

LEC 3 Q- CYTOLOGY:-

1. **Which of the following best describes the primary function of the Golgi apparatus?**

- A) Synthesis of proteins in the cytoplasm
- B) Further processing, modification, and sorting of proteins and lipids
- C) Degradation of cellular waste
- D) Synthesis of ribosomal RNA

Answer: B

2. **The Golgi apparatus is structurally characterized by:**

- A) A single, continuous membrane
- B) A stack of flattened sacs with distinct cis, medial, trans compartments, and a trans-Golgi network
- C) A series of tubular structures interconnected by microtubules
- D) An arrangement of ribosomes and endoplasmic reticulum

Answer: B

3. **What distinguishes N-linked glycosylation from O-linked glycosylation in the context of protein modification?**

- A) N-linked glycosylation occurs only in the Golgi, while O-linked begins in the ER.
- B) N-linked glycosylation involves adding carbohydrates to asparagine residues, whereas O-linked involves serine and threonine residues.
- C) Both processes occur exclusively in the ER.
- D) O-linked glycosylation is more prevalent than N-linked glycosylation.

Answer: B

4. **Which statement accurately describes the dynamic nature of the Golgi apparatus?**

- A) Proteins move exclusively in the cis-to-trans direction without retrograde transport.
- B) The Golgi apparatus is static and does not allow for the recycling of vesicles.
- C) The Golgi apparatus facilitates both forward and backward movement of transport vesicles, enabling flexibility in protein processing.
- D) All proteins processed in the Golgi are immediately transported to the lysosomes.

Answer: C

5. **In polarized cells, how is the transport of proteins to the plasma membrane selectively managed?**

- A) By a uniform distribution of all proteins across the membrane
- B) Through random fusion of vesicles at the membrane
- C) Via specific signals or sequences that direct proteins to either the apical or basolateral surfaces
- D) By the Golgi retaining all proteins for later use

Answer: C

6. **How are lysosomal proteins recognized and processed in the Golgi apparatus?**
- A) By phosphorylation of serine residues
 - B) By the addition of mannose-6-phosphate to specific signal patches on the proteins
 - C) Through direct transport to the nucleus
 - D) By binding to ribosomal RNA before reaching the Golgi
- Answer: B**
7. **Which of the following statements about the metabolic processes occurring in the Golgi is true?**
- A) Sphingomyelin is synthesized in the ER and not modified in the Golgi.
 - B) Ceramide is synthesized in the Golgi and converted to phospholipids and glycolipids.
 - C) The Golgi apparatus plays a key role in the synthesis of lipid molecules like sphingomyelin from ceramide.
 - D) All lipids are synthesized in the nucleus and transported to the Golgi for processing.
- Answer: C**
8. **Which of the following best describes the role of the trans-Golgi network in protein sorting?**
- A) It serves as the primary site for ribosomal assembly.
 - B) It modifies proteins by adding lipid anchors only.
 - C) It acts as a sorting station where proteins are directed to their final destinations, such as lysosomes, secretory vesicles, or the plasma membrane.
 - D) It is solely responsible for the synthesis of glycolipids.
- Answer: C**
9. **In the context of vesicular transport, which of the following statements is true regarding regulated secretion?**
- A) Vesicles fuse with the plasma membrane immediately upon formation.
 - B) Regulated secretion occurs in response to specific signals, such as hormonal or neuronal stimuli.
 - C) All proteins in regulated secretion are soluble in the cytoplasm.
 - D) Regulated secretion is the only mechanism used by all cell types.
- Answer: B**
10. **What is the significance of the addition of mannose-6-phosphate to lysosomal proteins in the Golgi apparatus?**
- A) It stabilizes the proteins against degradation.
 - B) It serves as a recognition marker for transport to late endosomes and subsequent maturation into lysosomes.
 - C) It enhances the proteins' activity in the cytoplasm.
 - D) It allows proteins to enter the nucleus directly.
- Answer: B**
11. **Which of the following processes does NOT occur within the Golgi apparatus?**

- A) Modification of glycoproteins
- B) Synthesis of ribosomal RNA
- C) Formation of transport vesicles
- D) Synthesis of sphingomyelin

Answer: B

12. How does the Golgi apparatus ensure the specificity of protein targeting to different cellular compartments?

- A) By using random diffusion processes
- B) Through the presence of unique sorting signals and receptor interactions that determine the destination of proteins
- C) By degrading improperly folded proteins
- D) By modifying all proteins in the same manner regardless of their final destination

Answer: B

13. What distinguishes the mechanism of continuous secretion from regulated secretion in the Golgi apparatus?

- A) Continuous secretion involves the immediate release of all proteins.
- B) Continuous secretion occurs in response to specific cellular signals, while regulated secretion does not.
- C) Continuous secretion allows vesicles to be pre-stored and released upon signaling, while regulated secretion does not store vesicles.
- D) Continuous secretion releases proteins constantly, whereas regulated secretion releases them only in response to stimuli.

