

Description of the Eukaryotic Animal Cell

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General Description

The animal cell is the basic unit of life in the animal body. Cells are the building blocks of more complicated structures and they are specialized to carry out specialized functions. Cells are highly organized structures and in order to be successful in carrying out its functions they must be able to separate its contents from the external environment. Eukaryotic cell size is limited and it ranges from ten to one-hundred micrometers in diameter. The eukaryotic animal cell has a plasma membrane that surrounds the cell along with internal structures that are referred to as organelles. Organelles are specialized to carry out specific functions such as converting energy to usable forms, synthesizing compounds, and manufacturing structures that are essential to function and reproduction.

Major Structures

As figure 1 indicates, the major structures of the eukaryotic animal cell are the plasma membrane, the Golgi complex, the nucleus, which contains the nucleolus, a nuclear envelope, and nuclear pores, the endoplasmic reticulum (rough and smooth), lysosomes, mitochondria, peroxisomes, microfilaments, microtubules, cilia, and the centrioles. Each structure is described below.

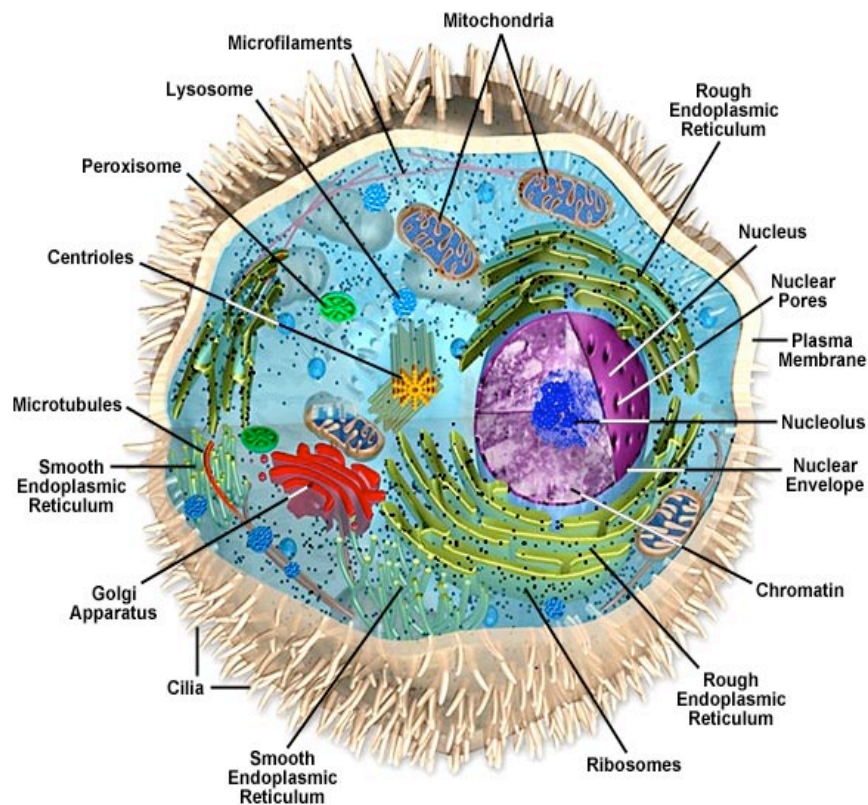


Figure 1: Anatomy of the Animal Cell

Source: © 1995-2005 by Michael W. Davidson and the Florida State University. Retrieved May 4, 2005 from <http://micro.magnet.fsu.edu/cells/animalcell.html>

Plasma Membrane

A structure that surrounds all cells with the function of separating the cells contents from the outside environment. The plasma membrane serves as a selective barrier in that it only allows certain exchanges to take place between the internal area of the cell and the outside environment.

Golgi Complex

The Golgi complex or apparatus is composed of stacks of flattened membrane sacs. The main function is that it processes and packages proteins. The membranous sacs are called cisternae and they are usually filled with cellular products.

Nucleus: Nucleolus, Nuclear Envelope, and Nuclear Pores

The nucleus is usually a circular or oval shape. It contains the nucleolus and DNA. The process of DNA being transcribed into RNA takes place in the nucleus and cellular proteins are specified here. The nucleolus is a granular structure located inside of the nucleus and it consists of RNA and protein. It is the site of RNA synthesis. The nuclear envelope consists of two membranes and its purpose is to separate the nuclear contents from the cytoplasm of the cell. Nuclear pores regulate the passage of substances between the cell's cytoplasm and the nucleoplasm of the nucleus.

Endoplasmic Reticulum (Smooth and Rough)

The ER, as it is called, is a network of membranes that extends throughout the cytoplasm of the cell. Its function is to synthesize lipids and modify proteins. There are two forms of ER, the smooth and the rough. The smooth ER lacks ribosomes, granules of RNA, on its outer surface and its major function is lipid biosynthesis and drug detoxification. The rough ER contains ribosomes on its outer surface and it manufactures proteins.

Lysosomes

The lysosomes are membranous sacs that are found in animal cells. They contain enzymes that break down materials, secretions, and wastes.

Mitochondria

The mitochondria are sacs that consist of two membranes. This is the site of cellular respiration and the transformation of energy from glucose or lipids. ATP is formed in the mitochondria.

Peroxisomes

Peroxisomes are also membranous sacs and they consist of many different types of enzymes. The peroxisome is the site of many different metabolic reactions.

Microfilaments

Microfilaments are rodlike structures that consist of a protein called actin. They provide structural support for the cell and they play a role in cell division and the movements of organelles.

Microtubules

Microtubules are hollow tubes that are made up of a protein called tubulin. They provide structural support and they also have a role in cellular division and the movements of organelles. They are also the components of cilia, flagella, basal bodies, and centrioles.

Cilia

Cilia are short hair-like projections that extend from the surface of the cell. They are involved in the movement of some single-celled organisms and they are used to move substances onto the surfaces of some tissues.

Centrioles

Centrioles are a pair of hollow cylinders that are located near the nucleus. They anchor the microtubules in animal cells and they are also involved in the cellular division process.

How the Eukaryotic Animal Cell Functions

The eukaryotic animal cell incorporates all of the organelles that are located within the cytoplasm of the cell. The nucleoplasm of the nucleus communicates with the cytoplasm of the cell by the nuclear pores and the cytoplasm of the cell communicates with the outside environment by the pores that are located in the plasma membrane. Cells obtain energy from the environment but the energy that they receive is usually not in a useable form. Cellular organelles, such as the mitochondria, take energy sources from the environment and convert them into a ready to use energy source such as ATP. The energy that cells create allows the animal to carry out mechanical and biochemical functions. Cells are the building blocks of multicellular organisms and without the functions that they are able to carry out, animals would not exist.

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