LEC 4 Q – CYTOLOGY:

1. **What are the primary functions of the Golgi apparatus?**
   A. Protein synthesis
   B. Protein processing and modification
   C. Lipid degradation
   D. DNA replication
   answer B
2. **Which of the following correctly describes the structure of the Golgi apparatus?**
   A. A single flattened sac
   B. A stack of flattened sacs called cisternae
   C. A network of microtubules
   D. A membrane-bound organelle with no compartments
   answer B
3. **In which direction do proteins move through the Golgi apparatus?**
   A. Trans-to-cis
   B. Cis-to-trans
   C. Lateral diffusion
   D. Random movement
   answer B
4. **Which of the following statements is true regarding glycosylation in the Golgi?**
   A. N-linked glycosylation starts in the Golgi.
   B. O-linked glycosylation starts in the ER.
   C. N-linked glycosylation modifies carbohydrates added to asparagine residues.
   D. Both A and C.
   answer C
5. **What can ceramide be converted into in the Golgi apparatus?**
   A. Phosphatidylcholine
   B. Glycolipids and sphingomyelin
   C. Fatty acids
   D. Cholesterol
   answer B
6. **Which mechanism describes the transport of proteins to lysosomes?**
   A. Direct transport from the ER
   B. Binding to mannose-6-phosphate receptors
   C. Immediate fusion with the plasma membrane
   D. Random diffusion
   answer B
7. **What distinguishes regulated secretion from unregulated secretion?**
   A. Regulated secretion occurs continuously.

B. Regulated secretion is triggered by specific signals.
C. Unregulated secretion requires vesicles to be stored.
D. Regulated secretion only occurs in non-polarized cells.
answer B

8. **What is a characteristic of polarized cells regarding protein transport?**
A. All proteins are secreted equally.
B. Transport vesicles lack specific targeting sequences.
C. Proteins are selectively packaged based on apical or basolateral sequences.
D. Polarized cells do not utilize the Golgi apparatus.
answer C

9. **Which of the following statements regarding the glycosylation of proteins is correct?**
A. O-linked glycosylation occurs exclusively in the ER.
B. N-linked glycosylation involves the addition of sugars to serine and threonine residues.
C. N-linked glycosylation starts in the ER and continues in the Golgi apparatus.
D. O-linked glycosylation is primarily responsible for lysosomal targeting.
answer C

10. **What is the primary role of the trans-Golgi network?**
A. To initiate protein synthesis
B. To serve as a sorting hub for proteins and lipids
C. To synthesize fatty acids
D. To degrade misfolded proteins
answer B

11. **Which enzyme is primarily responsible for converting ceramide to sphingomyelin in the Golgi apparatus?**
A. Sphingomyelinase
B. Ceramide synthase
C. Phosphatidylcholine transferase
D. Sphingomyelin synthase
answer D

12. **What signal is crucial for the recognition and transport of proteins destined for lysosomes?**
A. Acetylation
B. Mannose-6-phosphate modification
C. Phosphorylation of serine residues
D. Ubiquitination
answer B

13. **What mechanism ensures that proteins retained within the Golgi complex are membrane-associated rather than soluble?**
A. The presence of chaperone proteins
B. Specific Golgi retention signals
C. The Golgi matrix composition

D. The lack of a signal for export

answer B

14. **How do transport vesicles containing lysosomal proteins reach their destination?**

    A. By direct fusion with the plasma membrane

    B. By migrating along microtubules

    C. By fusing with late endosomes that mature into lysosomes

    D. By random diffusion in the cytosol

    answer C

15. **In the context of regulated secretion, which statement is true regarding the storage of secretory proteins?**

    A. Proteins are stored in an inactive form within the ER.

    B. Secretory proteins are stored in mature secretory granules until a signal triggers release.

    C. All secretory proteins are continuously released from the Golgi.

    D. Regulated secretion does not involve vesicles.

    answer B

16. **In polarized epithelial cells, how are proteins targeted to the apical or basolateral membrane?**

    A. Through random vesicle fusion

    B. By GPI anchor modification or basolateral sequences

    C. By translocation across the nuclear envelope

    D. Through universal Golgi exit pathways

    answer B

17. **Which of the following best describes the process of cisternal maturation in the Golgi apparatus?**

    A. Cisternae remain static and do not change composition.

    B. Each Golgi cisterna progresses from cis to trans while carrying cargo.

    C. Newly synthesized proteins are added to cisternae without any maturation.

    D. Cisternae undergo rapid turnover and are constantly replaced.

    answer B

18. **Which of the following post-translational modifications does NOT occur in the Golgi apparatus?**

    A. N-linked glycosylation

    B. O-linked glycosylation

    C. Phosphorylation of serine residues

    D. Lipidation

    answer C

19. **Which of the following conditions can result from a malfunction of the Golgi apparatus?**

    A. Diabetes mellitus

    B. Cystic fibrosis

    C. Congenital disorders of glycosylation

D. Alzheimer's disease

answer C

20. **What mechanism helps ensure that certain proteins are retained in the Golgi apparatus rather than being secreted?**

A. O-linked glycosylation

B. Retrieval signals that bind to specific receptors

C. Random vesicle fusion

D. High concentrations of calcium ions

answer B

21. **Which lipid is synthesized in the Golgi apparatus and serves as a precursor for sphingomyelin?**

A. Phosphatidylserine

B. Cholesterol

C. Ceramide

D. Phosphatidylcholine

answer C

22. **Which of the following is the correct order of maturation for lysosomal proteins from the Golgi apparatus?**

A. Golgi → Early Endosome → Late Endosome → Lysosome

B. Golgi → Late Endosome → Early Endosome → Lysosome

C. Golgi → Lysosome

D. Golgi → Secretory Vesicle → Plasma Membrane

answer A

23. **How does calcium signaling influence the secretion of proteins from the Golgi apparatus?**

A. Calcium ions inhibit vesicle fusion with the plasma membrane.

B. Calcium ions enhance the binding of vesicles to the Golgi.

C. Calcium ions facilitate the interaction of vesicles with cytosolic proteins that promote fusion.

D. Calcium ions are not involved in Golgi function.

answer C

24. **What role do GPI anchors play in protein sorting at the Golgi apparatus?**

A. They facilitate degradation of proteins in lysosomes.

B. They ensure that proteins are secreted into the cytosol.

C. They target proteins to the apical membrane of polarized cells.

D. They prevent proteins from being modified.

answer C

25. **What is the function of mannose-6-phosphate in lysosomal protein trafficking?**

A. It signals the protein for secretion into the extracellular space.

B. It acts as a retrieval signal for proteins returning to the ER.

C. It marks proteins for transport to lysosomes via specific receptors.

D. It inhibits the glycosylation of proteins.

answer C

26. **Which statement best describes the role of the Golgi apparatus in exocytosis?**

A. The Golgi synthesizes proteins that are immediately released.

B. The Golgi modifies proteins for exocytosis but does not participate in vesicle formation.

C. The Golgi generates vesicles that carry proteins to the plasma membrane for exocytosis.

D. The Golgi is not involved in exocytosis processes.

answer C

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