

Cell Basics: Cells and the Plasma Membrane

- What are the three basics of the cell theory
- What is the relative size of cells?
- What are the major differences between a prokaryotic cell and a eukaryotic cell? (A general definition of prokaryotic and eukaryotic cells will suffice here for the moment)
- What are the three basic regions or parts of every single cell on Earth?
- What is the structure and function of the phospholipid bilayer?
- Focusing on prokaryotic bacterial cells for the moment:
 - Concerning structures surrounding the plasma membrane found in Prokarya (bacteria): What is their structure? What is their function for the cells that have them?
 - What is the cell wall that is found around bacteria?
 - What is a glycocalyx? What are the two major types of glycocalyxes?
 - What otherwise extracellular appendages might be found embedded within the cell membrane? Structure? Function?
 - What is a flagella?
 - What is a fimbriae?
 - What is a conjugation pili?
 - What are the inner parts of the cell that you might find in a Prokarya? Structure? Function?
 - What is the cytoplasm?
 - What maintains the structure of the cell? How?
 - What are the forms, functions and cellular locations of RNA?
 - What is special about the ribosomes?
 - What are inclusions?
 - How do bacteria carry their genetic information?
 - What is a plasmid?
 - How do bacteria reproduce? How often?
 - What is an endospore?
 - What are the ways that bacteria can metabolize?
- Focusing on eukaryotic cells now
 - How do the cell wall and glycocalyx differ among the 4 eukaryotic Kingdoms?
 - What is the structure and function of otherwise extracellular appendages?
 - What are the inner parts of the cell that you might find in a Eukarya? Structure? Function?
 - Not covered by a membrane:
 - How does the cytoskeleton of a eukaryote differ from a prokaryote?
 - What are centrioles? How are they arranged? What is their function?
 - Ribosomes:
 - How does the cytoplasm of a eukaryote differ from a prokaryote?
 - Covered by a membrane or membrane-bound: Determine structure, function, location and the type of cell that would contain the following:
 - What is the nucleus? What structures would you find in a eukaryotic nucleus?
 - What is the structure and function of the endoplasmic reticulum
 - What is the Golgi apparatus?
 - What is a lysosome
 - What is a peroxisome
 - What is a vacuole
 - What is the mitochondria? Where did it come from? What supporting evidence is there to “prove” its origin? What processes occur in the mitochondria?
 - What is a chloroplast? Where did a chloroplast come from? Supporting evidence? What processes occur in the chloroplasts?

- What is a plastid?
- How do these organelles listed in this eukaryotic section differ from prokaryotic organelles?
- Throwing this in for micro students on the domain Archaea.
 - What extracellular features are available in the domain Archaea? Structure? Function?
 - What otherwise extracellular appendages would be found in Archaea? Structure? Function?
 - How does the plasma membrane of an Archaea differ from Prokarya and Eukarya?
 - What is special about the ribosome of an Archaea?
- Back to the phospholipid bilayer:
 - What would be found in the extracellular matrix or environment outside a cell?
 - Describe the phospholipid bilayer's structure.
 - What is the role of cholesterol in the phospholipid bilayer?
 - What types of proteins are found in the phospholipid bilayer? What are their functions?
 - What are glycoproteins, glycolipids, lipoproteins, lipopolysaccharides, proteoglycans?
- Transport Process across the cell membrane:
 - Describe the activities of the cell membrane as it relates to transport.
 - What is the major difference between passive transport and active transport?
 - What is a concentration gradient? How do solutes move?
 - Passive Transport Processes: which cells possess the ability to do each of the following?
 - What is simple diffusion? What substances will freely diffuse across the plasma membrane? Why?
 - What is facilitated diffusion? What types of substances utilize facilitated diffusion?
 - What is osmosis? What conditions are required for osmosis to occur?
 - What substance actually moves across the plasma membrane during osmosis? Why does it move?
 - What is the difference between hypertonic, hypotonic, and isotonic?
 - Assuming that the cell has a solute concentration equivalent to 0.9% NaCl, determine which part is hypertonic, hypotonic, isotonic; the direction that water will move; and the end result for the cell for the following:
 - A cell is in a solution containing 1.8g NaCl/100 mL water.
 - A cell is in a solution containing 0.9g NaCl/200 mL water.
 - A cell is in a solution containing 0.9g NaCl/50 mL water.
 - A cell is in a solution containing 1.8g NaCl/400 mL water.
 - A cell is in a solution containing 1.8g NaCl/200 mL water.
 - Active Transport Processes: which cells possess the ability to do each of the following?
 - What is primary active transport? What concentration on each side result from primary active transport?
 - Describe the function of the Na⁺-K⁺ ATPase (sodium-potassium pump). Is this a uniporter, symporter or antiporter?
 - What is secondary active transport? What conditions allow the cell to do secondary active transport?
 - Describe the function of the Na⁺-Glucose Transport Protein. Is this a uniporter, symporter or antiporter?
 - If you have a sodium-potassium pump on one side of the cell, and a sodium-glucose “pump” on the other side of the cell, how could they work together?
 - Vesicular Transport:
 - What is vesicular transport?
 - What is endocytosis?
 - What is meant by pinocytosis? Which cells pinocytose? How?
 - What is meant by phagocytosis? Which cells phagocytose? How?
 - What is meant by receptor-mediated endocytosis?

- What is exocytosis? How would this work if you just produced a protein destined to be excreted from the cell?
- What is meant by transcytosis?
- How do cells connect together to form things like tissues? What domains are able to form tissues?