Lysosome Glossary

Acid Hydrolase

A type of enzyme that functions optimally at acidic pH and breaks down biomolecules such as proteins, lipids, nucleic acids, and carbohydrates.

Autolysis

The self-destruction of a cell through the action of its own lysosomes, often associated with cell death or injury.

Autophagy

A cellular process in which a cell digests its own components, such as damaged organelles or misfolded proteins, using lysosomes.

Cathepsin

A family of proteases (protein-digesting enzymes) found in lysosomes, involved in degrading intracellular and extracellular proteins.

Christian de Duve

The Belgian scientist who discovered lysosomes in the 1950s and coined the term. He was awarded the Nobel Prize in 1974 for his work.

Endocytosis

The process by which cells internalize external materials by engulfing them with the cell membrane, forming vesicles that often fuse with lysosomes for digestion.

Endosome

A membrane-bound compartment inside cells that forms as a result of endocytosis; early endosomes can mature into late endosomes and fuse with lysosomes.

Enzyme

A biological catalyst, typically a protein, that speeds up chemical reactions. Lysosomes contain digestive enzymes to break down macromolecules.

Gaucher's Disease

A lysosomal storage disorder caused by a deficiency in the enzyme glucocerebrosidase, resulting in the accumulation of glycolipids.

Golgi Apparatus

A cellular organelle responsible for modifying, packaging, and sorting proteins and lipids. It produces enzyme-containing vesicles that form lysosomes.

Lysosomal Storage Disorder (LSD)

A group of inherited metabolic diseases caused by defects in lysosomal enzymes or transporters, leading to substrate accumulation.

Lysosome

A membrane-bound organelle found in most animal cells that contains enzymes for breaking down biological molecules and cellular waste.

Macrophage

A type of white blood cell that engulfs and digests pathogens and debris; contains many lysosomes to carry out its immune functions.

mTORC1

A protein complex that regulates cell growth, nutrient sensing, and lysosomal biogenesis through signaling pathways.

Mannose-6-Phosphate (M6P)

A molecular tag added to lysosomal enzymes in the Golgi apparatus to direct them to the lysosome.

Niemann–Pick Disease

A group of lysosomal storage diseases involving accumulation of sphingomyelin or cholesterol due to enzyme deficiencies.

pH

A scale measuring the acidity or alkalinity of a solution. Lysosomes maintain an acidic pH (~4.5–5.0), necessary for optimal enzyme activity.

Phagocytosis

The process by which a cell engulfs large particles, such as pathogens or debris, forming a phagosome that fuses with lysosomes for degradation.

Phagosome

A vesicle formed around a particle engulfed by phagocytosis. It fuses with a lysosome to form a phagolysosome where digestion occurs.

Peroxisome

A membrane-bound organelle similar to the lysosome but involved in oxidative reactions like fatty acid breakdown and detoxification of hydrogen peroxide.

Pompe Disease

A lysosomal storage disorder caused by a deficiency of the enzyme acid alpha-glucosidase, leading to glycogen buildup in tissues.

Protease

An enzyme that digests proteins by hydrolyzing peptide bonds; many proteases are found in lysosomes (e.g., cathepsins).

Tay–Sachs Disease

A fatal genetic disorder caused by a deficiency of the lysosomal enzyme hexosaminidase A, leading to accumulation of GM2 gangliosides in neurons.

Trans-Golgi Network (TGN)

The region of the Golgi apparatus where lysosomal enzymes are sorted and packed into vesicles destined for lysosomes.

Vacuolar H+-ATPase

A proton pump embedded in the lysosomal membrane that maintains the acidic internal environment by actively transporting protons into the lysosome.

Vesicle

A small membrane-bound sac used to transport substances within a cell. Vesicles carrying enzymes or substrates can fuse with lysosomes.