein maintenance is 0,2 g/L. Lymphocytes are prevail in Rivalt's test.

Question

What is the character of the received liquid during the puncture?

The decision

The received liquid is a transudate. Transuates have not-high relative density (0,005–1,015), the protein level in transudates does not exess 0,3 g/L, therefore Rivalt's test is negative. Transudates have light yellow color, it is transparent, it also contains a small amount of cellular elements among which lymphocytes prevail.

THERMOREGULATION IMPAIRMENTS

Task 1

Fever is repoduced by the subcutaneous injection of turpentine in the intact rabbit and the rabbit with the sharply expressed granulocytopenia caused by nitrogen-yperite injection.

Questions

1. Whether there will be fever of identical intensity caused by administrated turpentine in these animals?
2. Whether there will be a distinction in character of the temperature reaction development observed after pyrogenal injection to these rabbits?
3. Whether there will be a distinction in time of temperature reaction observed after the turpentine administration in comparison with the reaction after pyrogenal administration?

Task 2

Three rabbits were used in the experiment. Pyrogenal was introduced intravenously to the rabbitr A. In 5 min bloods was taken from the rabbit A and 5 ml of the prepared serum were introduced intravenously to the rabbit B. Then in 120 min blood was taken from the rabbit A and 5 ml of the prepared serum was introduced to the rabbit C. The constant thermometry was led to the rabbits. The more quicker and more considerable body temperature increase was in rabbit B as compared with rabbit C from the moment of the serum introduction. Why was it so?

Task 3

For finding-out of the value of the CNS functional condition in the fever development the following experiment was lead on three white outbred rats: the solution of benzedrine in a dose of 0,6 ml/200 g of weight was administrated to the first rat, the solution of hexenal in the same dose was administrated to the second rat, the isotonic solution of NaCl in the equivalent dose was administrated to the third rat. After the narcotic condition develoment in the second rat, the rectal temperature has been measured and the same dose of pyrogenal has been administrated to the all animals. Then the rectal temperature of each animal has been measured in every 15 minutes during one hour and a half. The results are presentd in the table.

Rat	**0**	**15**	**30**	**45**	**60**	**75**	**90**
1-st	36,6	37,0	37,2	37,6	38,1	38,6	38,9
2-nd	36,6	36,5	36,3	36,1	35,8	35,6	35,2
3-rd	36,7	36,9	37,1	37,3	37,7	37,7	37,9

Questions

1. What factors can influence the position of «a set point» of the thermoregulation center?
2. What part of nervous system does participate in the feverish reaction development?
3. Having analysed the results of experiment, try to explain the distinctions of the fever development in experimental animals.

Task 4

Fever has developed in the 25 years old patient B (the body temperature is 38,9ºC), also there is a cough with phlegm and the right side pains during respiration. She is in the hospital because of AIDS. During the medical examination there is leucopenia because of decrease in quality of lymphocytes and monocytes; also in phlegm:big quality of cast — off epithelial cells, leukocytes, different types of bacteria, the Treponema Ag positive test.

Questions

1. What are the source of pyrogens in the given case? Prove the answer.
2. How will you explain the fever development on the leucopenia background?
3. May the given fever episode be associated with AIDS? Prove the answer.

Task 5

The rabbits body temperature increase can be caused by the intramuscular introduction of 0,5 ml of turpentine, by the intravenous introduction of 2–3 ml of the hemolytic streptococcus broth culture, by the subcutaneous introduction of caffeine in a dose 0,3 g on 1 kilo of body mass, the intramuscular introduction of pyrogenal (0,01 g/kg), the intravenous introduction of dinitrophenol (0,02 g/kg), also big doses of adrenaline and thyroxin.

Question

In which of the given cases the fever development takes place?

Task 6

In healthy rabbit and in rabbit with the severe granulocytopenia caused by the prevail introduction of nitrogenous yperite, the fever reaction was reproduced by the turpentine subcutaneous introduction.

Questions

1. Is the fever intensity same under the introduced turpentine influence?
2. Why fever develops in rabbits with granulocytopenia?

Task 7

The experimental fever is reproduced by the pyrogenal introduction to a laboratory animal on the prevail alpha-adrenergic receptors blockade background.

Question

In which conditions of the fever modeling will the heat emission — heat production ratio change on the stage of the body temperature increase?

Task 8

The pyrogenal introduction to the laboratory animal with experimental thyrotoxicosis was accompanied by the more acute increase in the body temperature then in the intact animal after the same pyrogenal doses introduction.

Question

How will you explain the described phenomenon?

Task 9

Experimental fever was caused by the pyrogenal introduction to two rabbits-intact and other one after a great number of the glucocorticoids introductions.

Question

Is reaction on pyrogenal same in the specified variants of the fever modeling?

Task 10

The cat's hypothalamus anterior lobe was injured by electrocoagulation.

Question

Will thermoregulation be intact in the given animal in conditions of the increased ambient temperature?

Task 11

The pyrogenic properties of serums taking in different time lag after the intravenous introduction of bacterial pyrogen to the experimental animals were determined in experiments carrying out on normal and tolerant to bacterial pyrogen animals.

It turned out, that introduction of serum taking in 5 min after the bacterial pyrogen injection leads to the fever development with the prolonged latent period in the normal rabbit and do not cause fever in tolerant rabbit. The introduction of serum taking in 120 min after the bacterial pyrogen injection leads to the feverish reaction development in normal and tolerant rabbits. Fever develops in the shorter latent period in normal rabbits.

Question

Why does the serum taking in 120 min after the bacterial pyrogen introduction take effect in case of introduction to tolerant rabbits in contrast to the serum taking in 5 min after the bacterial pyrogen introduction?

Task 12

Pyrogenal was administrated to the rabbit located in the ambient temperature +2°C in dose which led to the body temperature rise up to 39,5°C in 90 minutes. After that rabbit has transferred to the room with the ambient temperature +20°C.

Question

Will such an ambient temperature change cause the additional temperature rise in the rabbit?

Task 13

Pyrogenal was administrated to two rabbits, one of them located in ambient temperature –3°C, and another located in ambient temperature +26°C, in the doses which cause rise in the body temperature up to 39,8°C in 90 minutes.

Questions

Are the mechanisms of heat accumulation in the experimental animals located in various ambient conditions identical? What are these mechanisms?

Task 14

Dinitrophenol was administrated to one of two rabbits located in temperature 0°C. And pyrogenal was administrated to another. Doses of dinitrophenol and pyrogenal have been choosen in the following way: these drugs in the given doses cause the similar change of the body temperature at identical amnbient temperature (18°C).

Question

Whether the appreciable distinction in temperature reaction of experimental animals will be observed?

Task 15

Aseptic inflammation → neutrophils, monocytes, tissue macrophages activation → synthesis and excreta in blood of endogenous pyrogenes from the activated cells → action on the hypothalamic thermoregulation center → decrease in excitability of heat sensitive neurons and increase in excitability of cold sensitive neurons → increase in heat production → increase in the body temperature.

Questions

1. Is the character of the functional changes in case of the fever development on the scheme below right?
2. If it is not, what is the mistake?

Task 16

In response to the one hand submergence (the water temperature is 45ºC) the other hand's reflex skin blood vessels dilation develops. This phenomenon is used as test during the fever development mechanisms study.

The experimental fever in probationers was caused by the pyrogenal intravenous introduction. In latent period for 45 min the body temperature increase began and in one hour and a half after the pyrogenal introduction the body temperature has set on the level of 33ºC and was stable for 3 hours, than it gradually decrease.

Every 30 min from the moment of introduction of pyrogenal and till the temperature normalization probationers were submergencing hands in the hot water, and the other handreflex skin blood vessels dilation was examined.

Questions

Will there be the reflex vasodilation in probationers with the experimental fever:

— on the stage of increase in temperature;

— on the high level set point stage;

— on the stage of decrease in temperature.

Task 17

The 47 years old patient has delivered to the hospital by the ambulance car because of the increasing retrosternal pain and epigastric pains.

During the hospital receipt the patient is pale, his lips were cyanotic and body temperature was 38ºC. The arterial blood pressure is 100/65 mm hg, pulse was 100 per minute. The cardiac sounds are muffled, the cardiac boundary dilation to the left. There is a systolic murmur over the cardiac apex. There are the ECG signs of the left myocardial infarction.

Task 18

The 12 yeas old patient B. has got 3000 Units of anti-tetanus serum (by Bezredke) with the aim of prophylaxis. On the 9^{th} day the typical picture of serum disease appeared in the child: severe pains, swelling of the shoulder and knee joints, the generalized eruption, the low arterial blood pressure level, the body temperature was 38,6ºC.

Question

What are the mechanisms of the feverish reaction in the given case?

Example of the task decision

In the morning headache, weakness, pains in the back muscles and limbs, the nose stuffiness, fever have suddenly appeared in the 32 years old patient. The body temperature has quickly risen up to 39,2°C. The caused doctor has diagnosed a flue (a grippe).

Question

What are the mechanisms of the fever development in this case?

The decision

The conditions of the endogenous pyrogens formation are created in the infectious inflammation conditions caused by agrippe virus.

THE MAIN TYPES OF TISSUE GROWTH IMPAIRMENT. TUMOURS

Task 1

The increase of the subclavicular lymph nodes was revealed in the 52 years old patient in a year after the lung malignant tumor surgical removal and the subsequent chemotherapeutic treatment. During the subclavicular lymph nodes biopsy the cancer cells were found out. The cell's structure reminding the removed lung tumor.

Questions

1. How the given phenomenon is possible to explain?

Is it possible to explain by the new tumour development?

Is it possible to explain by the relapse of the lung's cancer?

Is it possible to explain by the metastasis of the lung's cancer?

2. Prove the answer, having described the possible mechanism of the phenomenon development.

Task 2

The 50 years old patient complains of the general weakness, unmotivated decrease in appetite, nausea. The significant loss of weight, fever, pallor were noted by the patient. The results of blood and gastric juice laboratory researches specify anemia and the lowered gastric juice acidity.

During the gastroscopy the tumor was found out. The patient has informed in addition that he is ill with atrophic gastritis in 30 years.

Questions

1. May the chronic atrophic gastritis lead to the gaster tumour development?

2. What additional researches are necessary to be leading to define a type of a tumour?

3. What is the mechanism of cachexy development in the patient?

Task 3

The 78 years old woman visits the doctor for the planned follow-up. She feels good, but doctor finds out some little elastic lymph nodes in a size of 1×2 sm on the neck and the right axilla. In the clinical blood analysis: Le — 26×10^3, lymphocytes — 69%, neutrophils — 13%, Hb —128 g/L, Ht — 37,5%, Tr — 353×10^3 in 1 mcl.

Questions

1. What is the probable diagnosis?

2. What should be done further?

3. What the immunophenotypic structure is typical for this type of leukosis?

Task 4

The 77 years old man has come to the medical consultation because of the bad blood analysis. He has been done the aortocoronary by pass. The increase of

the maintenance of common blood plasma protein and erythrocyte sedimentation rate (ESR) is revealed during the annyal medical examination. The plasma proteins electrophoresis has shown the monoclonal «peak» in the gamma-globulin area — 17 g/L, the other immunoglobulins level were within the norm limits.

Questions

1. What is the patient's prospective diagnosis?
2. What should be done further?

Task 5

The 26 years old man has found out a tumor on the left neck side. He went to the doctor. The doctor hasn't revealed any painful symptoms and specific disease, but he has paid attention to the elastic fixed left cervical lymph node medullar sclerosis in a size 3×2 sm. During the biopsy lymphogranulomatosis, medullar sclerosis is revealed.

Question

What is the following stage of the diagnostic search?

Task 6

The given below chain describes the metastatic cascade. Find the inexactitude in the sequence events.

The metastatic subclone → adhesion and invasion of the basal membrane → aspiration through endocytoplasmic membrane → the vessel's basal membrane invasion → the tumor cells embols → migration in the endotheliocytes → the metastatic unit formation.

Task 7

The first line of the organism protection from a tumor is provided by NK (natural killers), which find out the transformed cell without presensitization. NK strongly attached to the tumor by its pseudopodia, and NK excrete on the tumor surface killing protein perforin.

Question

Specify the perforin action mechanisms on a tumour cell.

Example of the task decision

The second line of protection against a tumour is carried out by macrophages and sensebilized T-killers operating similary to NK.

Question

Specify the damaging action mechanism on a tumor cell.

The decision

The macrophage is capable to render cytotoxic action on a tumor cell in case of direct contact to it by means of secreted by macrophage tumor necrosis factor (TNF), interferon, lysosome enzymes, ect., and also it is capable to render cytotoxic action by relative activation of T-killers, NK cells, cytokins secretion.

PATHOLOGICAL PHYSIOLOGY OF THE ERYTHROCYTIC SYSTEM

Task 1

Blood is taken from the child for medical research on the 2-nd day after the birth.

Erythrocytes	$5,7\times10^6$ in 1 mcl
Hemoglobin	212 g/L
Color index	1,1
Myelocytes	1%
Metamyelocytes	2%
Nomsegmental neutrophils	5%
Segmental neutrophils	49%
Eosinophils	3%
Basophils	0
Lymphocytes	30%
Monocytes	10%
Thrombocytes	308×10^3 in 1 mcl
The peripheral blood smear: normochromy, reticulocytes — 2,0 %	

Question

Will you specify, are there any pathological changes in peripheral blood in the given child?

Task 2

Blood is taken from the 2 years old child for medical research.

The peripheral blood smear:

Erythrocytes	$4,7\times10^{12}$/L
Hemoglobin	117 g/L
Color index	0,9
Leucocytes	$10,0\times10^9$/L
Metamyelocytes	0,5%
Nomsegmental neutrophils	3,5%
Segmental neutrophils	34%
Eosinophils	2,5%
Basophils	0,5
Lymphocytes	49%
Monocytes	10%
Thrombocytes	280×10^3 in 1 mcl
The peripheral blood smear: normochromy, reticulocytes — 0,6%	

Question

Will you specify, whether there are any pathological changes in peripheral blood of the child.

Task 3

To three groups of experimental animals with posthemorrhagic anemia the following hormonal preparations have been injectioned: to the first group — androgenes, to the second group — estrogenes and to the third group — glucocorticoids.

Question

Specify under which hormones influence from the specified below hormones the erythropoesis activation will be observed.

Task 4

The 34 years old patient has arrived to the hospital with the suspicion on a gastric bleeding. During the medical research b blood was revealed in the gaster:

Erythrocytes	$3{,}0\times10^{12}$/L
Hemoglobin	100 g/L
Color index	1,0
Leukocytes	$3{,}4\times10^{9}$/L
Metamyelocytes	0
Nonsegmental	1%
Segmental	50%
Eosinophils	0
Basophils	0
Lymphocytes	40%
Monocytes	9%
Thrombocytes	120×10^{9}/L
The peripheral blood smear: normochromy, reticulocytes — 0,7%	

Questions

1. Are the received peripheral blood analysis characteristic for acute blood loss?
2. Explain by what the thrombocytes level decrease in peripheral blood is caused in this case.
3. In what terms after the acute blood loss clinical signs of hydremic reactions are revealed?

Task 5

The blood of the 54 years old patient Sh. on the fifth day after operative intervention was researched.

Erythrocytes	$3{,}6\times10^{12}$/L
Hemoglobin	95 g/L
Color index	0,78
Leukocytes	16×10^{9}/L
Myelocytes	1%
Metamyelocytes	2%
Nonsegmental	8%
Segmental	64%
Eosinophils	3%
Basophils	1%
Lymphocytes	18%
Monocytes	3%
The peripheral blood smear: nonexpressed anisocytosis, poikilocytosis, reticulocytes — 3,8%	

Questions

1. Characterize the available peripheral blood changes in the patient.
2. What of these changes do specify about the compensatory mechanisms activation of haemopoesis?
3. What factors do influence haemopoesis stimulation in this case?

Task 6

The 42 years old patient has arrived to the clinic with complaints to the abdominal cavity pains, the frequent stool (3–4 times a day) with slime and blood, loss of weight, weakness. She considers herself ill during one year, when the above listed sings have begun to be marked. The disease proceeds with periodic improvements and aggravations.

