Cell Structure and Its Parts (teacher Notes)

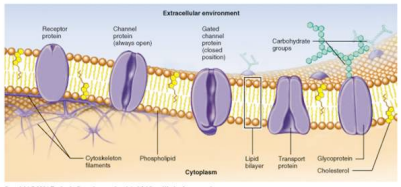
Cellular Organization

- **Cell-** smallest unit of life
- **Tissue** – group of cells functioning together.
- **Organ** – group of tissues functioning together.
- **Organ System** – group of organs functioning together.
- **Organism** – group of organ systems functioning together.

The Organelles

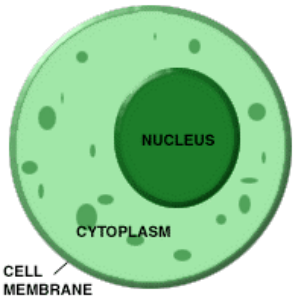
Cell Membrane

1.forms the outside boundary that separates the cell from its environment.
2. has tiny pores that let substance into and out of the cell
3. food water oxygen in and harmful waste product can leave. Acts like a window screen.
4. holds the cell together
keeps all of the pieces (like the organelles and the cytoplasm) inside the cell
5. controls what goes in and out of the cell



Cytoplasm

1.Many types of organelles are suspended in a gel like substance called cytoplasm.
2. Cytoplasm consists of many types of proteins and other macromolecules.
3. everything inside the cell membrane & outside of the nucleus except the cell's nucleus



The Nucleus

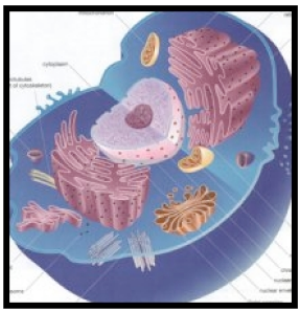
1.The first organelle that biologists observed was the nucleus.
2. The nucleus is a spherical structure that is usually located near the center of the cell.
3. It directs the production of the proteins in the cell.
4. The "brain" of the cell
5. Controls all of the cellular activities
6. DNA is inside the nucleus
7. The nucleus is bounded by two unit membranes called the nuclear membrane.
8. Nuclear Membrane "gatekeeper" protects the nucleus and allows materials to pass in and out of the nucleus through pores.
9. Within the nucleus is a material called chromatin. The chromatin contains the hereditary information of the cell.
10. When a cell reproduces, the chromatin becomes visible as long strands called chromosomes.

NUCLEOLUS

1.The dark area in the nucleus
2.Like a tiny nucleus inside the nucleus.
3.The nucleolus is involved in the production of ribosomes, which are organelles involved in protein synthesis

Centrioles:

1.These are found in the nucleus when the cell divides.
2. generally appear in animal cells
3. they look like two cylinders at right angles to one another when viewed with an electron microscope, the cylinders show up as nine bundles of tiny microtubules arranged in a circle



Endoplasmic Reticulum/

1. – "transports" passage way carry proteins from one part of the cell to another
2, There are two different
Smooth ER Rough ER
3. Endoplasmic reticulum to which ribosome are attached is called rough endoplasmic reticulum, or rough ER.
4. Endoplasmic without ribosome is called smooth endoplasmic reticulum, or smooth ER.

Smooth ER

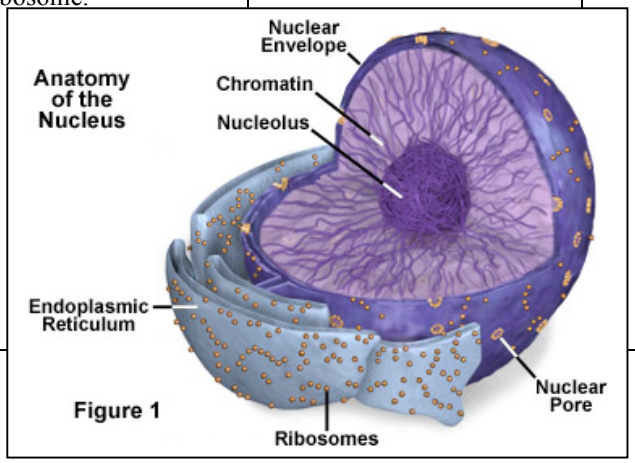
1. Main function is to collect, maintain & transport things
2. Shaped slightly tubular
3. Creates steroids

Rough ER

1.It has bumps all over it giving it a "rough" appearance
2. Bumps are called RIBOSOMES ER collects the proteins (built by the ribosomes) and creates a bubble around them

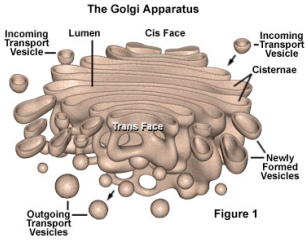
Ribosomes

1 – "protein factory" they make proteins and pass it to the endoplasmic reticulum.
2.Throughout the cytoplasm are tiny, round organelles called ribosome.
3. Ribosomes are composed of nucleic acids and proteins.
4. The synthesis of proteins occurs on the ribosome. Some cells contain as many as half a million ribosome.



