LEC 2 Q-Cyology :

1. **What is the largest organelle in the cell?**
   A) Golgi apparatus
   B) Nucleus
   C) Endoplasmic Reticulum
   D) Mitochondria
   Answer: C
2. **What type of ER is involved in lipid metabolism?**
   A) Rough ER
   B) Smooth ER
   C) Transitional ER
   D) Nuclear ER
   Answer: B
3. **Which of the following proteins are synthesized on free ribosomes?**
   A) Proteins destined for the ER
   B) Cytosolic proteins
   C) Membrane proteins
   D) Secretory proteins
   Answer: B
4. **What happens to proteins with a KDEL sequence?**
   A) They are secreted from the cell.
   B) They are retained in the ER.
   C) They are transported to the Golgi apparatus.
   D) They are degraded in the proteasome.
   Answer: B
5. **Which process marks misfolded proteins for degradation?**
   A) Glycosylation
   B) Ubiquitination
   C) Folding
   D) Cleavage
   Answer: B
6. **What is the role of chaperones in the ER?**
   A) Synthesizing proteins
   B) Assisting in protein folding
   C) Modifying lipids
   D) Transporting proteins to the Golgi
   Answer: B
7. **What is the primary function of the rough endoplasmic reticulum (RER)?**
   A) Lipid synthesis
   B) Protein synthesis and processing
   C) DNA replication
   D) ATP production
   Answer: B
8. **Which component of the ER is responsible for the translocation of nascent polypeptides into the lumen?**

A) Ribosome
B) Signal sequence
C) Translocon
D) Chaperone
Answer: C

9. **What is the consequence of improper protein folding in the ER?**
A) Enhanced protein function
B) Ubiquitination and degradation
C) Increased secretion of the protein
D) Formation of disulfide bonds
Answer: B

10. **How does the smooth endoplasmic reticulum (SER) contribute to drug metabolism?**
A) By synthesizing proteins
B) By converting lipophilic drugs into hydrophilic forms
C) By degrading proteins
D) By transporting lipids to the Golgi
Answer: B

11. **What is the significance of the KDEL sequence in protein retention?**
A) It targets proteins for lysosomal degradation.
B) It signals proteins to return to the ER.
C) It directs proteins to the Golgi apparatus.
D) It enhances protein folding.
Answer: B

12. **In which organelles are glycosylation and disulfide bond formation primarily processed?**
A) Mitochondria and nucleus
B) Golgi apparatus and rough ER
C) Lysosomes and peroxisomes
D) Cytosol and plasma membrane
Answer: B

13. **What is the relationship between the ER and the Golgi apparatus regarding protein sorting?**
A) The ER synthesizes lipids exclusively; the Golgi processes only carbohydrates.
B) The ER transports all proteins directly to the plasma membrane, bypassing the Golgi.
C) The ER packages proteins into vesicles that fuse with the Golgi for further modification and sorting.
D) The Golgi synthesizes proteins, while the ER is solely for degradation.
Answer: C

14. **Which process in the ER is crucial for ensuring that proteins attain their correct three-dimensional structures?**
A) Glycosylation
B) Chaperone-assisted folding
C) Lipid anchoring
D) Signal peptide cleavage
Answer: B

15. **What mechanism allows proteins to enter the lumen of the rough ER during translation?**
    A) Passive diffusion
    B) Active transport
    C) Co-translational translocation
    D) Post-translational translocation
    Answer: C
16. **Which enzyme is responsible for cleaving the signal peptide from nascent proteins in the ER?**
    A) Protein disulfide isomerase
    B) Signal peptidase
    C) Chaperone
    D) Ubiquitin ligase
    Answer: B
17. **What role do chaperones play in the endoplasmic reticulum?**
    A) They degrade misfolded proteins.
    B) They assist in proper protein folding.
    C) They facilitate vesicle transport.
    D) They synthesize lipids.
    Answer: B
18. **What are the consequences of ER stress and the accumulation of misfolded proteins?**
    A) Enhanced protein synthesis
    B) Activation of the unfolded protein response (UPR)
    C) Increased secretion of proteins
    D) Decreased cell metabolism
    Answer: B
19. **How does the structure of the smooth ER differ from the rough ER?**
    A) The smooth ER has ribosomes; the rough ER does not.
    B) The smooth ER is involved in protein synthesis; the rough ER is not.
    C) The smooth ER is tubular; the rough ER has flattened sacs.
    D) The smooth ER synthesizes steroids; the rough ER synthesizes carbohydrates.
    Answer: C
20. **Which proteins are typically directed to the lysosomes for degradation?**
    A) Secreted proteins
    B) Cytosolic proteins
    C) Proteins with mannose-6-phosphate tags
    D) Membrane proteins
    Answer: C
21. **What is the primary role of the transitional ER?**
    A) Synthesize carbohydrates
    B) Store calcium ions
    C) Package and send proteins to the Golgi apparatus
    D) Assist in protein folding
    Answer: C
22. **In the context of ER function, what does "quality control" refer to?**
    A) Ensuring all proteins are secreted properly
    B) Monitoring the folding and assembly of proteins before they exit the ER

