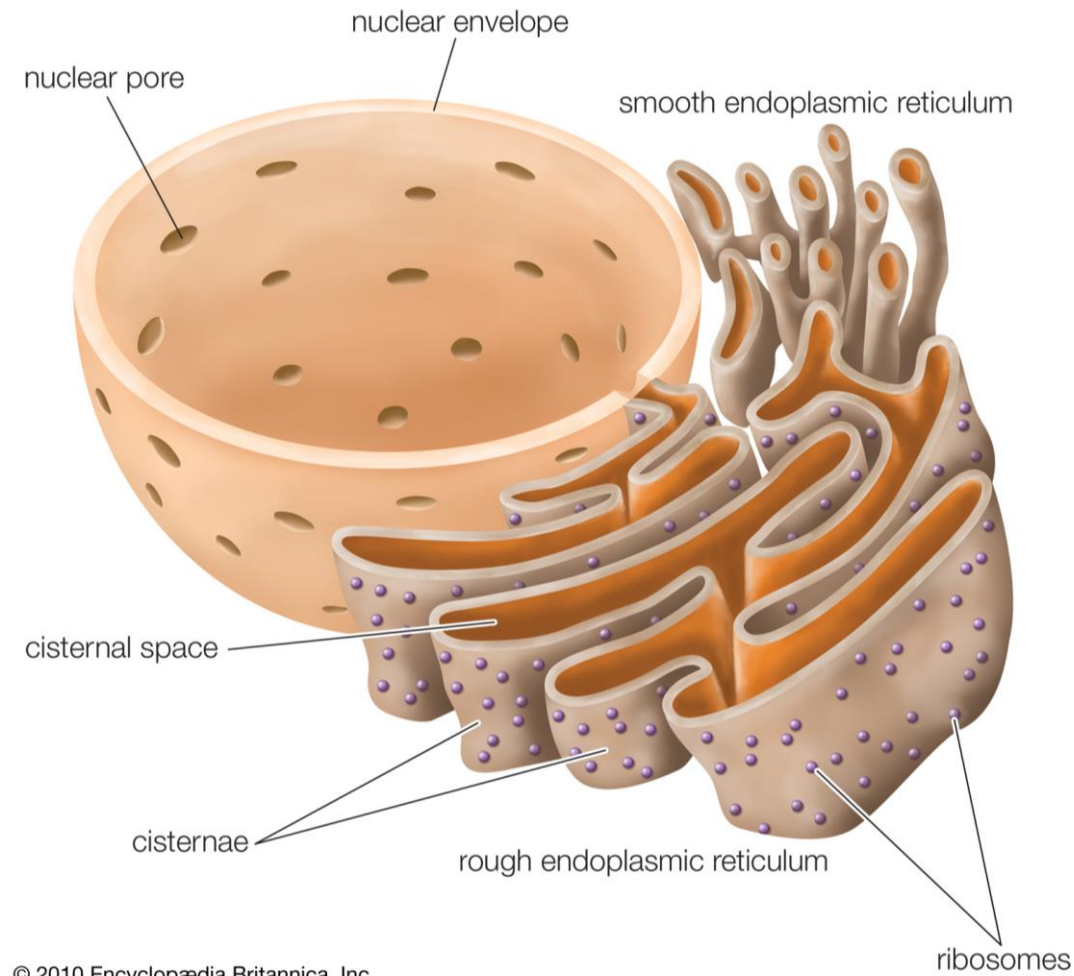


# Endoplasmic reticulum



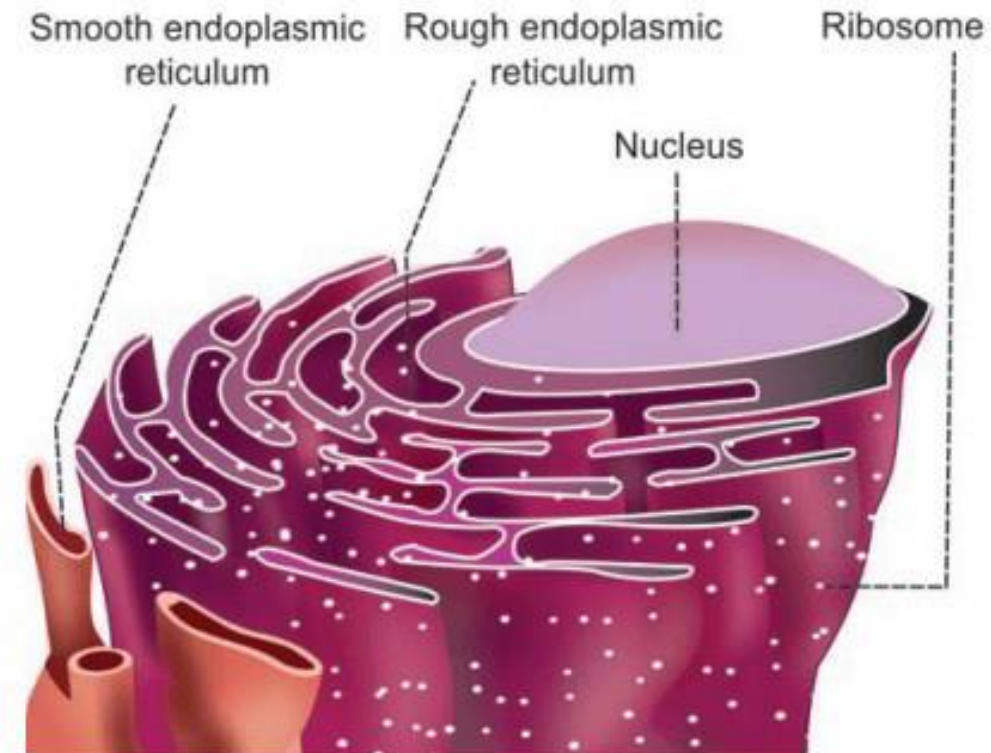
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Asst. Prof.

TCSC, Mumbai.

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# Endoplasmic reticulum

## History

- **Garnier in 1897** first time observed the ER under light microscope.
