General Biology II (101-HTK)

Cell Membranes Concepts & Learning Outcomes

Topic	Concept	Learning Outcomes
Composition	1. Membranes consist of a phospholipid bilayer combined with a variety of proteins and other lipids in a fluid mosaic arrangement.	1. List and describe the chemical components of biological membranes
Structure (fluid mosaic model)	2. Biological membranes composed of a fluid phospholipid bilayer ("lake" of lipids) in which proteins move about ("float") like icebergs in a sea.	2. Define what is meant by fluid mosaic 3. Draw an annotated sketch of the fluid mosaic model of biological membranes 4. Relate the physical/chemical properties of phospholipids to membrane structure and fluidity 5. Name 3 functions of membrane proteins
Membrane permeability and fluidity	3. Cell membranes are selectively permeable. Some solutes cross the membrane freely, some cross with assistance, and others do not cross at all. 4. Several factors can affect membrane permeability and fluidity, including temperature, types of membrane lipids, and amount of cholesterol in membrane.	6. List three factors that affect the permeability and fluidity of biological membranes and identify how these factors act to influence membrane permeability and fluidity
Cell adhesion	5. Cell groups are formed by two processes: cell recognition (in which one cell specifically binds to another cell of a certain type) and cell adhesion (in which the relationship between the two cells is "cemented").	7. Define cell adhesion and give an example of the importance of its importance in multicellular organisms
Cell-cell junctions	6. Animal cells in multicellular tissues are usually joined by tight junctions, desmosomes, and gap junctions.	8. Compare the structures and functions of the main cell-cell junctions in animal tissues
Passive transport: diffusion & osmosis	7. Most biologically important solutes require membrane protein to cross cell membranes, by a process of either passive or active transport. 8. Passive transport does not require the cell to expend metabolic energy. 9. Diffusion occurs down a concentration gradient and includes simple and facilitated diffusion (requires transport membrane proteins)	9. Define passive transport 10. Define diffusion and contrast simple diffusion with facilitated diffusion 11. Define osmosis and solve simple problems involving osmosis

	10. Passive transport proteins include channel proteins (ions and water) and carrier proteins (solutes such as glucose). 11. Osmosis is the diffusion of water across a selectively permeable membrane.	
Active transport: primary, secondary, bulk transport	12. Active transport uses metabolic energy to move solutes "uphill" against their concentration gradient. 13. Active transport is directional, involving 3 types of active transport systems: uniporter (movement of 1 substance in 1 direction), symporter (movement of 2 substances in the same direction), and antiporter (movement of 2 substances in opposite directions). 14. There are 2 basic types of active transport: primary (direct use of ATP by pumping systems) and secondary (indirect use of ATP; use of gradient established by primary active transport). 15. Bulk transport of substances involves exocytosis and endocytosis.	12. Define active transport 13. List and compare the 3 types of directional active transport systems and give an example for each type 14. Contrast primary and secondary active transport 15. Compare exocytosis and endocytosis bulk transport mechanisms 16. Compare and contrast passive and active membrane transport
Homeostasis	16. Plasma membrane surrounds the cell, separates the intracellular environment from the extracellular environment, regulates the passage of substances into and out of the cell, and is involved in the processing of signals from its extracellular environment.	17. Evaluate the importance of biological membranes to the homeostasis of the cell, emphasizing their various structures