C) The degradation of lipids that are not used
D) The synthesis of all necessary proteins for the cell
Answer: B

23. **Which organelle is primarily involved in the synthesis of steroid hormones?**
A) Rough ER
B) Smooth ER
C) Golgi apparatus
D) Ribosomes
Answer: B

24. **What effect would a defect in the translocon have on a cell?**
A) Increased protein secretion
B) Impaired protein translocation into the ER
C) Enhanced lipid synthesis
D) Unaffected cellular functions
Answer: B

25. **What is the function of protein disulfide isomerase (PDI) in the ER?**
A) Assists in protein folding
B) Cleaves signal peptides
C) Synthesizes lipids
D) Modifies carbohydrates
Answer: A

26. **Which type of glycosylation occurs in the rough ER and is critical for protein stability?**
A) O-linked glycosylation
B) N-linked glycosylation
C) Phosphorylation
D) Ubiquitination
Answer: B

27. **What are the primary functions of the Golgi apparatus in relation to the ER?**
A) Protein synthesis and lipid storage
B) Modifying, sorting, and packaging proteins and lipids
C) ATP production and cellular respiration
D) DNA replication and repair
Answer: B

28. **Which organelle is responsible for detoxifying harmful substances in the liver?**
A) Rough ER
B) Smooth ER
C) Golgi apparatus
D) Lysosome
Answer: B

29. **What happens to proteins that are incorrectly folded and not repaired in the ER?**
A) They are stored in the nucleus.
B) They are marked for degradation by ubiquitin.
C) They are secreted from the cell.
D) They undergo further folding attempts.
Answer: B

30. **How do changes in calcium ion concentrations affect the function of the ER?**
    A) They enhance lipid synthesis.
    B) They regulate protein folding.
    C) They can trigger apoptosis.
    D) They have no effect on ER function.
    Answer: C
31. **What is the role of GPI anchors in membrane proteins?**
    A) They facilitate protein synthesis in the cytosol.
    B) They anchor proteins to the plasma membrane.
    C) They assist in the transport of proteins to the lysosome.
    D) They promote disulfide bond formation.
    Answer: B
32. **What triggers the unfolded protein response (UPR)?**
    A) Increased protein synthesis
    B) Accumulation of misfolded proteins in the ER
    C) Enhanced lipid metabolism
    D) Decreased calcium levels
    Answer: B
33. **Which of the following is true regarding the smooth and rough ER?**
    A) The rough ER is involved in lipid synthesis; smooth ER is involved in protein synthesis.
    B) Rough ER has ribosomes; smooth ER does not.
    C) Both types are structurally identical.
    D) Only rough ER has a lumen.
    Answer: B
34. **How do membrane proteins acquire their orientation in the ER membrane?**
    A) Through post-translational modifications
    B) Via the translocon during synthesis
    C) By random insertion into the membrane
    D) Through the action of chaperones
    Answer: B
35. **Which mechanism ensures that only properly folded proteins exit the ER to enter the Golgi apparatus?**
    A) Co-translational translocation
    B) Quality control processes
    C) Signal peptide recognition
    D) Membrane insertion
    Answer: B
36. **In what way does the topology of the ER lumen resemble that of the extracellular environment?**
    A) Both are rich in carbohydrates.
    B) Both contain the same types of proteins.
    C) Both have a similar ionic composition.
    D) Both have the same pH.
    Answer: C
37. **What specific modifications occur to proteins during their passage through the Golgi apparatus?**
    A) Glycosylation and phosphorylation

B) Cleavage and degradation
C) Lipidation and ubiquitination
D) Folding and refolding
Answer: A

38. **How does the structure of the translocon facilitate protein entry into the ER lumen?**
A) By providing a hydrophobic environment
B) By creating a channel for nascent polypeptides
C) By anchoring proteins in the membrane
D) By promoting disulfide bond formation
Answer: B