The perirheral blood analysis at receipt:

Erythrocytes	$2{,}9\times10^{12}$/L
Hemoglobin	63 g/L
Color index	0.7
Leukocytes	14×10^{9}/l
Metamyelocytes	1,5 %
Nonsegmental	8%
Segmental	52%
Eosinophils	2%
Basophils	0,5%
Monocytes	6%
Thrombocytes	220×10^{9}/L
The peripheral blood smear: normocytes, insignificant quantity of microcytes, erythrocytes of irregular shape, single individual, Rt — 2,6 %	

Questions

1. What changes of the peripheral blood structure are presented in the given hemogram?
2. About what pathology of the blood system the similar changes are characteristic?
3. Are there any signs of blood regeneration in the blood analysis?

Task 7

The 40 years old patient has arrived to the clinic on the medical checkup in occasion of stomach pains of not clear origin.

The peripheral blood analysis at reicept:

Erythrocytes	$3{,}8\times10^{12}$ /L
Hemoglobin	68 g/L
Color index	0,51
Leukocytes	$5{,}4\times10^{3}$ in 1 mcl
Metamyelocytes	0
Nonsegmental	6%
Segmental	54%
Eosinophols	2%
Basophils	1%
Lymphocytes	30%
Monocytes	7%
Thrombocytes	280×10^{3} in 1 mcl
The peripheral blood smear: hypochromy, a significant amount of microcytes, erythrocytes of irregular shape, annulocytes, reticulocytes — 1,2 %	

Questions

1. What changes of the peripheral blood structure are available in the patient?
2. Of what blood pathology are the similar changes characteristic?
3. What is the possible mechanism of these changes development?

Task 8

The 13 years old patient has complained of the general weakness, dizziness, frequent unconscious conditions

The peripheral blood smear: hypochromy, expressed microcytosis, poikilocytosis, reticulocytes — 0,8%.

Erythrocytes	$3{,}8\times10^{12}$ /L
Hemoglobin	56 g/L
Color index	0,52
Leukocytes	$6{,}7\times10^{9}$/L
Metamyelocytes	0
Nonsegmental	2%
Segmental	52%

Eosinophils	3%
Basophils	0
Lymphocytes	37%
Monocytes	6%
Thrombocyte	270×10^9/L
The peripheral blood smear: hypochromy, expressed microcytosis, poikilocytosis, reticulocytes — 0,8%	

Questions

1. Of what pathology are available changes of the peripheral blood structure characteristic?
2. What pathological processes can lead the similar peripheral blood changes?

Task 9

The 54 years old patient, the type-selter of a printing house, has arrived to the clinic with complaints of the general weakness, headaches, dizziness, troubled sleep.

Erythrocytes	$3,2\times10^{12}$/L
Hemoglobin	69 g/l
Color index	0,65
Leukocytes	$6,1\times10^9$/L
Metamyelocytes	0
Nonsegmental	6%
Segmental	62%
Eosinophils	3%
Basophils	1%
Lymphocytes	24%
Thrombocytes	220×10^9/L
The level of the serosity iron is 63 mmole/L	
The peripheral blood smear: hypochromy, microanisocytosis, sigle polychromatophils, target cells, erythrocytes with basophilic stipping, reticulocytes — 1,8 %	

Questions

1. About what blood pathology does the given analysis testify?
2. What is the pathogenesis of the revealed blood pathology?

Task 10

Megaloblastic anemia has developed in four months after the enteric resection because of its adenomatous lesions in the patient.

Question

With what factor deficiency, vitamin B_{12} or folic acid, is the anemia development caused?

Task 11

The 62 years old patient is in the clinic because of the stomach cancer.

The blood analysis at the receipt:

Erythrocytes	$1{,}3\times10^{12}$/L
Hemoglobin	58 g/L
Color index	1,3
Leukocytes	$2{,}8\times10^{9}$/L
Metamyelocytes	1%
Nonsegmental	8%
Segmental	45%
Eosinophils	1%
Basophils	0
Lymphocytes	40%
Thrombocyte	120×10^{9}/L
The peripheral blood smear: macroanisocytosis, poikilocytosis, Jolly's bodies, polysegmented neutrophils, reticulocytes — 0,1%.	

Questions

1. Of what pathology are the similar changes of the blood structure characteristic?
2. What is the possible mechanism of the developed blood pathology?

Task 12

The 54 years old patient B. has arrived to the clinic with complaints to the sudden weakness, dyspnea in case of the least physical activity, the finger-tips numbness, the tongue pain.

Erythrocytes	$1{,}44\times10^{12}$/L
Hemoglobin	66 g/l
Color index	1,4
Leukocytes	$2{,}8\times10^{9}$/L
Metamyelocytes	0
Nonsegmental	1%
Segmental	43%
Eosinophils	5%
Basophils	0%
Lymphocytes	48%
Thrombocytes	100×10^{9}/L
The peripheral blood smear: anisocytosis, poikilocytosis, megaloblasts, megalocytes, erythrocytes with basophilic stippling, hypersegmented neutrophils, Rt — 0,4%	

Questions

1. Of what pathology of the blood system are the found out changes of the blood structure characteristic?

2. What type of erythropoiesis in the given pathology? What are it's features?

Task 12

The 24 years old patient is in the clinic for clinical examination because of the increasing weakness, the rapid fatigability, dyspnea. Three years ago he was operated because of the intestinal obstruction. Resection of 60 sm of the small intestine was made with the side to side anastomosis imposition. After that the periodical abdomen pains and unstable stool are marked.

Erythrocytes	$2{,}23\times10^{12}$ /L
Hemoglobin	85 g/L
Color index	1,2
Leukocytes	$3{,}5\times10^{3}$ in 1 mcl
Metamyelocytes	0
Nonsegmented	0,5%
Segmented	58%
Eosinophils	5%
Basophils	0,5%
Lymphocytes	30%
Monocytes	6%
Thrombocytes	120×10^{3} in 1 mcl
The peripheral blood smear: macroanisocytosis, poikilocytosis, schistocytosis, single megalocytes, Rt — 0,4%	

Questions

1. About what pathology does the given analysis testify?
2. Can we make a predisposition about the given blood pathology development according to the available information?

Task 13

The 18 years old recruit has arrived to the hospital for the diagnosis specification.

During the draft board the blood analysis has been carried out and as a result of which it is revealed:

Erythrocytes	$2{,}7\times10^{6}$ in 1 mcl
Hemoglobin	81 g/L
Color index	1,0
Leukocytes	$7{,}5\times10^{3}$ in 1 mcl
Mtamyloctes	0
Nonsegmentated	4%
Segmentated	54%
Eosinophils	2%
Basophils	0

Lymphocytes	37%
Monocytes	3%
Thrombocytes	230×10^3 in 1 mcl
The peripheral blood smear: normochromy, microspherocytosis, reticulocytes — 12 %.	

Questions

1. What changes in the blood structure are available in the patient?
2. Of what pathology of system of the blood system the revealed changes are characteristic?

Task 14

The 12 years old patient has arrived to the clinic for medical examination. Since the childhood the decreased hemoglobin (till 90–95 g/L) was marked.

The patient was treated by iron-containing drugs without any effect.

The blood analysis at receipt:

Erythrocytes	3.2×10^{12}/L
Hemoglobin	85 g/L
Color index	0.78
Leukocytes	5.6×10^9/L
Metamyelocytes	0
Nonsegmented	4 %
Segmented	58 %
Eosinophils	3 %
Basophils	0
Lymphocytes	29 %
Monocytes	5 %
Thrombocytes	210×10^9/l
The level of the serosity iron –30 mmole/L.	
The peripheral blood smear: anisocytosis, poikilocytosis, target cells, erythrocytes with basophilic stipping, reticulocytes — 16 %.	

Questions

1. What pathology of the blood system is presented on the given hemogram?
2. About what does peripheral reticulocytosis testify in this case?

Task 15

The 12 months old boy Vitia from monthy age suffers from catarrhal diseases. According to his mother's observations the child's skin and scleras icteritiousness, dark colour of the urine appear after the reception of sulfadimine, acetylsalicilic acid, tetracyclin. All the signs dissapeare after the drugs cancelling.

The peripheral blood smear:

Erythrocytes	$3{,}0\times10^{12}$/L
Hemoglobin	70 g/L
Color index	0,7
Leukocytes	19×10^{9}/L
Metamyelocytes	0
Nonsegmented	2%
Segmented	33%
Eosinophils	3%
Basophils	0
Lymphocytes	55%
Monocytes	7%
Thrombocyte	280×10^{9}/L
The peripheral blood smear: expressed aniso-and poikilocyto-sis, polychroma-tophily, reticulocutes — 10 %.	
The activity of glucose-6-phosphatedehydrogenase — 2.3 units (the norm is 5.4 ± 0.3).	

Questions

1. What is the available blood system pathology in child?
2. What is the mechanism of this pathology occurence?

Task 16

The 3,5 years old Petia had bronchopneumonia three months ago. He had out-patient treatment. But after the disease he became inert and pale.

Erythrocytes	3.3×10^{12} /L
Hemoglobin	99 g/L
Color index	0.9
Leukocytes	$8{,}2\times10^{3}$ in1 mcl
Metamyelocytes	0
Nonsegmented	3%
Segmented	43%
Eosinophols	4%
Basophils	0%
Lymphocytes	44%
Monocytes	6%
Thrombocytes	280×10^{3} in 1 mcl

Example of the task decision

The boy B from the first pregnancy was born in time with weight 2590 g. The moderate icteritiousness of the skin and mucouse has been revealed in 16 hours after the birth.

The mother's blood is Rh-; the child's blood is Rh+. The peripheral blood smear: polychromatophily, reticulocytosis — 17%.

Eythrocytes	$4{,}2\times10^{12}$/L
Hemoglobin	140 g/L
Color index	1,0
Leukocytes	$16{,}2\times10^{3}$ in 1 mcl
Metamyelocytes	2%
Nonsegmented	6%
Segmented	61%
Eosinophils	3%
Basophils	1%
Lymphocytes	20%
Monocytes	7%
Thrombocytes	327×10^{3} in 1 mcl
The mother's blood is Rh-; the child's blood is Rh+.	
The peripheral blood smear: anisocytosis, poikilocytosis, polychromatophily, reticulocytosis — 17%	

Questions

1. About what blood pathology do the findings testify?
2. What is the main pathogenetic factor in the revealed pathology pathogenesis?

The decisions

1. About hemolytic anemia of newborns.
2. The immunologic incompatibility by the Rh-factor.

PATHOLOGICAL PHYSIOLOGY OF THE LEUKOCYTES SYSTEM

Task 1

In the presented hemogram:

1. Estimate the change of the total leukocytes amount in the volume unit of peripheral blood.
2. Characterize deviations from the norm of relative and absolute number of each leukocytes type (preliminary having calculated their absolute number in the blood volume unit).
3. Describe the direction, the type and expressiveness of the nuclear shift (having calculated the index of the shift) at the presence of neutrophils nuclear shift signs.
4. Define the type of leukocytosis (leukopenia) by the type of changed leukocytic cells.
5. Name the possible mechanisms of leukocytosis (leukopenia) development.

Hb	85 g/L
Erythrocytes	$3{,}4\times10^{12}$/L
Color parameter	(to calculate)
Reticulocytes	2,1%
Thrombocytes	190×10^{9}/L
Leukocytes	$17{,}0\times10^{9}$/L
Neutrophils	
myelocytes	0
metamyelocytes	4,5%
nonsegmented	16,0%
segmented	59,5%

Task 2

In the presented hemogram:

1. Estimate the change of the total leukocytes amount in the volume unit of peripheral blood.
2. Characterize deviations from the norm of relative and absolute number of each leukocytes type (preliminary having calculated their absolute number in the blood volume unit).
3. Describe the direction, the type and expressiveness of the nuclear shift (having calculated the index of the shift) at the presence of neutrophils nuclear shift signs.
4. Define the type of leukocytosis (leukopenia) by the type of changed leukocytic cells.
5. Name the possible mechanisms of leukocytosis (leukopenia) development.

Hb	122 g/L
Erythrocytes	$3,6\times10^{12}$/L
Color index	(to calculate)
Reticulocytes	0,8%
Leukocytes	$3,4\times\cdot10^{9}$/L
Neutrophils:	
myelocytes	0
metamyelocytes	0
nonsegmented	23%
Segmented	14%
Eosinophils	1%
Basophils	0
Lymphocytes	55 %
Monocytes	7%
Toxigenic stipping of neutrophils	

Task 3

The 6 years old patient has arrived to the clinic with complaints of general weakness, the decreased appetite, loss of weight, the dull abdominal ache, the unstable stool, the eruption in the hip's area accompanied by itch.

Erythrocytes	$4,4\times10^{12}$/L
Hemoglobin	128 g/L
Color index	0,87
Leukocytes	$13,6\times10^{3}$ in 1 mcl
Metamyelocytes	0
Nonsegmented	4%
Segmented	47%
Eosinophils	18%
Basophils	1%
Lymphocytes	23%
Monocytes	8%
Thrombocytes l	210×10^{3} in 1 mc
The peripheral blood smear: normochromy, reticulocytes — 0,7%	

Questions

1. What changes of peripheral blood structure are available in the child?
2. Of what pathological conditions similar blood changes are characteristic?

Task 4

The 35 years old patient is in the clinic in occasion of the lung abscess.

Erythrocytes	$3{,}9\times10^6$ 1 mcl
Hemoglobin	120 g/L
Color index	0,9
Leukocytes	25×10^3 in 1 mcl
Metamyelocytes	0
Nonsegmented	16%
Segmented	58%
Eosinophils	3%
Basophils	0
Lymphocytes	15%
Monocytes	4%
Thrombocytes	230×10^3 in 1 mcl
The peripheral blood smear: neutrophils with the toxic grain in cytoplasm	

Questions

1. What changes of peripheral blood are available in the patient?
2. About what does the toxic grain in cytoplasm testify?

Task 5

The 52 years old patient K. was delivered to the clinic with the suspicion to cardiac infarction.

The peripheral blood analysis at the receipt:

Erythrocytes	$4{,}1\times10^6$ in 1 mcl
Hemoglobin	123 g/L
Color index	0,9
Leukocytes	15×10^3 in 1 mcl
Metamyelocytes	2%
Nonsegmented	10%
Segmented	61%
Eosinophils	2%
Basophils	1%
Lymphocytes	17%
Monocytes	7%
Thrombocytes	240×10^3 in 1 mcl
The peripheral blood smear: normochromy, reticulocytes — 0,9 %	

Questions

1. What changes in the blood structure are available in the patient?
2. What sort of lymphocytopenia takes place in this case?
3. Are similar changes of blood characteristic for cardiac infarction (acute inflammatory process)?

Task 6

The 49 years old patient complaints of the general weakness, of the body temperature periodic increase up to 38,5°C, the moderate expectoration.

Erythrocytes	$4{,}1\times10^{12}$/L
Hemoglobin	135 g/L
Color index	1,0
Leukocytes	$10{,}2\times10^{9}$/L
Metamyelocytes	0
Nonsegmented	1%
Segmented	35%
Eosinophils	3%
Basophils	0
Lymphocytes	53%
Monocytes	8%
Thrombocytes	220×10^{9}/L
The peripheral blood smear: normochromy, reticulocytes — 0,7 %	

Questions

1. What changes of the peripheral blood structure are available in the patient?
2. In what pathological conditions are similar changes observed?

Task 7

The 37 years old patient G is transferred in the surgical department for the operative treatment of the hip joint tuberculosis.

Erythrocytes	$4{,}3\times10^{12}$/L
Hemoglobin	125 g/L
Color index	0,85
Leukocytes	47×10^{9}/L
Monocytes	1%
Metamyelocytes	2%
Nonsegmented	5%
Segmented	27%
Eosinophils	1,5%
Basophils	0,5%
Lymphocytes	51%
Monocytes	12%
Thrombocytes	210×10^{9}/L
The peripheral blood smear: single lympho-blasts, the expressed toxic grain of neutron-phils, Rt — 0,8 %	

Questions

1. Of what pathology are available changes of peripheral blood characteristic?
2. What is the nature of the revealed blood structure changes?

Task 8

The 38 years old patient is delivered to the hospital in a severe septic condition. It has developed after the tooth removal.

