Sample multiple-choice questions of Medical Biophysics exam

1. Which factor detremines aggregation of lipid molecules in aqueous environment?

a) Lateral diffusion
b) Hydrophobic effect
c) Wan der Waals interactions
d) Electrostatic interactions

2. Long fatty acid chains of phospholipid:

a) Increases fluidity of the bilayer
b) Does not change fluidity of the bilayer
c) Decreases fluidity of the bilayer
d) Decreases Van der Waals interaction

3. What is the function of ion channel dehydration filter?

a) Decreases energy barrier for ion transport
b) Increases energy barrier for ion transport
c) Is involved in active transport of ions
d) Decreases intensity of passive transport

4. Which Glucose transporter (GLUT) is insulin-dependent?

a) GLUT1
b) GLUT 2
c) GLUT3 and GLUT5
d) GLUT4

5. V_0V_1 ATPase:

a) Synthesizes ATP in mitochondria
b) Hydrolysis ATP in mitochondria
c) Is located in the lysosomes and transports H+ ions against the concentartion gradient
d) Is located in the lysosomes and transports H+ ions down the concentartion gradient

Sample tickets of Medical Biophysics exam

1.

a. Describe the fluid-mosaic model of the biological membrane.
b. Formulate the structure of membrane lipids and their placement in the membrane;
c. Characterize saturated and unsaturated phospholipids.
d. What are the common properties of membrane lipids?

2.

a. What is the difference between simple and facilitated passive transport?
b. Describe kinetic of facilitated passive and simple passive transport. What is the saturation phenomenon?
c. Describe mobile membrane carriers; Describe glucose transport systems (according to their localization);
d. Describe glucose transport systems by mechanism of action (insulin-dependent and Insulin-independent)

3.

a. Describe primary active transport
b. Describe primary active ATP-ases.
c. Describe P-class pump action mechanism; Describe K^+/ Na^+ pumps; What determines activity of K^+/ Na^+ pump?
d. What is the function of K^+/ Na^+ pump? Is this pump electrogenic?

4.

a. Name the mechanisms involved in the formation of membrane potential.
b. Describe Donan's equilibrium; In which cells (in what condition) Donan's equilibrium has special significance?
c. Name the mechanisms involved in the formation of action potential.
d. What factors determine the speed of action potential propagation?

5.

a. The signaling role of the Ca^{2+} ions in muscle contraction.
b. The role of exiting stimulus in initiation of muscle contraction.
c. The role of Ca^{2+} channels in muscle contraction process.
d. The role of Ca-ATPase in muscle relaxation process