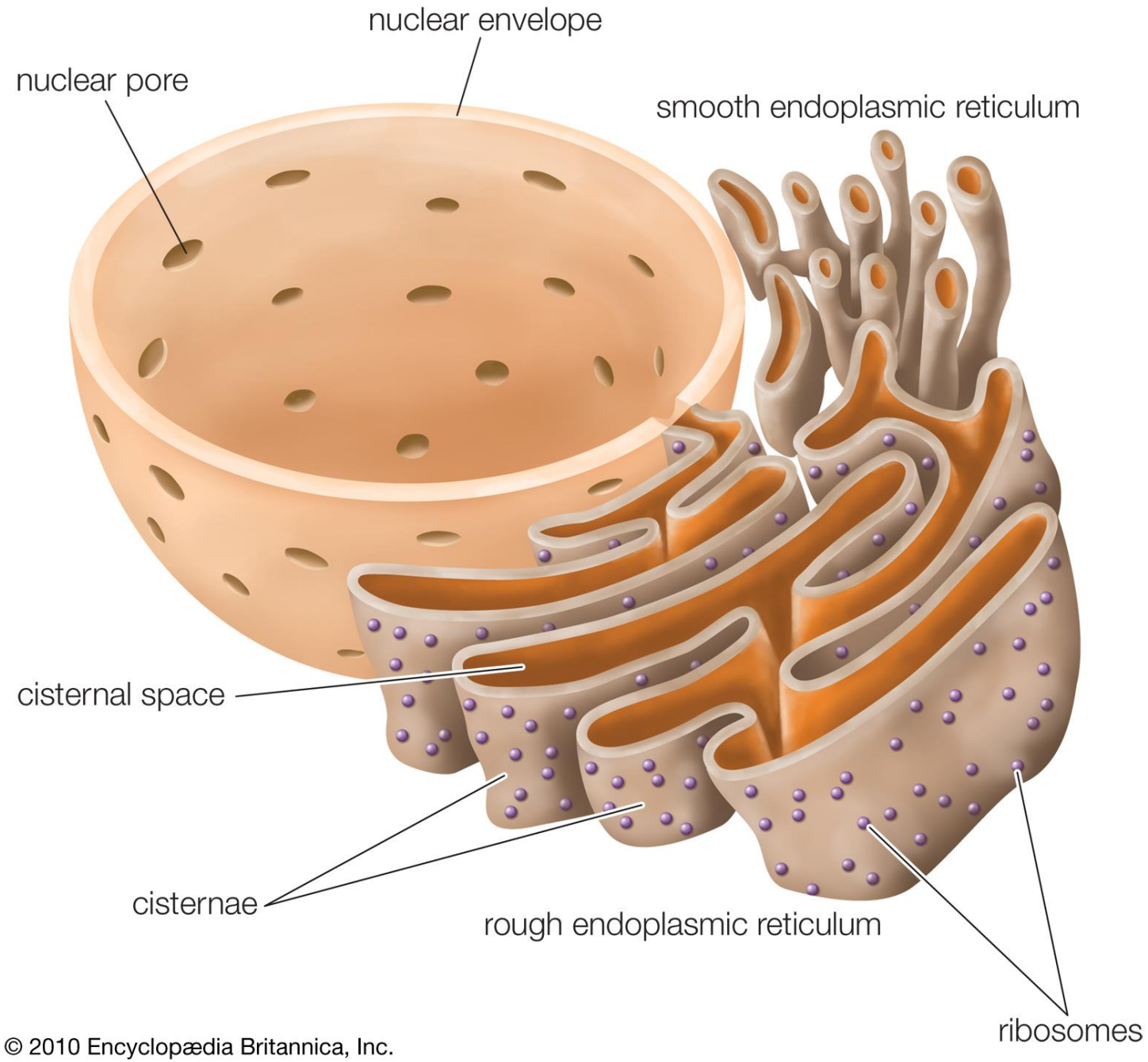


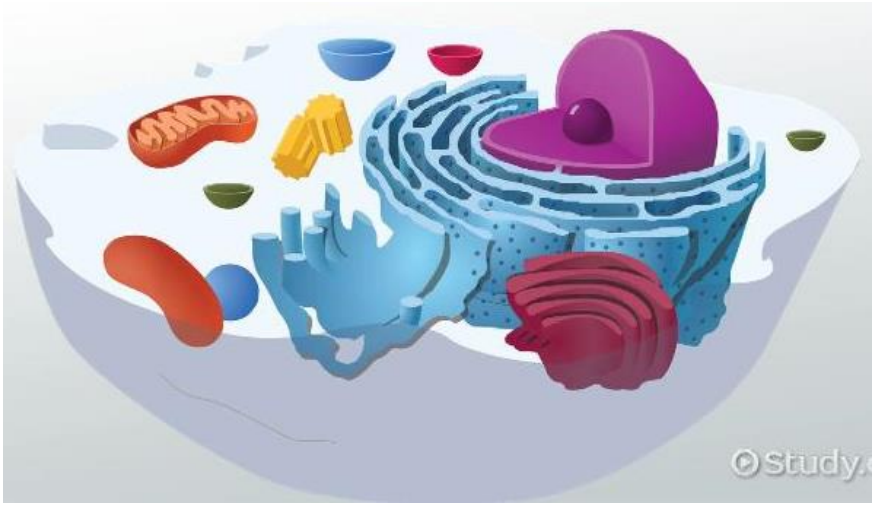
Endoplasmic Reticulum Function

Dr. Rupesh B. Yadav

Asst. Prof.

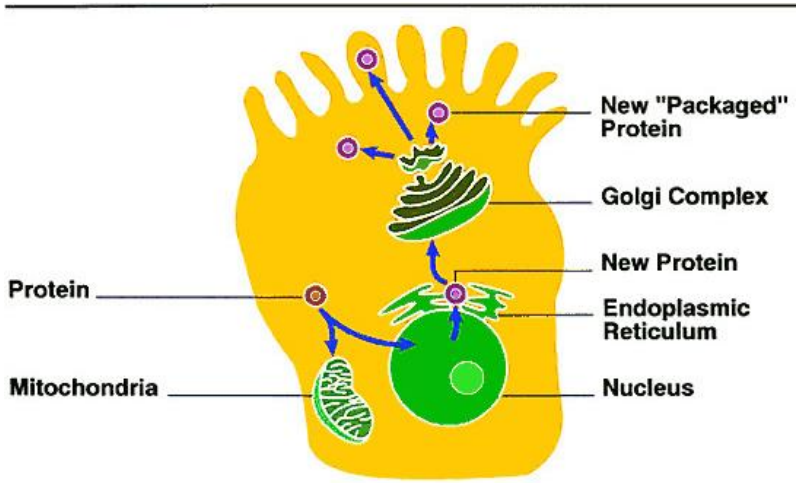
TCSC, Mumbai.

Functions of ER



- **Mechanical Support:** ER divides the fluid content of cell into compartments & thus provides mechanical support for the colloidal structure of the cytoplasm.
- **Cellular Metabolism:** The membrane of ER provides an increased surface for metabolism activities with the cytoplasm such as synthesis of cholesterol, triglycerides and other lipid metabolism.
