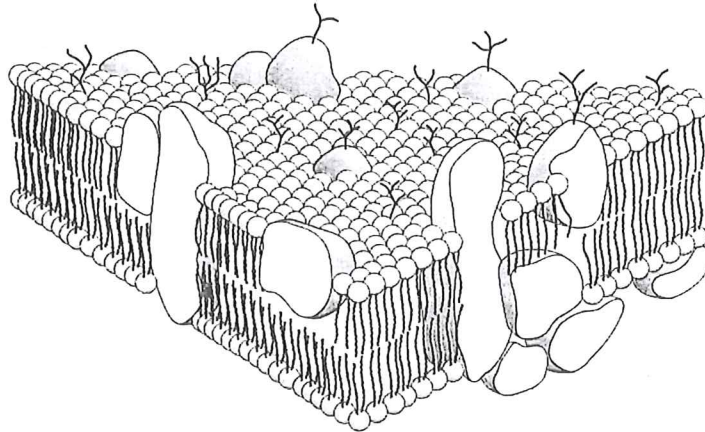


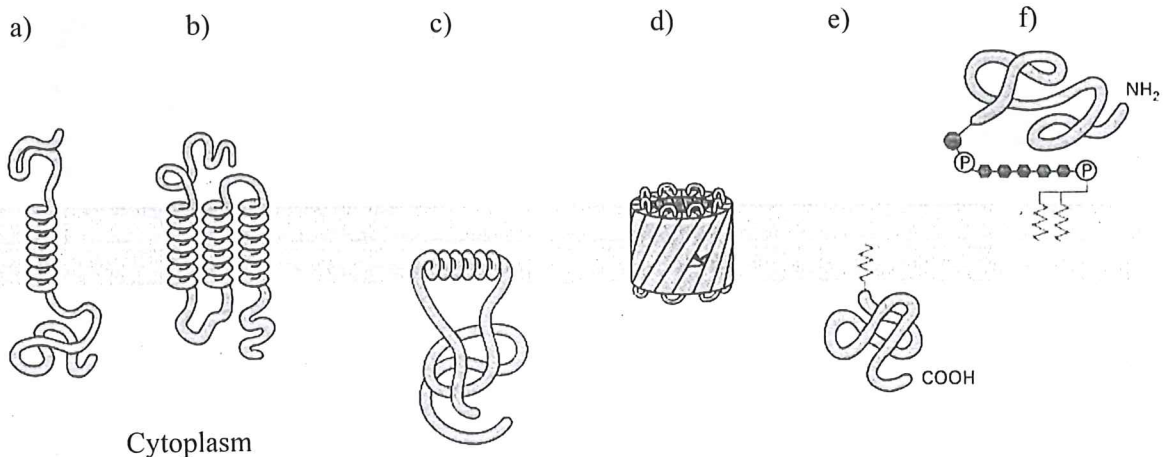


Biomembranes – composition, function. Membrane glycoproteins – structure, function. Membrane transport – passive diffusion, facilitated diffusion, active transport, endocytosis, exocytosis.

Membrane Structure



1. Describe the composition and arrangements of cell membrane.
2. Characterize main types of membrane lipids (structure, properties).
3. Which membrane phospholipids have a negative charge?
4. Explain the term membrane fluidity. How is it affected by the presence of cholesterol and unsaturated fatty acids in phospholipids?
5. Describe the main types of membrane proteins and their insertion into a membrane.
6. Membranes are asymmetric structures. What are the aspects of this asymmetry?
7. How are called enzymes translocating phospholipids in membranes?



8. What is the most common orientation of integral protein in a cytoplasmic membrane?
9. At which side of membrane are integral proteins most often glycosylated?

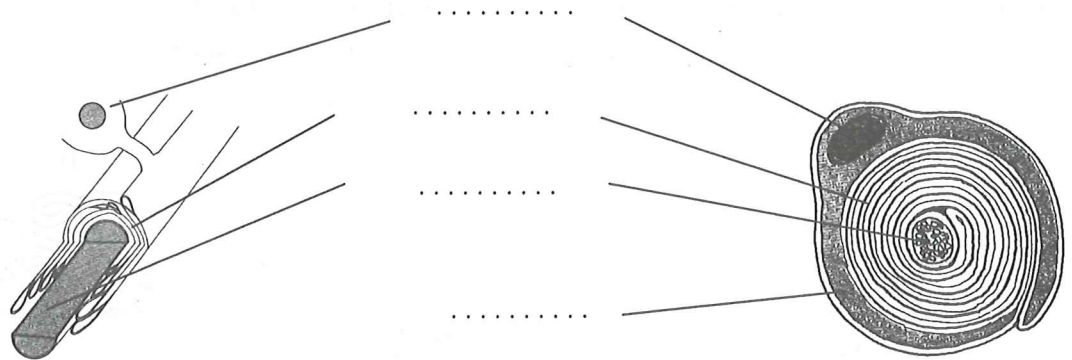
10. What is glycocalix?
11. Where in the cell is located a process of membrane proteins glycosylation?
12. In which way a saccharide part can be linked to a protein?
13. What function can have a saccharide component in a membrane protein?
14. What are caveoles, what is their role in membranes?

