Skills to Develop

1. Describe the structure and state the function of the following:
   a. lysosomes
   b. peroxisomes
   c. proteasomes
   d. vacuoles

Eukaryotic cells contain a variety of internal membrane-bound organelles that are not a part of the endomembrane system. These include mitochondria, chloroplasts, lysosomes, peroxisomes, vacuoles, and vesicles. We will now look at lysosomes, peroxisomes, vacuoles, and vesicles.

Lysosomes

Lysosomes, synthesized by the endoplasmic reticulum and the Golgi complex, are membrane-enclosed spheres typically about 500 nanometers in diameter that contain powerful digestive enzymes. They function to digest materials that enter by endocytosis. The enzymes are called acid hydrolases because the function best at a slightly acid pH, maintained by pumping protons into the lysosome. During endocytosis, the cytoplasmic membrane invaginates and pinches off placing the ingested material in a vesicle or vacuole called an endosome. Primary lysosomes fuse with the endosome forming a secondary lysosome where the materials within are digested.
Peroxisome

Peroxisomes are membrane-bound organelles containing an assortment of enzymes that catalyze a variety of metabolic reactions.

Proteasome

Proteasomes are cylindrical complexes that use ATP to digest proteins into peptides (def) and play a critical role in enabling the body to kill infected cells and cancer cells during adaptive immunity.
Vacuoles and Vesicles

Vacuoles are large membranous sacs; vesicles are smaller. Vacuoles (see Fig. 32A) are often used to store materials used for energy production such as starch, fat, or glycogen. Plant cells often contain large vacuoles filled with water. Vacuoles and vesicles also transport materials within the cell and form around particles that enter by endocytosis (def).

Summary

1. Lysosomes, synthesized by the endoplasmic reticulum and the Golgi complex, are membrane-enclosed spheres typically about 500 nanometers in diameter that contain powerful digestive enzymes that function to digest materials that enter by endocytosis.
2. Peroxisomes are membrane-bound organelles containing an assortment of enzymes that catalyze a variety of metabolic reactions.
3. Proteasomes are cylindrical complexes that use ATP to digest proteins into peptides and play a critical role in enabling the body to kill infected cells and cancer cells during adaptive immunity.
4. Vacuoles are large membranous sacs; vesicles are smaller. Vacuoles are often used to store materials used for energy production such as starch, fat, or glycogen. Vacuoles and vesicles also transport materials within the cell and form around particles that enter by endocytosis.

Questions

Study the material in this section and then write out the answers to these questions. Do not just click on the answers and write them out. This will not test your understanding of this tutorial.

1. Match the following:
   ______ Cylindrical complexes that use ATP to digest proteins into peptides. (ans)
   ______ Membrane-enclosed spheres that contain powerful digestive enzymes to digest materials that enter by endocytosis. (ans)
   ______ Large membrane-enclosed spheres often used to store water or materials used for energy production such as starch, fat, or glycogen. (ans)
   ______ Membrane-bound organelles containing an assortment of enzymes that catalyze a variety of metabolic reactions. (ans)
      a. lysosomes
      b. peroxisomes
      c. proteasomes
      d. vacuoles
      e. vesicles

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