

Quadrant II- Transcript and Related Material

Programme	: Bachelor of Science (First Year)
Subject	: Zoology
Semester	: I
Paper Code	: ZOC101
Paper Title	: Diversity of Non chordates and Cell Biology
Unit Number	: Cell organelles
Module Name	: Structure of Golgi complex
Module Number	: 38
Name of the Presenter	: Dr. Kulkarni Rajender Rao.

Notes

Camillo Golgi (1898) discovered this cellular organelle in Purkinje cells (nerve cells of cerebral cortex) of barn owl and cat, by using Silver chromate impregnation method and termed it as “Internal Reticular Apparatus” . Later it was named as Golgi apparatus / Golgi complex. Dalton and Felix (1954) studied it under the electron microscope.

Golgi complex is a pleomorphic or multiple structural forms cell organelle present in the cytoplasm. It is single (localised) as in vertebrate cells and connected complex form (diffused) as in invertebrates, liver and nerve Cells of vertebrates.

It is absent in prokaryotic cells. e.g. P.P.L.O (pleuro pneumonia like organism), Bacteria and Blue-green algae. It is Present in all eukaryotic cells except, mature RBC and mature erythrocytes.

Shape and Size of Golgi complex is dependent on physiological state of the cells. It is made up of cisternae or saccules, tubules, vacuoles and Vesicles. Zone of exclusion or Golgi ground substance is the location of Golgi complex in cell cytoplasm where generally no other cell organelle like mitochondria, centriole etc present. Position – It is Polar in secretory cells, circum nuclear in nerve cells.

Golgi complex consists of Cisternae or saccules : long, elongated structures arranged in a Single stack of 3-7, with smooth surface without ribosomes. It's lumen is of 60-90 A° in length. Inter cisternal space is about 100-300 A° and filled with matrix. It contains thin layer of cytoplasm having parallel fibrils.

Polarity - Cisternae have Curved margins with convex side as forming (cis) face and the concave side as maturing (trans) face.

Polarization Cis -Trans axis.

Cis / Proximal/ forming face is 3-4 nm width, facing towards Nucleus or Endoplasmic reticulum, where as Trans/distal/maturing face is 6-9 nm width, facing towards Plasma membrane.

Tubules form complex network with fenestrations and interconnects the cisternae at maturing face. Its diameter of 30-50 nm.

Golgian Vacuoles- form from expanded cisternae at concave or maturing face, contain amorphous or granular substance. Some of them contain hydrolases and develop into lysosomes

Vesicles- are small sacs of 20-80 nm diameter attached to the tips of tubules. They are of three types.

Transitional – form new cisternae

Smooth - secretory vesicles from maturing face, which move to Plasma membrane to undergo exocytosis.

Clathrin - coated vesicles have a rough surface and carry material from the P.M to endosomes, Endoplasm to Golgi complex, Golgi Complex to lysosomes.

Cisternal maturation model.

Endoplasmic reticulum /Nuclear membrane produce transitional vesicles at forming face -proximal face - cis face Their contents pass through various stages/reactions of processing and reach the maturing / distal/ trans face.(as they move towards

the *trans* face their product becomes fully mature). Vesicles(smooth or coated) or vacuoles. secretory vesicles , fuse with the plasma membrane , pinched off as secretion.

Chemistry - Golgi complex mainly constitute Proteins-60%,Lipids-40%..Main Phospholipids are Phosphatidyl choline in animals and Phosphatidyl glycerol in plants. It also contains Glycoproteins, Glycolipids,Sialic acid and Galactose. Important enzymes of Golgi complex are Glycosyl transferases for glycoprotein synthesis, Sialyl transferases which transfer Sialic acid from Cytidine monophosphate. Galactosyl transferases which transfer galactose to proteins or lipids. Sulpho and glycotransferases responsible for glycolipid biosynthesis, oxido reductases causing oxidation and reduction reactions, Cytochrome c reductases (Co enzyme Q) act to remove or add hydrogen from reactants and Glucose 6 - phosphatases and ATPases responsible for removal of phosphates from the substrates.

ORIGIN- Golgi complex originates from pre existing stacks by division or fragmentation, from smooth Endoplasmic Reticular vesicles fusion and de novo formation from Cytoplasmic substances.

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