

What Are Lysosomes?

Worksheet

Lysosomes are organelles containing digestive enzymes that break down waste, damaged organelles, and foreign particles, recycling their components for the cell to reuse.

Questions

1. What do lysosomes contain that lets them break down material?

- A) ATP
- B) Digestive enzymes
- C) DNA
- D) Chlorophyll

2. What pH do lysosomal enzymes work best in?

- A) Strongly basic
- B) Neutral
- C) Acidic
- D) Strongly alkaline

3. What is 'autophagy'?

- A) A cell dividing
- B) A lysosome digesting the cell's own damaged parts
- C) DNA replication
- D) Protein synthesis

4. Which organelles work together to produce and package lysosomal enzymes?

- A) Mitochondria and nucleus
- B) Rough ER and Golgi apparatus
- C) Ribosomes and vacuole
- D) Cell membrane and cytoskeleton

5. A white blood cell engulfs a bacterium. How do lysosomes help destroy it?

6. During metamorphosis, a tadpole's tail is broken down and disappears. What role do lysosomes play?

7. A rare genetic disorder prevents a specific lysosomal enzyme from working. What would you predict happens inside cells?

8. Define: What is the main function of lysosomes?

9. Define: Why are lysosomes called the cell's 'recycling center'?

10. Define: What environment do lysosomal enzymes need to work best?

Answer Key

1. B) Digestive enzymes - Lysosomes are packed with digestive (hydrolytic) enzymes.
2. C) Acidic - Lysosomal enzymes are optimized for the acidic interior of the lysosome, around pH 4.5-5.
3. B) A lysosome digesting the cell's own damaged parts - Autophagy is the process of lysosomes breaking down and recycling a cell's own damaged components.
4. B) Rough ER and Golgi apparatus - Enzymes are synthesized on the rough ER, then packaged into lysosomes by the Golgi apparatus.
5. The white blood cell engulfs the bacterium into a vesicle called a phagosome. A lysosome fuses with the phagosome, forming a phagolysosome. Digestive enzymes inside the lysosome break down the bacterium's proteins, lipids, and nucleic acids. The destroyed material's useful parts are recycled; the rest is expelled.
6. Lysosomes in tail cells rupture and release their digestive enzymes into the cytoplasm, a process called autolysis. The enzymes digest the cell's own structures from within. The broken-down materials are absorbed and reused by the developing frog's body, and the tail disappears.
7. Without that enzyme, the specific substrate it normally breaks down cannot be digested. The undigested material accumulates inside the lysosome over time. This buildup, called a lysosomal storage disease like Tay-Sachs disease, damages the cell and can impair organ function.
8. To digest waste, damaged organelles, and foreign material using digestive enzymes.
9. Because they break down materials and release reusable molecules back into the cytoplasm.
10. An acidic environment, around pH 4.5-5.

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