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EXAMINATION TESTS from PATHOLOGICAL PHYSIOLOGY

Pavel Maruna et al.

KAROLINUM

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Reviewed by:
Prof. MUDr. Emanuel Nečas, DrSc.
Prof. MUDr. Jaroslav Veselý, CSc.

Authors:
Prof. MUDr. Pavel Maruna, CSc.
Doc. MUDr. Martin Vokurka, CSc.
Prof. MUDr. RNDr. Petr Maršálek, Ph.D.

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INTRODUCTION

Pathological physiology is a rapidly expanding field with changing concepts of etiology, pathogenesis and diagnostic methods for various diseases and clinical syndromes in last years. Examination tests from pathological physiology were prepared as a complement to lectures, seminars and textbooks of pathological physiology. Authors hope, that the tests will be useful for the students to make their preparing for a final exam from pathological physiology easier. The text is divided into nine chapters including pathophysiology of hematological, cardiovascular, respiratory, gastrointestinal disorders, internal environment, kidney and urinary tract, endocrinological and neurological disorders. The last chapter concerns general pathophysiology. Multiple choice questions have one or more correct answers that are marked in a right column beside the questions.

Pavel Maruna, MD

1 PATHOLOGICAL PHYSIOLOGY OF BLOOD

001. Blood viscosity is

a) linearly proportional to hematocrit ○
b) increased when hematocrit increases ●
c) decreased when hematocrit decreases ○
d) is independent of the hematocrit ○

002. Hypersplenism

a) is defined as the presence of accessory spleens ○
b) is defined as a type of bone marrow failure, connected to spleen hyperactivity ○
c) is a situation, in which blood cells are sequestrated by an enlarged spleen ●
d) can be characterized by anaemia, leukopenia and thrombocytopenia ●

003. "Cold" antibodies

a) are generated during long-term exposure to cold environment ○
b) are usually of the IgG type ○
c) can lead to acrocyanosis (if the temperature of the external environment is low) ●
d) are usually of the IgM type ●

004. "Warm" antibodies

a) are generated during febrile states ○
b) are often directed against muscle proteins ○
c) are often directed against erythrocyte antigens ●
d) can be detected using the Coombs test ●

005. Hyperviscous syndrome is characterized by

a) an increased release of activated coagulation factors from the place of their origin ○
b) decreased release of activated coagulation factors from the place of their origin ●
c) being an acute life-threatening situation ●
d) decreased heart work ○

006. Splenectomy is accompanied by

a) thrombocytopenia ○
b) anaemia ○
c) increased number of granulocytes in peripheral blood ●
d) presence of Howell-Jolly bodies in erythrocytes ●

007. The combination of decreased plasma haptoglobin, anaemia and positive Coombs test points to a diagnosis of

a) intracorpuscular hemolytic anaemia ○
b) autoimmune hemolytic anaemia ●
c) anaemia in DIC (disseminative intravascular coagulopathy) ○
d) lead poisoning ○

008. Chronic lead poisoning leads to

a) macrocytic anaemia ○
b) microcytic anaemia ●
c) ethanol test positivity ○
d) Coombs test positivity ○

009. Which of the following is not among the primary functions of blood plasma

a) transport of hormones ○
b) maintenance of red cell size ○
c) transport of chylomicrons ○
d) transport of O_2 ●

010. Which of the following plasma proteins are not synthesized primarily in the liver

a) angiotensinogen ○
b) C-reactive protein ○
c) angiotensin II-converting enzyme ●
d) alpha$_2$-macroglobulin ○

011. Splenomegaly can be caused by

a) portal vein thrombosis ●
b) renal vein thrombosis ○
c) lienal vein thrombosis ●
d) Budd-Chiari syndrome ●

012. Sideroblastic anaemia is a subtype of

a) megaloblastic anaemias ○
b) anaemias caused by a lack of erythropoietin ○
c) anaemias caused by heme synthesis disorders ●
d) hemolytic anaemias ○

013. Production of erythropoietin in a patient with polycythemia rubra vera is

a) decreased ●
b) increased ○
c) unchanged ○

014. Among others, sideropenic anaemia is characterized by

a) normo/hypercelularity of bone marrow ●
b) hypocellularity of bone marrow ○
c) microcytosis ●
d) macrocytosis ○

015. Haptoglobin is

a) excreted into urine in PNH (paroxysmal nocturnal hemoglobinuria) ○
b) decreased after intravascular hemolysis ●
c) increased after extravascular hemolysis ○
d) a degradation product of hemoglobin ○

016. Paroxysmal nocturnal hemoglobinuria is

a) characterized by the presence of pathological hemoglobin ○
b) caused by defective glycolytic enzymes ○
c) the manifestation of a parasitic infection ○
d) the result of hemopoietic stem cell damage ●

017. Microcytic anaemia often develops in patients with

a) the deficiency of intrinsic factor ○
b) thalassemia minor ●
c) sideropenia ●
d) aplastic anaemia ○