- The Electron microscopic study in relation to the **Ultra structure** of ER was first time carried out in **1969** by Keith R. **Porter**, Albert **Claude**, and Ernest F. **Fullam**.
- The **word reticulum**, which means "**network**", was applied **by Porter in 1953** to describe this fabric of membranes.



Albert Claude



Keith Porter

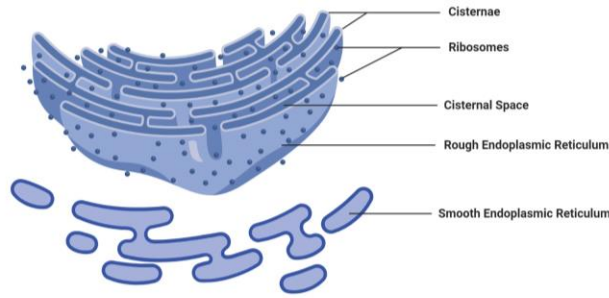
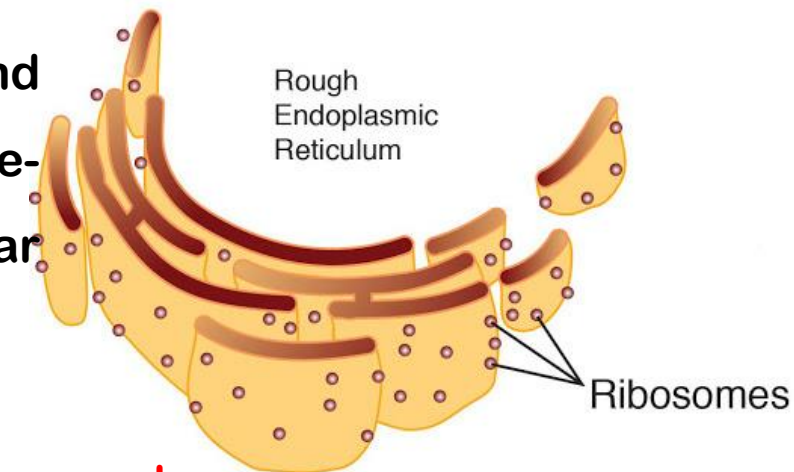


