Golgi complex

Lipid and polysaccharide metabolism

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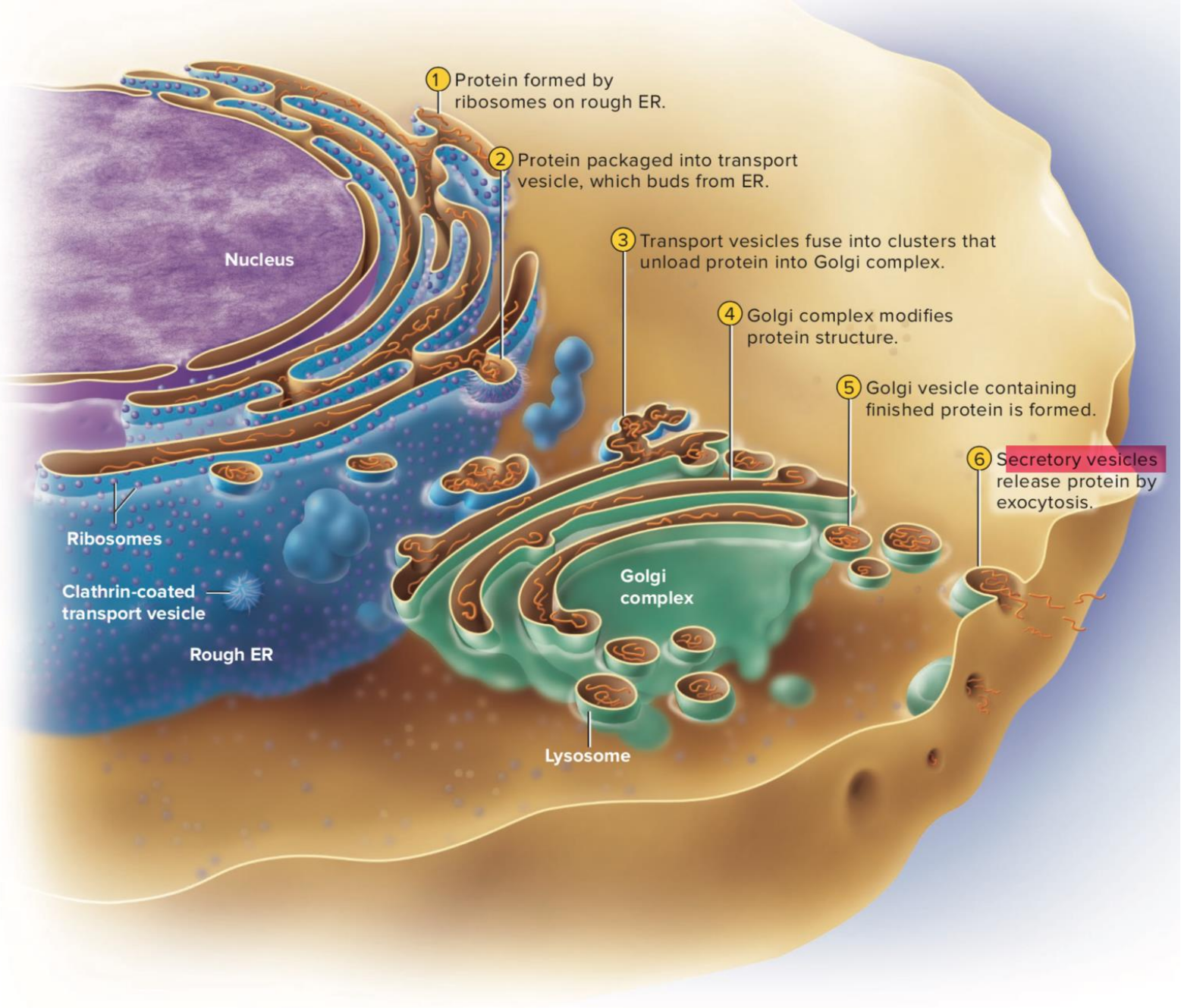
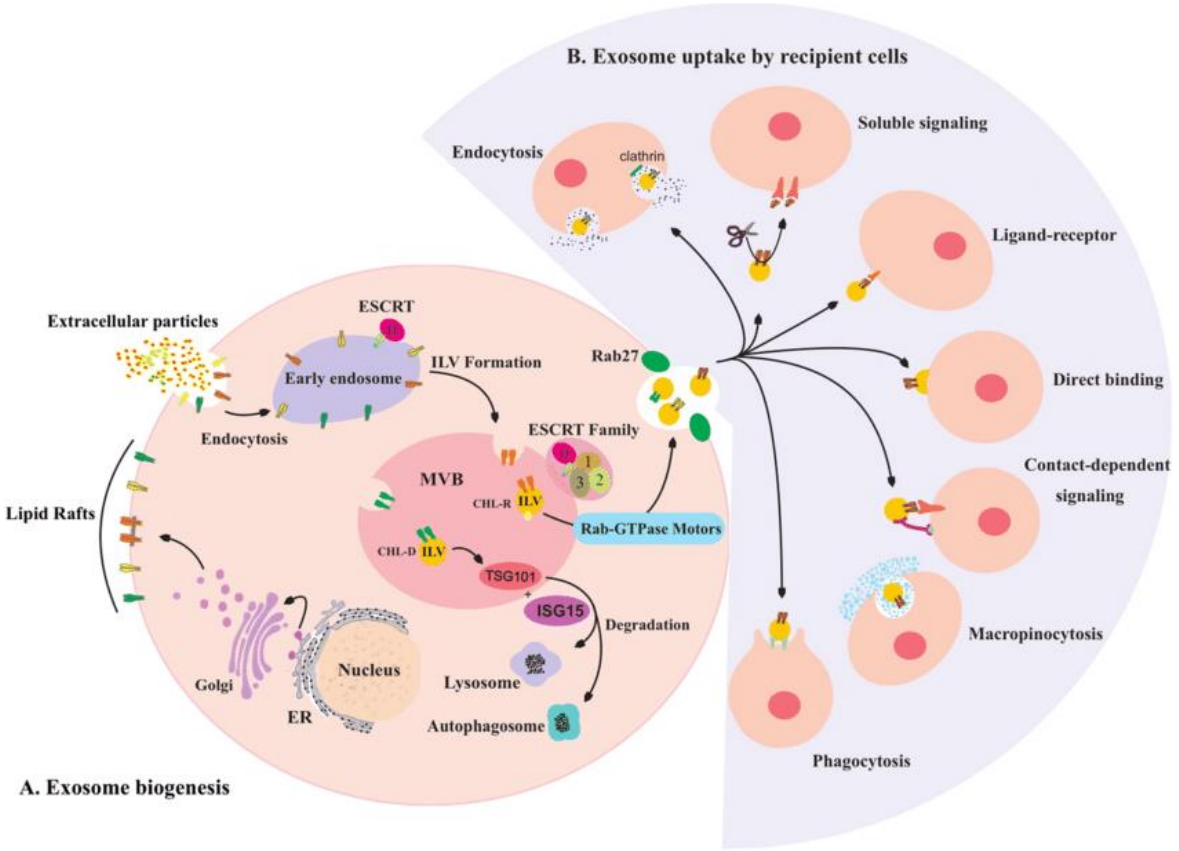