- **Protein synthesis:** The RER is the main site of protein synthesis. Protein are synthesized on the ribosome and enter ER cisternae through channels in the membrane.

Functions of ER



- **Intracellular Transport:** Protein including enzymes, lipids and probably other material are transported and distributed to the various parts of the cell through ER.

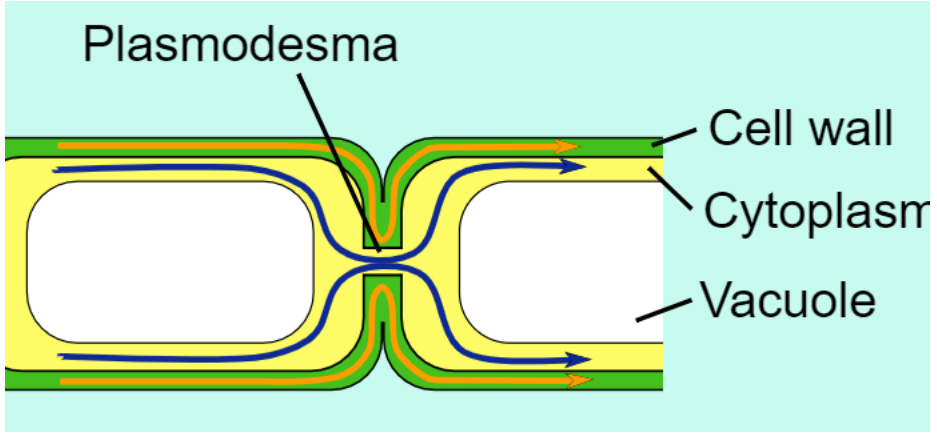
- **Detoxification:** Smooth ER also involved in the detoxification of many endogenous & exogenous compounds. Prolonged administration of certain drugs results in the increased activity of enzymes related to detoxification.