Figure: Endoplasmic Reticulum (ER), Image Copyright © Sagar Aryal, www.microbenotes.com

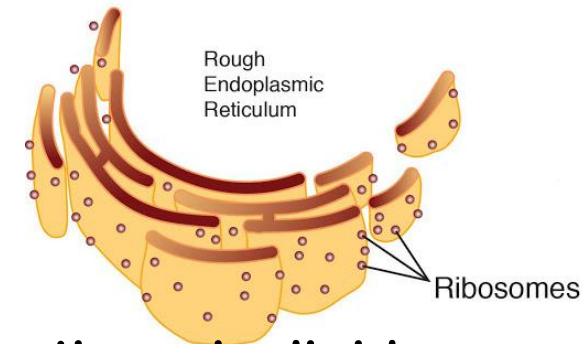
# Endoplasmic reticulum

- **Endoplasmic Reticulum is a complex network of tubular membranes exclusively present in the cytoplasm of the eukaryotic cell.**
- The endoplasmic reticulum (ER) is a type of organelle made up of two subunits – rough endoplasmic reticulum (**RER**), and smooth endoplasmic reticulum (**SER**).
- The **endoplasmic reticulum is found in most eukaryotic** cells and forms an interconnected network of flattened, membrane-enclosed sacs known as cisternae (in the RER), and tubular structures in the SER.
- The membranes of the **ER are continuous with the outer nuclear membrane.**
- The **endoplasmic reticulum is not found in red blood cells, or spermatozoa.**



# Endoplasmic reticulum

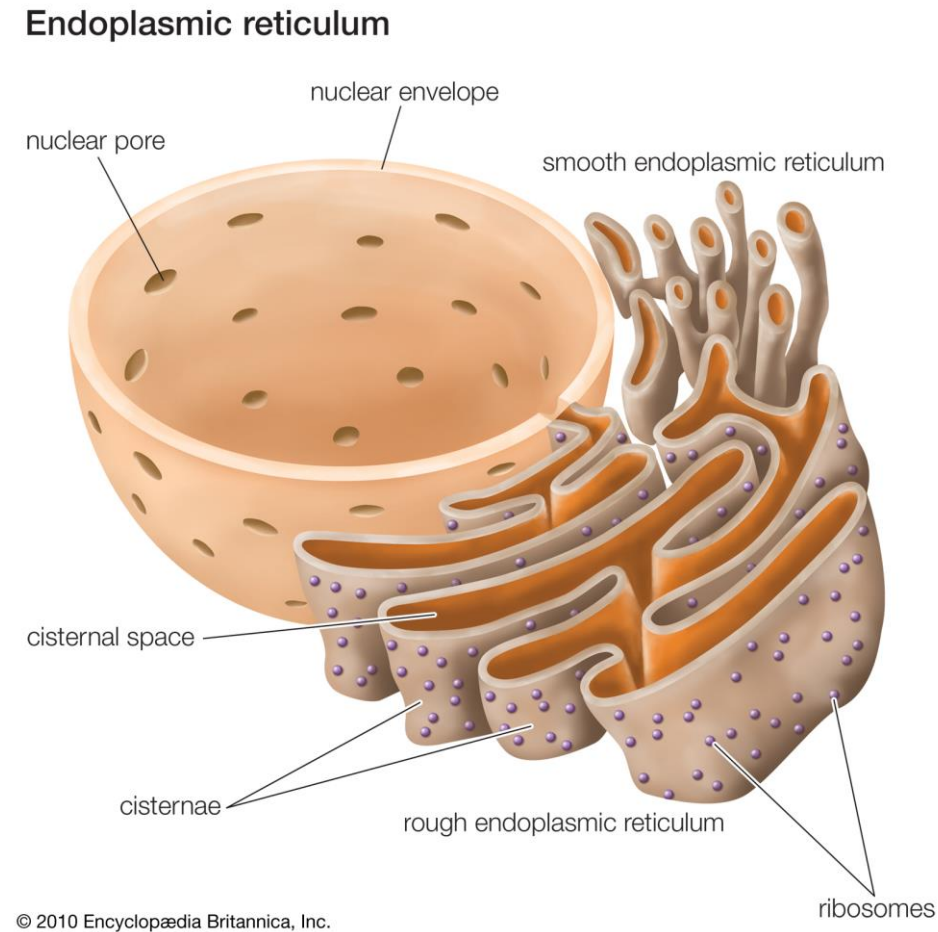
- The **two types of ER** one is engaged in proteins synthesis and second engage in lipids synthesis.
- The **outer** (cytosolic) face of the **rough endoplasmic** reticulum is studded with **ribosomes** that are the sites of protein synthesis.
- The **rough endoplasmic reticulum is prominent in cells.**
- The smooth endoplasmic reticulum lacks ribosomes and functions in lipid synthesis but not metabolism, the production of steroid hormones, and detoxification.
- The smooth endoplasmic reticulum is especially abundant in mammalian liver and gonad cells.



