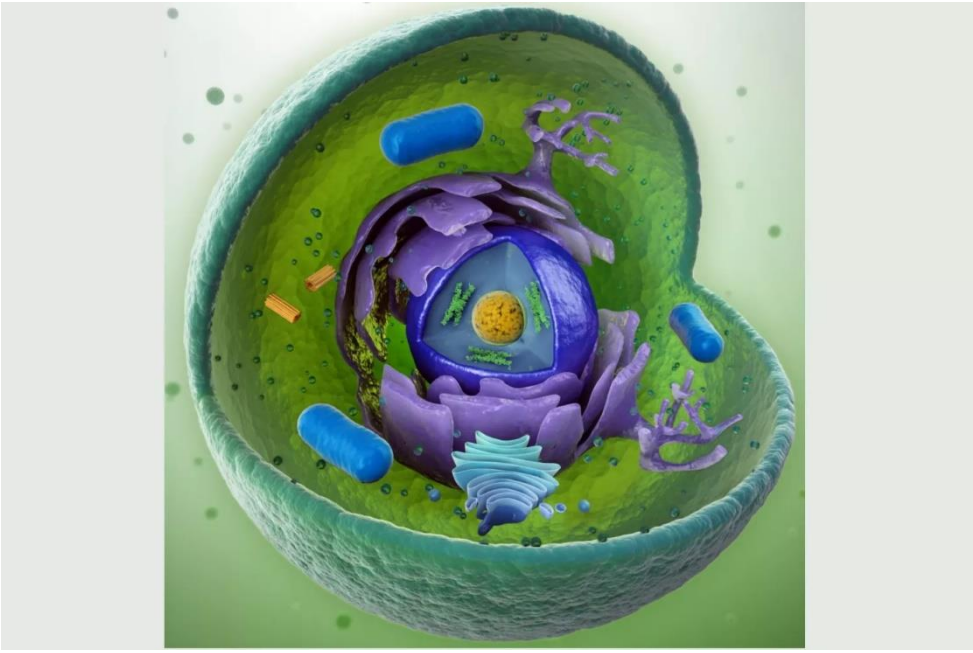
Cell Organelles

An organelle is a tiny cellular structure that performs specific functions within a cell. Organelles are embedded within the cytoplasm of eukaryotic and prokaryotic cells. In the more complex eukaryotic cells, organelles are often enclosed by their own membrane. Analogous to the body's internal organs, organelles are specialized and perform valuable functions necessary for normal cellular operation. Organelles have a wide range of responsibilities that include everything from generating energy for a cell to controlling the cell's growth and reproduction.



1. Eukaryotic Organelles

Eukaryotic cells are cells with a nucleus. The nucleus is an organelle that is surrounded by a double membrane called the nuclear envelope. The nuclear envelope separates the contents of the nucleus from the rest of the cell. Eukaryotic cells also have a cell membrane (plasma membrane), cytoplasm, cytoskeleton, and various cellular organelles. Animals, plants, fungi, and protists are examples of eukaryotic organisms. Animal and plant cells contain many of the same kinds or organelles. There are also certain organelles found in plant cells that are not found

in animal cells and vice versa. Examples of organelles found in plant cells and animal cells include:

Nucleus - a membrane bound structure that contains the cell's hereditary (DNA) information and controls the cell's growth and reproduction. It is commonly the most prominent organelle in the cell.

Mitochondria - as the cell's power producers, mitochondria convert energy into forms that are usable by the cell. They are the sites of cellular respiration which ultimately generates fuel for the cell's activities. Mitochondria are also involved in other cell processes such as cell division and growth, as well as cell death.

Endoplasmic Reticulum - extensive network of membranes composed of both regions with ribosomes (rough ER) and regions without ribosomes (smooth ER). This organelle manufactures membranes, secretory proteins, carbohydrates, lipids, and hormones.

Golgi complex - also called the Golgi apparatus, this structure is responsible for manufacturing, warehousing, and shipping certain cellular products, particularly those from the endoplasmic reticulum (ER).

Ribosomes - these organelles consist of RNA and proteins and are responsible for protein production. Ribosomes are found suspended in the cytosol or bound to the endoplasmic reticulum.