Answer: D

14. Which of the following statements correctly describes the role of the Golgi apparatus in lipid metabolism?

- A) The Golgi is primarily responsible for the synthesis of all fatty acids.
- B) The Golgi modifies ceramide into complex lipids like sphingomyelin and glycolipids, essential for cell membrane structure.
- C) Lipid synthesis occurs exclusively in the mitochondria, with the Golgi only involved in lipid transport.
- D) The Golgi apparatus does not participate in lipid metabolism at all.

Answer: B

15. In polarized cells, how are proteins destined for the apical membrane differentiated from those meant for the basolateral membrane?

- A) All proteins are randomly distributed across the membrane.
- B) They are segregated during their synthesis in the ER.
- C) Specific sorting sequences and lipid modifications direct their packaging into distinct vesicles.
- D) Proteins are initially sent to the nucleus for final targeting.

Answer: C

16. Which of the following mechanisms best describes how the Golgi apparatus facilitates the movement of proteins to their destinations?

- A) Proteins are tagged with a universal signal that directs them to the nearest

membrane.

B) Vesicular transport relies on specific protein coat complexes that help shape and select cargo for transport.

C) All proteins passively diffuse from the Golgi to their destinations without specific targeting.

D) Proteins are permanently anchored in the Golgi and only released upon complete synthesis.

Answer: B

17. During the formation of secretory vesicles, what critical step occurs that distinguishes regulated secretion from continuous secretion?

A) The complete folding of proteins occurs before vesicle budding.

B) The vesicle coats are selectively removed in response to calcium ion influx.

C) The accumulation of cargo within the vesicle is triggered by hormonal signaling.

D) The vesicle fuses immediately with the plasma membrane upon formation.

Answer: C

18. In terms of molecular recognition, how do mannose-6-phosphate receptors ensure the correct sorting of lysosomal enzymes in the Golgi?

A) They are expressed universally on all vesicles, allowing for random transport.

B) They bind specifically to phosphorylated proteins, facilitating their packaging into vesicles destined for late endosomes.

C) They only recognize proteins based on their amino acid sequence, disregarding post-translational modifications.

D) They operate independently of the Golgi, relying solely on the endosomal system.

Answer: B

19. Which of the following statements about glycosylation processes within the Golgi apparatus is correct?

A) O-linked glycosylation only involves the addition of sialic acid to proteins.

B) N-linked glycosylation is entirely completed in the Golgi without any preliminary modifications in the ER.

C) O-linked glycosylation involves the addition of sugars to hydroxyl groups of serine and threonine residues.

D) Both N-linked and O-linked glycosylation occur exclusively in the Golgi.

Answer: C

20. Which of the following best describes the consequence of improper mannose-6-phosphate modification in lysosomal proteins?

A) Increased secretion of lysosomal enzymes into the extracellular space.

B) Enhanced delivery of lysosomal enzymes to the nucleus.

C) Ineffective targeting of lysosomal enzymes, leading to their accumulation in the cytoplasm.

D) Direct integration of lysosomal enzymes into the Golgi membrane.

Answer: C

21. **How do specific sorting signals influence the trafficking of proteins within the Golgi apparatus?**
- A) They are recognized by signal recognition particles that direct proteins to the Golgi.
 - B) They are short peptide sequences or post-translational modifications that determine the packaging of proteins into transport vesicles.
 - C) They are involved in the folding of proteins before their transport.
 - D) They dictate the rate at which proteins are synthesized in the Golgi.

Answer: B

22. **What is the primary function of the vesicular transport system in maintaining cellular homeostasis?**
- A) To synthesize new proteins continuously.
 - B) To transport ions directly across the plasma membrane.
 - C) To facilitate the specific delivery of enzymes, hormones, and structural proteins to their respective cellular locations.
 - D) To degrade damaged organelles through fusion with lysosomes.

Answer: C

Done By: Khaled Ghanayem