FIGURE 4.11 Protein Processing and Secretion. See the text for further explanation of the numbered steps.

Lipid and polysaccharide metabolism

- In addition to its activities in processing and sorting glycoproteins, the Golgi apparatus functions in lipid metabolism—in particular, in the synthesis of glycolipids and sphingomyelin.
- The glycerol phospholipids, cholesterol, and ceramide are synthesized in the ER. Sphingomyelin and glycolipids are then synthesized from ceramide in the Golgi apparatus.

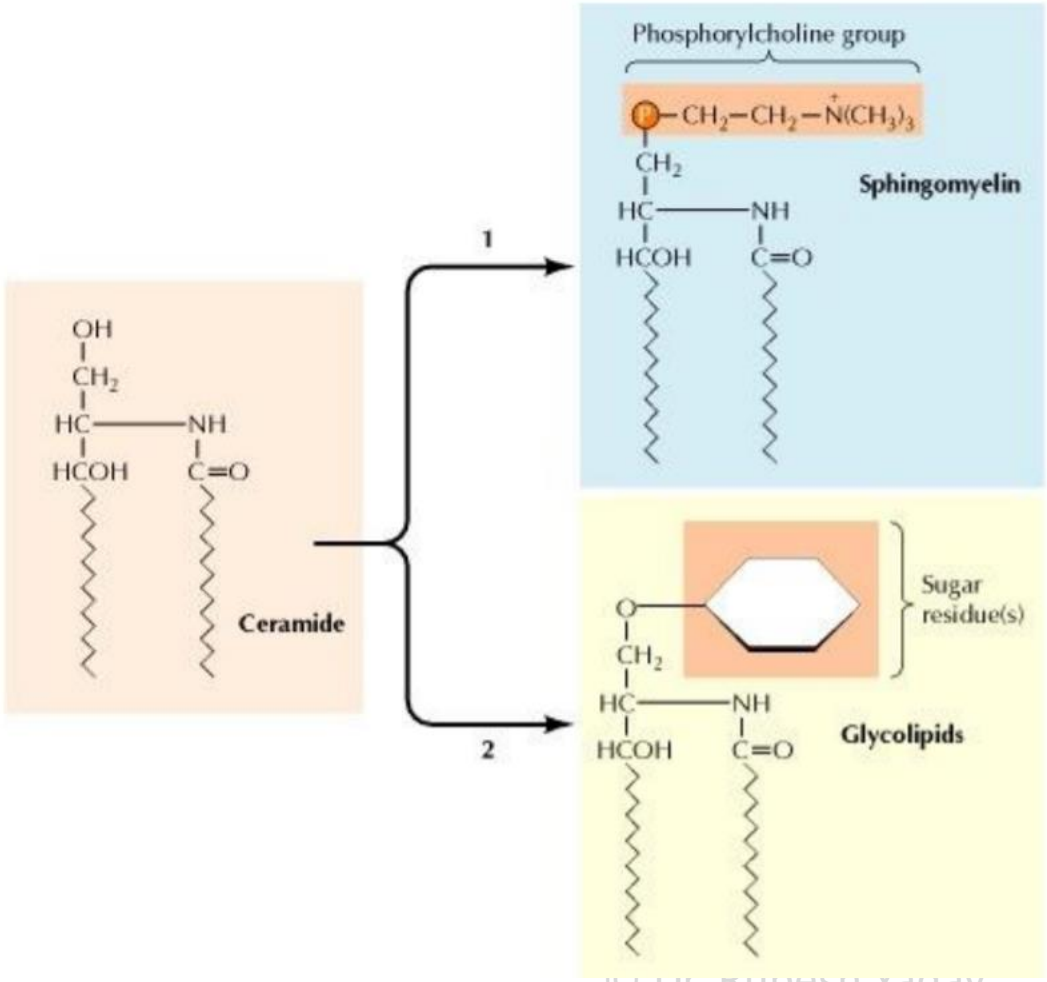


Lipid and polysaccharide metabolism

- One of the most important functional properties of the plant Golgi apparatus is its ability to synthesize complex matrix polysaccharides of the cell wall.

