Histology 1
Topic: lysosome
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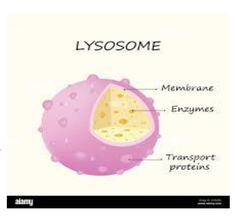
Definition

Lysosomes are specialized membranous vesicles formed by the Golgi apparatus. They break down and recycle cell materials.

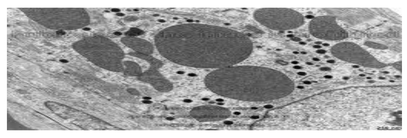
It is produced by budding from the Golgi membrane and the endoplasmic reticulum, Golgi apparatus. It is surrounded by a single membrane and then separates from the that separates it from the rest.

It serves as the digestive system responsible for digesting large molecules, parts of old cells, and microorganisms.



***Size : range from,05 to 5,µm in diameter.**

***Structure: It contains hydrolytic digestive enzymes**



These enzymes called hydrolases e.g .Proteases, lipase, nucleases……,

These enzymes have optimal activity at an acidic (PH ~ (5

These enzymes are synthesized in RER and transported to Golgi.

Types: primary and secondary lysosomes

Primary lysosomes are Homogenous by EM. They are newly formed and don't enter into digestive process.

Secondary lysosomes are Heterogeneous by EM.

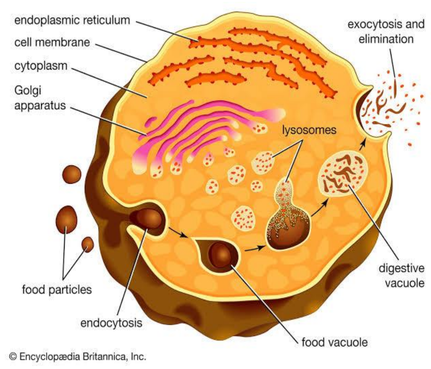
They are formed by fusion of primary lysosome with other substances.

Function

The key function of lysosomes is digestion and removal of waste

•Cellular debris or foreign particles are pulled in to cell through the process of endocytosis .

*** The process of endocytosis happens when the cell membrane falls in on itself)invagination), creating a vacuole or a pouch around the external contents and then bringing those contents into the cell.**



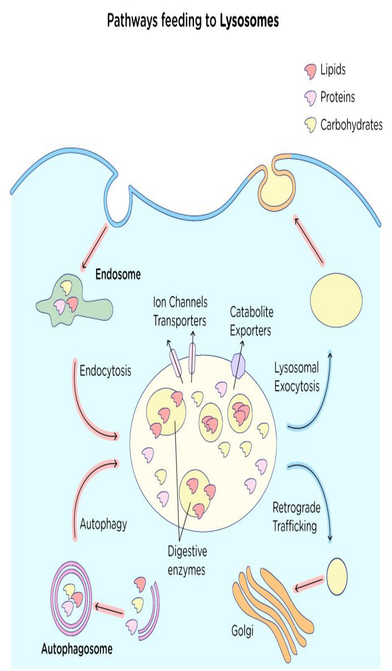
•On the other hand, discarded wastes and other substances originating from within the cell is digested by the process of autophagocytosis or autophagy .

***The process of autophagy involves disassembly or degradation of the cellular components through a natural, regulated mechanism.**

•Maintain cell health by elimination of old or worn out organelles

•Postmortem autolysis by digestion of the whole cell after death due to escape of the hydrolytic enzymes from the lysosomal membrane

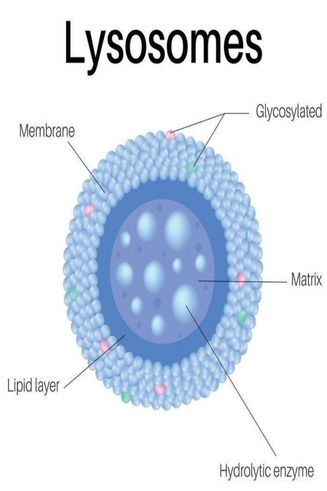
•Fertilization by helping the sperm to penetrate the ovum

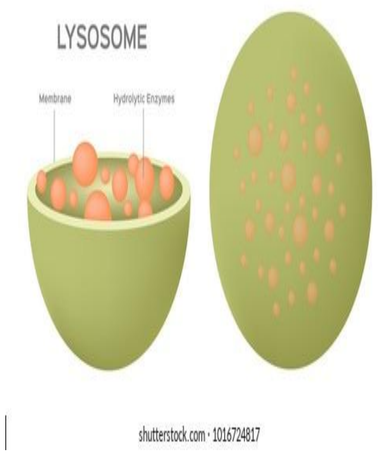


Description

:subcellular organelle that is found in nearly all types of eucaryotic cells)cells with a clearly defined nucleus) and that is responsible for the digestion of macromolecules, old cell parts, and microorganisms. Each lysosome is surrounded by a membrane that maintains an acidic environment within the interior via a proton pump. Lysosomes contain a wide variety of hydrolytic enzymes)acid hydrolases) that break down macromolecules such as as nucleic , proteins, and polysaccharides. These enzymes are active only in the lysosome's acidic interior; their acid-dependent activity protects the cell from self-degradation in case of lysosomal leakage or rupture, since the pH of the cell is neutral to slightly alkaline. Lysosomes were discovered by the Belgian cytologist Christian Rene de Duve in the 1950s.)De Duve was awarded a share of the 1974Nobel prize for Physiology or Medicine for his discovery of lysosomes and other organelles known as peroxisomes(. Lysosomes originate by budding off from the membrane of the trans-Golgi network, a region of the Golgi complex responsible for sorting newly synthesized, which may be designated for use in lysosomes, endosomes, or the plasma membrane. The lysosomes then fuse with membrane vesicles that derive from one of three pathways: endocytosis, autophagocytosis, **and** phagocytosis .

In endocytosis, extracellular macromolecules **are taken up into the** cell **to form membrane-bound vesicles called endosomes that fuse** with lysosomes.





Disease Of lysosome

• Production of enzymes of the lysosome is organized by nuclear genes.

o Nuclear genes are genes which are located within the nucleus of a cell, specifically in eukaryotes.

• Any mutations in these genes may result in the emergence of over 30 diverse human genetic ailments, which are collectively called lysosomal storage diseases (LSD).

• When such a mutation occurs, the molecules accumulate within the cell and eventually kills it. This can lead to cancer and a host of other diseases ranging from cardiovascular diseases, neurodegenerative disorders and ageing-associated ailments.

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