



3) endoplasmic reticulum

(endo inside - plasm = cytoplasm - reticulum = network)

Def: is an irregular network of branching anastomosing tubules, cisterna and vesicles

Types according to presence or absence ribosomes on the surface :

There are two types

1. Rough endoplasmic reticulum.
2. Smooth endoplasmic reticulum.

1. Rough endoplasmic reticulum.

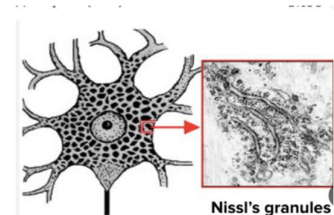
Def: membranous organelle concerned principally with synthesis and secretions of protein

Q/Why it is called rough endoplasmic reticulum?

Due to presence of large number of ribosomes attached to its limiting membrane

Site of endoplasmic reticulum in protein forming cells

1. Plasma cells (diffuse basophilic cytoplasm)
2. Pancreatic cell (localized basophilic cytoplasm)
3. Nissl granules in nerve cells (clumps basophilic cytoplasm)



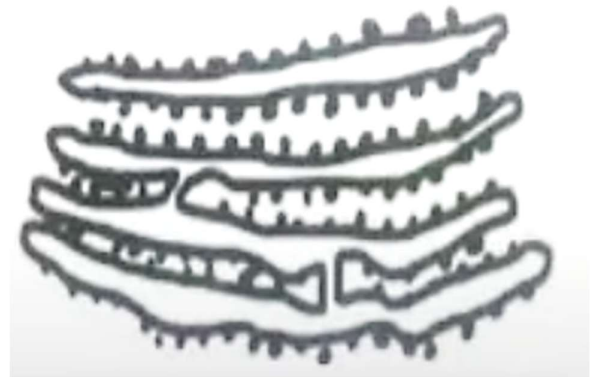
E.M:

Consisting of anastomosing network of

Tubules Vesicles Cisternae

Much of surface of rough endoplasmic reticulum is studded

with ribosomes give the reticulum granular appearance (give reason for)





Rough endoplasmic reticulum

Functions:

1. Synthesis of proteins for extracellular use (secretory protein - lysosomal proteins - membrane protein)
2. Glycosylation of protein to form glycoprotein

2. Smooth endoplasmic reticulum:

Def is a membranous organelle consists of primarily network of branching and anastomosing tubules and vesicles

N.B: the limiting membrane devoid ribosomes

L.M: smooth endoplasmic reticulum doesn't appear

N.B: when smooth endoplasmic reticulum abundant it appear acidophilic

E.M smooth endoplasmic reticulum appear as irregular network of membranous tubules and vesicle devoid ribosomes in contrast to cisternae of r ER

Functions:

1. Steroid hormone synthesis in the testicular interstitial cells - the cell of corpus luteum and adrenal cortex cells
2. Drug detoxification in liver cells
3. Lipid synthesis in the intestinal absorptive cell
4. Release and storage of Ca ions in striated muscle
5. Production of HCl in gastric parietal cells.

5. Lysosome

Def: is a membranous bounded vesicles containing a number of hydrolytic enzymes



Hydrolytic enzymes are more than 40 in number and active in acid PH (acid 4.
Golgi apparatus (Golgi complex)

Def: is a membranous organelle concerned principally with synthesis concentration packing and release of the secretory products

L.M :

With H-E: appear as lighter stained region called negative Golgi image

With silver stain (silver salts Ag): a network of brown granules near to nucleus

With osmium stain: Golgi appear as a black network near to nucleus

N.B: Golgi apparatus seen in secretory cells as osteoblasts

E.M:

the main structure unit of Golgi apparatus is a flattened membranous vesicle called

Golgi saccules (cisternae)

The Golgi saccules are arranged in Golgi stacks

Each stack contain from 3-10 saccules

Each stack has 2 faces

1. Forming face (cis face):

Convex in shape

Associated with number of small transfer vesicle

2. Maturing face (trans face):

Concave in shape

Associated with much larger secretory granules

N.B: most cells possess several stacks of Golgi saccules forming elaborate ramifying network called Golgi complex





Functions:

1. Packing and concentrations of secretions

2. Modification of secretory products.

Glycosylation of protein to form glycoproteins .

