I'm Dr. Kulkarni Rajender Rao from Government College of Art, Science and Commerce, Quepem. I'm going to explain the structure of lysosomes from the unit Cell organelles.

Outlines of this module, structure of lysosomes, labelisers and stabilizers of lysosomes, polymorphism in lysosomes, Enzymes in lysosomes. At the end of this module you can explain the structure of lysosomes. You can list the labilisers and Stabilizers lysosomes, Differentiate the polymorphic forms in lysosomes.. And state the enzymes and their functions.

In the Greek language Lysis.means digestive, Soma means body. So Lysosomes are the digestive bodies. These are small vesicles made up of a single membrane. They enclose different enzymes known as acid hydrolases. They are in the form of minute crystalline or semicrystalline granules. There are about 50 to 60 different types of enzymes. All these enzymes are not necessarily present in a single lysosome. There may be different combinations of enzymes in different lysosomes. Therefore, because of the combination of the enzymes, there are different types of lysosomes. Christian de. Duve in the year 1963, discovered the lysosomes. and coined the term Perinuclear dense granules. He shared the Nobel Prize with Palade and Claude. In the year 1974. Novikoff in the year 1964 observed the lysosomes under electron microscope and coined the term lysosomes. Lysosomes are present in all the eukaryotic cells. Exception is a mature RBC. As the mature RBC loses the nucleus during the maturation, all other cell organelles are absent in the mature RBC .lysosomes are absent in prokaryotic cells, as all the membrane bound organelles are absent in prokaryotic cells, The number of lysosomes is few in muscle cells.but abundant in absorptive organs. That is like intestine, secretory organs like liver, excretory organs like kidneys and in all the cells with. active phagocytic activity, like for example acinar cells of the pancreas, leukocytes, lung cells and uterine cells. Lysosomes are generally round in shape,

Sometimes they are irregular also. They have a diameter between .2 to.8 micrometers. Some of these are large and grow up to five micrometres, as you see in some leukocytes and kidney cells. The interior is solid. or differentiated into outer dense region, and a central less dense mass with granular content. The covering membrane separates hydrolytic enzymes from cellular contents. As the contents are acid hydrolases. The covering membrane itself gets protected from the action of these enzymes, because of its high glycosylation of proteins. The covering membrane contains high lipid concentration, because of which it can easily fuse with other membranes. Lysosomes are referred to as suicidal bags. The reason being it contains the digestive or destructive enzymes. Also known as acid hydrolases because they perform. or they function in acidic condition of about five (5) pH. When the membrane of the lysosome rupture the entire cellular contents which come in contact with these enzymes will undergo destruction or lysis. For this reason, these organelles are called lysosomes. The membrane stability of lysosomes depends on the. Balance between labilisers and stabilizers. The following are the stabilizers. Cholesterol Corticosteroids, like cortisone, cortisol and chloroquine. These chemicals are responsible for stabilizing the lysosomal membrane. The labellizers are the absence of oxygen.or the presence of excess.of vitamin A&E. androgens, estrogens bile salts. Carcinogenic substances. Silica asbestos particles ,heat,mini drinks, X Rays.and ultraviolet rays. Coming to the formation of Lysosomes Endoplasmic reticulum. Produces Precursors of hydrolytic enzymes. These enzymes. pinch off or bleb off. from the endoplasmic reticulum as small vesicles. These vesicles Fuse and form the cis face of Golgi Complex. These precursors in the Golgi complex undergo various changes, or different reactions, and gets converted into enzymes. These enzymes. will be pinched off as the vesicles from the maturing phase of Golgi complex. Once they pinch off from the Golgi complex, the secretory vesicles. Join with the

endosomes and form the lysosomes. Polymorphism. That is, existence of more than one morphological form in the cell. Lysosomes exhibit polymorphism. They are present in different forms in the cell. They pass through various stages in the same cell. There are four important types of lysosomes. In the cell based on the morphology and functions, the first one primary, lysosomes or proto lysosomes or storage granules. They are filled with hydrolytic enzymes from the ribosomes accumulated in the endoplasmic reticulum and processed in the Golgicomplex. These are also called secretory vesicles. and they form the primary lysosomes in the cytoplasm. Secondary lysosomes or phagolysosomes or hetero phagosomes or digestive vacuoles. By the process of phagocytosis. The food or other substances enter into the cell.In the form the phagosome. The phagosome, which is formed from the plasma membrane enter into the cytoplasm and fuse with the lysosomes ,results into the formation of secondary Lysosome Or phagolysosomes.. Once the lysosome fuse with the phagosome, the enzymes or digestive enzymes present in the lysosome, enter into the phagosome and perform the digestion. So the digested food is absorbed into the cytoplasm and the undigested food remain in the secondary lysosome, which is known as the residual body. The third type of the lysosomes is known as the residual. bodies or telo lysosomes with indigestible food. The residual bodies have to be removed from the sell by the process of exocytosis aor ephagy. If due to any reason, residual bodies remain inside the cell. or failure of exocytosis or ephagy of telo lysosomes, results into the several storage diseases like hepatitis, which results in the liver inflammation due to the survival of hepatitis virus in the cell forms. Disease is due to the accumulation of glycogen resulting in defective muscular function. Hurler's disease. Due to the cartilage and bone abnormalities resulting in the limb deformities and heart diseases. Poly Nephritis Results in the cloudy, dark, bloody and foul smelling urine. With frequent and painful urination.

Failure of. Exhausted process of residual bodies also results in the aging of the cells at a faster rate. The fourth form of lysosomes Is autophagic vacuoles are autophagosomes also known as autolysosomes .site to lysosomes degenerated, are injured intracellular organelles are wrapped over by membranes of endoplasmic reticulum, and these degenerated are. Injured intracellular organelles are recognized by the primary lysosomes and issues with the degenerated are. Injured organelles. Results in the formation of Autophagosomes.or the process is known as autophagy or autodigestion.Autophagy mainly play important role in. Scavenging removal of the waste from the cell. The worn out or aged cells dispose of. And the process is known as apoptosis. For this reason, lysosomes are regarded as disposal bags. The digestive products are used for the synthesis of new structures. For this reason, lysosomes are known as recycling centers. Autophagic vacuoles provide nourishment during starvation. That is during starvation, primary lysosomes will fuse with several cell organelles like mitochondria, which is rich. with the energy, and provides the nourishment during starvation. Coming to the important enzymes and their substrates. Proteases like cathepsin acts on the proteins ,. Proteases like collagenases act on the collagen and peptidases act on the peptides. Nucleases like ribonucleases act on, RNA and deoxyribonucleases acts on the DNA. Phosphatases like acid phosphatases act on Phosphate monoesters phosphodiesterases act on the phosphodiesters. Galactosidases, Glucosidases act on Glycogen.Mannosidases act on Mannosides and glycoproteins Sialidases act on Sialic acid derivatives, . Lysosomes acts on the Mucopolysaccharides .Nucleases acts on Polynucleotides, Hyaluronidase acts on Hyaluronic acid and chondroitin sulphate. Phospholipases acts on lecithin and ,Phosphatidylethanolamine,Esterases acts on Fatty acids.

Thank you.