GOLGI APPARATUS

1.Also called the Golgi Complex
2.It is made up of a stack of flattened out sacs …like a loose stack of pancakes
What does it do?
1.– "mailroom" they receive proteins, package them, distribute them to others parts of the cell and release materials to the outside of the cell.
2. It takes simple molecules and combines them to make larger molecules.
3. Takes those larger molecules and puts them into packs called GOLGI VESICLES



LYSOSOMES

(primarily animal cells)

1. When an organelle no longer works, the lysosome will attach itself to it and break it down like food (kind of like a cannibal)
2. Chemicals can then be reabsorbed or excreted
3. Lysosomes can also destroy the cell if it breaks open accidentally
4. The enzymes inside the lysosome spread throughout the cell and digest it
5. Next…smaller molecules are released which are absorbed by the mitochondria

Mitochondria

Mito = Mighty / Power
1. The Power-House of the cell
2. They break down food molecules so the cell has the energy to live
3.If a cell needs a lot of energy…it will have more mitochondria
4. Mitochondria contain enzymes that release the energy stored in food in the process of cellular respiration.

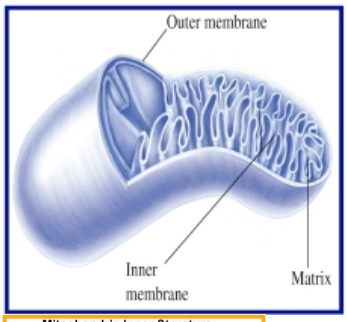
The Mitochondria structure has three main parts:

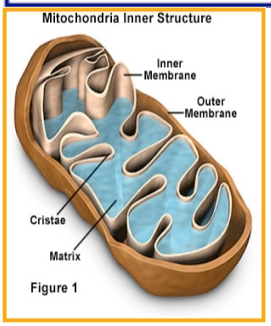
1.OUTER MEMBRANE:
covers the mitochondria

2. INNER MEMBRANE:
folds many times to increase the surface area because chemical reactions (glycolysis) occur here
So…the more space it has the more energy it can create

3. MATRIX
a fluid that has water and proteins all mixed together (like a solution)
The proteins take the food molecules in and combine them with Oxygen to release the energy

Matrix in Mitochondria





Cellular Respiration:

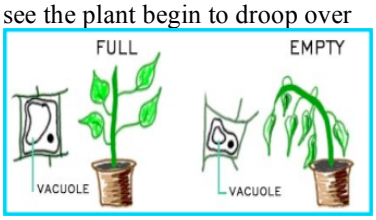
food+O2 -----> is changed into CO2+H2O+ Energy

this is the process in which food and oxygen combine in the mitochondria to make carbon dioxide and water and release energy to do all of the cell's work.

VACUOLE

1.Vacuoles are "bubbles" that float in the cell
2.Vacuoles are more important to the survival of plant cells than they are to animal cells
3. Storage In Plant Cells
4. Vacuoles in plants support structure
5.Vacuoles hold onto things that the cell might need…like a backpack
6.There are some vacuoles that hold onto waste products, similar to having a big septic tank
7. Storing waste products protects the cell from contamination
8. So, when there is no water…the vacuole shrinks and the cell wall is the only thing holding the plant together.

Turgor **Pressure**- force exerted by the water entering (osmosis) the vacuole, which then swells exerting internal force on the cell wall
Causes "rigidity" so the plant may increase by stacking cells
You will know that a plant's vacuoles are shrinking when you see the plant begin to droop over



CELL WALL

1.is a rigid layer of nonliving material that surrounds the cells of plants and some other organisms.
2. It protects and supports the cell It adds strength
3. Material like water and oxygen can pass through easily
4. It is made from a tough flexible material called cellulose - fiber we can't digest this but it helps keep you regular.

Chloroplasts

1.the site of photosynthesis in eukaryotic cells
2. disk-like structures
3.composed of a single membrane
4.surrounding a fluid containing stacks of membranous disks
SOLAR energy radiated from the sun is captured by plants chloroplast
5.Then it is instantaneously changed into ELECTRICAL energy
6. Then packaged as CHEMICAL energy
7.are green organelles that trap energy from sunlight and turn it into food. This food is needed by the plant to stay alive. As the plant needs energy, the mitochondria release the food's energy

Photosynthesis: takes place inside the chloroplast. the process in which plant use water, carbon dioxide, and energy form the sun to make food. No energy transformation is 100% efficient. Not all the solar energy captured is converted to electrical and then chemical energy. Some of it gets lost as heat or other forms of energy (light)
sun's energy + water + carbon dioxide --is changed into--> food and oxygen