- **Membrane Flow:** Transport of ions, molecules & particles into and out of the cells may also take place through membrane flow. Thus, substances like RNA & nuclear proteins may pass out from the nucleus to the out side of the cell by Nuclear membrane--- Pores--- ER--- Golgi complex--- PM--- Out side.

Functions of ER

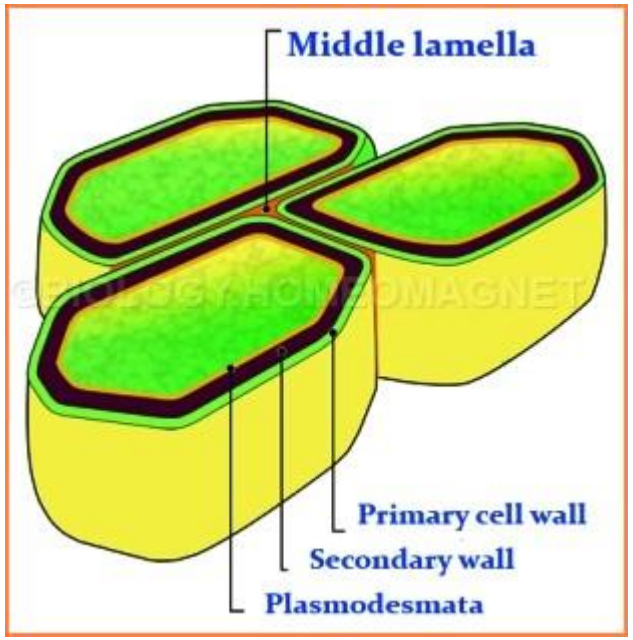
- **Ionic Gradients:** The sarcoplasmic reticulum of straited muscle is involved in the concentration of calcium ions by an energy utilizing ATP. The Calcium ions are sorted in the sarcoplasmic reticulum. When the muscle is stimulated by nerve impulse, hormone or other mean the calcium ions are released leading to muscular contraction.

- **Formation of Plasmodesmata:** Electron microscopic studies suggest that the ER in plants plays a special role in the interconnection of the cells through the cytoplasmic strand called plasmodesmata .



Functions of ER

- **Formation of Secondary Wall:** In the Formation of Secondary cell wall in the plants, certain enzymes & metabolites may be carried by the reticulum to the region of wall synthesis.

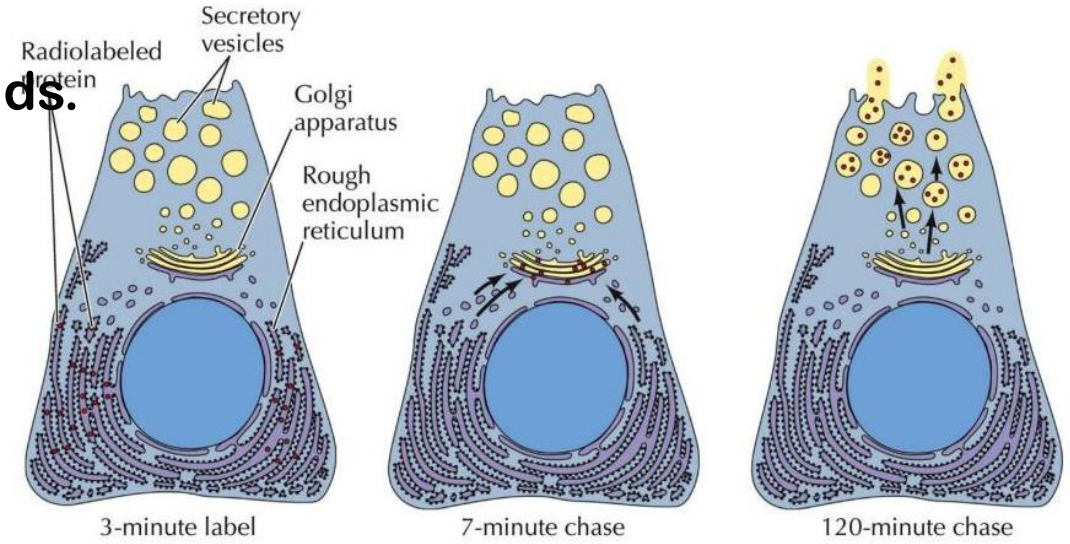


- **Glycogen Synthesis & Storage:** Residual glycogen has been found associated with the ER in fasting animals. ER helps in breakdown of glycogen (Glycogenolysis).

