Al- Mustaqbal university collage
Department of radiology technologies
1.St stage
Lecture3

Cytoplasmic orgenall

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Mitochondria

mitochondrion :membrane-bound organelle found in the cytoplasm of almost all eukaryotic cells (cells with clearly defined nuclei)
the primary function of which is to generate large quantities of energy in the form of adenosine triphosphate (ATP)
. Mitochondria are typically round to oval in shape and range in size from 0.5 to 10 μm. In addition to producing energy, mitochondria store calcium for cell signaling activities, generate heat, and mediate cell growth and death

Mitochondria

The number of mitochondria per cell varies widely
for example, in humans, erythrocytes (red blood cells) do not contain any mitochondria
whereas liver cells and muscle cells may contain hundreds or even thousands.

The only eukaryotic organism known to lack mitochondria is the oxymonad Monocercomonoides species.

Mitochondria are unlike other cellular organelles in that they have two distinct membranes and a unique genome and reproduce by binary fission

these features indicate that mitochondria share an evolutionary past with prokaryotes (single-celled organisms).

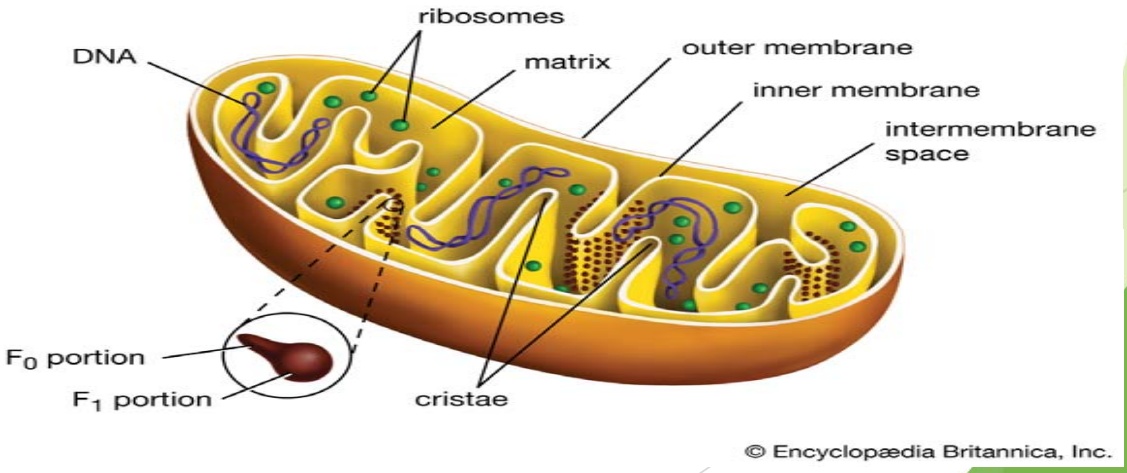
Roles Mitochondria Play in Cells

1. Production of ATP. Perhaps the most well-known role of mitochondria is the production of ATP, the energy currency of cells.
2. Calcium Homeostasis.
3. Regulation of Innate Immunity.
4. Programmed Cell Death.
5. Stem Cell Regulation

Mitochondria (structure)

Mitochondria may have a number of different shapes
A mitochondrion contains outer and inner membranes composed of phospholipid bilayers and proteins

The two membranes have different properties. Because of this double-membraned organization there are five distinct parts to a mitochondrion



Mitochondria structure

1. The outer mitochondrial membrane,
2. The intermembrane space (the space between the outer and inner membranes),
3. The inner mitochondrial membrane,
4. The cristae space (formed by infoldings of the inner membrane), and
5. The matrix (space within the inner membrane), which is a fluid.

lysosomes

Lysosomes: are membrane-enclosed organelles that contain an array of enzymes capable of breaking down all types of biological polymer proteins, nucleic acids, carbohydrates, and lipids

Lysosomes function as the digestive system of the cell, serving both to degrade material taken up from outside the cell and to digest obsolete components of the cell itself