39. **In the context of ER function, what is the significance of "retrotranslocation"?**
A) It allows proteins to be secreted from the ER.
B) It is the process of transporting misfolded proteins back to the cytosol for degradation.
C) It facilitates the recycling of lipids in the ER.
D) It promotes protein synthesis.
Answer: B

40. **What is the role of mannose-6-phosphate in protein sorting within the ER and Golgi apparatus?**
A) It directs proteins to the plasma membrane.
B) It signals proteins for lysosomal targeting.
C) It enhances protein stability.
D) It assists in protein folding.
Answer: B

41. **How does the synthesis of phospholipids in the smooth ER contribute to membrane biogenesis?**
A) By degrading old membranes
B) By providing the building blocks for new membranes
C) By facilitating protein insertion into membranes
D) By transporting lipids to the Golgi
Answer: B

42. **What consequence might arise from a mutation that affects the KDEL sequence of a resident ER protein?**
A) Increased protein degradation
B) Proteins may be secreted from the cell instead of retained in the ER
C) Enhanced protein folding
D) No effect on protein function
Answer: B

43. **How do internal transmembrane sequences determine the orientation of integral membrane proteins?**
A) By providing a signal for degradation
B) Through the action of chaperones
C) By interacting with the translocon during insertion
D) By random insertion
Answer: C

44. **In what way can ER stress lead to cell death, and what mechanisms are involved?**

A) By enhancing protein synthesis
B) Through the activation of apoptosis pathways
C) By promoting lipid synthesis
D) Through random protein degradation
Answer: B

45. **What are the main structural components of the endoplasmic reticulum (ER), and how do they differ?**
A) Smooth ER is involved in protein synthesis; rough ER is involved in lipid synthesis.
B) Rough ER has ribosomes; smooth ER does not.
C) Both have identical structures.
D) Only rough ER has a lumen.
Answer: B

46. **How do proteins synthesized on free ribosomes differ in their destination compared to those synthesized on membrane-bound ribosomes?**
A) Free ribosomes synthesize only cytosolic proteins; membrane-bound ribosomes synthesize all other proteins.
B) Free ribosomes send proteins to the nucleus; membrane-bound ribosomes send proteins to the plasma membrane.
C) Free ribosomes synthesize proteins that remain in the cytosol; membrane-bound ribosomes synthesize secretory and membrane proteins.
D) There is no difference; both types synthesize proteins for the same destinations.
Answer: C

47. **What role does the signal sequence play in directing a nascent protein to the rough ER?**
A) It binds to ribosomes in the cytosol.
B) It facilitates the protein's entry into the Golgi apparatus.
C) It directs the ribosome to the ER membrane for protein translocation.
D) It initiates the degradation of misfolded proteins.
Answer: C

48. **What is the significance of the lumen in the ER, and how does it relate to the external environment?**
A) It is a site for lipid synthesis only.
B) It is continuous with the extracellular space, allowing for protein modifications.
C) It is isolated from the cytosol.
D) It contains only degraded proteins.
Answer: B

49. **What happens to misfolded proteins in the ER, and what system is responsible for their degradation?**
A) They are secreted from the cell.
B) They are transported to the nucleus.
C) They are ubiquitinated and directed to the proteasome.
D) They are stored in the ER.
Answer: C

50. **How do transitional ER regions function in the process of protein sorting?**
A) They assist in the degradation of misfolded proteins.
B) They serve as sites for lipid synthesis.
C) They act as entry points for proteins destined for the Golgi apparatus.

D) They enhance ribosome binding.
Answer: C

51. **What is the role of the Golgi apparatus in relation to proteins synthesized in the ER?**
A) It degrades misfolded proteins.
B) It modifies, sorts, and packages proteins for secretion or delivery to other organelles.
C) It synthesizes lipids for membrane formation.
D) It is involved in DNA replication.
Answer: B

52. **What modifications occur to proteins during their transit through the Golgi apparatus?**
A) Ubiquitination
B) Cleavage and glycosylation
C) Lipidation and folding
D) Phosphorylation and proteolytic processing
Answer: B

53. **How does the smooth ER contribute to lipid metabolism and drug detoxification?**
A) By synthesizing all cellular proteins
B) By metabolizing carbohydrates
C) By synthesizing lipids and modifying drugs into less harmful substances
D) By degrading misfolded proteins
Answer: C

54. **What happens to proteins with a KDEL sequence if they are mistakenly sent to the Golgi apparatus?**
A) They are degraded in the lysosome.
B) They are returned to the ER.
C) They are secreted from the cell.
D) They undergo further processing in the Golgi.
Answer: B

Done By: Khaled Ghanayem