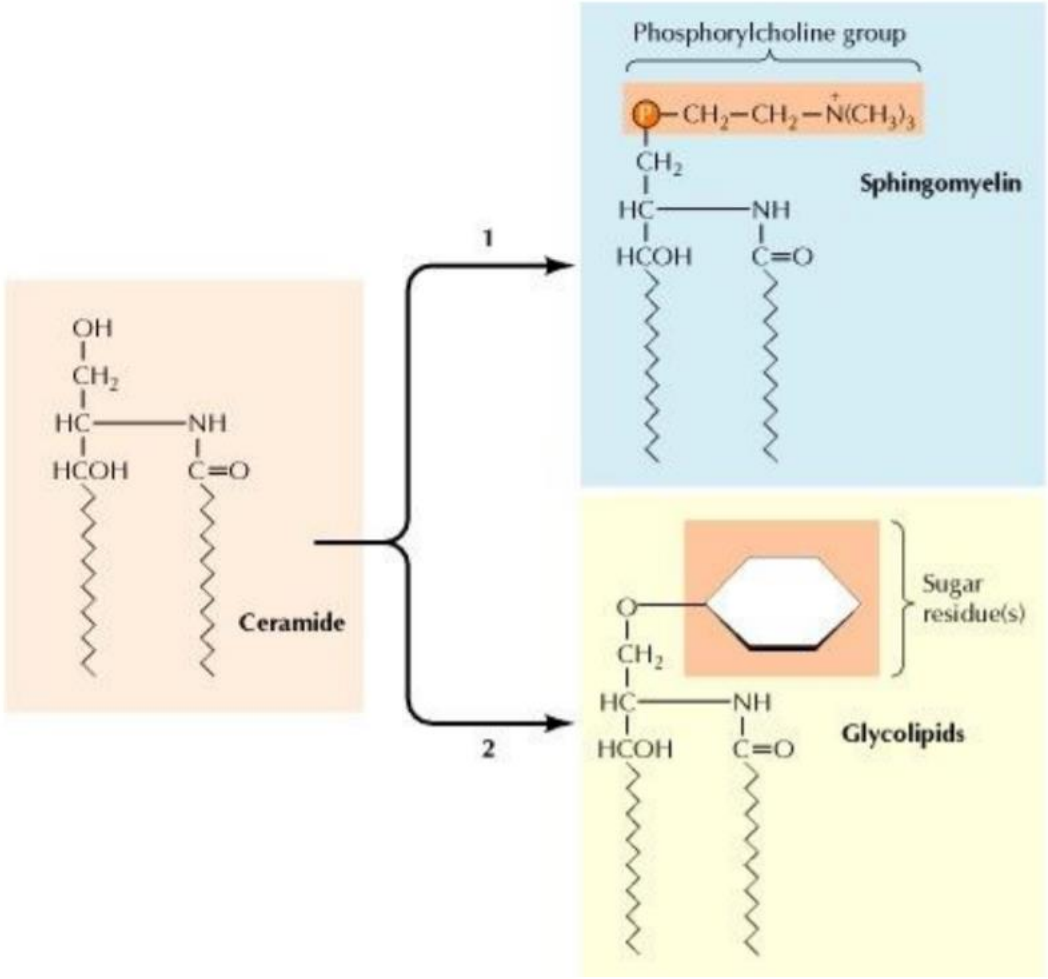
- The synthesis of cell wall matrix polysaccharides occurs through the concerted action of hundreds of glycosyltransferases.

- In animals cell, most of the glycosaminoglycans of the extracellular matrix are synthesized in the Golgi.



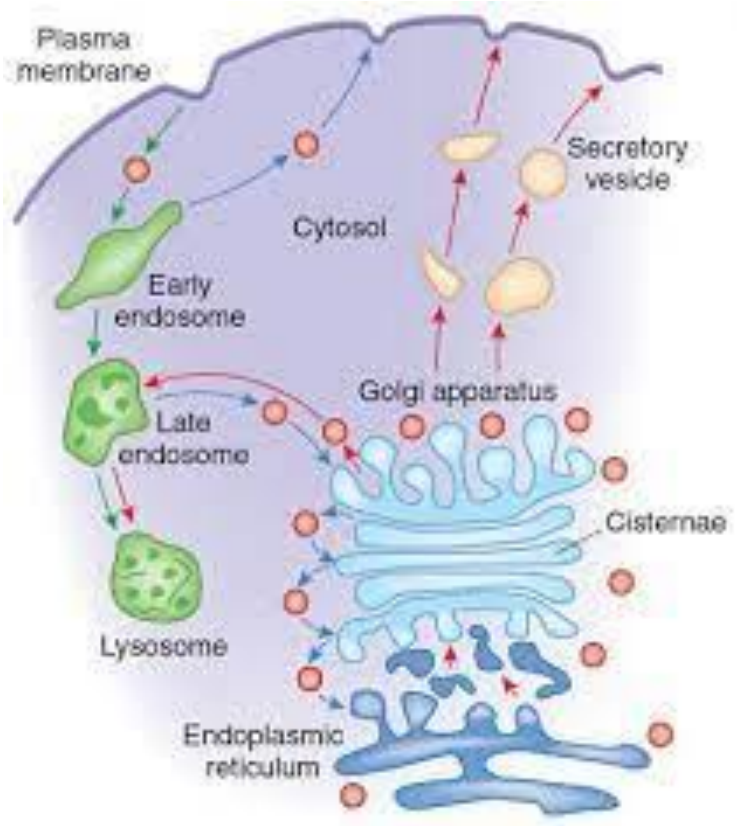
Lipid and polysaccharide metabolism

- **Synthesis of sphingomyelin and glycolipids:**
  - Ceramide, which is synthesized in the ER, is converted either to sphingomyelin (a phospholipid) or to glycolipids in the Golgi apparatus.
  - In the first reaction, a phosphorylcholine group is transferred from phosphatidylcholine to ceramide. Alternatively, a variety of different glycolipids can be synthesized by the addition of one or more sugar residues (e.g., glucose).