Functions of ER

➢ Lipid Synthesis & storage:

- ✓ Electron microscopic & autoradiographic studies of Stein & Stein (1967) suggested that the ER was the site of triglyceride formation.
- ✓ They injected Labelled material into fasted ethanol treated rats. It was found that the labelled material was seen in the SER & RER after 2 min.
- ✓ The SER membrane also appear to be involved in the formation of lipoprotein complexes.
- ✓ Th ER also associated with storage of Lipids.



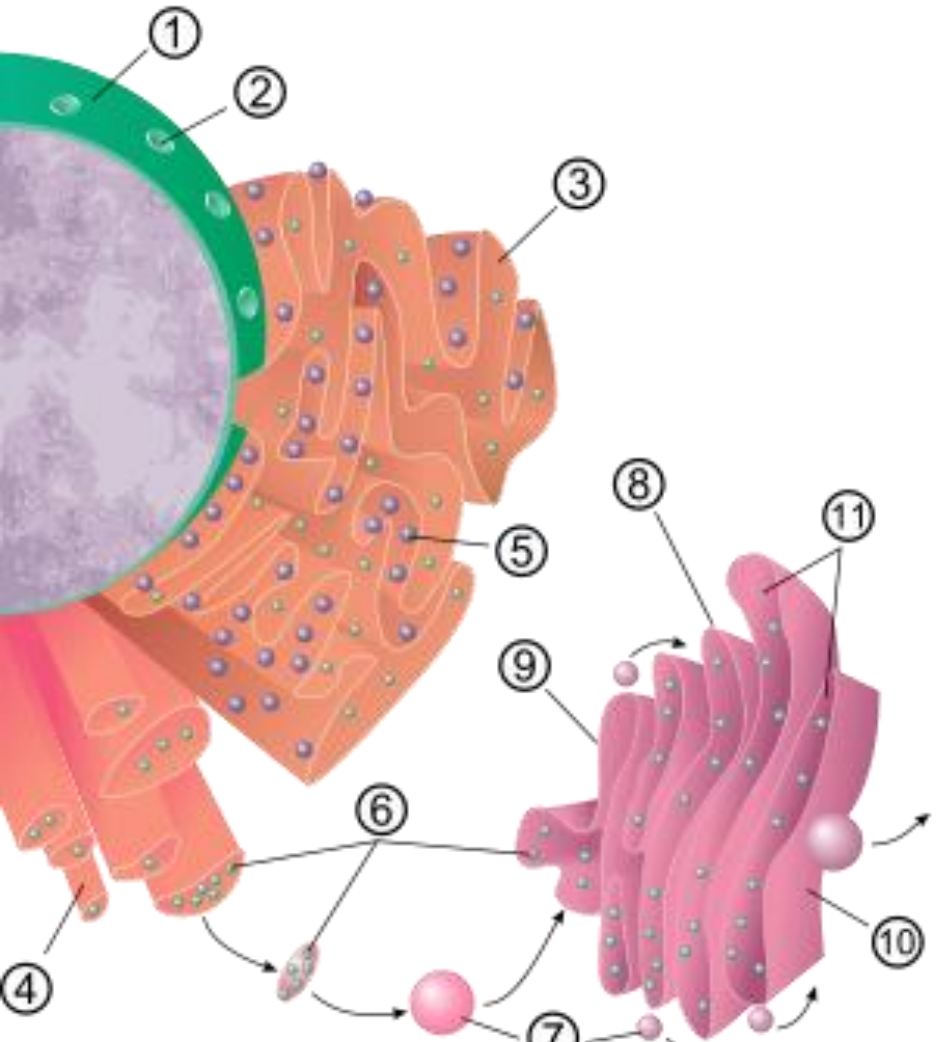
Functions of ER

- **Synthesis of Cholesterol & Steroidal Hormone:**
  - ✓ Cholesterol is an important precursor of steroid hormone. The major site for Cholesterol synthesis is ER.
  - ✓ In the testis, ovaries and adrenal cortex, the SER has a role in the synthesis of steroid hormones.

- **Formation of Microbodies:**
  - ✓ Microtubules are closely related with the ER, which are small granular bodies filled with an electron dense substance.
  - ✓ They have to be found in Protozoans, Yeast, Higher plant, liver & kidney.
  - ✓ They are rich in enzyme peroxidase (Peroxisomes), catalase & D – amino acid oxidase.

Functions of ER

- **Origin of cell organelles:** There are also evidences to show that ER is the place for the origin of the organelles known as primary lysosomes.
- **Amphibian Development:** There are evidences to suggest that the ER contributes in several ways to the development of the amphibian embryo.
- **Cell Differentiation:** Some specific instances of a development have been studied in details, which more or less confirm the argument that the ER is important in the process of cell differentiation. They also help in coordinating the differentiation.



Thank You