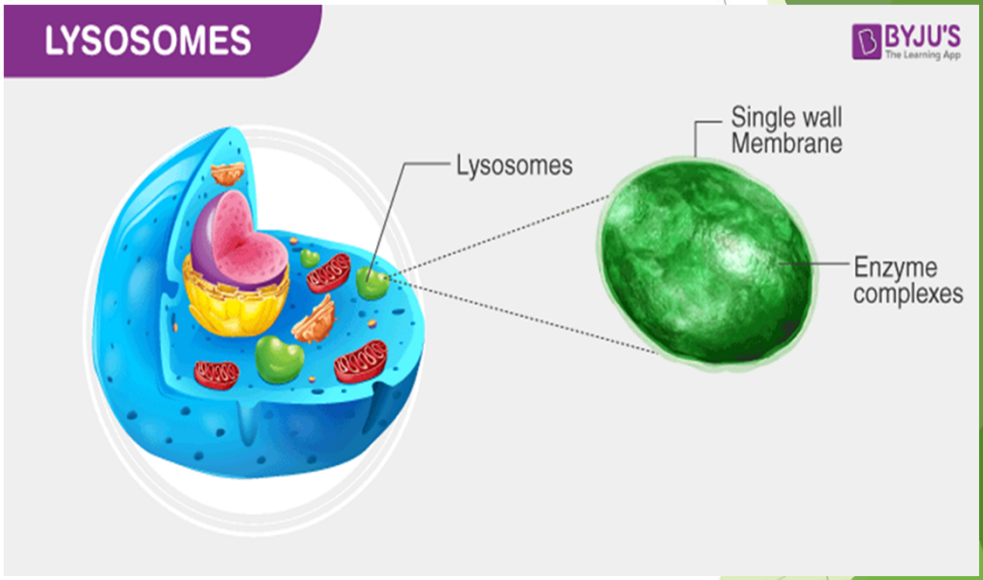
In their simplest form, lysosomes are visualized as dense spherical vacuoles, but they can display considerable variation in size and shape as a result of differences in the materials that have been taken up for digestion

lysosomes thus represent morphologically diverse organelles defined by the common function of degrading intracellular Materia

Lysosome structure

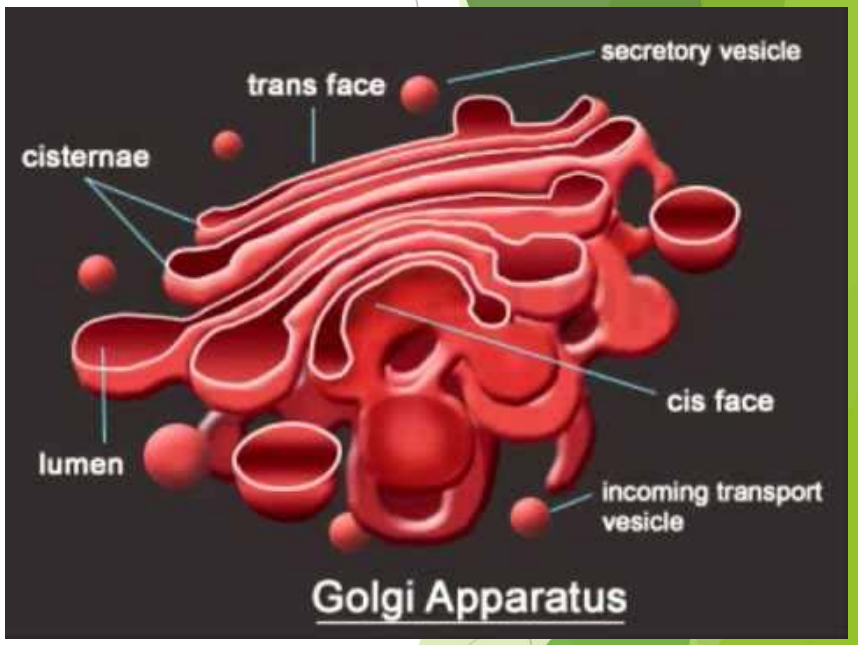
Lysosomes are acidic membrane-bound organelles found within cells, usually around 1 micrometre in length. Lysosomes contain numerous hydrolytic enzymes which catalyse hydrolysis reactions.

The membrane surrounding the lysosome is vital to ensure these enzymes do not leak out into the cytoplasm and damage the cell from within. In order to maintain the acidic pH of the lysosome, protons are actively transported into the organelle across the lysosomal membrane.



