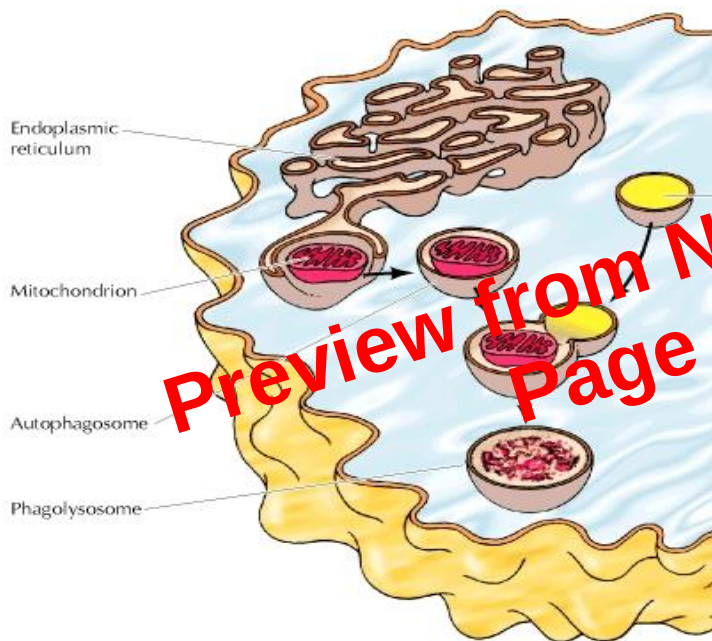


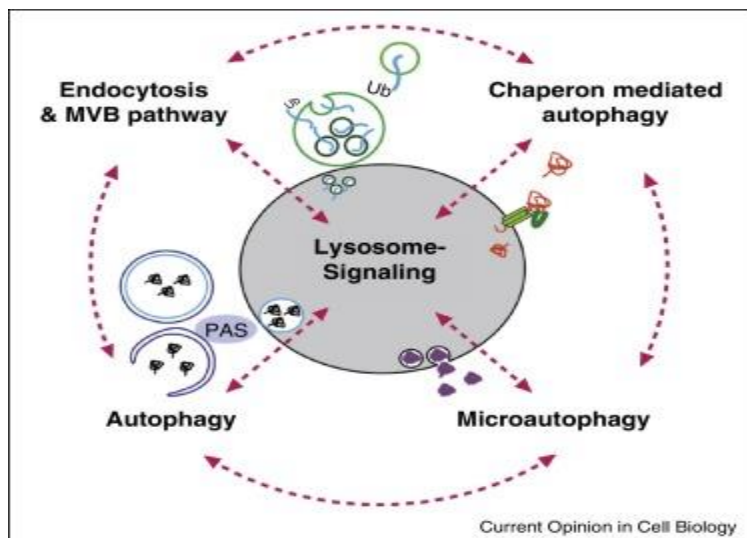
Lysosomal Proteolysis

- The other major pathway of protein degradation in eukaryotic cells involves the uptake of proteins by lysosomes. Lysosomes are membrane-enclosed organelles that contain an array of digestive enzymes, including several proteases. They have several roles in cell metabolism, including the digestion of extracellular proteins taken up by endocytosis as well as the gradual turnover of cytoplasmic organelles and cytosolic proteins.
- The containment of proteases and other digestive enzymes within lysosomes prevents uncontrolled degradation of the contents of the cell. Therefore, in order to be degraded by **lysosomal proteolysis**, cellular proteins must first be taken up by lysosomes. One pathway for this uptake of cellular proteins, autophagy, involves the formation of vesicles (**autophagosomes**) in which small areas of cytoplasm or cytoplasmic organelles are enclosed in membranes derived from the endoplasmic reticulum. These vesicles then fuse with lysosomes, and the **degradative lysosomal enzymes** digest their contents. The uptake of proteins into autophagosomes appears to be nonselective, so it results in the eventual slow degradation of long-lived cytoplasmic proteins.



➤ The lysosome system

Lysosomes contain various digestive enzymes, including proteases. Lysosomes take up cellular proteins by fusion with autophagosomes, which are formed by the enclosure of areas of cytoplasm or organelles (e.g., a mitochondrion) in fragments of the endoplasmic reticulum. This fusion yields a phagolysosome, which digests the contents of the autophagosome.[2]



➤ Regulation of lysosomal degradation pathways.

Autophagy, endocytosis and the MVB pathway, chaperone mediated autophagy (CMA) and microautophagy (MA) are depicted. Regulation by lysosomal signaling and potential cross-talks are indicated. [3]