Cell Structure:

A cell consists of three parts: the cell membrane, the nucleus, and, between the two, the cytoplasm. Within the cytoplasm lie hundreds or even thousands of structures called organelles.

Most plant and animal cells are only visible under a microscope, with dimensions between 1 and 100 micrometres. Organisms can be classified as unicellular or multicellular.

The number of cells in plants and animals varies from species to species, humans contain around 40 trillion (4×10^{13}) cells. The human brain accounting for around 80 billion of these cells. cells emerged on Earth at least 3.5 billion years ago.

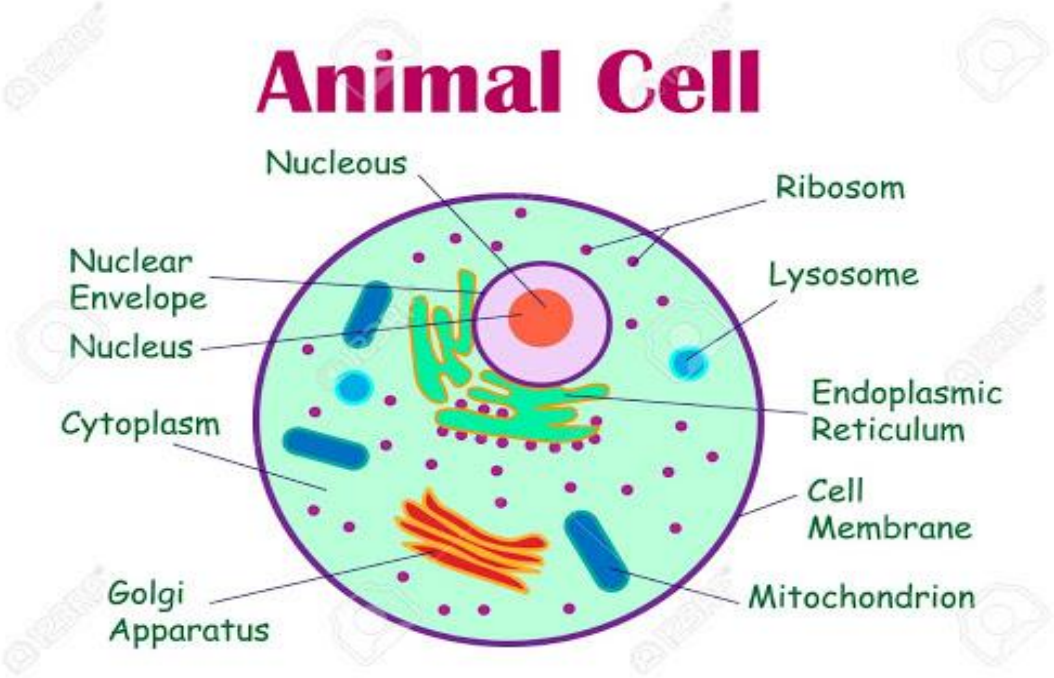
Cell Function:

Cell provide **structure** for the **body**, take in **nutrients** from food, convert those **nutrients** into **energy**, and carry out specialized functions. Cells also contain the body's hereditary material and can make copies of themselves. Cells have many parts, each with a different function. Cell structure and function are closely related. The cell division make new cells, and protein synthesis.

Animal Cells:

They are eukaryotic **cells** that have both a membrane-bound nucleus and other membrane-bound organelles. These organelles carry out specific functions that are needed for the normal functioning of the **cell**. Plant and **animal cells** are similar in that

they are both eukaryotic and have similar types of organelles. Animal cells are the types of cells that make up most of the tissue cells in animals. Different kinds of animals have different numbers of cells, human beings, for instance, have over **40 trillion cells**.



Cell wall:

A cell wall is a structural layer surrounding some types of cells, just outside the cell membrane. It can be tough, flexible, and sometimes rigid. It provides the cell with both structural support and protection, and acts as a filtering mechanism. Cell walls are present in most prokaryotes, in algae, fungi and eukaryotes including plants but are absent in animals. A major function is to act as pressure vessels, preventing over-expansion of the cell when water enters. Plant cell walls are primarily made up of cellulose, and bacteria cell walls are made up of peptidoglycan.