Golgi complex definition

- The Golgi apparatus is an organelle in eukaryotic organisms that moves molecules from the endoplasmic reticulum to their destination.
- The organelle also modifies products of the endoplasmic reticulum to their final form
- The Golgi apparatus is comprised of a series of flattened sacs that extend from the endoplasmic reticulum .
- THE Function: Golgi apparatus modifies proteins and lipids that it receives from the endoplasmic reticulum. These biochemicals leave the Golgi by exocytosis before being delivered to different intracellular or extracellular targets.



Golgi structure: The Golgi is made of 5-8 folds called cisternae. The cisternae contain specific enzymes creating five functional regions which modify proteins passing through them in a stereotypical way, as follows:

1. Cis-Golgi network: faces the nucleus, forms a connection with the endoplasmic reticulum and is the entry point into the Golgi apparatus.
2. Cis-Golgi: major processing area allowing biochemical modifications
3. Medial-Golgi: major processing area allowing biochemical modifications.
4. Trans-Golgi: major processing area allowing biochemical modifications.
5. Trans-Golgi network: exit point for vesicles budding off the Golgi surface, packages and sorts biochemicals into the vesicles according to their destinations

Endoplasmic reticulum

The endoplasmic reticulum (ER) is a continuous membrane system that forms a series of flattened sacs within the cytoplasm of eukaryotic cells. All eukaryotic cells contain an ER.
In animal cells, the ER usually constitutes more than half of the membranous content of the cell. The endoplasmic reticulum (ER) serves important functions particularly in the synthesis, folding, modification, and transport of proteins.

The ER can be classified in two functionally distinct forms:
1- smooth endoplasmic reticulum (SER) SER is function in the synthesis of lipids, including cholesterol and phospholipids, which are used in the production of new cellular membrane. In cells of the liver, SER contributes to the detoxification of drugs and harmful chemicals:

2- rough endoplasmic reticulum:is function in (Synthesis and conjugation of proteins, metabolism of lipids and steroids, detoxification and metabolism of drugs, and breakdown of glycogen).

Ribosome

ribosome: is a complex molecular machine found inside the living cells that produce proteins from amino acids during a process called protein synthesis or translation. The process of protein synthesis is a primary function, which is performed by all living cells.

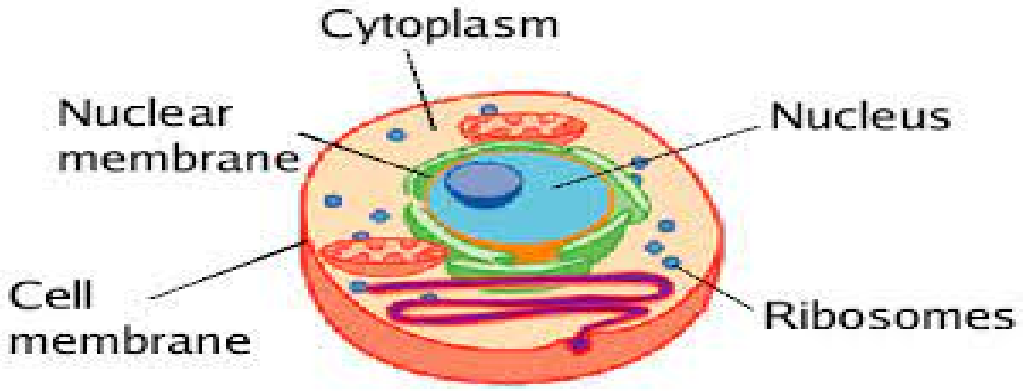
Ribosomes are specialized cell organelles and are found in both prokaryotic and eukaryotic cells. Every living cell requires ribosomes for the production of proteins.

Ribose structure:A ribosome is a complex of RNA and protein and is, therefore, known as a ribonucleoprotein. It is composed of two subunits – smaller and larger.

The smaller subunit, where the mRNA binds and is decoded, and in the larger subunit, the amino acids get added. Both of the subunits contain both protein and ribonucleic acid components.

The ribosome structure includes the following

- It is located in two areas of cytoplasm.
- Scattered in the cytoplasm.
- Prokaryotes have 70S ribosomes while eukaryotes have 80S ribosomes.
- Around 62% of ribosomes are comprised of RNA, while the rest is proteins.
- The structure of free and bound ribosomes is similar and is associated with protein synthesis.

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