The peripheral blood analysis at the receipt:

Erythrocytes	$4{,}1\times10^6$ in 1 mcl
Hemoglobin	129 g/L
Color index	0,9
Leukocytes	36×10^3 in 1 mcl
Promyelocytes	2%
Myelocytes	2%
Metamyelocytes	7%
Nonsegmented	9%
Eosinophils	2,5%
Basophils	0,5%
Lymphocytes	20%
Monocytes	5%
Thrombocytes	280×10^3 in 1 mcl
The peripheral blood smear: the toxic grain in neutrophils cytoplasm, reticulocytes — 0,9 %	

Questions

1. What pathology of the blood system does the given hemogram testify?
2. What is the pathogenesis of the blood revealed changes in the patient?

Task 9

The 25 years old patient K has arrived to the clinic with the directional diagnosis: lingering septic endocarditis.

The blood analysis at receipt:

Erythrocytes	$3{,}9\times10^6$ in 1 mcl
Hemoglobin	120 g/L
Color index	0.92
Leukocytes	$3{,}4\times10^3$ in 1 mcl
Metamyelocytes	0
Nonsegmented	2 %
Segmented	29 %
Eosinophils	2 %
Basophils	0
Lymphocytes	55 %
Monocytes	12 %
Thrombocytes	210×10^3 in 1 mcl
The peripheral blood smear: normochromy, reticulocytes — 0,6 %	

Questions

1. About what pathology of the blood system the given hemogram testify?
2. What character of lympho- and monocytosis takes place in this case?

Task 10

The 9 years old patient D is hospitalized in the clinic for the medical examination. During last year the patient suffered from the frequent cattharal diseases, pneumonias. It is treated basically by sulfanimides and less often by antibiotics.

The blood analysis at the receipt:

Erythrocytes	$4{,}3\times10^{12}$/L
Hemoglobin	130 g/L
Color index	0,9
Leukocytes	$3{,}0\times10^{9}$/L
Metamyelocytes	0
Nonsegmented	2%
Segmented	27%
Eosinophils	0
Basophils	0
Lymphocytes	60%
Monocytes	11%
Thrombocytes	260×10^{9}/L
The peripheral blood smear: normochromy, reticulocytes — 0,6 %	
In the serum leukoagglutinins are revealed.	

Questions

1. About what pathology does the given analysis testify?
2. What is the possible reason of the leukoagglutinins occurrence in this case?
3. Is there a causation between the increased suspectability to catarrhal diseases and the revealed blood changes? If yes, what is it?

Example of the task decision

The 34 years old patient, the doctor-psychiatrist, in occasion of high arterial pressure and headache within 7 days has taken 60 tablets of resolvent, aminazine, reserpine. The health state acute deterioration has come suddenly-fever, the general weakness, pain at swallowing.

At research of blood it is revealed:

Erythrocytes	$3{,}9\times10^{6}$ in 1 mcl
Hemoglobin	130 g/L
Color index	0,9
Leukocytes	$0{,}9\times10^{3}$ in 1 mcl
Metamyelocytes	0
Nonsegmented	0
Segmented	12%

Eosinophils	0
Basophils	0
Lymphocytes	73%
Monocytes	15%
Thrombocytes	210×10^3 in 1 mcl
The blood smear: normochromy, reticulocytes — 0,6 %	
At serum research the leukoagglutinin reaction is negative	

Questions

1. What haemopoetic shoot suppression takes place in this case?
2. About what pathology of the blood system does the given hemogram testify?
3. What is the probable mechanism of the found out changes development?

The decision

1. Granulocytic shoot of haemopoesis.
2. About agranulocytosis.
3. Myelotoxic action of sulfonamide large dozes leading to oppression of granulocytic's elements prolipherative activity.

TYPICAL FORMS OF HEMOSTASIS IMPAIRMENTS

Task 1

The patient has arrived to the clinic with complaints to intensive retrosternal pain. Though of nitroglycerine reception the pains haven't disappeared. Moreover, after a while the general condition of the patient has worsened. As a result of it the patient has been transferred to the intensive care unit. The doctor has decided to give the patient anticoagulants and fibrinolytic agents. The rapid blood analysis has been made before the beginning of antithrombotic therapy: Hb 105 g/l, erythrocytes $3{,}5\times10^{12}$/l, leukocytes 12×10^{9}/l, thrombocytes 80×10^{9}/l, hypofibrinogenemia, increase in prothrombin time (PT) and thromboplastin time. The maintenance of antithrombine III 50% above the norm. After that the doctor has refrained from the anticoagulants and fibrinolytic agents' introduction.

Questions

1. What type of the hemostasis impairment has developed in the patient?
2. The hemostasis impairment is caused by frustration of its cellular and/or plasma mechanism?
3. Why the doctor has refrained from the antithrombotic therapy?

Task 2

The 30 years old woman A. has arrived to the ICU by the ambulance. During medical examination the following things are revealed: reactions are delayed, the consciousness is confused, she answers the questions hardly, also there is a diffuse cyanosis, the sclera's icteritiousness, small-celled hemorrhages on the mucous membrane of the mouth. The temperature is 39°C; the blood pressure is 80/50 mm hg. According to the information given by the relatives it is known that the patient is pregnant and one week ago she was ill. She has suffered from a heavy form of flu. She accepted aspirin. In a day there is still a grave condition, the consciousness is absent and the body temperature and the peripheral blood pressure are on the same level. Diuresis is 200 ml/day.

The data of laboratory researches:

The peripheral blood analysis: Hb 75g/l, erythrocytes $2{,}5\times10^{12}$/l, thrombocytes 150×10^{9}/l.

The urine analysis: density — 1,017, protein and Hb are present, sugar isn't found, urobilin is sharply increased.

Tests of definition of hemostasis system condition: The time of a capillary bleeding is 25 minutes (the norm is 2–9 minutes). The prothrombin time (PT), prothrombin, fibrinogen and partial thromboplastin time, prothrombin, fibrinogen and fibrinolysis products are in the normal ranges.

Questions

1. What type of the hemostasis impairment is available in the patient?
2. What clinical symptoms testify about the hemostasis system impairment?

3. On the basis of clinical picture analysis and laboratory data make and prove the conclusion about the syndrome developing in the patient. Describe the given syndrome pathogenesis and mechanisms of available symptoms.

4. With what syndrome the given condition is necessary to differentiate? In what there will be a distinction and similarity of a clinical picture and results of laboratory researches.

Task 3

The 20 years old patient A and the 25 years old patient B have complained because of the big ecchymomses after the small trauma and the prolonged bleeding after the teeth removal. Patient A in contrast to patient B complains of the periodically bleeding from gums, especially during the teeth brushing. Patient A marked that the same symptoms his mother had. Patient B deny susceptibility to bleeding in his relatives. During the medical examination the increased capillary bleeding time is found out. in patient A. And this index is normal in patient B. And partial thromboplastin time is decreased in both patients. Prothrombin time, a number of thrombocytes, prothrombin and fibrinogen level are normal in patient's A and B.

Questions

1. What impairments of the hemostasis system elements (vessels, thrombocytes, the coagulation or anti-coagulation systems) have patients?

2. What is your probable diagnosis? Is this type of pathology heritable? What is the type of inheritance? What additional laboratory tests are necessary to be done for diagnosis formulation and specification? What factors deficiency is ought to expect in patients A and B in case of the corresponding laboratory examination carrying out?

3. Why there is a difference between symptoms in patients?

Task 4

The blood has taken from the experimental animal in the test tube containing of sodium citrate for reception of blood plasma.

Question

On what stage does the blood coagulation process stop in case of this coagulant using?

Task 5

With the purpose of the hemophilia type identification to the three portions of blood plasma of the examined patient the plasma samples without accordingly either VIII, or IX, or XI factors have added.

Questions

1. What type of hemophilia is available in the patient?

2. To what type of hemostasis pathology do we refer the given disease?

Task 6

The antihemophilic globulin (the factor VIII) absence in blood plasma is revealed in the 2 years old sick child with the expressed hemorrhagic syndrome.

Questions

1. Specify in what phase of blood coagulation there is a primary impairment of hemostasis in this case;
2. What mechanisms of prothrombinase activity formation, external or internal, will be defective in this case?

Task 7

The patient suffers because of the hereditary type of coagulopathy. It manifests by Hagmen's factor (XII factor) deficiency.

Questions

1. Specify in what phase of blood coagulation there is a primary impairment of hemostasis in this case;
2. Will the intensity of fibrinolytic process change in the patient?

Task 8

The hemorrhagic syndrome with the expressed impairment of the third phase of blood coagulation has developed in the patient after operative intervention on the pancreas.

Question

Specify the possible mechanism of the hemostasis impairment in this case.

Example of the task decision

The 34 years old patient has arrived to the hospital with the suspicion on a gastric bleeding.

It is revealed in case of the blood research

Erythrocyte	$3{,}0\times\cdot 10^{12}$/l
Hemoglobin	100 g/l
Color index	1,0
Leukocytes	$3{,}4\cdot\times 10^{9}$/l
Metamyelocytes	0
Nonsegmented	1%
Segmented	50%
Eosinophiles	0
Basophiles	0
Lymphocytes	40%
Monocytes	9%
Thrombocytes	$120\cdot\times 10^{9}$/l
The peripheral blood smear: normochromy, reticulocytes — 0,7	

Questions

1. Whether the received results of the blood analysis are characteristic of the acute blood loss?

2. Explain by what the thrombocytes maintenance reduction in peripheral blood is caused in this case;

3. In what terms the clinical signs of hydremic reactions after acute blood loss are revealed?

The decisions

1. Yes, they are characteristic

2. The decreased thrombocytes quantity is caused by their increased consumption.

3. The hydremic reaction begins right after the blood loss and its intensity is subjected to individual changes and it isn't always proportional to the quantity of blood loss. Clinically its results begin to reveal only in some hours after blood loss and run up to the maximum in 18–24 hours.

HYPOXIA

Task 1

The 60 years old patient K. has arrived to the therapeutic clinic with complaints of the general weakness, the headaches of constant type, dizziness, stagger during the walking, the slightly expressed breathlessness, bad appetite, the burning feeling on a tip of the tongue.

The gastric juice has been researched in case of some dyspeptic impairments (pains in the epigastric area, diarrhea sometimes) in anamnesis. The expressed decrease in its acidity is established.

Objectively: a condition of moderate degree, the expressed pallor of skin and mucous membranes, an insignificant breathlessness in rest, the blood pressure is within the limits of the age norm.

Questions

1. Are there the signs of the general hypoxia of the organism development in the patient?
2. Are the specified by you signs are only characteristic of hypoxia? If it is not, in what other pathological process will the similar symptoms develop?
3. What additional data about the patient's condition are necessary for you for the attestation or the refutation of the version which has appeared in association with the question № 2?
4. Are there any bases for the assumption of the circulatory type of hypoxia presence in the patient? If it is, will you name it? What objective parameter could confirm or deny the version about the circulatory hypoxia?
5. Are there any bases for the assumption of the respiratory type of hypoxia development? If yes, will you name it? What is it necessary to define for the attestation or the refutation of the version about the respiratory type of hypoxia?
6. Are there any bases for the assumption of the hemic type of hypoxia development in the patient? If yes, what researches could confirm it?

Task 2

The ambulance doctor on the place of accident for a painful shock therapy the victim with the thorax polytrauma and the open fracture of the lower extremity has administered a big dose of anaesthetic (morphine) and also stimulators of cardiac activity after the application of tourniquet on the lower extremity and the intensive bleeding stop.

Though the morphine injection the victim groans loudly because of pain and complaints of the shortness of breath. During the medical examination there are: the blood pressure is 70/35 mm hg, the pulse is 126 per minute (it is defined only on major vessels, the respiration is weakened in the left half of the thorax and it isn't listened in the right half.

In doctor's presence the victim's condition continues to worsen: respiration becomes superficial, he catches air by his mouth, and he cannot inhale. The doc-

tor has administered to the patient the respiratory center stimulator-cytiton. However after that the victim's condition hasn't improved.

Questions

1. Whether it is possible to assume, that the insufficiency of anesthetic action is connected with the increased tolerance of the victim to the drug?

2. Based on representations about path physiological reactions of an organism in the conditions of the post hemorrhagic shock development, which of them could cause an inefficiency of the medical therapy in the given situation?

3. Do you think that the doctor's therapeutic action insufficiency on the respiratory restoration is caused only by the cytiton insufficient absorption in the victim in case of its subcutaneous introduction (cytiton)?

In tasks 1, 2, 3 determine the type of acid-base balance disorder and formulate the conclusion.

Task 3

The operation is performed to the patient with mechanical ventilation of lungs.

pH	7,31
pCO_2	75 mm hg
SB	27 mmole/l
BB	49 mmole/l
BE	+2,5 mmole/l

Question

Determine the type of the acid-base balance impairment and formulate the conclusion.

Task 4

The patient has arrived to the clinic with the preliminary diagnosis «acute myocardial infarction».

pH	7,32
pCO_2	38 mm hg
SB	18 mmole/l
BB	36 mmole/l
BE	-6 mmole/l
MK blood	26 mg of %
Titrable acidity	45 mmole/l

Question

Determine the type of the acid — base balance impairment and formulate the conclusion.

Task 5

The patient is in a coma.

pH	7,17
pCO_2	50 mm hg
SB	15,5 mmole/l
BB	38 mmole/l
BE	-13 mmole/l
MK blood	58 mg of %
Titrable acidity	70 mmole/l

Question

Determine the type of the acid - base balance impairment and formulate the conclusion.

Task 6

Group of mountain-climbers, in which the inexperienced doctor-researcher was included, supposed to be mountaineer on the 6700 meters height. The climbing was succesfull up to the 2800 meters where the beginner has felt tiredness, dizziness, ringing in the ears. After the one hour rest, where the doctor had taken the capillary blood samples from himself (B) ans from his workmate (A), the group continued its rout. On the 4900m height doctor felt the air shortage, haviness of the whole body, headache, the eyesight and coordination of movement impairment. So he stopped climbing because of all this. After the repeated blood sampling this group begin to go down till the 3000 meters height.

The blood analysis results are presented here

	A_1	**B_1**	**A_2**	**B_2**
pH	7,43	7,46	7,35	7,32
pCO_2	32	26	30	40
pO_2	74	69	58	38
SB	20,5	20,5	18,5	18,5
BE	+2,5	+1,5	-3,5	-5,5

Questions

1. Estimate the acid-base balance change in the mountain-climber (A) and doctor (B) arising on the different heights?
2. What are the mechanisms of the acid-base balance shift on the first and second stage of climbing in the doctor-researcher?
3. What additional laboratory data are necessary for the concrete acid-base impairment specification?
4. What type of hypoxia has developed in the mountain-climber-doctor?
5. What is the difference and character of the acid-base balance impairments on this two mountain-climbers?

Task 7

Determine the types of hypoxia; name the possible reasons of hypoxia occurrence and mechanisms of its development.

$p_{atmosphere}O_2$	158 mm hg
p_AO_2	88 mm hg
p_aO_2	61 mm hg
p_aCO_2	59 mm hg
p_vO_2	16 mm hg
S_aO_2	88%
S_vO_2	25%
Respiratory minute volume	2,85 l/min
Cardiac output	8,5 l/min
pH	7,25 l/min
МК (mg %)	20,0 mg %
ТК	60 mmole/l
Hb	140 g/l

Example of the task decision

Determine the types of the acid-base imbalance, name the possible reasons of it's occurrence and mechanisms of development:

1. The bronchial asthma attack.
2. The operation is performed with artificial pump oxygenator.

pH	7,34
pCO_2	37 mm hg
SB	14 mmole/l
BB	29 mmole/l
BE	-12 mmole/l

The decision

The non-compensated acidosis is in the patient (as pH is below the norm limits — 7,35). This is not respiratory acidosis (as there is no increase of pCO_2 and SB). Decrease in SB parameter testifies about the non-volatile acids accumulation in blood. By the statement of the task the metabolic acidosis in the patient is observed owing to the blood circulation system insufficiency.

