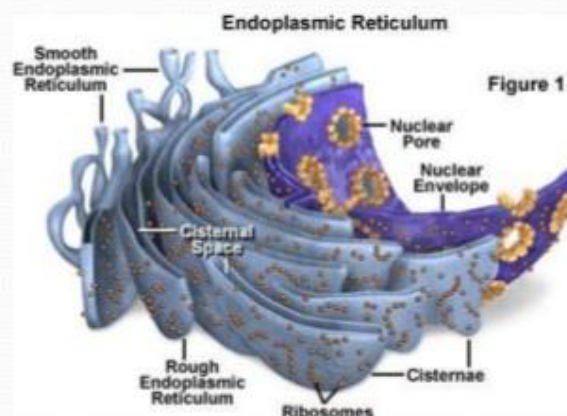


❑ Origin of endoplasmic reticulum

- At present manner of origin of the endoplasmic is not definitely known. The most concrete hypothesis is that the **ER is “budded” off from the nuclear envelope (wischnitzer, 1974).**
- The ER appears to arise from the outer membrane of the nuclear envelope by out folding , or from the plasma membrane by in folding.
- The smooth ER seem to arise from the rough ER by detachment of ribosomes.

- There are two basic morphological types of ER namely RER and SER.
- The ER membrane is thinner (50 \AA) than that of plasma membrane ($80\text{-}100\text{ \AA}$ thick)



❑ PHYSICAL STRUCTURE-

- The ER is 3-dimensional network of intracellular. It is formed of three types of element:
 - 1-Cisternae
 - 2-Tubules
 - 3-Vesicles

❑ Cisternae-

- These are flattened , unbranched, sac-like element.
- They lie in stacks parallel to one another.
- They bear ribosomes on the surface that, therefore, appears rough.
- It contain glycoproteins named *ribophorin-I* & *ribophorin-II* that bind the ribosomes.

❑ Tubules-

- These are irregular branching element which form a network along with other element.
- These are often free of ribosomes.

❑ Vesicles-

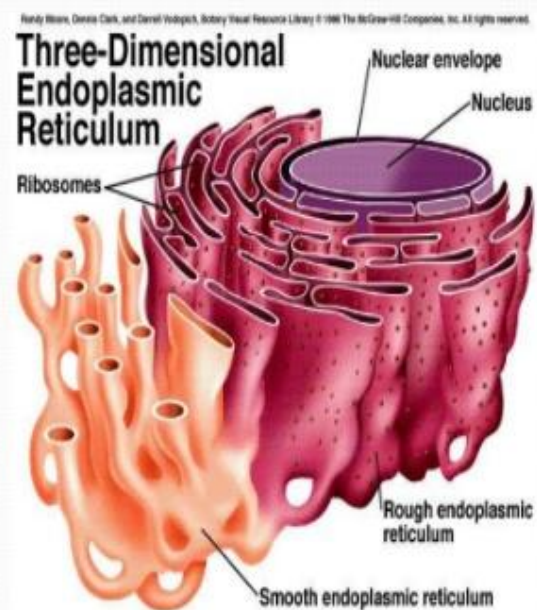
- These are oval and rounded, vacuole like element.
- These are also free of ribosomes.
- All the element of ER freely communicates with one another, and contain a fluid called endoplasmic matrix, in the ER lumen.
- These matrix is different from cytoplasmic matrix outside the ER
- The ER may pass from one cell to another through the plasmodesmata in the form of desmotubules.

❑ FUNCTION OF RER-

- Surface for Ribosomes- The RER provides space and ribophorins for the attachment of ribosomes to itself.
- Surface for protein synthesis
- Formation of Glycoprotein- Linking of sugars to for glycoprotein starts in the RER and is completed in Golgi complex.
- Synthesis of precursors- The RER produce enzyme precursors for the formation of lysosomes by Golgi Complex.
- Smooth ER formation- The RER gives rise to the smooth ER by loss of ribosomes.

❑ FUNCTION OF SER


- The smooth endoplasmic reticulum lacks ribosomes and functions in lipid metabolism, carbohydrate metabolism, and detoxification and is especially abundant in mammalian liver and gonad cells.
- It also synthesizes phospholipids. Cells which secrete these products, such as those in the testes, ovaries, and skin oil glands have a great deal of smooth endoplasmic reticulum.



- Detoxification-The SER brings about detoxification in the liver , i.e., converts harmful materials(drugs, poisons) into harmless ones for excretion by the cell.
- Formation of organelles- The SER produces Golgi apparatus , lysosomes and vacuoles.
- It also carries out the attachment of receptors on cell membrane proteins and steroid metabolism.
- In muscle cells, it regulates calcium ion concentration
- The smooth endoplasmic reticulum also contains the enzyme glucose-6-phosphatase, which converts glucose-6-phosphate to glucose, a step in gluconeogenesis.

SR

- The sarcoplasmic reticulum (SR) is smooth ER found in smooth and striated muscle.
- The only structural difference between this organelle and the smooth endoplasmic reticulum is the medley of proteins they have, both bound to their membranes and drifting within the confines of their lumens. This fundamental difference is indicative of their functions.
- The endoplasmic reticulum synthesizes molecules, while the sarcoplasmic reticulum stores and pumps calcium ions.

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- The sarcoplasmic reticulum contains large stores of calcium, which it sequesters and then releases when the muscle cell is stimulated.
 - It plays a major role in excitation-contraction coupling in muscles cells.