Cell Membrane:

The cell membrane (also known as the plasma membrane (PM) or cytoplasmic membrane, is a biological membrane that separates the interior of all cells from the outside environment which protects the cell from its environment. The cell membrane consists of a lipid bilayer, including cholesterols that sit between phospholipids to maintain their fluidity at various temperatures. The cell membrane controls the movement of substances in and out of cells and organelles. In this way, it is selectively permeable to ions and organic molecules. In addition, cell membranes are involved in a variety of cellular processes such as cell adhesion, ion conductivity and cell signalling.

Cytoplasmic Matrix:

The **cytosol**, also known as **intracellular fluid** (**ICF**) or **cytoplasmic matrix**, is the liquid found inside cells. It is separated into compartments by membranes. For example, the mitochondrial matrix separates the mitochondrion into many compartments.

In the eukaryotic cell, the cytosol is surrounded by the cell membrane and is part of the cytoplasm, which also comprises the mitochondria, plastids, and other organelles which the cell nucleus is separate. The cytosol is thus a liquid matrix around the organelles. In prokaryotes, most of the chemical reactions of metabolism take place in the cytosol, while a few take place in membranes or in the periplasmic space. In eukaryotes, while many metabolic pathways still occur in the cytosol, others take place within organelles.

Nuecleous:

In cell biology, the **nucleus** (pl. ***nuclei***; come from Latin word kernel which meaning *nucleus*). Nucleus is a membrane-bound

organelle found in eukaryotic cells. Eukaryotes usually have a single nucleus, but a few cell types, such as mammalian red blood cells, have no nuclei, and a few others including osteoclasts have many. The main structures making up the nucleus are the nuclear envelope, a double membrane that encloses the entire organelle and isolates its contents from the cellular cytoplasm; and the nuclear matrix, a network within the nucleus that adds mechanical support.

The cell nucleus contains all of the cell's genome, except for the small amount of mitochondrial DNA. The nucleus maintains the integrity of genes and controls the activities of the cell by regulating gene expression—the nucleus is, therefore, the control center of the cell.

The Endoplasmic Reticulum (ER): is found near the Nucleas and is made up of a number of flattened sacs called Cisternae. The Rough Endoplasmic Reticulum is called so because it has a lot of Ribosomes on its outer surface. The Smooth Endoplasmic Reticulum however, does not have Ribosomes. The Rough transports proteins that are synthesised in the Ribosomes, and the Smooth synthesises Lipids.

The Golgi apparatus: An organelle in eukaryotic cells lying usually near the cell nucleus and consists of a number of flattened sacs. The Golgi body has a number of functions, including sorting and processing proteins. Proteins are synthesized in the rough endoplasmic reticulum, then they travel to the Golgi body to processed and sent throughout the cell. The Golgi body is also responsible for determining which proteins are to be transported outside the cell.

Cilia:

The **cilium**; the plural **cilia** is found on eukaryotic cells in the shape of a slender protuberance that projects from the much larger cell body.

There are two types of cilia: *motile* and *non-motile* cilia. Non-motile cilia are also called *primary cilia* which serve as sensory organelles. Most mammalian cell types possess a single non-motile, primary cilium, which functions as a cellular antenna. Exceptions olfactory neurons which possess several non-motile cilia and cells of the embryonic node, which possess singular motile cilia known as *nodal cilia*.

Flagella Plant Cells:

Most **plant cells** lack **flagella**; they have no need to move and hence no need for this means of propulsion. Some **plant** species, however, produce flagellated sperm that can swim through water to reach the egg. Consequently, **plant cells** typically lack **flagella**, although **plant** sperm **cells** are flagellated.

Comparison Between Animal and Plant cell:

- Both animal and plant cells have mitochondria, but only plant cells have chloroplasts**.** Plants do not get their sugar from eating food, so they need to make sugar from sunlight. This process (photosynthesis) takes place in the chloroplast. Once the sugar is made, it is then broken down by the mitochondria to make energy for the cell. Because animals get sugar from the food they eat, they do not need chloroplasts: just mitochondria.
- **Both plant and animal cells have vacuoles.** A plant cell contains a large, singular vacuole that is used for storage and maintaining the shape of the cell. In contrast, animal cells have many, smaller vacuoles.
- **Plant cells have a cell wall, as well as a cell membrane. In plants, the cell wall surrounds the cell membrane.** This gives the plant cell its unique rectangular shape. Animal cells have a cell membrane, but no cell wall.

Mitochondria:

Mitochondria are membrane-bound organelles, which responsible for Aerobic Respiration and generate most of the chemical energy needed to power the cell's biochemical reactions. Chemical energy produced by the mitochondria is stored in a small molecule called adenosine triphosphate (ATP).

