

Topics for seminars on pathophysiology.

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1. Disturbances of blood and lymph circulation in lower extremities

1. Give explanation of mechanisms involved in manifestation of symptoms and signs related to acute closure of arteries in lower extremities.
2. Give explanation of mechanisms involved in development of symptoms and signs related to graduate obturation of arteries in lower extremities.
3. Give explanation of blood circulation in venous system of lower extremities under physiological conditions.
4. Give explanation of main risk factors related to development of venous trombosis in lower extremities, and explain their role in the mentioned pathological process.
5. Give explanation of mechanisms involved in development of chronic venous insufficiency.
6. Give explanation of mechanisms involved in manifestation of symptoms and signs of chronic venous insufficiency.

2. Disturbances of glomerular and tubular functions

1. Disturbances of glomerular function
2. Increased permeability of glomerular capillaries; classification of proteinuria
3. Disturbances of tubular function
4. Disturbances of water reabsorption
5. Nefrotic syndrome
6. Pathophysiology of edema formation-primary and secondary edema.

3. Hypoxia

1. The binding of oxygen to haemoglobin is a function oh P_{aO_2} . Why the dissociation curve of haemoglobin to O_2 is S-shaped?
2. How P_{50} value (from the dissociation curve) is affected by pH, PCO_2 , temperature and fetal Hb?
3. Why the increased ventilation is not an essential factor for increasing the delivery of oxygen to the tissues at the sea level.

4. Give the mathematical equation of factors influencing the delivery of oxygen to the tissues.
5. Why the ischemic tissues are pale (not cyanotic) in spite of ischemic hypoxic hypoxia?
6. What are the changes of „capillary-mitochondrial“ oxygen gradient under histotoxic hypoxia?
7. Why the changes of ventilation cause the acid-base balance disorders?

4. Lung ventilation and perfusion

1. Alveolar hypoventilation is very frequent result of severe respiratory diseases. Explain the main mechanisms involved in development of this disturbance of alveolar ventilation. Which respiratory diseases can lead to alveolar hypoventilation? What are the consequences?
2. Which mechanisms are involved in disturbance of inspired air in the lung? Discuss the pathological processes and respiratory diseases that can lead to this disturbance. What are the consequences?
3. Explain the diffusion of gases across the alveolar-capillary barrier under physiological conditions. How this function is changed by different pathological processes related to the respiratory system?
4. Explain the perfusion of lung by blood under physiological and its changes under different pathological conditions. What are the possible consequences for blood gases exchange?
5. Why alveolar ventilation/perfusion ratios are important for external ventilation? Explain normal alveolar ventilation-perfusion ratios and the mechanisms involved in disturbances of their balance. What are the main consequences of these disturbances?

5. Pathophysiological problems for seminar devoted to valvular heart disease

1. Describe physiological function of the heart, and explain compensatory mechanisms of the heart.
2. Make complex pathophysiological analysis of mitral stenosis. How the symptoms and signs of this valvular dysfunction develop?
3. Describe and explain the mechanisms involved in changes of hemodynamic parameters in mitral regurgitation. What are the consequences of this dysfunction?
4. Describe and explain the mechanisms of hemodynamic disturbances in aortic stenosis. Explain the mechanisms involved in onset of symptoms and signs present in patients suffering from aortic stenosis.
5. Describe and explain the mechanisms of hemodynamic disturbances in aortic regurgitation. Explain the mechanisms involved in onset of symptoms and signs present in patients suffering aortic regurgitation.
6. Describe and explain mechanisms, which are involved in hemodynamic disturbances at tricuspid regurgitation. Explain how the symptoms and signs of this valvular dysfunction are developed.

6. Pathophysiology of hepatal insufficiency

1. What are the main liver functions?
2. Define the hepatal insufficiency and liver failure.

3. What are the main noxious factors responsible for the damage of liver?
4. Describe main changes of metabolic functions of liver due to its serious damage.
5. Describe changes of detoxicant function of insufficient liver and their consequences.
6. Give characteristic features of systemic circulation occurred at the liver insufficiency.
7. What are the mechanism involved in development of hepatal encephalopathy and what are the symptoms and signs of hepatal encephalopathy

7. Renal failure

1. Disorders of the ability to concentrate urine.
2. Mechanisms of oedema formation in nephrotic syndrome.
3. Vascular components of acute renal failure.
4. Cellular and molecular basis of acute renal failure and its functional consequences.
5. Compare the pathogenesis of acute and chronic renal failures
6. Abnormalities of the metabolism of water, sodium, potassium, and calcium and acid-base disbalance in chronic renal failure.
7. Disturbances of nervous, blood, cardiovascular and pulmonary systems in chronic renal failure.

8. Respiratory insufficiency

1. Compare the processes of oxygenation and ventilation (CO₂ exchange)
2. Compare the pattern of dissociation curve for O₂ and CO₂ and their effect on the exchange of O₂ and CO₂.
3. The effect of low ventilation/perfusion compartments on the exchange of O₂ and CO₂
4. The effect of high ventilation/perfusion compartments on the exchange of O₂ and CO₂
5. Pathomechanisms leading to hypoxemia.
6. Pathomechanisms leading to hypercapnia.

9. SIRS

1. Define inflammatory response, describe the difference between the local and systemic inflammatory response
2. Characterize the differences between these processes - bacteraemia, sepsis, SIRS, septic shock and multiorgan failure
3. Describe initiation of SIRS due to infectious and noninfectious causes
4. Describe the SIRS symptoms and mechanisms responsible for their onset.
5. Describe the mechanism responsible for production of proinflammatory cytokines via NFkappa B factor.
6. What is the main function of natural counter inflammatory system?
7. Which mechanisms are involved in the development of organ dysfunction due to SIRS?