Lysosomes - these membranous sacs of enzymes recycle the cell's organic material by digesting cellular macromolecules, such as nucleic acids, polysaccharides, fats, and proteins.

Peroxisomes - Like lysosomes, peroxisomes are bound by a membrane and contain enzymes. Peroxisomes help to detoxify alcohol, form bile acid, and break down fats.

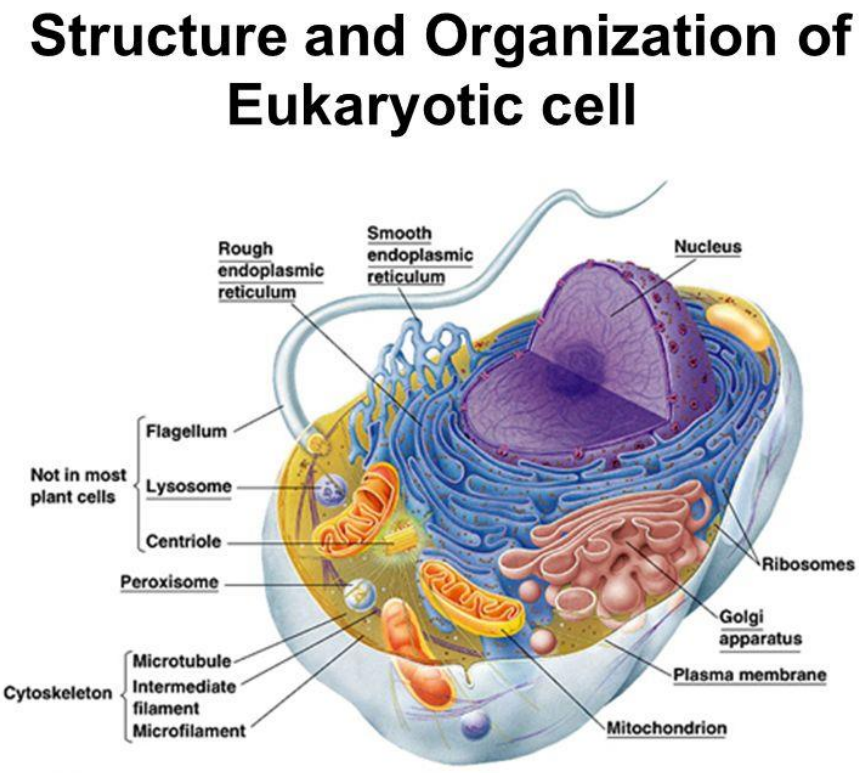
Vacuole - these fluid-filled, enclosed structures are found most commonly in plant cells and fungi. Vacuoles are responsible for a wide variety of important functions in a cell including nutrient storage, detoxification, and waste exportation.

Chloroplast - this chlorophyll containing plastid is found in plant cells, but not animal cells. Chloroplasts absorb the sun's light energy for photosynthesis.

Cell Wall - this rigid outer wall is positioned next to the cell membrane in most plant cells. Not found in animal cells, the cell wall helps to provide support and protection for the cell.

Centrioles - these cylindrical structures are found in animal cells, but not plant cells. Centrioles help to organize the assembly of microtubules during cell division.

Cilia and Flagella - cilia and flagella are protrusions from some cells that aid in cellular locomotion. They are formed from specialized groupings of microtubules called basal bodies.



Prokaryotic Cells

Prokaryotic cells have a structure that is less complex than eukaryotic cells since they are the most primitive and earliest forms of life on the planet. They do **not have a nucleus** or region where the DNA is bound by a membrane. Prokaryotic DNA is coiled up in a region of the cytoplasm called the **nucleoid**. Like eukaryotic cells, prokaryotic cells contain a plasma membrane, cell wall, and cytoplasm. Unlike eukaryotic cells, prokaryotic cells **do not contain membrane-bound organelles**. However, they do contain some non-membranous organelles such as ribosomes, flagella, and plasmids (circular DNA structures that are not involved in reproduction). Examples of prokaryotic cells include **bacteria and archaeans**.