THE TYPICAL FORMS OF EXTREME CONDITIONS

Task 1

The 46 years old patient has arrived to the clinic in a coma. His face is pale, the cheekbones area and superciliary arches area reddening; the acetone smell from the patient's mouth, the skin is dry, and the noisy type of Kussmaul's respiration — 16 times per minute. Pulse is rhythmical, 120 per minute; the blood pressure is 80/60 mm hg. Eyeballs are soft. The blood glucose level is 44,3 mmole/l, K^+ — 5,1 mmole/l, Na^+ — 137 mmole/l.

Questions

1. What is the prospective diagnosis?
2. How to distinguish the hyperglycemic coma and the hyperosmolar coma in Diabetes melitus?

Task 2

It is found out that the patient in a coma, who is delivered to the urgent therapy department, suffers from Diabetes melitus for 10 years, he was treated by chlorpropamide. He didn't adhere to the dietary recommendations. The use of alcohol was preceded the present condition.

During physical examination there is a rare noisy respiration, acrocyanosis, hypothermy, and hypotension.

Questions

1. What is your preliminary diagnosis?
2. What medical researches are necessary in the given case?

Task 3

The doctor on duty is invited to the patient with Diabetes mellitus because of his inadequate behavior.

During physical examination the patients sits, he doesn't answer the questions, his respiration is flat and calmly, his skin is slightly raised humidity, also he has tachycardia. The blood pressure is 200/130 mm hg.

Questions

1. What is your diagnosis?
2. What medical researches are necessary in the given case?

Task 4

The 66 years old patient with the increasing weakness changed to sopor has arrived to the clinic. The skin is pale; mucous membranes are cyanotic, solid edemas. There is a hypothermy. Pulse is 42 per minute, the blood pressure is 90/60 mm hg, the respiration rate is 8–10 per minute, and the respiration is stenotic.

It is found out from relatives that the operation on the thyroid gland was performed to the patient in the past. For the last day he urinated very little.

There is no pathology revealed in heart and lungs. The abdomen is unpainful. The blood serum Na^+ is 120 mmole/l, chlorides 8 mmole/l, thyroid hormones in blood — 45 nmole l^{-1} l, urea — 11 mmole/l.

Questions

1. What is your diagnosis?
2. What medical researches are necessary?

Example of the task decision

The 40 years old patient is delivered to the department with diagnosis «a coma». He is without consciousness, the painful sensitivity is absent. His face and sclera's are hyperemic. Also there is a myofibrilation and trismus of chewing muscles. There is a frequent pulse; the blood pressure is 120/90 mm hg

The EEG (ElectroEncephaloGram) data: there are desorganized and deformed slowed down elements of the basic activity 7–8.5 vibrations per second with the amplitude 20–60 mVolt. On this background there are slow vibrations in rhythm 4–6.5 vibrations per second with the amplitude 50–60 mVolt in rhythm 3–4 vibrations per second.

Questions

1. What is our diagnosis?
2. What is your medical tactics? How is it possible to provide adequate respiration?

The decisions

1. Heavy alcoholic poisoning, superficial coma of the first stage.
2. Maintenance of adequate respiration: restoration of airways patency. AVL (artificial lung ventilation). The intravenously injection of 500ml 20% glucose solution, 20 Units of insulin, 5 g of unithiol.

PATHOLOGICAL PHYSIOLOGY OF THE IMMUNE SYSTEM. ALLERGY. AUTOIMMUNE PROCESSES

Task 1

The eyelid have reddened and also have become swollen, watering has appeared, also there as a horsy voice, catarrh, sensation of ticking in the throat, respiration difficulty in one and a half an hour after arrival to the country recreation area. The specified symptoms were observed after returning home, though their expressiveness became a little smaller.

Questions

1. How will you designate the pathological condition which has developed in the patient? Prove the answer.
2. How is it possible to reveal the concrete reason which has caused this condition?
3. What is the basic part of the given condition mechanism development?
4. What principles and methods of therapy and preventive measures do you suggest in this case?

Task 2

The 28 years old patient has visited the doctors because complaints of often repeated stomititises, quinsy, otitises, periodically repeated pneumonias, including the summertime. Attempts to increase the organism activity of «nonspecific resistibility» by tempering haven't given any effect.

Laboratory data: reactions of lymphocytes on phytohemagglutinin and tuberculin are positive, activity of complement factors and IgM, IgG, IgA levels in blood serum are normal, the number of erythrocytes and the quantity of Hb in blood are within the norm limits, the number of leukocytes is decreased due to monocytopenia, the quantity of granulocytes is normal, the phagocytic activity of macrophages is 45% decreased.

Questions

1. In what part of the immunobiologic supervision system is there a defect of the patient's organism in the immunity system or in the system of factors of nonspecific protection? Prove the answer.
2. If defect is in the system of immune factors of immunity, due to what cells defeat the defect development will be: macrophages, B- or T-lymphocytes? How to explain the origin of the symptoms which are available in the patient?
3. If it is defect in system of factors of nonspecific protection of an organism, what (or what) from them? How thus to explain mechanisms of the symptoms which are available the given patient?
4. How you will designate the type of the pathological condition observed at the patient?

Task 3

The antitetanus serum was repeatedly administered to the victim under the «protection» of antihistaminic preparations because of the open leg trauma. On

the ninth day after the injection the body temperature has increased up to 38°C, the expressed weakness has appeared, also the humeral and knee joints morbidity and swelling has appeared, the generalized strongly itching rash on the skin has appeared too, the poplyteal and inguinal lymphoadenopathy (the palpation of lymph nodes is painful).

Questions

1. What type of pathology can be assumed in the patient?

2 What additional data are necessary for you for the final conclusion about the pathology type?

3. What is the possible reason and mechanisms of this pathology type development (in a view of the additional data received by you, name them)?

4. How would it be possible to prevent the development of this condition in the given patient?

Example of the task decision

On 6-th week of the patient's stay in the clinic on the background of the treatment good results there are the dull aches and the noice of the pericardium friction in the heart area because of extensive myocardial infarction, also the body temperature has increased up to 39 °C. During the blood research the eosinophilic leukocytosis, increase of the anticardiac antibodies titre are found out. The doctor has diagnosed «the postinfarction syndrome (Dressler's syndrome)».

Questions

1. It is known, that Dressler's syndrome has the immunogenic nature, In view of this will you specify an origin and a character of the antigens caused its development.

2. To what type (according to Jell's and Coomb's classification) will you refer the developed reaction if the anticardiac antibodies are found out in the patient's blood?

3. To what type of Ig will you refer the anticardiac antibodies?

The decisions

1. The Dressler's syndrome has developed on the myocardial infarction background. At the same time the necrotizing and damaged myocardial cells, the cellular membranes components becomes the antigenic-alien. Antibodies (IgG, IgM) are produced to this cells.

2. The «antigen-antibody» reaction lead to the complement dependent and complement independent (cellular, killer) injury of not only necrotized, but also the big number of functioning myocardial cells. The allergic myocarditis (type II according to the Jell's and Coomb's classification) develops. Later the infiltration of myocardium by T-lymphocytes and mononuclear cells with the signs of allergic reaction of type IV.

3. Anticardiac antibodies are the version of IgG and IgM. They have next features: high specifity and cytotoxity to the myocardial cells.

PATHOLOGICAL PHYSIOLOGY OF THE IMMUNE SYSTEM. IMMUNODEFICIENT CONDITIONS

8 years old Kostya N. has arrived to the pediatric hospital. His parents are disturbed by the otitises, quinsies, rhinitises, conjuctivites, bronchites, pneumonias, enterocolites frequent development. The present hospitalization is caused by the suspicion of endocardirtis and sepsis development.

It is revealed during the medical checkup: leucopenia due to significant decrease in number of lymphocytes, mainly T-pool of lymphocytes and in a smaller measure — B-lymphocytes, also there is an IgA and IgE maintenance reduction in blood (according to 40% and 50% of norm), the IgG level on the upper limit of norm, the lymphocyte's reaction on the phytohemagglutinin is lowered.

Questions

1. How will you designate the pathological condition which has developed in the child? Prove the answer.
2. What are the possible reasons?
3. What are the mechanism of development and the consequence of this condition according to the laboratory data?
4. How will you explain the facts of decreased reaction of lymphocytes on phytohemagglutinin and the significant maintenance reduction of IgA and IgE in blood at norm of IgG?
5. What type of painful condition manifestations can be a result of IgA and IgE decreased level?

The decisions

1. It is a combined T- and B-immunodeficient condition. The frequent infections, decrease in the number of lymphocytes, mainly T — pool and in a smaller measure — B-lymphocytes, decrease function of T-lymphocytes activity and also the decreased level of IgA and IgE in blood testify about it.
2. It is a hereditary type of pathology. The autosome-recessive type of inheritance. It is a Louis-Bar syndrome. Decrease in the IgA and IgE production and increase of fetal protein (alpha-fetoproteins) are characteristic of this syndrome. The presence of fetal proteins is a concequence of thymus aplasia.

3, 4. The developed in this child condition is a consequence of the T-lymphocytes proliferation and maturing impairment, including T-helpers. And as a result the B-lymphocytes control, proliferation and differentiation in the proplasmatic cells producing IgA and IgE (laboratory data testify about these impairments). The blastogenic response on a stimulator of this reaction — phytohemagglutinin and also — subsequent T-lymphocytes maturing is decreased because of it. The decreased titer of IgA and IgE at norm of IgG is caused by the significant selective impairment of calcium ions transport, which influences the T-lymphocytes (particular T-helpers) proliferation and maturing. The nor-

mal parameters of Ig are possible, in some patient's hypergammaglobulinemia is observed, in case of Louis-Bar syndrome.

5. The decreased maintenance of IgA first of all is possible to explain by the absence of proplasmatic cells synthesizing these antibodies. Also the production of anti-IgA-antibodies increases the IgA catabolism. The respiratory diseases propensity is marked in patients with the IgA deficiency. IgE deficiency creates the adverse conditions to some types of pneumonias and enterocolites development.

ACID-BASE BALANCE IMPAIRMENTS

Task 1

With the purpose of catecholamine's various doses pharmacological effects influence on a hemodynamic of a laboratory rat 0,1% of adrenaline solution has intravenously administered to the rat at the rate of 0.004 ml on 1g of the body weight. Right after the adrenaline injection the coverlets and mucous membranes have become pale, the blood pressure has risen up from 120/70 to 210/175 mm hg, there was an expressed tachycardia with extrasystols, the respiration has become frequent, p_aO_2 has remained constant, $pvCO_2$ has decreased. However in 12 minutes the coverlets have got grey color on a background of hyperventilation, the gas structure of arterial blood hasn't changed essentially, accruing decrease of p_v0_2 is noted. In the nearest 3–4 minutes the external respiration impairment signs have developed, the respiration has become spasmotic, heavy, with the moist rales during an exhalation, the blood pressure has decreased, the pulse pressure has decreased, and arrhythmia has arisen. Thus p_aO_2 has started to decreased and p_aCO_2 has started to increase. By the end of the 20-th minute the clonic-tonic seizures, the agonal respiration type have developed, the foamy excreta from the oral cavity and the nose have appeared. The animal has died.

Questions

1. Is it possible to assert that, though the acute activation of blood circulation in the animal, hypoxia has begun to develop? If it is so, by what time after the inflection of adrenaline has it develop?
2. What is the pathogenesis of the arisen hypoxia?
3. What are the probable reasons of animal's death?
4. What signs do specify about the pulmonary edema development?
5. What additional data are necessary to assert that there is a presence of the pulmonary edema?
6. What is the pathogenesis of the pulmonary edema in the given experiment?
7. What reasons can lead to the acute pulmonary edema development in man?

Task 2

«Myocardiodystrophy in a stage of decompensation» has been diagnosed to the 42 years old patient in a hospital. The patient of the normal body constitution, the subcutaneous fatty tissue is poorly developed. At height of 165 sm the weight of the body is 81 kg. Objectively: there is a forced semisitting position, breathlessness, acrocyanosis, the expressed lower limbs dropsical, the stagnant lung's rales. The liquid accumulation in the abdominal cavity is revealed, the liver is enlarged. The systolic and cardiac outputs are decreased. Ht is 38%. The diuresis is decreased. The increased levels of renin and sodium are revealed.

Questions

1. Are there any signs of the water exchange impairments?

2. What type of dishydria is available in the patient?

3. Is the liquid accumulation in the subcutaneous fat tissue, the abdominal cavity and the lungs concerned etiologically?

4. What is the pathogenesis of the biochemical deviations revealed in the patient?

5. What is the mechanism of the edema development in the given patient?

6. Estimate the edema value for the organism of the patient.

7. How to prevent the edema development in the given patient?

Task 3

Specify a mistake in the following combinations: the stagnant edemas are cardiac, the venous edemas are peripheral, the lymphatic edemas are nephritic, the renal edemas are nephrotic.

Task 4

What type of edema by pathogenesis develops in case of decrease in oncotic pressure of blood or in case of increase in oncotic pressure of the intracellular fluid? By what is hypoosmium caused in the most cases?

Task 5

What type of edema by pathogenesis develops in case of decrease in oncotic pressure of blood or in case of increase in osmotic pressure of the intracellular fluid. What are the reasons of the tissue hyperosmium?

Task 6

The given type of edema is formed owing to significant increase in vascular wall permeability.

Questions

What type of edema by pathogenesis will develop in this case? What is the main pathogenetic factors of the vascular wall permeability increase?

Task 7

The lymphogenic edema arises owing to the significant reduction of the liquid outflow by lymphatic vessels. What are the reasons of lymphogenic edema formation? When does the elephantiasis arise?

Example of the task decision

The 22 years old patient, two weeks after she had had a severe form of the scarlet fever, has complaints of headaches, pains in the waist area, breathlessness, palpitation. For the last week she has added 11.5kg of the body weight. Objectively: her face is pale, eyelids are swelled, palpebral fissures are narrowed. Shins and feet are dropsical. The cardiac borders are extended, the blood pressure is 180/100 mm hg. The diuresis is markedly decreased, there are erythrocytes and proteins in the urine. The antistreptococcal antibodies titre in blood is increased.

Questions

1. Are there any reasons to consider that the patient has a renal impairment? If it is so, what is the possible mechanism of this pathology?

2. What does cause the arisen hyperhydration: acute decreasing the secretory renal function or the strengthening of the water retention mechanisms in the organism?

3. What are the mechanisms of the edema development in the given case?

The decisions

1. Yes, the markedly decreased diuresis, the change of the urine content (erythrocytes and proteins presence), pains in the waist area testify about it. Possibly it is a question about the immunogenic renal impairment in which the antigentransformed renal tissue under the streptococcal exotoxin influence can act as an antigen. It is mainly cytotoxic type of allergic reaction by the mechanism of development.

2. Both this causes. The immunogenic renal impairment is accompanied by decrease in the normally functioning glomeruli number and decrease in the filtration area. The microcirculation and glomerular blood-flow impairments arising in case of inflammation and lead to the renin-angiotensis-aldosterone system activation. In this case it manifestates by increase in the sodium and water reabsorption in the renal tubules and also by increase in the blood pressure.

3. As in this type of the immune renal impairment not only the renal microvessel's wall impairment has undergone the aggression, but also other tissues (for example acute diffuse vascular purpura), so the membranogenic factor also takes part in pathogenesis of the nephritic edemas formation.

PATHOPHYSIOLOGY OF PROTEIN EXCHANGE
TYPICAL DISORDERS

Task 1

There is a patient M. with the diagnosis «phenylketonuria». The patient's appearance: the light skin, blue color eyes. The given disease pathogenesis is connected with the phenilalanine-hydroxylase insufficiency and dehydropterin-reductase insufficiency in the liquid mediums. The «murine» smell proceeds from the napkins of the given child.

Questions

1. Specify the pathogenetic reason of the «murine» smell.
2. Give the characteristic of criteria of the classical phenylketonuria diagnostics.

Task 2

There is a stasis and the arrest of development, the nervous system damage (the depressed intelligence, speech disorder the spastic gait), the crystalline lens incomplete dislocation, the myocardial exchange process impairment, change of skeleton is noted: the shorten trunk, the elongated extremities, the acrocephaly, also there is a generalized osteoporosis on the X-ray in the 3 years old child. Also there is an excess homocystinuria.

Questions

1. What is your prospective diagnosis?
2. What is the pathogenesis in the given disease?

Task 3

The nervous system impairment is observed in the child: the mental retardation, the speech disorder, seizures. The patient's appearance: light hair color, blue eyes. The histidine increase level in blood plasma is revealed.