# Endoplasmic reticulum

## Structure

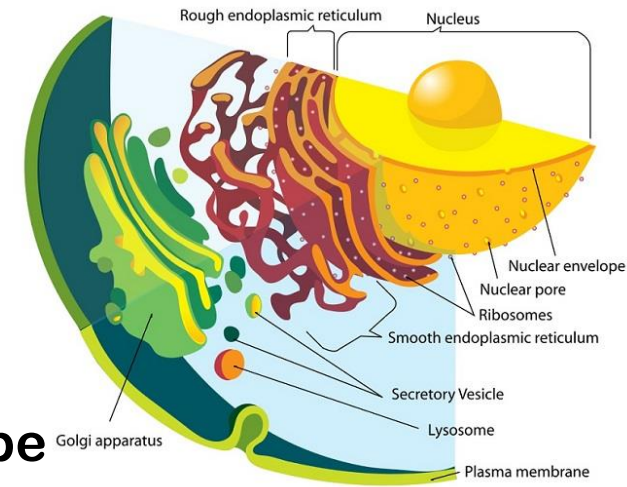
- The general, structure of the endoplasmic reticulum is a **network of membranes called cisternae**.
- These sac-like structures are held together by **the cytoskeleton**.
- The phospholipid membrane encloses the **cisternal space (or lumen)**, which is continuous with the perinuclear space but separate from the cytosol