Composition of Membranes

Membrane	Composition (mass %)		
	Proteins	Lipids	Saccharides
Myelin	20	75	5
Erythrocytes	49	43	8
Hepatocytes	54	39	7
Outer mitochondrial membrane	50	46	4
Inner mitochondrial membrane	75	23	2

15. Compare the composition of various types of membranes.
16. What are lipid rafts in plasmatic membrane? Which compounds are contained in them?

Oligodendrocyte and Schwann Cell



17. Describe the arrangement of myelin in oligodendrocyte and in Schwann cell.
18. What type of phospholipids prevails in myelin sheath?
19. What type of cerebrosides prevails among myelin lipids?
20. Which glycosphingolipids impart the negative charge to membranes?

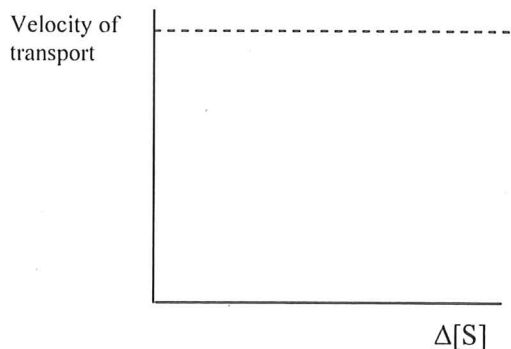
Building and Degradation of Membranes

21. In which organelles does the synthesis of membrane components occur?
22. In which way are they built up into membranes?
23. Describe the main differences in the synthesis of secreted and membrane bonded proteins.
24. What is the function of chaperones in the cell?

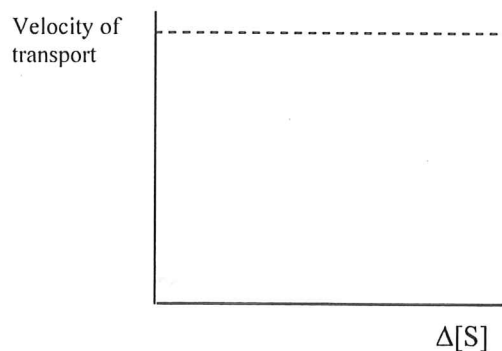
Membrane Transport

25. Substantiate, which membrane region will penetrate through the given compounds at passive diffusion: a) O_2 ; b) urea; c) ethanol; d) acetylsalicylic acid; e) CO_2 .
26. Characterize the transport through membrane channels. How is controlled the opening and closing of these channels? Give examples.
27. Which factors determine the direction and velocity of ion transport through membrane channels?
28. How are named the channels specifically transporting water? Are these channels permeable for ion H_3O^+ ?
29. What is the driving force of the water movement?
30. What are ionophores? Explain the principle of their action. What types of ionophores are distinguished?
31. Where in the membrane the gap junctions are? What is their function? How are named channels forming these junctions?
32. Describe the transport of solutes with the help of carrier proteins.
33. Name the properties common for enzymes and transporters.
34. What factors affect the facilitated transmembrane transport?
35. May a facilitated diffusion occur against a concentration gradient?
36. Compare the kinetics of passive and facilitated diffusion. Draw the curves into the graph assuming that:
 - a) the kinetics of passive diffusion is of the first order in relation to the concentration gradient;
 - b) the kinetics of the facilitated diffusion is of the first order at low concentration gradient and of the zero order at the high concentration gradient.

a) kinetics of passive diffusion



b) kinetics of facilitated diffusion



37. What types of transport ATPases are distinguished?
38. Describe the function of Ca^{2+} -ATPase. What is its function in myocytes?
39. What is the stoichiometry of Na^+ /K membrane transfer associated with ATP hydrolysis?
40. What are ABC-transporters?
41. Give examples of ABC-transporters.
42. Transport of glucose from intestinal lumen into mucose cells is secondary active transport. Explain.
43. Characterize the transport of amino acids by γ -glutamyl cycle.
44. Decide, which of the two membrane transports of amino acids – symport with Na^+ or γ -glutamyl cycle – consumes less energy?
45. Characterize the process of endocytosis.
46. What is the difference between phagocytosis and pinocytosis? What cells are able to perform phagocytosis?
47. What is the role of clathrine in the process of endocytosis?