Questions

1. What is your prospective diagnosis?
2. What is the pathogenesis in the given disease?

Task 4

There is an anorexia, a vomiting, the milk intolerance, a delay of the body weight increase, a hepatosplenomegaly, a jaundice, edemas, impairments of the central nervous system. The galactose level in blood is increased.

Questions

1. What is your prospective diagnosis?
2. What is the pathogenesis in the given disease?

Example of the task decision

There is a lactase insufficiency with the water-salt metabolism impairment, the increased renal excretion of potassium and calcium is observed in the child.

Questions

1. What are the consequences for the child of the increased calcium renal excretion?

2. What is the treatment of the given patient?

The decisions

1. The increased calcium renal excretion can lead to the cartilaginous tissue ossification delay.

2. The treatment of this patient is to keep to a lactoseless diet. Taking lactase is very efficiently.

PATHOPHYSIOLOGY OF LIPID EXCHANGE IMPAIRMENTS. ATHEROSCLEROSIS

Task 1

The 15 years old youth N. complains of periodic pains in the heart area intensify in case of effort. During the angiography the coronary arteries stenosis is found out. During the physical examination there are the tendinous xanthomas on the way of hand muscles tendons. The level of the low-density lipoproteins is increased. During the special research of lymphocytes the decreased quantity of low-density lipoproteins receptors is found out.

Questions

1. What type of hyperlipidemia is available for in patient?
2. Is the risk of the atherosclerosis and myocardial infarction development in N. high? If so, what is the reason?
3. Has hereditary value in occurrence and development of the found out pathology?
4. What is the pathogenetic role of decrease in quantity and activity of the low-density lipoprotein receptors in the pathology development in the patient?

Task 2

The tuberculosis eruption like xanthomatosis, planar xanthomas on the planta, and also xanthomas on the back surface of hands and finger-tips and palmer folds are observed in the 39 years old patient M. The blood plasma is turbid, the pre-β-lipoproteins appearance with increased level of cholesterol is observed, and the levels of cholesterol and triglycerides are increased.

Questions

1. What is your prospective diagnosis?
2. With what does the given impairment's pathogenesis associate?

Task 3

The patient M. complains of periodic abdominal pains. During the physical examination hepatosplenomegaly, xanthomas, adiposity are revealed. There is a pancreatitis, Diabetes mellitus in the patient's anamnesis. Decrease in the tolerance to lipids and the low post heparin lipolytic activity is established.

Questions

1. What is your prospective diagnosis?
2. With what does the given impairment's pathogenesis associate?

Task 4

The clinical syndrome is observed in the patient: pancreatitis, abdominal gripes, hepatosplenomegaly, retinal lipemia, eruptive xanthomatosis. The increased level of triglycerides in the blood plasma, the serum is milky color.

Questions

1. What is your prospective diagnosis?
2. With what does the given impairment's pathogenesis associate?

Task 5

Anemia, proteinuria, keratoleukoma are observed in the 3 years old patient. The levels of free cholesterol and phosphatidylcholine are over the norm, the level of triglycerides is increased, and the levels of cholesterol esters and lysolecithin are decreased.

Questions

1. What is your prospective diagnosis?
2. With what does the given impairment's pathogenesis associate?

Example of the task decision

The anomalous excess low-density lipoproteins («float» lipoproteins) are revealed in the blood serum during the medical examination.

Question

To what type of hyperlipidema do we refer the given impairment?

The decisions

The given disease concerns we refer to the family disbetalipoproteidemia (III type). It refers to wide, floating β- or pre-β-lipopreteinemia.

PATHOPHYSIOLOGY OF CARBOHYDRATE EXCHANGE IMPAIRMENTS DIABETES

Task 1

The 72 years old patient suffering from arterial hypertension within last two years has marked the legs chill, the numbness and pains in gastrocnemius muscles at walking and then in rest (the sleep disturbance developed mainly at night time because of this). The painless ulcer was formed on the right shin 6 months ago and it is badly giving to the treatment. During the visit to the doctor the patient has shown the complaint specified above and also the complaint of dry mouth, the excessive thirst and the frequent plentiful urination.

Objectively there is a dry skin on the shins, the skin is pale and dry, cold. The pulsation on arteries is not found out at palpation. The blood analysis: the levels of cholesterol, fibrinogen, and thrombocytes are increased; the peripheral blood glucose on an empty stomach is 180 mg%.

Questions

1. Is it possible to assume the carbohydrate exchange impairment in the given patient?
2. What is the pathogenetic interdependence between the carbohydrate exchange impairment and the angoipathy development?

Task 2

The 60 years old patient is delivered to the hospital's pigeon hole without consciousness. During the medical examination: there is a dry coverlet, turgor is decreased and eyeballs tone is also decreased, the respiration is superficial, pulse is 96 per minute, the blood pressure is 70/50 mm hg, the tongue is dry, the spasms of limbs and mimic face muscles are periodically observed.

The express blood analysis: hyperglycemia 600 mg%, hyperazotemia, hypernatremia, pH is 7.32

After questioning the relative accompanied the patient it was found out that the patient suffers from Diabetes mellitus, and he was taken a small doses of the glucose level decreasing drugs. Last month he suffered from acute condition of the chronic cholecystitis and colitis, quite often there was a vomiting and diarrhea, he also complained of constant thirst and the excess urination.

Questions

1. How we refer the condition in which the patient was delivered to the hospital? Prove the answer.
2. What is the reason of this condition occurrence? Will you refer and characterize its basic parts of pathogenesis.
3. Why the consciousness was lost in case of the similar pathological condition development?
4. What methods are used for help out the patient from these conditions?

Task 3

Spasms and the fit of weakness have developed in the first class pupil on the PT-lesson after the one hundred meters round, and then it stopped independently. Thus the physical exercise of other character does not cause the attacks development. The levels of peripheral blood glucose and the insulin secretion are normal.

Questions

1. What is the probable reason of the attack development?
2. What recommendations can you give the patient?

Example of the task decision

The 45 years old patient with the excessive use of alcohol marked a weakness, dizziness, and a thirst. Mostly these manifestations have been expressed in the morning (especially in case of breakfast absence). Usually he associates weakness with the use of alcohol. Overnight he has psycho emotional stress (because of intensive family relations). Also he has noted occurrence of breathlessness, general sweating. He has lost his consciousness in the transport. The caused «First aid» brigade during the physical examination has paid attention to the pale coverlet, the blood pressure was 70/50 mm hg, also there was a tachycardia (120 beats per minute), the respiration impairment (Cheyene-Stokes respiration has developed). The patient has been hospitalized.

Questions

1. What additional researches are necessary for the situation specification?
2. What type of the carbohydrate exchange pathology has presumably developed in the patient? What is the role of alcohol intoxication in the given type of pathology and a coma development in the patient?
3. With what conditions is it possible to differentiate the given pathology?

The decisions

1. The research of glucose and insulin levels in blood, the electrocardiogram (for exertion of cardiac pathology, particularly cardiac infarction).
2. Most likely there is a latent Diabetes mellitus with a severe current. The hypoglycemic coma development is provoked by the unkeeping the diet, reception of alcoholic drinks, stresses.
3. The alcoholic psychoses. glycogenoses. The cardiac infarction.

TYPICAL FORMS THE OF CARDIAC FUNCTIONS IMPAIMENTS

Task 1

The 56 years old patient is in the resuscitation department with the diagnosis «acute generalized cardiac infarction». On the second day after the short-term condition improvement, despite of proceeding medical actions, the breathlessness began to accrue; the plentiful small bubbling rales have appeared in lungs.

Questions

1. What pathological process in the respiratory system and the cardiac vascular system could cause a clinical picture of the condition which has developed on the second day in the patient?
2. What parameters of the intracardiac and homodynamic systems can be exposed to objectivation of the cardiac failure development in the patient? How will you refer these parameters and specify an orientation of their changes?
3. In case of confirmation of the version about the cardiac failure development in the given patient specifies its type (according to the affected part of the heart and the process development rate). Is there a: a) reloading type, b) myocardial type, c) mixed type of cardiac failure? Prove the answer.

Task 2

The patient X. suffering the arterial hypertension has addressed to the clinic with complaints to periodically arising dyspnea with the complicated and no satisfied inhale, especially expressed at physical activity. Several days ago he had an attack of a severe inspiratory dyspnea («asthma») with fear of death at night. In this occasion the first aid brigade has been called, the doctor has diagnosed «the cardiac asthma».

During the physical examination in the clinic it is revealed: the blood pressure is 155/120 mm hg, the X-ray examination gives the picture of the left heart expansion.

Questions

1. What type of the cardiac pathology has developed in the patient? What is the direct reason of its development?

Is its pathogenesis associated with an overload of the ventricle? What ventricle? An overload than: in volume? in pressure?

2. What is the trigger mechanism of the cardiac contractive function in case of its overload?
3. Will you refer and prove the treatment principles of the cardiac function impairment which has developed in the patient.

Task 3

The 50 years old patient has arrived to the intensive care department with the complaint to constricting retrosternal pains proceeding more then 20 hours.

During physical examination there are: the average state, face hyperemia. During the auscultation there is a vesicular respiration, the rales are not present. The respiration rate is 16 times per minute. The heart rate is 80. The blood pressure is 180/100 mm hg. The electrocardiogram: the sinus rhythm, Q wave profound and rise of ST segment at the first standard lead with the mirror reflection in the third standard lead. Activity of the blood aspartate-aminotransferase is sharply increased. Leukocytes $12,0\cdot\times10^9$/l. Thrombocytes $450,0\cdot\times10^9$/l, prothrombin index is 120% (the norm rate is up to 105%).

Questions

1. About what pathology do the described changes testify?
2. In what part of the heart does the pathological process localize?
3. How will you explain the increased activity of blood aspartate-aminotransferase in the given form of pathology?
4. What is the basic mechanism of the given pathology development?

Task 4

The group of rats was placed in the chamber with low partial pressure of oxygen and has been forced to run in a trade-hothouse with increasing speed. During the whole experience by means of the implanted sensor the frequency and force of cardiac contractions were registered. In 30 minutes after the experiment beginning the progressing cardiac weakness has developed in rats.

Questions

What is the principal cause of cardiac failure development in rats in this case?

Task 5

In operations on rats by means of metal ring which has been put on an aorta for reducing its cross-section in 3 times. The animal was killed in 35 seconds after the experimental coarctation of aorta.

Question

Will be the hypertrophy of left ventricle observed in rats with experimental narrowing of aorta?

Task 6

Porpoises with the various degree of a myocardial hypertrophy which is caused by physical activities of various intensity and duration were forced to swim up to a full exhaustion.

Question

In what animals, with the greatest or the least degree of myocardial hypertrophy, physical exhaustion will develop before all during the swimming? Explain your answer.

Task 7

In experiments on animals with the experimental bacterial intoxication at the myocardium metabolic condition research inhibition of the creatine kinase activity and decrease in creatine kinase level was found out.

Questions

Is the myocardial fibers contraction possible in this conditions?

Task 8

The decrease in ATP level and increase in AMP level are revealed in the emergency stage of the compensatory hyper function during the myocardium metabolic features research in the given experiment.

Question

Specify what additional sources of ATP resynthesis are used in this conditions?

Task 9

In phase before the diastolic myocardium weakening there is a decrease in the Ca level in sarcoplasm and there is no free Ca in diastole.

Question

What from the listed below structures take part in the Ca accumulation: ribosomes, mitochondria, lysosomes, T-system, the longtitudinal tubules of the Golgy complex?

Task 10

The high level of Ca is revealed in the experimental animal with the heart failure.

Question

How does the energy supply of myocardium change in the given conditions?

Task 11

The compensatory myocardium hyper function in probated rats is caused by the aorta orifice constriction. The constant overload of resistance led to the lasting a long time increased overload adaptation mechanisms development in 1,5 months.

Questions

Will the lasting a long time adaptation of the heart develop, if the non-toxic doses of actinomycin D is introduced to the experimental animals (actinomycin D inhibits RNA synthesis on the DNA matrix)?

Task 12

Oxygen arterio-venous difference of myocardium is 12%, oxygen-utilization coefficient is 75%.

Question

Is there an oxygen extraction by myocardium?

Task 13

In experiments on animals the pressure chamber upgrade height influence on the physical exercise stability was researched. By increase in the pressure chamber upgrade height and decrease in the oxygen partial pressure in the pressure chamber the coronary deficiency frequencies under the physical exercise influence (the prolonged running in the trade-hot house) has sharply increased, though the increased blood inflow by coronary vessels to myocardium.

Question

What is the mechanism of the coronary deficiency development in the probated animals?

Task 14

In case of the maximal physical exercise the heart rate increases in 2,5 times in the healthy undisciplined people. Cardiac output increases in a great proportion — in 3–4 times.

Parameter	Physical rest	Peak load	Degree of increasing at physical exercise
Heart rate	64–75	170–180	2,5
Cardiac output	5,0	16–20	3–4

Question

How to explain the revealed inconsistency between the increased cardiac output and the degree of the cardiac contractions increase?

Task 15

The 9 years old patient B. has arrived to the cardiological department with complaints to increase in the body temperature, pains and swelling of knee- and ankle-joints, weakness, the decreased appetite.

Objectively the child's condition heaviness is moderate. Boy is low nutrition, he is pale. Pulse is 80 per minute in rest, change of position in bed leads to the tachycardia development. Heart beat is increased. The left heart boundary 1,5 sm expansion. Heart sounds are muffled. There is an intensive systolic murmur over the heart apex.

Diagnosis: rheumatism, the reccuring attack. The moderate endocarditis on the mitral valve insufficiency background.

Questions

1.What is the type of the cardiac failure in the child?

2.What has caused the heart boundary expansion? What is it's value?

3.What is the variant of overloads in the given case?

Example of the task decision

The 62 years old patient is in a hospital in occasion of the expressed cardiac ventricle failure. His position is forced. A significant part of day and night

he sits on the bed with the lowered limbs on the floor. The attempts to lie down associated with the sharply increased breathlessness.

Question

Why does the expressiveness of the breathlessness decrease in the sitting position with the lowered limbs on the floor and it increase in the lying position?

The decision

The sitting position with the lowered limbs on the floor reduces the circulating blood amount and inflow of blood to the pulmonary circle and the heart. All this promotes easing of the blood stagnation phenomena in lungs and leads to the pulmonary ventilation improvement.

TYPICAL FORMS OF VESSELS FUNCTION IMPAIRMENTS

Task 1

During the visit to the policlinic the 56 yeas old man complaints to the rapid fatigability and pains in the gastrocnemius muscles at walking, pains stops after a stop (the symptom of «intermittent claudication»), feeling of the legs chill and numbness, the «ant crawling» and pricking (presthesias) in rest. The patient smokes much (from youthful age), his trade is associated with the periods of long cooling (work out of doors during the autumn-winter time). During the physical examinations there are: footsteps are pale, the footstep's skin is dry to the touch, it is also cold, nails are crumbled, the pulse on the posterior tibial artery of limbs is not probed. The doctor's preliminary diagnosis is a «bliterating arteritis».

Questions

1. Will it be possible to assume that the reason of ischemia in the patient is an atherosclerotic defeat of the lower limb's artheries, if a level of the serum common cholesterol is normal (250 mg/decilitre)? Prove the answer.
2. What risk factors of the atherosclerosis development are revealed in the patient? Will you list the other possible risk factors.
3. What are the possible mechanisms of these factors realization?

Task 2

During the professional examination in the 32 years old man it is revealed: the arterial blood pressure is 175/115 mm hg, the cardiac rate is 75. During the additional medical examination the expressed angiospasm of eye-ground, microhematuria, albumiuria have revealed. In anamnesis there is an acute diffuse glomerulonephritiscarried out in the childhood.

Questions

1. What type of pathology has revealed in the patient? Will you characterize it hemodynamic parameters.
2. Will you refer the possible reason of it's occurrence and the basic mechanisms of it's development in the patient.

Task 3

After the heavy physical activity period the patient had feeling of fear, a muscular shivering, a severe headache, dizziness, a tachycardia. The blood pressure is 270/65 mm hg. In 2 hours the health state of the patient has improved, the specified symptoms were not marked, polyuria has arisen. The adrenal gland tumor was found out during the US and roentgenoscopy.