Sulfation of protein to form sulfated glycoprotein (mucus).

3. Production of primary lysosome.

packing and release of the secretory products

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Functions:

1. Packing and concentrations of secretion
2. Modification of secretory products

Glycosylation of protein to form glycoproteins

Sulfation of protein to form sulfated glycoprotein (mucus)

3. Production of primary lysosome.

hydrolysis) maintain within their interior

Hydrolytic enzymes are capable of destroying all majors macromolecules as(protein lipids) -

L.M histochemical stains to detect acid phosphatase enzyme

E.M: lysosome appear as spherical membrane bounded vacuoles

With their contents showing varying degree of electron density

origin of lysosome: the enzyme synthesized in r ER then carried to Golgi to form a transfer vesicle to come out to lysosome numbers abundant in phagocytic cells:

Q/ compare between types of lysosome

types of lysosome

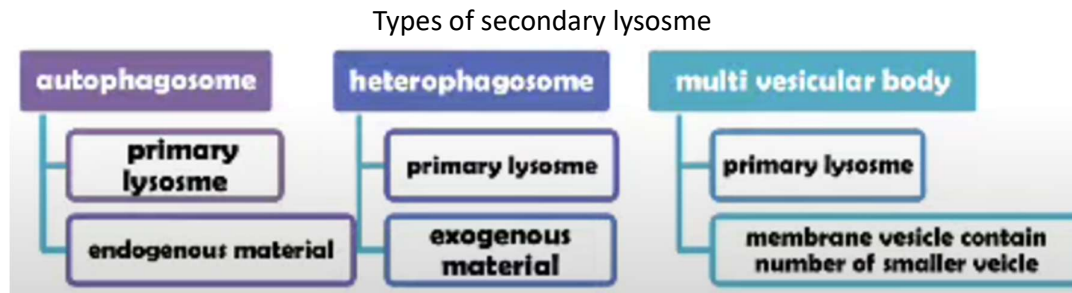
secondary lysosome:

primary lysosme freshly formed contain hydrolytic enzymes

Primary lysosome	Secondary lysosome
Homogenous	Heterogeneous
Not yet engaged in intracellular digestion	Engaged in intracellular digestion
Smaller	Larger
Formed from Golgi and r ER	



Q/compare between types of secondary lysosome



N.B: phagosome is a membrane bounded vesicle contain either exogenous material (bacteria) or endogenous material (damaged organelle)

Residual body: debris containing vacuoles representing the terminal stage of lysosomal activity (undigested material)

Fate of the residual body :

- 1) Residual body may be extruded from the cell by exocytosis
- 2) Accumulate of the residual body in the cytoplasm as lipofuscin pigments in long lived cells as nerve cells - heart cells).

Functions:

- 1) Degradation of any exogenous macromolecules (phagocytosis and pinocytosis)
- 2) Disposition of any organelle or cell constituents that is no longer useful to the cell

Peroxisomes

Def: spherical membranous organelle containing peroxide forming enzyme and catalase that are involved in the formation and degradation of intracellular hydrogen peroxide

L.M it doesn't appear

E.M:

- *Membrane bounded vacuole
- *Vary in size and appearance depending on species and cell type.
- *large in hepatocyte and kidney cells



- *small in intestinal cells (microperoxisome)
- *in human contain granular matrix of moderate density
- *in many species - they have crystalline core (nucleoid)
- *nucleoid absent from liver peroxisome from reptiles - birds and human
- * these species (reptiles - birds - human) have lack in urate oxidase

N.B: urate oxidase an enzyme that degrades urate

Functions:

1) peroxisome contain

D-amino acid oxidase

Urate oxidase

Catalase

- 2) D-amino acid oxidase - urate oxidase are responsible for production of hydrogen peroxide (H_2O_2)
- 3) The catalase utilizes (H_2O_2) in oxidation (detoxification) of various toxic substances such as (alcohol - phenol - fatty acids)