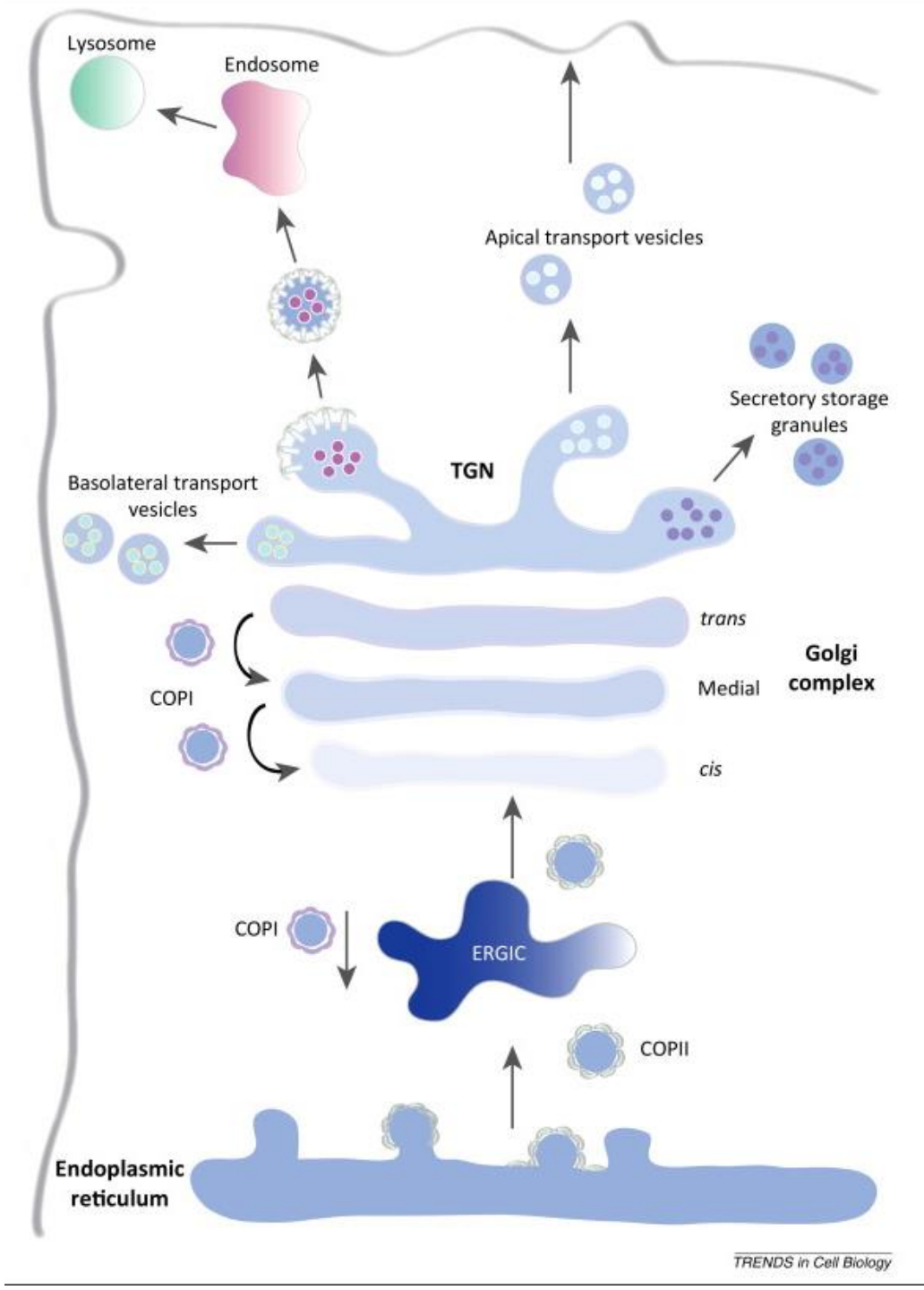
Protein sorting and secretion

- The Golgi apparatus is responsible for transporting, modifying, and packaging proteins and lipids into vesicles for delivery to targeted destinations.
- Secretory pathway involves sorting of proteins into different kinds of transport vesicles. Which bud from the trans Golgi network and deliver their contents to the appropriate cellular locations.