Questions

1. What tumour of adrenal glands can cause the development of the described condition in the patient? Prove the answer.
2. What is the prospective mechanism of this condition development?
3. What additional researches need to be lead for the final diagnosis statement? Will you give the example of results in support of your conclusion.

Task 4

The clinical supervision are lead for patients with the essential hypertension, they have allowed to devide the surveyed patients depending on the blood renin level into 3 groups: normorenin, hyperrenin, hyporenin. Thus the attention was paid to that circumstance, that the highest parameters of the diastolic pressure were observed in the patients with the high blood plasma renin activity. The systolic pressure essentially didn't differ in different groups of patients.

Questions

1. How will you explain the highest parameters of diastolic pressure in patients with the hyperrenin type of essential hypertension?
2. Why the systolic pressure did not differ in different groups of patients opposite the diastolic pressure?

Task 5

The 24 years old patient has arrived to the clinic with complaint to headaches, lumbago, facial edemas, the general weakness.

All years before she felt healthy. A month ago she has carried quinsy.

At receipt to the clinic the blood pressure was 180/110 mm hg, the peripheral blood analysis: erythrocytes 3.1×10^6 in 1 mcl, leukocytes 12.6×10^3 in 1 mcl, ESR is 28 mm/h. The urine analysis: expressed proteinuria, microhematuria, leukocyteuria.

Questions

1. From what type of hypertension does the patient suffer?
2. What is the reason and mechanism of the hypertension development in this case?

Example of the task decision

The 42 years old patient K. has arrived to the clinic for medical examination. There is a long, stable and high increase in the arterial blood pressure in the anamnesis.

It is revealed during the clinical-biochemical research: decrease of the blood plasma renin activity parameter, increase of the extracellular liquid volumes, increase of the maintenance of sodium ions and decrease of the potassium ions maintenance in saliva, the beta-adrenoreceptors blocking agents, but the positive effect of saluretic treatment.

Question

About what mechanism of the hypertension development do the resulted clinic-biochemical parameters testify — the strengthened formation of angiotensin II or the increased secretion of mineralocorticoids.

The decision

The resulted clinic-biochemical parameters allow to consider that one of two pressor humoral mechanisms is the reason of hypertension development. The reason of hypertension development in this case is an increase of the mineralocorticoids secretion by adrenal glands in this case.

TYPICAL FORMS OF THE EXTERNAL RESPIRATION SYSTEM IMPAIRMENTS

Task 1

Duing the medical examination of the adult patient who has arrived to the clinic with the preliminary diagnosis «bronchial asthma» no characteristic clinical manifestations of the given disease are revealed. There is an asthma attacks with a cough which are typical enough for the bronchial asthma, the patient can not specify the reason of its occurrence.

Results of the external respiration system condition research:

— respiratory minute volume the % from the due value is 110;

— vital capacity of the lungs the % from the due value is 87;

— maximum pulmonary ventilation % from the due value is 95;

— maximum expiratory flow volume is 2.3l;

— vital capacity of the lungs is 3.5l;

— total lung capacity the % of due value is 108.

After the bronchial spasmolytic introduction of salbutamoli there is 15% increase of the Tiffno index.

The Tiffno index is supposed to be calculated before the test.

Questions

1. Which of the given parameters are the functional tests of the obstructive type impairments revelation? Prove the answer and conclude the airway conductance condition in the given patient.

2. How has the maximal expiratory flow volume change after the bronchial spasmolytic introduction? About what does this change testify?

3. Explain the mechanism of the «expiratory bronchial compression phenomenon» in patients with the bronchial athma and specify a spirometric parameter in the given patient indirectly testifying about this phenomenon development opportunity.

4. Explain the mechanisms of the key pneumogram's parameters change in patient during the bronchial asthma attack (the inhale depth, the respiration rate parameter, the inhale/exhale ratio).

Task 2

The clinical signs of emphysema are revealed in the 33 years old patient after the repeated sulphurous gase poisonings in the mine, including the sharply expressed breathlessness in the patient.

Data of the arterial blood gas analysis:

p_aO_2	86 mm hg,
p_aCO_2	48 mm hg,
oxygen capacity	19,6 volumetric %,
S_a0_2	95,4 %.

The spirometry data:

total lung capacity is increased;
lung vital capacity is reduced;
inspiratory reserve volume is decreased;
expiratory reserve volume is decreased;
functional residual capacity is increased;
pulmonary residual volume is increased;
tiffno index is decreased.

Questions

1. Are there the signs of the extensibility and elasticity impairments of the pulmonary tissue in the patient? If so, specify and characterize these signs.
2. Determine the character of the maximal expiratory flow volume change (decrease or increase), the exhalation change and explain the possible mechanisms of this changes development.
3. By means of what elementary functional test is it possible to estimate the diffusive abilities condition of lungs in the given patient?
4. Draw a conclusion about the pulmonary gaseousexchange function impairments in the given patient.

Task 3

The 24 years old patient has arrived to the clinic with complaint to breathlessness, tachycardia at physical activity performance, the heart area ache. During the full-blown breathlessness the small amount of the mucous sputum is exuded and also there is a blood streaked sputum is exuded. According to the specified complaint of the patient and the subsequent research there was an assumption of the pulmonary circulation impairment owing to the mitral valvular disease (stenosis).

Results of the external respiration system condition research:

respiration rate is 20 per minute,
lung vital capacity % from yhe due value is 81,
total lung capacity % from the due value is 76,
respiratory minute volume % from the due value is 133,
the maximal expiratory flow volume/ vital capacity of the lungs ratio % is 80

Questions

1. What types of the pulmonary perfusion impairments atre possible in the given patient?
2. Explain the possible mechanisms of the vital capacity of the lungs and total lung capacity decrease in the patient.
3. Is there the obstructive type of alveolar ventilation impairment in the given patient?

Task 4

Two rats, one of which is under the anesthetic, are put to the discharged oxygen action test in the pressure chamber.

Question

What rat will die the first? Explain your answer.

Task 5

In experiences on dogs the respiration impairment was caused by the animals keeping in the high ambient temperature conditions with the oxygen deficiency. On the certain stage of the experiment the irregular respiration has developed, it is characterized by the gradually increase in depth and respiration rate after the short-term respiratory arrest. On the certain respiratory depth and rate reaching there was a gradually decrease in respiratory rate till the respiratory arrest.

Question

What form of the external respiration impairment was found out in the experiment?

Task 6

As the experimental results show the partial or even the whole lung removal is not accompanied by the blood oxygenation impairment. At the same time the ventilation turn off in the lobe of the lung limits by the appropriate bronchial obstruction leads to decrease in the arterial blood oxygenation on about 5–6%.

Question

Why in case of the ventilation turn off by the bronchial obstruction of the lobe of the intact lung there is a decrease in the arterial blood oxygenation in contrast to pulmonectomy or the lung resection?

Task 7

The acute inflammatory process in dogs was caused by 3 ml of the sterile hot water introduction in the lung tissue.

On the third day after the alternating agent introduction the external respiration efficiency was examined in all experimental animals. At the same time decrease in the arterial blood oxygenation was found out, the CO_2 level hasn't changed.

Question

How to explain this circumstance that the gaseous exchange impairment in the experimental dog's lungs manifested only by hypoxemia and did not accompanied by hypercapnia?

Task 8

The 23 years old patient A is moved up into the artificial respiration. During the gaseous structure study the arterial blood oxygen tension is 85 mm hg, and CO_2 is 45 mm hg.

Question

Is the external respiration impairment compensation sufficient in the given case?

Task 9

The 43 years old patient, the pressman of the fireproof bricks with the 20 years record of service, complains of the hard realized work because of the breathlessness at physical activity performance. During the objective physical examination the pale coverlets attract the attention. the thorax is the regular shape, two parts of it actively participate in the respiration act. The mobility of the pulmonaty borders is limited. The hard respiration and the dispread dry rales are auscultated.

The X-ray: the pulmonary picture is changed of cellular pneumosclerotic type.

The moderate dicrease of the external respiration efficiency is revealed the 74% oxygen saturation of arterial blood.

Questions

1. What part of the external respirationfunction impairment does basically cause it's insufficiency in this case?
2. How will you explain the fact that patient's breathlessness develops only at the physical activity performance?

Task 10

The 42 years old patient is a thehospital because of the simple fractures of the X and XI right side ribs. The fractures are not complicated by the pulmonary tissue injury.

The general condition is satisfactory. The respiration rate is 13 per minute. The respiration is superficial. The right half of the thorax lags behind in the respiration process.

It is revealed during the common spirography: the respiratory capacity is 83%, the respiratory minute volume is 82%, the lung vital capacity is 90% of the due value.

Questions

What type of the pulmonary ventilation impairment takes place in this case?

Task 11

The 19 years old patient T. on the third day of disease has visited the doctor with the diagnosis «acute pneumonia». He was directed to the in-patient treatment.

During the receipt his respiration rate was 32 per minute and also it was superficial. The intracostal muscles take part in respiratory movements. During auscultation the fine moist rales are found out.

During the X-ray of lungs changes characteristic of the bilateral croupous pneumonia (lung-fever) are found out.

During the external respiration efficiency examination decrease in the arterial blood oxygenation are found out (it is 86%).

Questions

1. What form of the external respiration impairment is in patient? What are the mechanisms of it’s development?
2. Which of the external respiration processes impairment are mainly caused the arterial blood oxygenation decrease in the given case?

Task 12

The 8 years old patient K. complains of the increased asphyxia frequency attacks. The asphyxia attacks appear without any certain reasons. During the asphyxia attack respiration becomes heavy; it is accompanied by cough, not much of the viscous mucoid sputum discharge. The sibilant crepitations is auscultated.

There is a bronchial asthma in anamnesis.

Questions

1. What type of dyspnea is characteristic of the given pathology?
2. What type of the pulmonary ventilation impairment during the respiratory arrest attacks takes place in the given case?

Task 13

The 56 years old patientW. suffers diabetes during 20 years. She was delivered to the clinic in a precoma (a headache, weakness, a nausea, a flabbiness and the expressed breathlessness).

Despite of taking measures the atient's condition was worsened progresively. The patient is without conciousness. The pulse is increased. The arterial blood pressure is decreased.

Question

Will the breathlessness be kept in the patient in coma? Explain the answer.

Task 14

The 56 years old patient B has arrived to the neurology unit because of the cerebral stroke. At receipt he was in grave condition. There was a periodic respiration like Cheyne-Stokes. On the second day of staying in the clinic the Cheyne-Stokes respiration changed to the Biot's respiration.

Questions

1. Is the Biot's respiration appearance prognostically auspicious sign?
2. What factor has the main value in the periodic respiration pathogenesis?

The example of the task decision

The 52 years old patient has delivered to the clinic in a condition of uraemia. The patient is adynamic and leepy. The face is puffy with the plural scratches. The breathlessness with the increase of inhalation and exhalation phase and the respiratory rhythm is observed.

On the fourth day of stay in the hospital despite of taking measures the patient's condition has become worssened: coma has developed, the pupils reaction to the light is slow, the patient is an unconciousness condition, coma hass developed. There was an original loud respiration. Increase of the respiratory rhythm is observed encloe deep inhales are in regular intervals ahnge into deep exhalations.

Question

What type of the respiration impairment has appeared in the patient?

The decision

Kussmaul's respiration has appeareed in the patient.

TYPICAL FORMS OF THE GASTROINTESTINAL TRACT PATHOLOGY

Task 1

The gastric secretion stimulation has been led in two groups of animals. the vagus stimulation in one group and the stressful stimulation in another.

Question

Will the gastric juice be secreted in response to vagus stimulation?

Task 2

Hydrocortisone was injected to two rats weightining 160–180 g in dose of 0.5–1.0 mg on 100 g of weight. The gastric erosion and ulcer has appeared in all animals after 10–15 injections.

Questions

Explain the mechanisms of the «hydrocortisone» stomach ulcer development in experimental animals.

Task 3

For reproduction of the experimental stomach ulcers resort to the pylorus ligature imposing at preservation of its passability (Shey's method).

Question

Explain the mechanism of the stomach ulcer occurrence in case of the pylorus ligature imposing.

Task 4

The plural hemorrhages have arisen in the patient with the bile insufficient receipt in the intestines and the expressed intestinal steatorrhea.

Question

Explain the possible mechanisms of the specified pathological processes association.

Task 5

The microsomy and acromegaly phenomena have arisen on the background of the diencephalic pathology. The diencephalic pathology manifestates as the stable somatotropic hormone hyperproduction. At the same time the gastritis signs have developed. During the gastric secretory function examination 220 ml of the gastric contents has been extracted after the Boas test meal. The free chydrochloric acid level was 68 titration units, the total acidity was 87 titration units.

Questions

1. Specify the gastric secretion function impairments in this case.
2. Is there any associations between the organism's hormonal balance impairments and the gastric secretory function changes?

Task 6

The sharply increse in the G-cells number and decrease in the D-cells number are revealed during the gastric biopsy material immunocytochemical examination.

Questions

Speify the possible stomach ulcer pathogenetic mechanism development in this case.

Task 7

Macrosomy and acromegaly appear on the background of the diencephalic pathology which is manifests by the stable somatotropic hormone hyper function. At the same time the gastritis signs have developed. During the gastric secretion function examination in 45 min after the Boas test — breakfast 220 ml of the gastric contents is derived. The free hydrochloric acid level is 68 titration units and the total acidity is 87 titration units.

Questions

1. Will you specify the gastric secretion function impairment character in the given case.
2. Are there any associations between the listed above organism hormonal balance impairments and the gastric secretion function changes?

Task 8

Three years later the subtotal stomach resection the progressive anemia appeared. During the blood examination it is revealed, that Er $1{,}9\times10^{12}$ / l, leukocytes 3×10^{9}/l, thrombocytes 100×10^{9} / l. The peripheral blood smear: megalocytes, hypersegmented neutroiphils.

Questions

Specify is there any associations between the specified blood pathology and the earlier stomach resection? If there are some associations, what are they?

Example of the task decision

The 60 years old patient has visited the gastroenterologist becase of the loss of weight complaints, the epigastric pains and anemia. It is known from the anamnesis that 25 years ago the patient has carried out the partial gastroectomy in occasion of the ulcer bleeding and also appendectomy. After the gaster surgery the plentiful heavy food ingestion the abdominal distension andiarrhea are periodically observed in the patient. He did not take any drugs (even analgetics).

The hereditary anamnesis: the patient's father suffered the gastric ulcer.

Objectively he is skinny without the exhaustion signs. During the phyical examination of the head, eyes, the nose, the throat the conjunctiva and the oral mucous membrane pallor is marked. The cardiac and pulmonay function is nomal. The abdomen is scaphoid, the liver and spleen aren't changed.

The laboratory examination data: hemoglobin is 70 g/l, microcytosis, the peripheral blood analysis paameters are normal.

The rectal examination data: the brown stool, the latent blood positive reaction.

Questions

1. What is your presumable diagnosis?
2. What additional methods ae necessary to be done to the patient?

The decisions

1. During the gastrointestinal endoscopy the flat ulcerous formation in the size of 1.5 sm in the gastrojejunal anastomosis area is reveald. During the biopsy adenocarcinoma with the intstinal surrounding epiithelium metaplasia is revealed.
2. Research with the barium meal.

THE HEPATOBILIARY SYSTEM PATHOLOGICAL PHYSIOLOGY

Task 1

Determine the juandice type.

Parameter	Blood	Urine	Excrement
Bilirubin	1,5 mg%	—	—
Direct reacting bilirubin	0,5 mg%	traces	—
Urobolin	it is found out	it is found out	—
Stercobilin	normal	normal	normal
Bile acids	are not present	are not present	are not present

Task 2

Determine the jaundice type.

Parameter	Blood	Urine	Excrement
Alanin-transferase	—	—	it is increased
Aspartate-transferase	—	—	it is increased
Bilirubin	2.4 mg%	—	—
Direct reacting bilirubin	1.4 mg%	it is found out	—
Urobolin	traces	traces	—
Stercobilin	traces	traces	it is considerably decreased
Bile acids	are found out	are not found out	are not found out

Task 3

Determine the juandice type.

