**Dr. Rima Kumari: Date: 28/09/2020**

Online class and e- content for MSc IIIrd semester students

|  |  |  |
| --- | --- | --- |
| Date and Time | Online class medium  | E. content topic |
| 28/09/202001:00 p.m to 1.50 p.m | Via Google meetLink: Meeting URL: https://meet.google.com/ygb-kjbo-nyi | **GOLGI APPARATUS** |

**GOLGI APPARATUS**

Camillo Golgi in 1898 discovered a reticular structure in the cytoplasm of nerve cells with the help of metal impregnation technique using silver nitrate for which he received the Nobel Prize. This structure was named as Golgi apparatus or Golgi complex after him. Golgi complex is located near the cell nucleus. Golgi complex is structurally similar in both plant and animal cells, but in plant cells it is more evident and is called a5 dictyosomes which are stack-like or plate-like bodies. Animal bodies contain comparatively much smaller number of Golgi apparatus than plant cells.

The Golgi complex consists of (a) stack of flattened sacs or cisternae (b) small rounded transport vesicles (c) larger vacuoles filled with amorphous or granular material. The cistemae, which are flattened sac like vesicles of Golgi complex, are arranged in parallel series and **are** separated by a space of 20-30 **nm.** Cisternae are gently curved so that the Golgi bodies give a bow like appearance (Fig. 3.2). The convex side facing the endoplasmic reticulum is 'forming' or 'proximal'-face, whereas the concave side oriented towards cell surface is the 'releasing' or 'distal' face of the complex.



**Fig. Golgi apparatus based on the study of electron micrograph. The cisternae exhibit a structure** --

**having two faces i.e. forming face (convex) and releasing face (concave). The forming face is generally**

**curved and closer to the endoplasmic reticulum and the nuclear membrane. The releasing face is concave**

**shaped and encloses a region containing large secretory vesicles**

Small vesicles called transition vesicles are frequently seen lying between rough endoplasmic reticulum and the forming face. It is thought that these vesicles are formed from the ER and migrate to Golgi, where they form new cisternae, which get fused with existing cisternal membrane, and thus the growth of the organelle occurs. New cistemac are formed at the forming face to compensate for the loss of secretory vesicles of the releasing

face. The transformation of membrane from one type to another is a step which leads to the formation of a vesicle. The chemical composition of Golgi complex is intermediary between ER and the plasma membrane. Golgi apparatus is composed of at least three types of sacks which contain different types of enzymes. The most characteristic enzymes are transferases, for example, glycosyl transferase. Besides this, acid phosphatases and other lysosomal and oxidative enzymes are so present. Golgi apparatus performs many functions in the cell such as processing of the molecules secreted by the ER, and packaging of the molecules according to their final destination as shown below:

 **Exocytosis**

 Endoplasmic reticulum

 Golgi complex

 Secretory granules

 Plasma membrane

 Cell exterior

In plant cells, Golgi apparatus helps in the formation of cell plate and cell wall **Recycling.**

**Recycling of Plasma Membrane Components**

During exocytosis secretory vesicles fuse with plasma membrane, adding to the membrane surface area. Yet, the surface area of plasma membrane remains constant. This is due to recycling of the membrane components. This recycling is carried out by subsequent return of the internalised membrane components and by removal of excess membrane through internalisation. For example, plasma membrane of thyroid cells can bind wiih ferritin, endocytosis is induced by addition of thyrotropin to the cells. Immediately after endocytocis, ferritin appears in lysosomes, and within 30 minutes it can be detected in cisternae of Golgi complex (Fig. 3.3). Likewise, endocytosis results in the internalisation of plasma membrane. Golgi complex. may reprocess and reuse the membrane components after endocytosis, and secretion, lysosome formatidn or restoration of plasma membrane itself. Golgi apparatus functions in recycling of the membrane components.



Fig.: **a)** Secretion of proteins across membranes. Proteins from ER enter the forming face of the (Golgi. Proteins from ER destined to **be** secreted out are successively purified and are discharged as vesicles from the distal face.

**b)** Role of the Golgi apparatus in recycling and reuse of plasma membrane components, which enter the

cytosol during endocvtosis