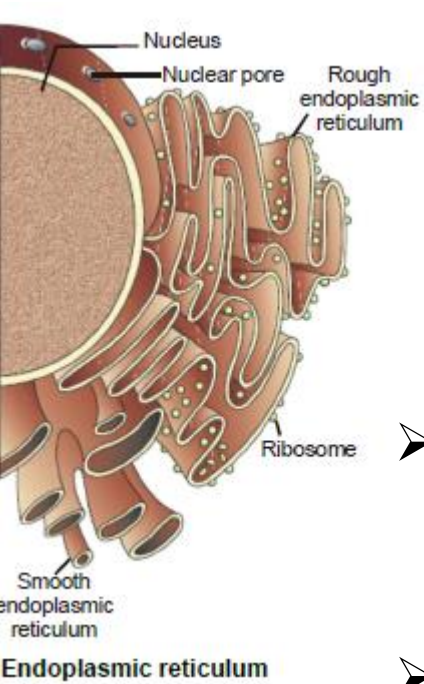


# Endoplasmic reticulum

## Ultra-structure

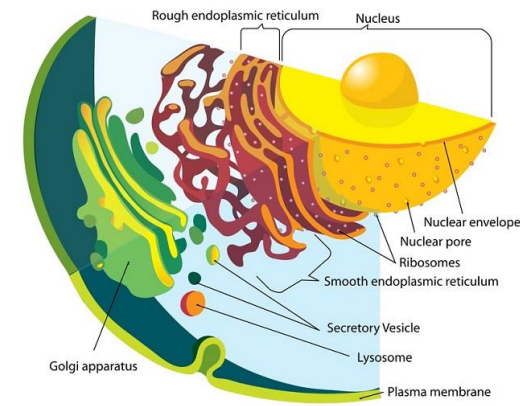
- The endoplasmic reticulum membrane system can be morphologically divided into **three structures—cisternae, Tubules and vesicles.**
- Cisternae are tubular in structure, and form a three-dimensional polygonal network. 40 – 50 nm
- ER sheets, on the other hand, are membrane-enclosed, two-dimensional flattened sacs that extend across the cytoplasm.





# Endoplasmic reticulum

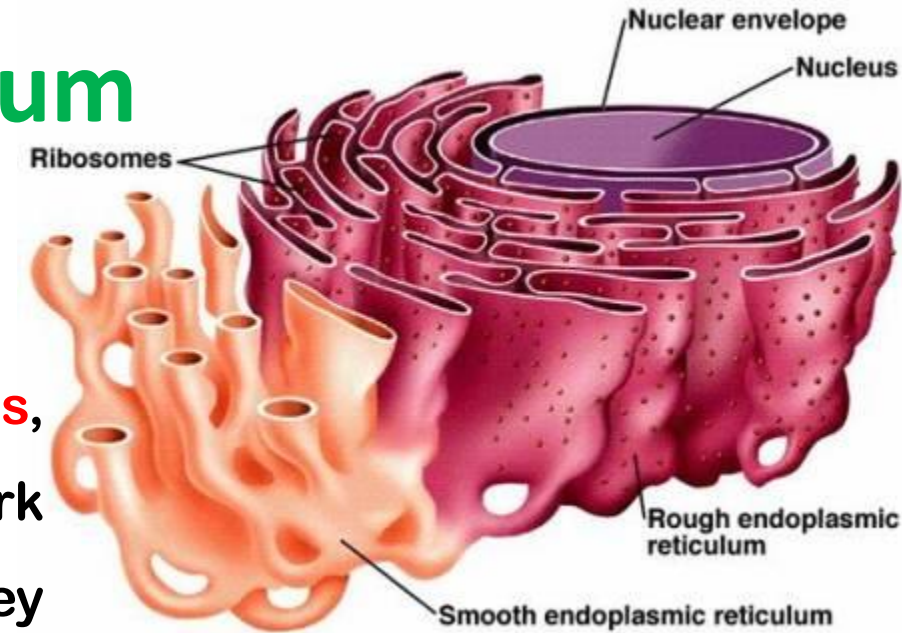
## Ultra-structure



- RER are frequently associated with ribosomes and special proteins called translocons that are necessary for protein translation within the RER.
- Endoplasmic reticulum is an extensive membrane network of cisternae (sac-like structures), which are held together by the cytoskeleton.
- The phospholipid membrane encloses a space, the lumen from the cytosol, which is continuous with the perinuclear space.
- The surface of the rough endoplasmic reticulum is studded with the protein manufacturing ribosome, which gives it a rough appearance. Hence it is referred as a rough endoplasmic reticulum.

# Endoplasmic reticulum

## Ultra-structure



- The **smooth endoplasmic** reticulum **consists of tubules**, which are located near the cell periphery. This network increases the surface area for the storage of key enzymes and the products of these enzymes.
- **Rough endoplasmic** reticulum **synthesizes proteins**, while smooth endoplasmic reticulum synthesizes lipids and steroids.
- Endoplasmic reticulum **varies extensive** extending from the cell membrane through the cytoplasm and forming a **continuous connection with the nuclear envelope**.

*Thank  
You*