Parameter	Blood	Urine	Excrement
Alanin-transferase	normal	—	—
Aspartate-transferase normal	normal	—	—
Bilirubin	2.4 mg%	—	—
Direct reacting bilirubin	1.4 mg%	it is found out	—
Urobolin	it is absent	it is absent	—
Stercobilin	it is absent	it is absenit	it is absen
Bile acids	are found out	are found out	are found out

Task 4

The 28 years old patient has arrived to the clinic with complaints to the constant right hypochondrium pains, dyspepsia, general weakness, rapid fatigability. In the age of three years old he has carried out a juandice of the unknown etiology juandice.

Objectively there are irectic scleras and coverlets. The liver is enlarged, soft and painless at palpation. The stool is the usual coloring.

Results of the laboratory research:

the blood analysis: leukocytes $3,7\times10^9$/l, the leukogram is singulary – free, ESR is 6 mm/h;

the blood biochemical analysis: the crude protein level is 8 mg%, the albumine level is 5.2 mg%, the bilirubin level is 5.8 mg%, the glucose level is 115 mg%.

Questions

1. What is the possiblevcharacter and the origin of dyspepsia in case of liver disease?
2. Can the skin icteric coloring be accompained by the skin itch?
3. Can the ddyspepsia, the enlarged liver be pathogenetically associated in a single whole? Does it always testify about the direct liver injury?
4. Is it possible to approve that the hepatic functions are disturbed in the patient? If so, what functions are disturbed?
5. What additional data are necessary for you for the process essence definition and it's pathogenesdis?
6. Is it possible to exclude the direct hepatic tissue injury according to the objective data?
7. What juandice type has developed in the patient?
8. What is the juandice origin?

Task 5

The 31 years old patient has arrived to the clinic by the ambulance car. At receipt he is inert, braked, apathetic, he doesn't always answer questions right away and sufficiently. His tongue is coated. The body temperature is 36,5 ºC. His skin and mucous membranes are iretic. There are teleangiectasias on his upperparts, erythema of palms is marked. There is an enlargement of abdomen because of the ascetic liquid accumulation and palpation of liver is difficult because of it. The low extremities edemas are found out. The left cardiac ventricle boundary is increased. The arterial blood pressure is 160/95 mm hg, cardiac rate is 90, pulse is rhythmical.

The results of the laboratory tests:

The blood test:	
Hb is 108g/l, Er — $4,0\times10^{12}$/l, Le — $4,8\times10^9$ /l, ESR — 35 mm/hour	
The biochemical blood test:	
Bilirubin	7,1mg%
Glucose	80mg%
Titrable acidity	is increased
Urea	is decreased
Prothrombin index	is decreased
Choline esterase activity	is decreased
Australia antigen	is not revealed

Questions

1. What are the mechanisms of the specified skin vessels changes and the stable erythema of palms? What symptoms are also caused by this effect?
2. What are the variants of the portal hypertension and ascites pathogenesis?
3. Are there any signs of hepatic failure? If there are some signs, what are the mechanisms of their development?
4. According to the clinical and laboratory tests what we can mostly suppose: Diabetes mellitus, the hepatic acute inflammatory injury or cirrhosis?
5. What additional data do you need for the last two questions answer?

Task 6

During the animal's liver extripation the glucose level is quickly decreasing. Attempts to increase the blood glucose level by the adrenaline injections are ineffectual and the animal dies because of the hypoglycemic coma phenomenon.

Questions

1. Explain the hypoglycemia mechanisms in case of liver extripatioon.
2. Why does adrenaline not render it's inherent hyperglycemic action in this case?

Task 7

Two groups of animals were without nutrition: one group for 10 hours, and another for 28 hours.

After the blood glucose test at the end of starvation the blood glucose level test was on the norm lower limit.

Questions

1. Are there mechanisms of the normal blood glucose level are identical in this two groups of animals?
2. What is the role of liver in this mechanisms realization?

Task 8

The 38 years old examined K. was given 40g of galactose, after that in the excreted urine the galactose level was 12 g. The intact liver completely assimilate 40 g of the taking galactose, or it does not assimilate no more than 3–4 g, which are excreted with urine.

Questions

1. What of the hepatic functions are impaired in the patient?
2. What is the basis of the galactose usage as the functional liver condition test?

Task 9

The 54 years old patient has arrived to the clinic in occasion of the unknown etiology juandice. The prothrombin blood level analysis was made with the purpose of differential diagnostics. The blood prothrombin level is noticably decreased. During four days of the vitamin K intravenous injections the prothrombin blood level analysis was made again. At the end of the vitamin K injections the prothrombin blood level has 40% increased.

Questions

1. Does the given test result testify about the protein synthetic function impairment?

2. In favour of what jaundice type does the given test testify?

Example of the task decision

The 46 years old patient at the clinic's pigeon hole complaints to weakness, the appetite absence, nausea, the right hypochondrium pains.

During the physical examination the icteric scleras and skin are observed. The blood analysis: bilirubin is 78 mcmole/l. The urine analysis: the bilirubin and urobilin levels are plentiful. Stercobilin is found out in excrement.

Questions

1. Determine the juandice type.

2. What are the mechanisms of hyperbilirubinemia and urobilinuria in the given jaundice type?

The decisions

1. The hepatic type of jaundice.

2. The basic mechanismm of hyperbillirubinemia is the energy dependent direct bilirubin transport (from the hepatocytes to the bile capillaries against the concentration gradient) processes impairment. In base of urobilirubinemia there are the urobilinogen extraction processes impairments. Urobilinogen enters the liver by the portal system and changes into dipyrrole compounds.

TYPICAL FORMS OF THE RENAL FUNCTIONS IMPAIRMENTS

Task 1

Describe the presented in the task data by medical terms. On base of the data analysis formulate a conclusion about the renal pathology form.

Diuresis	420ml/day
Density	1,011
Protein	2g/l
Titrable acidity	no

The urinary sediment microscopy: single leached erythrocytes in the field of vision, waxy and hyaline cylinders.

Additional data: the arterial blood pressure is 175/95 mm hg, the blood residual nitrogen is 190 mg%.

Task 2

The under eyes edemas especially after the sleep, have started to appear in the patient M in one week after the transmitted angina. The urine analysis: diurnal diuresis is 750 ml, the urine density is 1,028, the protein level is 0,1%, glucose and acetone level are absent. The urinary sediment: erythrocytes, including the leached erythrocytes10–29 in the field of vision, a small number of hyaline and erythrocytic cylinders. The arterial blood pressure is 180/110 mm hg. The blood analysis: the residual nitrogen is 60 mg%, the protein level is 7,3 mg%, the endogenous keratin clearance 50 ml/min.

Questions

1. Of what pathology form are the revealed in patient signs characteristic?
2. What is the main chaint of the given pathology pathogenesis?
3. What are the mechanisms of azotemia and hypertension development in the given case?

Task 3

The «acute diffuse glomerulonephritis» was made. At the present time weakness, headaches, dizziness, ill-defined edemas are marked. The urine density is 1,008, the protein level is 0,2%, glucose and acetone are absent. The urine sediment microscopy: single erythrocytes in the field of vision, a small number of hyaline cylinders. The arterial blood pressure is 180/100 mm hg. The blood analysis: the residual nitrogen is 90 mg%, the protein level is 5,9 mg%, the endogenous keratin clearance is 40 ml/min.

Question

Does the polyuria presence conflict with the «acute glomerulonephritis» diagnosis, which was made 2 years ago?

Task 4

The generalized edemas are in the patient K. Last week they increase especially on the lower extremities. The urine analysis: diurnal analysis is 700 ml, the urine density is 1,037, the protein level is 3,3 mg. The urine sediment microscopy: lot of granular and waxy cylinders. The arterial blood pressure is 120/65 mm hg. The blood analysis: the residual nitrogen is 30 mg% (norm is 20–40 mg%), the protein level is 4,8 g%, the albumin level is 1,5 g% (norm is 4 g%), the globulin level is 2,0 g% (norm is 3 g%), the cholesterol level is 800 mg% (norm is 200 mg%).

Questions

1. About what disease (syndrome) development may the revealed in patient changes of diurnal diuresis, the arterial blood pressure level, the blood and urine structure testify?
2. What is the mechanism of the edemas development in the patient?

Task 5

The 48 years old patient K.is suffering from the chronic diffuse glomerulonephritis during 5 years. During last weeks tachycardia, edemas especially of the lower extremities appeared. The urine analysis: diurnal diuresis is 800 ml, the urine density is 1,024, the protein level is 3,3 mg%. The urine sediment microscopy: lot of the grany and wax-like cylinders. The arterial blood pressure is 130/80 mm hg. The blood analysis: the residual nitrogen is 30 mg% (norm is 20–40 mg%), the protein level is 4,8 g%, the albumin level is 1,5 g% (norm is 4 g%), the globulin level is 2,8 g% (norm is 3g%), hyperlipidemia, the acid-base balance parameters: pH 7,3, p_aCO_2 33 mm hg, SB 17 milliequivalent/l, BE 7 milliequivalent/l, Titration acidity is 10 milliequivalnt/l, $NH_{4\ of}$ urine is 18 milliequivalent/l.

Questions

1. What aberrations of the urine structure, the blood parameters, the water metabolism parameters and the arterial blood pressure are revealed?
2. About what syndrome do the found out aberrations in patient testify?
3. Are there any reasons to say about the uremia development in patient? Prove the answer.

Task 6

Hemoglobinuria will not arise until the plasma hemoglobin level is not over the thershold level 1.35 g/l. But hemoglobinuria will arise in case of the simultaneously administration of albumin and hemoglobin if hemoglobin concentration is 0.3–0.5 g/l.

Question

How to explain decrease in the hemoglobin threshold level in case of the simultaneous administration of albumin and hemoglobin?

Task 7

Duing the experiment on rats the adrenaline and noradrenaline diuresis effects were researched. Increase in diuresis was observed in case of low dose of adrenaline administration and decrease in diuresis was observed in case of high doses of adrenaline administration. Noradrenaline has only antidiuretic action.

Question

What are the mechanisms of diuresis changes in case of the used catecholamine action in the experiment?

Task 8

The heterologous antinephritic serum was intravenously injected to the rabbit. The developed nephritic injury was accompained by hypertension, edemas, proteinuria, microhematuria. During the morphologic nephritic examination there is an expressed picture of glomerulonephritis.

Questions

1. About what type of the glomerulonephrirtis development does the specified model testify?
2. About what renal syndrome does the described above semiology testify?

Task 9

In case of daily 0.8 ml of 1% mercuric chloride solution to rabbits the expressed oliguria, proteinuria, hypoproteinemia develop. Thus the glomerular filtration is 90% of norm.

Question

How to explain the expressed oliguria development on a background of decreased glomerular filtration?

Task 10

During carrying out the experiment it is established that intacapsular renal pressure equals 21 mmhg.

Questions

Will the filtration intensity process change in these conditions? If it changes, will you determine the mechanism and reasons?

Task 11

Decrease in the sodium and potassium ratio parameter in urine and increase in this parameter in blood plasma is revealed in the experimental animal.

Questions

1. What type of the hormonal shift can we indirectly observe according to these parametes?
2. What are the possible mechanisms of the hormonal disbalance development in the specified pathology variant

The example of the task decision

The 24 years old man, abused by drugs (intravenous injection), has delivered to the hospital ward without consciousness. It is unknown for how long he was without consciousness and what drugs were accepted. The drug did not react the antagonist injection.

During the physical examination it was revealed: the patient is braked. There are no data for any trauma.

During the ureteric catheterization 150 ml of dark urine are received. There is a positive haem reaction of urine and the centrifugated urine supernatant fluid carried out with the indicator strip test.

The pigmental granular cylinders and numerous epithelial cells of renal tubules are revealed in the urinary sediment. Erythrocytes are not revealed in the urinary sediment.

Blood plasma has no pink coloring. The serum sodium level is normal.

The biochemical blood analysis: hyperpotassemia, hypercalcemia, hyperphosphatemia, hyperurecemy, the decreased blood urea nitrogen – to – serotonin ratio, the creatine kinase hypereactivity.

Questions

1. What is your presumable diagnosis?
2. About hat do the boichemical analysis changes testify?

The decisions

1. There is an oliguria in the patient. The dark color of urine which has given the positive haem reaction carried out with the indicator strip test, the absence of erythrocytes in the urinary sediment specifies about the acute renal insufficiency caused by haem. As the molecule of myoglobin is less than the hemoglobin molecule, urine is usually colorless in myoglobinuria owing to the fast myoglobin renal clearance, urine is pink in hemoglobinuria.

2. The biochemical blood analysis testify about the rabdomyolytic myoglobinuric origin of the acute renal tubules necrosis.

THE ENDOCRINE SYSTEM PATHOLOGICAL PHYSIOLOGY (THE HYPOTHALAMO–PITUITARY–ADRENAL SYSTEM)

Task 1

The acute massive blood loss has developed in the 32 years old woman in labour (hemotransfusion was made in two hours). Later on the following changes were revealed: a) progressive loss of weight, b) atrophy of sceletal muscles, c) the dystrophic skin changes, hair falling out, d) the internal organs hypotrophy, e) decrease in the blood pressure up to 99/58 mm hg, g) the peripheral blood glucose level is 3,77 mmole/l (68 mg%).

Questions

1. About what pituitary gland pathology are specified manifestations characterstic?
2. What are the mechanisms of development of each of them?

Task 2

The 36 years old patient M. during his visit to the doctor has presented complaints to the pang headache, dizziness, tachycardia and the cardiac area pains, hyperhidrosis, trembling of the whole body and fear of death in case of intensive physical exercise. In state of rest: the pripheral blood pressure is 140/90 mm hg, heart rate is 76, the blood and urine analyses are without any changes.

Questions

1. What types of pathology are observed in the patient? Prove the answer.
2. What is the pathogenetic association between these process?
3. What factors cause the blood pressure substantion increase:

a) systolic;

b) diastolic.

4. What are the mechanisms of the developing pathological processes symptoms in the patient?

Task 3

The 40 years old patient with unlear etiology arterial hypertension has arrived to the clinic for the medical examination. The blood pressure was175/115 mm hg. He has complaints to the muscular weakness, headaches. Polyuria, the significant hypokalemia, the increased 17-oxycorticosteroid level in urine.

Questions

1. What is the prospective reason of increase in the blood pressure in the patient?
2. What is the possible mechanisms of the hypertension development? Prove the answer.
3. What additional examinations are necessary to the final diagnose?

Task 4

The 32 years old man the high end heavyweight boxer in the past, visited doctor because of the increasing overweight (he gained 7 kg of weight for the last six months), the muscle weakness, the livid spot appearance on the skin after the light shocks, dizziness, headaches (mostly in the occipital area), the midge flashing in front of eyes, the increased thirst (he drinks 5–6 l a day), the frequent plentiful urination.

During the medical examination patient has the hypersthenic type of the body constitution, the excess of the fat depot on the face (the moon-like face) and neck (the bison hump), also over the clavicles; the purple streaks on the abdomen, the excessive chest and back pilosis, black and blue arms and legs. The arterial blood pressure is 185/110 mm hg. The blood analysis: Hb 130 g/l, Er $5{,}1\times10^{12}$ /l, leukocytes 10×10^{9}/l, neutrophilia, the relative neutrophilia, the relative lymphopenia, absence of eosinophils; ESR is 5mm/hour, the peripheral blood glucose is 210mg%, hypernatremia. The urine analysis: diurnal diuresis is 4000 ml/day, the relative density is 1,035, glucosuria, there is no protein and titrable acidity, the increased free hydrocortisole level.

Questions

1. What is the form of the developed endocrine pathology in the patient? Prove the answer.
2. If you suppose several forms of the endocrine pathology, what will be the pathogenetic interrelations between them?
3. If there are several endocrine pathology forms what form will be primary? What is it's reason and mechanisms of development?
4. What are the each symptom mechanism of development in the patient?

Task 5

Both adrenal glands are removed in a dog. The pathological changes (stackness, muscular weakness, anorexia, vomiting, anuria) have developed. The animal has died on the third day after the operation.

Questions

Why has the dog died? With the insufficiency of the cortex or medulla of adrenal glands hormones is the dogs death mostly associated?