018. A patient after terminal ileum resection would be likely to suffer from which of the following conditions

a) sideroblastic anaemia ○
b) sideropenic anaemia ○
c) megaloblastic anaemia ●
d) microcytic anaemia ○

019. In the diagnosis of anaemia

a) increased level of haptoglobin signifies anaemia of hemolytic origin ○
b) decreased amount of reticulocytes suggests that the anaemia is caused by insufficient production of red blood cells, which is typical for thalassemia or sickle cell anaemia ○
c) decreased level of transferrin shows that the anaemia is sideropenic ○
d) positive direct Coombs test signifies autoimmune hemolytic anaemia ●

020. Hemoglobinuria can appear

a) after intravascular destruction of erythrocytes ●
b) after the erythrofagocytosis by macrophages in the spleen ○
c) when haptoglobin capacity is saturated by free hemoglobin ●
d) following the transfusion of incompatible blood ●

021. In pernicious anaemia

a) the incorporation of iron into the hemoglobin is defective ○
b) there are often antibodies against the intrinsic factor ●
c) DNA synthesis in erythroblasts is compromised ●
d) the size of erythrocytes often surpasses 100 fL ●

022. Which of the following applies to the latent phase of sideropenic anaemia

a) the level of iron in serum is normal ○
b) the binding capacity of transferrin is decreased ○
c) the ferritin level in serum is decreased ●
d) the hemoglobin level in serum is decreased ○

023. Paroxysmal nocturnal hemoglobinuria

a) is caused by a somatic mutation of the hematopoietic stem cell ●
b) is characterized by hemolysis during increased levels of pCO_2 ●
c) hemolysis is not involved in the pathogenesis of this disease ○
d) is characterized by defective synthesis of the glycosylphosphatidylinositol anchor ●

024. The plasma erytropoietin level in secondary polyglobulia is

a) decreased ○
b) increased ●
c) unchanged ○

025. Sideroblastic anaemias may occur due to

a) high rate of ineffective hematopoiesis ○
b) disturbances in the heme synthesis ●
c) lead intoxication ●
d) decreased intake of iron ○

026. Anaemia caused by the lack of both vitamin B12 and tetrahydrofolate is morphologically characterized by

a) presence of megaloblasts in bone marrow ●
b) normocytosis ○
c) microcytosis ○
d) macrocytosis ●

027. Macrocytic anaemia can accompany

a) severe hypothyroidism ●
b) folic acid deficiency ●

c) hepatic failure ●
d) hereditary spherocytosis ○

028. Anaemia and reticulocytosis can be symptomatic of which of the following
a) bone marrow infiltration by a tumour ○
b) Fanconi anaemia ○
c) pernicious anaemia ○
d) AIHA (autoimmune hemolytic anaemia) ●

029. Pronounced sideropenic anaemia is accompanied by
a) decreased serum ferritin concentration ●
b) decreased serum iron concentration ●
c) macrocytosis ○
d) decreased hemoglobin concentration ●

030. The lack of both vitamin B12 and folic acid
a) causes only disturbances in the red blood cell production ○
b) influences only the metabolism of blood cells ○
c) also influences cells other than blood cells ●
d) does not influence erythropoiesis ○

031. The combination of schistocytes in the peripheral blood and neurological symptoms can be caused by
a) sickle cell anaemia ○
b) paroxysmal nocturnal hemoglobinuria ○
c) AIHA (autoimmune hemolytic anaemia) ○
d) TTP (thrombotic trombocytopenic purpura) ●

032. Hemolytic anaemia caused by autoimmune disorders can be diagnosed by
a) testing the osmotic resistence of erythrocytes ○
b) a genetic test (sequencing of globin chains) ○
c) the Coombs test (direct antiglobulin test) ●
d) electrophoresis of serum immunoglobulins ○

033. Normal oxygen saturation of arterial blood, together with elevated red blood cell count, can be present in
a) polycythemia vera ●
b) in all cases of secondary polyglobulia ○
c) decreased erythropoietin production, e.g. in kidney failure ○
d) multiple myeloma ○

034. Paroxysmal nocturnal hemoglobinuria is a disease
a) caused by a mutation of a hematopoietic stem cell ●
b) accompanied by attacks of hemolysis following exposure to cold (low temperatures) ○
c) which can progress into acute leukemia ●
d) in which red blood cells have an increased sensitivity to complement ●

035. The direct antiglobulin (Coombs) test is positive in which of the following conditions

a) anaemia caused by lead intoxication ○
b) TTP (thrombotic thrombocytopenic purpura) ○
c) AIHA (autoimmune hemolytic anaemia) ●
d) beta-thalassemia ○

036. Which of the following is true for paroxysmal nocturnal hemoglobinuria

a) it is caused by a defect of protective proteins in the erythrocyte membrane ●
b) complement activation as well as a decrease of blood pH during sleep play a role in the pathogenesis of the disease ●
c) it develops as a result of overproduction of complement proteins ○
d) is caused by a lack of spectrin in the erythrocyte membrane ○

