

# Basic cell biology

In the beginning there was **the Cell**, or maybe not, depending on what you believe ;-)

There are two different types of cells – the **prokaryotes** and **eukaryotes**. Eukaryotes are cells that have a nucleus and many organelles in them. The cell encloses all these components by a membrane.

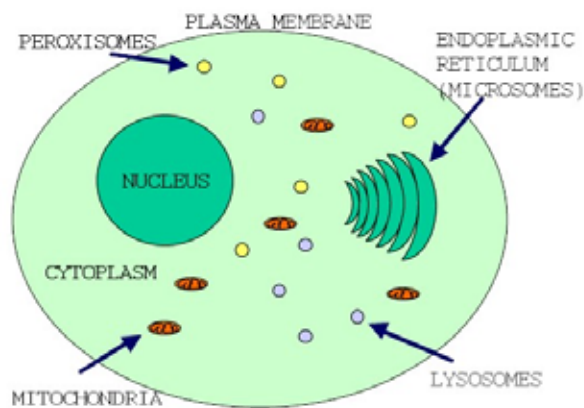
Cells are the structure of life, all living things on earth are made up of one or many trillions of cells. All living things are a function of cells. All cells perform varying chemical reactions important for life. These chemical reactions must keep up with the right speed at the right time in order to maintain normal metabolism in living organisms.

## THE CELL AND ITS COMPONENTS:

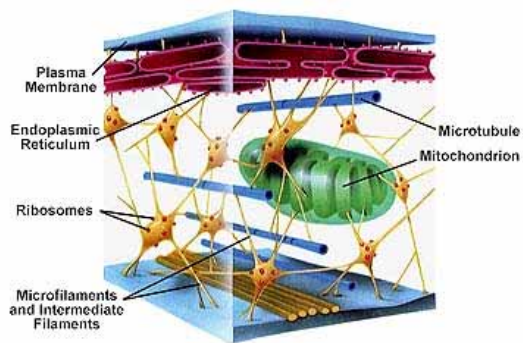
However, Eukaryotes are cells found not only in human beings but as well as plant, animals and fungi.

**The word Eukaryotes means “true nuclei”.**

HERE IS A DIAGRAM OF A EUKARYOTIC CELL



- A **plasma membrane** encloses every cell.
- **Structure** – 2 primary building blocks include protein (about 60% of the membrane) and lipid, or fat (about 40% of the membrane). The lipid forms a “bilayer” with one layer being hydrophilic and the other being hydrophobic. Functions of the membrane include supporting and retaining the cytoplasm and being a selective barrier. The cell is protected from its environment but nutrients need to go in and waste products need to get out of the cell. Proteins play an important role in this function. Proteins usually span the entire membrane and require the expenditure of energy to help compounds move across the membrane.
- **Cytoplasm** consists of a gelatinous solution and contains **microtubules** (which serve as a cell’s **cytoskeleton**) and organelles (literally ‘little organs’)



- Cells also contain a **nucleus** within which is found DNA (deoxyribonucleic acid) in the form of **chromosomes** plus **nucleoli** (within which ribosomes are formed)
- Organelles include:
  - **Endoplasmic reticulum**
    - comes in 2 forms: smooth and rough; the **surface of rough ER** is coated with ribosomes; the surface of smooth ER is not
    - functions include: mechanical support, synthesis (especially proteins by rough ER), and transport
  - **Golgi complex**
    - consists of a series of flattened sacs (or cisternae)
    - functions include: synthesis (of substances like phospholipids), **packaging of materials for transport** (in vesicles), and production of lysosomes
  - **Lysosomes**
    - membrane-enclosed spheres that contain powerful digestive enzymes
    - functions include destruction of damaged cells (which is why they are sometimes called 'suicide bags') & **digestion of phagocytosed materials** (such as bacteria)
  - **Mitochondria**
    - have a **double-membrane**: outer membrane & highly convoluted inner membrane
    - inner membrane has folds or shelf-like structures called cristae that contain **elementary particles**; these particles represent an **enzyme important in ATP production**
    - primary function is production of adenosine triphosphate (ATP)
  - **Ribosomes**
    - composed of rRNA (ribosomal RNA) & protein
    - may be dispersed randomly throughout the cytoplasm or attached to surface of rough endoplasmic reticulum
    - often linked together in chains called **polyribosomes** or polysomes
    - **primary function is to produce proteins**
  - **Centrioles**
    - paired cylindrical structures located near the nucleus
    - play an important role in cell division
  - **Flagella & cilia** – hair-like projections from some human cells
    - **cilia** are relatively short & numerous (e.g., **those lining trachea**)
    - a flagellum is relatively long and there's typically just one (e.g., **sperm**)