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| **Cells & Transport** | | |
| 1. Describe the similarities, differences and evolutionary relationship between prokaryotic and eukaryotic cells. | 6.2  98-101 | |  |  |  | | --- | --- | --- | | **Prokaryotic Cell Characteristics Only** | **Similarities** | **Eukaryotic Cell Characteristics Only** | | **Cell wall (peptidoglygan)**  **No nucleus**  **Naked, loop DNA**  **plasmids**  **No organelles**  **1-10** μm | **DNA**  **Ribosomes**  **Produce proteins**  **Plasma membrane** | **Nucleus**  **Double stranded DNA, polymer not loop**  **Membrane bound organelles**  **10-100 μm** | | **Evolutionary Relationship between Prokaryotic & Eukaryotic Cells** | | | | ***Endosymbiont Theory (Endosymbiosis)***  **Eukaryote evolved from prokaryotes. DNA became membrane bound through infolding of the outer plasma membrane. Infolding also is theorized to be how the golgi and ER originated. Mitochondria and chloroplasts are theorized to have been engulfed and instead of being digested remained in a symbiotic relationship continuing to produce their own energy as well as maintain their own DNA.**  http://www.bio.miami.edu/dana/pix/endosymbiosis2.jpg | | | |
| 2. Describe similarities and differences between animal and plant cells. | 6.2  98-101 | |  |  |  | | --- | --- | --- | | **Plant Cell Characteristics Only** | **Similarities** | **Animal Cell Characteristics Only** | | Photosynthesis  Chloroplasts  Cell wall (Cellulose- Carb)  Central Vacuoles (Store water, pigments) | Cellular respiration  Plasma membrane  Mitochondria  Nucleus  ER  Golgi | Centrioles  Lysosomes  Flagella | |
| 3. Describe the function a cell membrane. | 7.2 130-134 | Gate keeper, transport, communication, signaling, |
| 4. Explain how variations in cell membrane composition account for variation in the function of cells. | 7.1  124-129  11.1-11.4 | |  |  | | --- | --- | | **Phospholipids** | A molecule that is a constituent of the inner bilayer of biological membranes, having a polar, hydrophilic head and a nonpolar, hydrophobic tail. Keeps out large polar molecules like water or sugars | | **Glycoproteins** | protein covalently attached to a carbohydrate. Involved in communication, signaling, recognition (blood types A, B, O) | | **Transport Proteins** | Aquaporins, proton pumps, etc move molecules actively or passively in and out of the cell | | **Cholesterol** | Helps maintain fluidity | | **Enzymes** | Like those in the ETC speed up chemical reactions | | **Other Proteins** | Anchor cytoskeleton to maintain shape, Signal transduction, intercellular joining | |  |  | |
| 5. Explain how the cell membrane functions in osmosis, diffusion, and active transport. | 7.2-7.5  130-137 | |  |  | | --- | --- | | **Transport** | **How Functions with Cell Membrane** | | **Osmosis** | **Water must move through aquaporins embedded in the plasma membrane, moves from and area of LOW SOLUTE concentration to an area of HIGH solute concentration.** | | **Diffusion** | **Small, nonpolar molecules easily diffuse across the cell membrane from an area of high to low concentration** | | **Active Transport** | **Moves molecule against their concentration gradient, requires energy in the form of ATP. Transport proteins embedded in the membrane are specific to each substance to be transported.** | |
| 6. Describe the structure of function of the cell organelles, and the cytoskeleton. | 6.3-6.7  102-120 | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Organelle** | **Structure** | **Function** | **Where Present?** | | | **Plants** | **Animals** | | **Plasma or Cell Membrane** | **Fluid mosaic model,**  **Phospholipid bilayer with embedded or peripheral proteins, carbs, cholesterol…** | **Gatekeeper** | **√** | **√** | | **Cell Wall** | **Rigid barrier composed of cellulose** | **Protect cell, give rigidity/structure plant** | **√** |  | | **Nucleus** | **Membrane enclosed ball containing DNA in the form of chromatin** | **Protect DNA** | **√** | **√** | | **Nucleolus** | **Dense ball of chromatic inside of nucleus** | **Synthesizes ribosomal RNA to make ribosome** | **√** | **√** | | **Centrioles** | **composed of cylinders of microtubule triplets arranged in a 9 + 0 pattern.** | **Guide mitotic spindle, aid cell division** |  | **√** | | **Ribosomes** | **consists of rRNA and protein molecules, which make up two subunits**  **Can be free (cytoplasm) or attached (rough ER)** | **Build proteins by reading mRNA** | **√** | **√** | | **Golgi Aparatus** | **stacks of flat membranous sacs**  **Highly folded membrane structure** | **modify, store, and route products of the endoplasmic reticulum** | **√** | **√** | | **Endoplasmic Reticulum** | **extensive membranous network in eukaryotic cells, continuous with the outer nuclear membrane and composed of ribosome-studded (rough) and ribosome-free (smooth) regions** | **Smooth ER: synthesis of lipids, metabolism of carbohydrates, and detoxification of drugs and poisons**  **Rough ER: membrane factory** | **√** | **√** | | **Mitochondria** | **Double membrane with high folded inner membrane and fluid filled spaces** | **Cellular respiration, ATP production** | **√** | **√** | | **Chloroplast** | **Double membrane, stacks of chlorophyll containing thylakoids called grana surrounded by fluid called stroma** | **Photosynthesis** | **√** |  | | **Lysosomes** | **membrane-enclosed sac of hydrolytic enzymes found in the cytoplasm** | **Cleanup, digestion** |  | **√** | | **Peroxisomes** | **Membrane sac containing enzymes that transfer hydrogen from various substrates to oxygen, producing and then degrading hydrogen peroxide.** | **Break down toxins, detox (alcohol)** | **√** | **√** | | **Vacuole** | **membrane-bound sac that buds from the endoplasmic reticulum or the Golgi apparatus** | **Storage (water, waste, food, pigments…)**  **Shipping (exocytosis, endocytosis)** | **√** | **√** | | **Cytoskeleton** | **network of microtubules, microfilaments, and intermediate filaments that branch throughout the cytoplasm** | **serve a variety of mechanical and transport functions.** | **√** | **√** | |
| 7. Describe the principles that govern cell size. | 6.2  98-99 | **Surface area to volume ratio- the larger a cell becomes the less efficient diffusion and osmosis (necessary to metabolic functioning) become**  Figure |