037. Paroxysmal nocturnal hemoglobinuria is a disease, which is

a) hereditary with an autosomal dominant inheritance ○
b) acquired ●
c) a multifactorial hereditary disease ○
d) hereditary with autosomal recessive inheritance ○

038. In anaemia, the arterial oxygen tension (paO_2) is

a) decreased ○
b) normal ●
c) increased ○
d) approx. 40 mm Hg ○

039. If hematocrit >70 %, the blood viscosity

a) increases the workload of the heart ●
b) improves tissue perfusion and oxygenation of the blood ○
c) is connected with significant risk of intravascular blood clots (thrombosis) ●
d) decreases blood flow in the blood vessels and deteriorates the rheological parameters of the blood ●

040. Methemoglobin

a) is a type of hemoglobin with mutated globin chains ○
b) contains divalent iron (Fe^{2+}) ○
c) is caused by hypoxia ○
d) contains the trivalent iron (Fe^{3+}) ●

041. Which of the following anaemias can be classified as extracorpuscular hemolytic anaemia

a) S hemoglobinopathy ○
b) autoimmune hemolytic anaemia ●
c) thalassemia ○
d) aplastic anaemia ○

042. Which of the following anaemias cannot be classified as corpuscular hemolytic anaemia

a) sickle cell disease ○
b) hereditary spherocytosis ○
c) aplastic anaemia ●
d) autoimmune hemolytic anaemia ●

043. Sideropenia

a) can manifest itself as a microcytic anaemia ●
b) can manifest itself as a macrocytic anaemia ○
c) can increase the concentrations of the soluble transferrin receptor in plasma ●
d) can cause an increase in the plasma ferritin concentration ○

044. Hemolytic anaemias

a) are accompanied by the presence of bilirubin and urobilinogen in urine ●
b) are accompanied by elevated serum direct bilirubin (conjugated bilirubin) ○
c) may lead to cholelithiasis ●
d) may lead to the development of extramedullary hematopoiesis ●

045. Which of the following is the most common cause of sideropenic anaemia in the European population

a) iron deficiency in the diet ○
b) malabsorption ○
c) chronic bleeding ●
d) tapeworm ○

046. In hemolytic anaemias

a) serum haptoglobin is often elevated ○
b) serum lactate dehydrogenase is often elevated ●
c) the number of reticulocytes is frequently decreased ○
d) serum unconjugated bilirubin may be elevated ●

047. The Coombs test is used in order to determine

a) the function of blood coagulation factors ○
b) the presence of autoantibodies against erythrocytes ●
c) bleeding time ○
d) absorption of vitamin B12 ○

048. Anaemic syndrome includes which of the following symptoms

a) pallor of the skin and mucous membranes ●
b) exertional dyspnea ●
c) tachycardia ●
d) bradycardia ○

049. Macrocytic anaemia can develop in

a) folate deficiency ●
b) vitamin B12 deficiency ●
c) thalassemia major ○
d) liver failure ●

050. Which of the following statements about the sickle cell disease are not correct

a) it is classified among hemolytic anaemias ○
b) it is also known as S-hemoglobinopathy ○
c) hypoxia causes polymerization of hemoglobin ○
d) it is caused by a traumatic damage to erythrocytes (S shape RBC) caused by the fibrin fibres ●

051. In pernicious anaemia

a) the incorporation of iron into hemoglobin is seriously affected ○
b) autoantibodies against the intrinsic factor are often present ●
c) DNA synthesis in erythroblasts is slowed-down ●
d) erythrocyte volume often exceeds 100 fL ●

052. The latent phase of sideropenic anaemia

a) is often associated with normal serum iron levels ○
b) is characterized by reduced binding capacity of transferrin ○
c) is characterized by reduced serum ferritin levels ●
d) is characterized by reduced hemoglobin concentrations in blood ○

053. Paroxysmal nocturnal hemoglobinuria

a) is a hemolytic anaemia caused by an acquired globin gene mutation ○
b) is caused by a defect in the exposure of membrane proteins, which protect red blood cells from activated complement lysis ●
c) following the addition of acidified serum, the erythrocytes of patients with PNH undergo hemolysis ●
d) is characterized by hemolysis, caused by a hypertensive crisis occurring during the night ○

054. Pernicious anaemia

a) is caused by vitamin B12 deficiency ●
b) is typically associated with the presence of microcytes in the peripheral blood ○
c) is a hemolytic anaemia ○
d) is often associated with autoimmunity ●

055. Pernicious anaemia

a) is often accompanied by gastroduodenal ulcers ○
b) is a typical manifestation of gastroduodenal malignancy ○
c) occurs especially when there is a lack of trace elements in the diet ○
d) is often present in atrophic gastritis ●