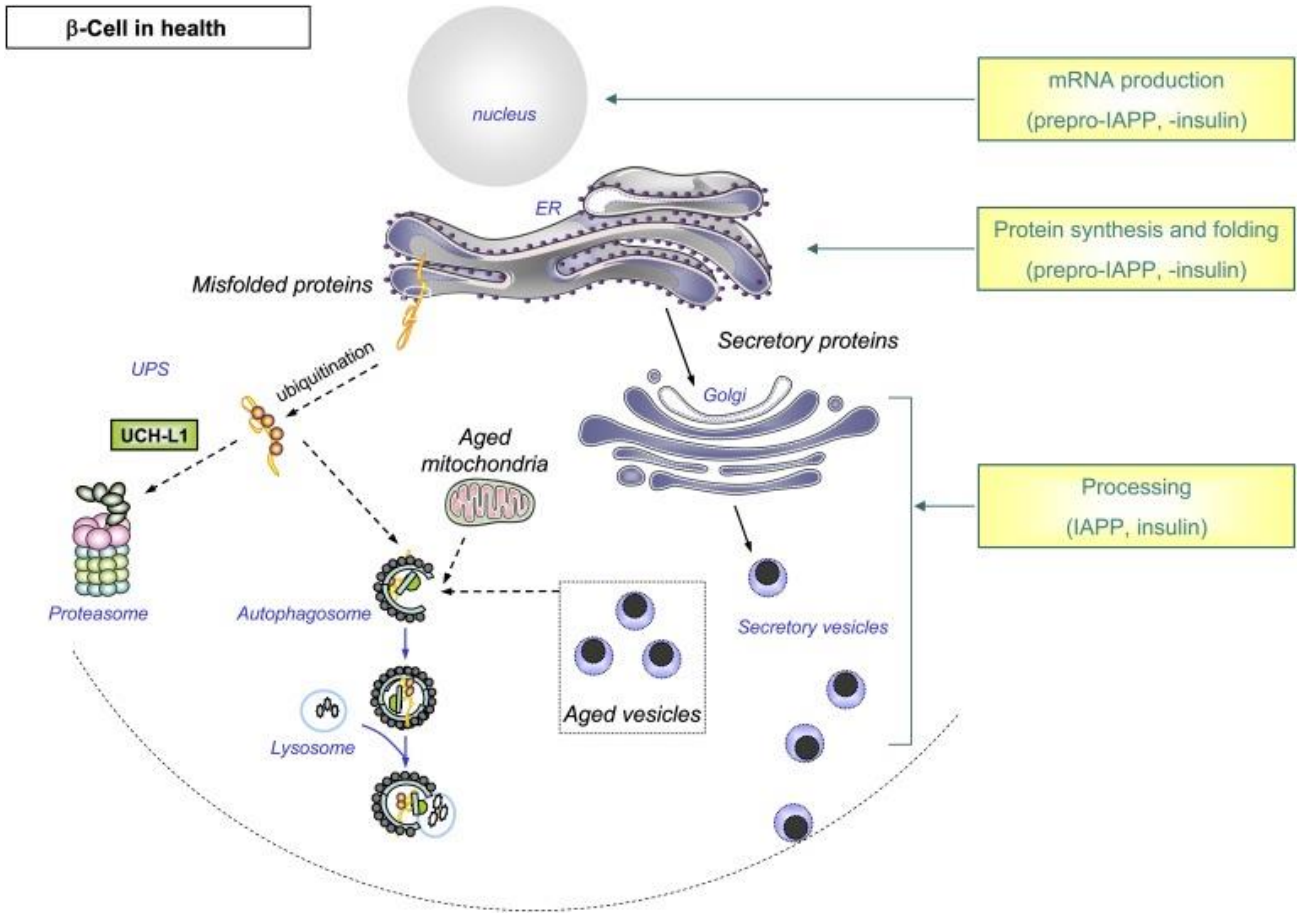
Protein sorting and secretion

- The Golgi apparatus modifies and sorts proteins for transport throughout the cell. Protein cargo moves from the ER to the Golgi, is modified within the Golgi, and is then sent to various destinations in the cell, including the lysosomes and the cell surface.



