**Problem 1**

Patient R., 48 years old, suffers from liver cirrhosis. He complains of abdominal distension, shortness of breath, and fatigue. Objective findings: pale skin, soft tissue swelling, presence of fluid in the abdominal cavity, dilation of superficial veins on the abdominal wall, hepatomegaly, and splenomegaly. Therapeutically, an abdominal puncture was performed to evacuate ascitic fluid. The puncture was conducted while the patient was seated. After the evacuation of 7 litters of fluid within 30 minutes, the patient suddenly felt dizzy and fainted. Blood pressure (BP) was 50/30 mmHg, heart rate was 160 beats per minute.

1. What type of microcirculatory disorder and in which system developed in the patient after the evacuation of fluid from the abdominal cavity, based on the patient's clinical symptoms?
2. How does energy metabolism change at the level of the central nervous system (CNS) during ischemia? Present the causal chain that leads to fainting.
3. What is one of the basic pathogenetic links in the development of ascites?
4. Why did this patient develop tachycardia?

**Problem 2**

Patient F., 52 years old, underwent surgery for the removal of a femur tumor. During the procedure, the femoral artery was injured. The artery was sutured, and the distal pulse of the artery was restored. After 24 hours, the patient complains of severe pain in the distal region of the operated leg, the pulse in the distal region (at the calf level) is not palpable, the patient cannot move the toes of the operated leg, the skin of the leg is pale, and the local temperature is reduced.

1. What type of microcirculation disorder has developed in the patient? Justify your answer.
2. What is the mechanism of pallor and low local temperature in the distal region of the operated leg?
3. What etiological factors can contribute to ischemia?
4. What is the pathogenetic mechanism of pain in this patient?
5. What types of collaterals (from a functional perspective) exist?
6. What is the pathogenetic mechanism of this type of microcirculation disorder?

**Problem 3**

Patient H., 38 years old, was admitted to the trauma department with an open fracture of the left femur with fragment displacement. During the repositioning of the bone fragments, the patient developed shortness of breath, acrocyanosis, and a systolic blood pressure of 40 mm Hg, with diastolic pressure undetectable. After 10 minutes, the pulse in the carotid arteries disappeared, the pupils dilated, and clinical death was confirmed.

1. What type of microcirculatory disorder developed in the patient?
2. What is the pathophysiological mechanism of this microcirculatory disorder in this patient?
3. What is the path of embolus circulation, considering the patient's clinical symptoms that led to death?
4. What other types of embolism do you know, based on their origin (give examples)?

**Problem 4**

Patient E., 43 years old, was admitted to the cardiology department with the diagnosis of "right atrioventricular orifice stenosis." She complains of fatigue, leg pain, and edema (which worsens in the evening), and cyanotic discoloration of the lips, ears, and nail beds. Objectively, acrocyanosis, hard edema localized in the calves, and hepatomegaly are observed.

Bio-microscopy of the nail bed microvessels revealed dilated venules with erythrocyte extravasation. Central venous pressure is 15 cm H₂O.

Blood biochemistry: ALAT - 80 UI/L; ASAT - 100 UI/L, Ht - 0.59. Hb - 160 g/L, Er - 5.5 x 10¹²/L.

1. What type of microcirculatory disorder do you suspect, considering the cause and clinical manifestations in the patient?
2. What compound causes cyanosis and acrocyanosis in venous hyperemia?
3. How do you explain the increased activity and levels of ALAT and ASAT in this patient?
4. What is the pathogenesis of stasis in right-sided heart failure?
5. What are the hemodynamic changes in venous hyperemia?
6. What are the metabolic changes in venous hyperemia?
7. What is the pathogenic link of hydrostatic edema in right-sided heart failure?
8. What is the pathogenic link of hyperosmolar edema in right-sided heart failure?
9. What is the pathogenic link of hypo-oncotic edema in right-sided heart failure?
10. What is the pathogenic link of membranous edema in right-sided heart failure?