Task 6

The 33 years old patient complains of thirst, headaches, weakness, the plentiful urination. The patient had the craniocerebral trauma three months ago. He hadn't any diseases in the past.

Objectively: the regular body constitution, the satisfactory calorie diet, dry skin. The pathological changes of the internal organs aren't revealed. Pulse is 78 per minute, the arterial blood pressure is 130/80 mm hg. Diuresis is up to 10l per day. The pathological components are not revealed during the urine analysis. The relative density of urine is 1.005–1.012.

Questions

1. In what endocrine pathologies the specified phenomena are marked?

2. Specify the possible mechanism of the water — salt metabolism impairment in this case?

Task 7

In three years old Volodia the physical backwardness is found out, also there are irritability, inappetence, thirst, polyuria. He may drink up to 3–4 l of water a day.

The urine glucose is absent. The negative reaction of the vasopressin introduction.

Question

What is the possible mechanism of the water metabolism impairment in the child?

Task 8

The 48 years old patient Z. has arrived to the clinic with complaints to the sharp pain, the fast fatiguability, the darkness of the trunk skin. There are the tuberculosis specifications in anamnesis.

Objectively the patient is exhausted, the trunk skin, especially on the neck, the hand's back surface, the palm lines and the waist is hyperpigmentated. There are black patches on the mouth mucose membranes. The body temperature is subfebrile. The muscle strength is sharply decreased. The arterial blood pressure is 95/55 mm hg.

Questions

1.Of what endocrine pathology the specified changes are characteristic?

2.Are the casual interrelation is possible between the pulmonary tuberculosis and the existence endocrine pathology?

3.Explain the mechanism of the skin hyperpigmentation and arterial hypotonia development in the given case?

Task 9

The 14 years old patient K. has arrived to the hospital with complaints to the fast fatiguability, the decreased appetite, nausea, the skin darkness. The patient's parents associate the disease with the 6 months ago transmitted scarlet-fever, after which the fast fatiguability, flabbiness, tiredness, the decreased appetite appeared. With the greatest pleasure patient eats only the salty food. Last time patient's parents noticed the skin darknening.

Objectively the expressed asthenia is marked. The muscle weakness. The skin is swarthy with the increased pigmentation of the neck, face and hands. On the gums mucose membrane there is a dark border. There are no essential changes of the internal organs.

Questions

1. Of what endocrine pathology the existence symptomatology characteristics?

2. How to explain the salty food preference?

3. What diet is supposed to be recommended to the patient: reach of sodium or potassium salts?

Task 10

The 26 years old patient has visited doctor because of the general weakness, headaches, change of appearance, increase in the legs and hands size. Over 2 years the size of footwear has increased from 39 up to 42.

Objectively the massive features (massive superciliary and malar arches, big nose and lips) are marked. The thorax is barrel — like shape, thickining of the clavicles, hands and feet are increased in the size. The important changes of the internal organs are not revealed. Pulse is 70 per minute, the arterial blood pressure is 150/90 mm hg.

Questions

1. In case of what hormone insufficiency or excess are the similar phenomena are marked?

2. How do we refer the corresponding disease? What is etiology of the disease?

Example of the task decision

The 38 years old patient J. complains of the extra mass of the body, drowse, the face pilosis. She felt ill two years ago after the abortion.

During the physical examination there are the moon — shaped crimson face with the hairiness of the upper lip and chin. The crismon purple striae cutis distense are on the internal surface of the hips and the abdomen skin. Pulse is 86 per minute. The artrial blood pressure is 220/120 mm hg, the cardiac borders enlargment over 3 sm, the systolic murmur, the second cardiac tone accent over the aorta.

The ECG: levocardiogramm, the signs of the left ventricle hypertrophy. The clinical changes of other organs are not revealed. The peripheral blood pressure analysis is without any changes, the urine glucose level is 0.5%. Diuresis is 1.4 L, the blood glucose level on an empty stomach is 6.8 mmole/l.

Questions

1. What is your preliminary diagnosis?

2. How do you regard the glucose presence in urine (because of Diabetes mellitus, renal glucosuria, steroid diabetes).

3. What is the reason of the striae cutis distense appearance?

4. What diet is recommended to the patient?

The decisions

1. Itsenko-Cushing's disease.

2. Steroid diabetes.

3. The catabolic action of glucocorticoids on the protein metabolism.

4. The diet № 9.

THE THYROID GLAND, THE PARATHYROID GLANDS, THE SEX GLANDS, THYMUS PATHOLOGICAL PHYSIOLOGY

Task 1

The 30 years old patient L. complains of the fast fatigue, the muscular weakness, the sleeplessness, the constant palpitation, hyperhidrosis, the low heat tolerance, the frequent stool, the substantial loss of weight. The patient had some virus infection three years ago. After this infection the patient felt pains in thyroid gland. She hasn't visited the doctor because of it.

During the medical examination the following changes are found out: the solid thyroid gland at palpation, it is also unpainful and a little bit increased; the cardiac rate is 98; the arterial blood pressure 150/65 mm hg; the signs of the left ventricle hypertrophy are present; the warm and wet skin; exophthalmus; the superior eyelid lag at the downward motion. There is a decreased TSH (thyrothropin) level, the increased IgG level.

Questions

1.What type of pathology has developed in the patient L.?

2.What is the cause and the mechanism of this pathology development? Can the increased IgG level play the pathogenic role in this case?

3.What are the mechanisms of the available symptoms development in the patient?

Task 2

The 10 years old child living in the mountain district has arrived to the clinic because of the fourth degree nodular goiter. The following things are found out from the patient's anamnesis: at the age of five parents observed the mental and physical backwardness of the child, also the insularity, the gloominess and the irritability of the child.

The physical examination data: brachycephaly, the wide face with the short forehead, the wide mouth and full lips, the deep eye-holes, the dry wrinkled skin, the carious teeth, the flat feet. Pulse is 42 per minute, the regular rhythm. The arterial blood pressure is 85/55 mm hg. The washout of the ^{131}I is decreased in comparison with the norm level.

Questions

1. In what disease are the specified symptoms observed?
2. What is the reason of the thyroid gland increasing?
3. What is the principle of the child's treatment?

Task 3

There are two women (the 50 years old mother (M) and her 26 years old daughter (D)) on the dispancer register at the endocrinologist. The both of them have the increased thyroid gland of the 2–3 degree, the clinical picture of thyro-

toxicosis. The diffuse toxic goiter was diagnosed according to the clinical and laboratory examinations. The patient D. has marked the health state improvement. The patient M. has complaints (she hasn't this complaints before) to the limpness, the slowness, the day time drowse and the night sleep disturbance, the memory change to the worse, degradation, the face edema and the extremities edema, the chill, the low body temperature after the eight months thyrostatics treatment. The patient M. has observed the specified signs after the carried out virus infection. The doctor has suspected Hashimoto's disease and changed the treatment. The other drugs group was appointed to the patient M.

Questions

1. What symptoms are characteristic of thyrotoxicosis? May we regard the new symptoms appearance as the thyrostatics treatment complications?
2. What laboratory examinations are necessary to be done for the patient's M diagnosis specification?
3. With what clinical forms of the thyroid gland functions impairments is the differential diagnose necessary?
4. Are there any common mechanisms in the development of the diffuse toxic goiter and Hashimoto's disease.

Task 4

The 50 yeas old patient P., the scientist, complains of the general weakness, drowse, degradation, constipation.

She is ill during 5 years. The disease has begun gradually.

At medical examination she has a round face and she has the older looks, she is amimic. There is a hydropic back surface of hands and feet: there is no hollow on the skin because of press. The skin is cold and dry to the touch, the nails are fragile. The thyroid gland is not palpable.

Pulse is 60 per minute. The cardiac sounds are muffled. The arterial blood pressure is 100/80 mm hg. Other internal organs are clinically without any pathology.

The ECG data: sinus bradycardia, the small wave voltage, the PQ prolongation up to 22 sec.

The isotopic examination data: the radioactive iodine absorption is 2.6% in two hours, in four hours it is 5.2%, in 24 hours it is 1.5%. After the radioactive iodine washout it is 5 units. TSH (thyrotropin) of the radioactive iodine absorption is 4.6; 5.1; 2% accordingly.

Questions

1. What is the preliminary diagnosis?
2. About what the radioisotope research testify?

Task 5

The 32 years old patient Z. complains of tachycardia, breathlessness, the mild pyrexia, the heartache, the troubled sleep, the increased irritability, degrada-

tion, the loss of weight. She is ill during two years. She has visited doctors domiciliary, she was treated on occasion of hypertension, hysteria and menopause.

During the physical examination the following things are revealed: the patient of malnutrition, the damped skin, the fine fingers tremor, the positive Graef's and Mobius's symptom. The thyroid gland is increased (the right lobe is bigger), it is visible approximately. Pulse is 118 per minute, rhythmical. The arterial blood pressure is 150/60 mm hg, the cardiac system boundary are normal, the cardiac sounds are clear, the II sound accent is the pulmonary artery above, the systolic murmur is above the cardiac apex and Botkin's point.

Question

What is your diagnosis? Prove the answer.

The example of the task decision

The 39 years old woman with the premature menopause has marked the changed features, the occurred necessity to wear a hat, glows and the jumbo size footwear.

8 years ago in the age of 31 her menstruation cycle suddenly stoped. Some vagina dryness was marked. The menstruation stop did not worry her.

Objectively there are more rough features, the lower jaw has moved forward, the intradental spaces have appeared. The elongated and wide hands and feet have appeared. There are especially noticeable enlargement of fingers and the sizeable soft tissues thickening.

Question

What is your preliminary diagnosis? Prove the answer.

The decision

There is an acromegaly in the patient. The given tumor is practically always benign, but the effect of this slowly growing hormone secreting adenoma can be destructive. As the epiphyses of the adult are closed the excess growth of tubular bones is not possible. The chondrocytes stimulation is very intensive because of the high somatotropic hormone level, as a result the insulin-like growth factor level increases. Such stimulation of the bone formation in post pubertal period leads to the bones dilation, it is especially noticeably on the skull and the distal part of the extremities.

TYPICAL FORMS OF THE NERVOUS SYSTEM IMPAIRMENTS

Task 1

The 30 years old patient in two weeks after the left hip trauma with the massive blood loss and the (presumably) sciatic nerve injury has noticed the «pricking» and «ant crawling» feeling on the skin of the shin and the planta. Then the paroxysms of the spontaneous extended, intolerable, burning pain (b), it increases because of the attempt to warm the leg. He became to drown his leg in cold water for the pain decrease, but it didn't easing the pain much.

Objectively in two months after the trauma the skin on the injured leg is pale, dry and slightly peeling (c), the leg is painful to the touch; the circle of the hip middle part is 4 sm smaller then the intact leg.

Questions

1. What is your conclusion according to the available symptoms in the patient? Prove the answer.
2. Specify the marked above symptoms with the corresponding medical terms. What are the reasons of this symptoms development?
3. What are the possible mechanisms of the pain syndrome development in the given case?
4. What has caused the different character of the pain on the second week and in two months after the hip trauma?

Task 2

The 42 years old patient V. is delivered to the hospital with complaints to the right hand increasing weakness and also the right painless burns and traumas, the small grazes long suppuration. For the first time he has found out these phenomena about 5 years ago. During the last six months he noticed the hard food ingestion difficulties, the nasal voice timbre occurrence.

During the medical examination by the neuropathologist the following changes are found out: the palpebral fissure narrowing because of the blepharoptosis, the right part of the face painful sensitivity decrease, the drooping soft palate, the pharyngeal reflex absence, the vocal band paresis signs on the right, the right hand interosseous muscles atrophic changes, the right arm periosteal reflexes absence, the right arm segmental dissociated type of the painful and the «alive» tendon reflexes preservation of the lower extremities is found out.

Questions

1. Designate the available symptoms in the patient by the corresponding medical terms.
2. What are the possible mechanisms of the specified impairments development?
3. On what level (levels) of the structurally functional organization of the nervous system is the pathological process development, which has caused in

the given patient a) the sensitivity impairment, b) the motor function impairment, possible?

4. Express your opinion about the possible pathological process and etiology, which has caused the specified impairments, according to the features and dynamics of the disease and the nervous system functions impairments?

Task 3

The 20 years old patient Ch., the final-year student at the clinic receipt complains of the troubled dream, irritability, tearfulness, the appetite absence, the unstable mood and headaches.

Objectively the somatic status is normal.

According to the anamnesis the specified at receipt phenomena have developed within last 10 months. This period was very difficult for the patient because of the unsuccessful marriage and also the necessity of the assignment departure (that she so much did not wish to do because of the diffidence and also the fear of the relations loss with the husband).

During the stay in the clinic the patient constantly has made complaints against the medical personnel, she claimed the particular attention. After the each ingestion there was a vomiting (more often it was in the patients and medical personnel presence).

Questions

1. What is the origin of the syndrome developing in the patient?

2. In what type of the higher nervous system do the similar impairments develop more often?

Task 4

The 42 years old patient has grown in the family in which the main aim in life was the personal success and the social status achievement though he was not very good in studies. By the parents request he tried to excel his friends in studies, but it was very difficult for him. He has entered the institute (at will of his parents). The institute studies demanded even greater efforts. He studied a lot, quite often at night. On graduating from the institute he came to the factory as a shift foreman. As soon as the shop superintendent post became vacant, he started to achieve it activity though the fact that the stop structure wasn't corresponding with his speciality. Besides it he had not enough of organizing experience. He met a lot of difficulties becoming the chief of the shop. The controlled by him shop had ceased to carry out the production program and that caused censures and criticism from the factory administration and the shop collective.

During this period he had headaches, the heart pains, sleeplessness, irritability, the fast fatigue, degradation.

Objectively: the arterial blood pressure is 170/90 mm hg, pulse is 90 per minute.

The focal neurologic semiology is not revealed.

Questions

1. What is the reason of the heart pains, tachycardia and arterial hypertension appearance?
2. What type of the nervous system pathology has develop in the given patient?

Task 5

The sciatic nerve cut was made to the rabbit, after that the nerve ends were sutured.

Question

Will the shin muscles reciprocal traction be caused by the sutured sciatic nerve proximal part irritation?

Task 6

The tetanic intoxication was reproduced in the experiment on cats by the small amount of the tetanic toxin injection directly in the peripheral nervous conductor. But for the tetanic intoxication development not only the peripheral synoptic structures damage is necessary, but the toxin penetration into the central nervous system, particularly in the spinal cord and it's neurons, providing the brake process development, the damage.

Question

Will you explain how the tetanic toxin entered the spinal cord from the periphery in case of the specified method of the tetanic intoxication reproduction?

THE PRE-NATAL DEVELOPMENT PATHOLOGICAL PHYSIOLOGY

Task 1

The practically healthy woman of 40 years is on 6-th week of the first pregnancy and she is afraid of a birth of the child with a Down syndrome.

Question

What is it necessary to offer her for her question answer?

Task 2

The increased alpha-fetoprotein level is found out in blood of the pregnant woman in the end of the first trimester of pregnancy in case of the safe family anamnesis by the nervous tube defects.

Question

What is supposed to be recommended for the sure fetus state estimate?

Task 3

What of the medical genetic methods is more informative for the whole members of the family with the compromised hereditary history who carried out 0,1 or 2 pathological gene doses, independent on the hereditary type and the given disease manifestations character?

Task 4

The cytogenetic research is made to the child with clinically diagnosed Down syndrome. The received result is given as the formula: 47+21.

Question

What do this formula symbols designate?

Task 5

Two of four children of a healthy married couple are suffered from mucoviscidosis.

Question

What is the probability of the next child of the given pair will suffer the same disease if the mucoviscidosis frequency in the general population is 1:2000 children?

Example of the task decision

The boy (proband) suffers from daltonism and his brother and three sisters have good eyesight. Proband's mother has three sisters and three brothers. Aunts from the mother's side and their husbands have good eyesight, but half of their sons have daltonism. Brothers of his mother have good eyesight and their children too.

Question

From whom of his grandfathers and grandmothers the boy (proband) has inherited daltonism?

The decision

From the mother's side grandfather. Such sign is controlled by the X-linked recessive gene. And this sign was absent in members of the family tree in which it could be manifested in case of this genes origin.

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