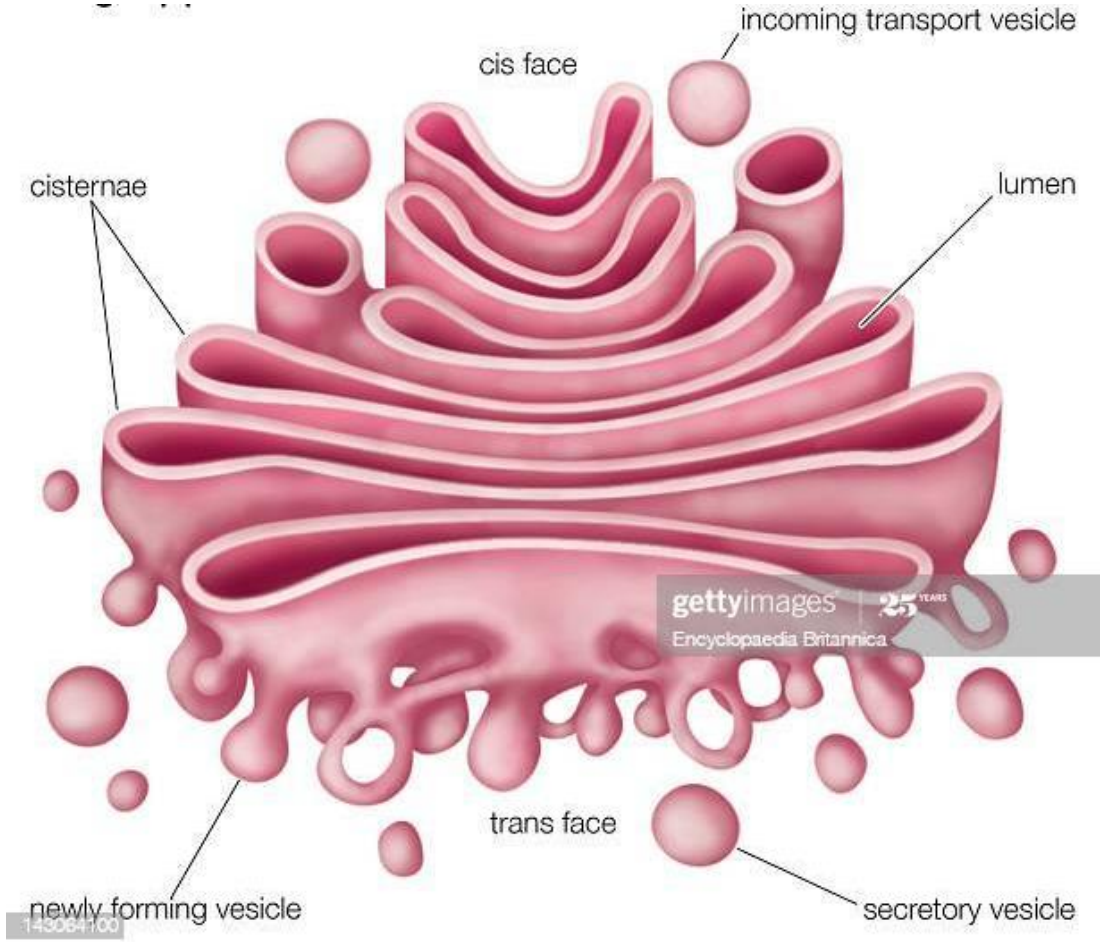
Protein sorting and secretion

- **Proteins are sorted into** the regulated secretory pathway in the **trans Golgi network**, where they are packaged into specialized secretory vesicles.
- These **secretory vesicles, which are larger than other transport vesicles**, store their contents until specific signals direct their fusion with the plasma membrane.



Golgi Anti-Apoptotic Protein (GAAP)

- Golgi anti-apoptotic proteins (GAAPs) are multi-transmembrane proteins that are expressed in the Golgi apparatus.
- Within eukaryotes, GAAPs regulate the Ca2+ content of intracellular stores, inhibit apoptosis, and promote cell adhesion and migration.
- GAAPs are oligomeric (chemical process that converts monomers to macromolecular complexes), multi-transmembrane proteins that are resident in Golgi membranes and form cation-selective ion channels that may explain the multiple functions of these proteins.
- Although GAAPs are naturally oligomeric, they can also function as monomers, a feature that distinguishes them from other virus-encoded ion channels that must oligomerize for function.



Thank You