Practice Exam 2 **Name** _____

MCBII

1. Which feature is true for signal sequences and for stop transfer transmembrane domains (4 pts)?

   A. They are both 20 hydrophobic amino acids long.

   B. They are both found at the N-terminus of the protein.

   C. They are cleaved off by the signal peptidase.

   D. They inhibit translation when bound to SRP.

   E. They are found in all membrane proteins.

2. Protein X has an ER signal sequence at its N-terminus and it does not contain a TM domain. It has a nuclear localization signal at its C-terminus. Where do you think it is localized? (4pts)

   A. Cytosol and nucleus.

   B. Extracellular space.

   C. Cytosol.

   D. Golgi.

   E. Nucleus.

3. These organellar proteins are co-translationally translocated? (4 pts)

   A. Mitochondrial membrane proteins.

   B. Tail-anchored ER proteins.

   C. Mitochondrial lumenal proteins.

   D. Chloroplast.

   E. Lysosomal enzymes.

4. If you agree with the cisternal maturation model, what would happen to the structure of the ER and what would happen to the Golgi if you add an inhibitor of COPII coat disassembly and why? (8 pts)

5. If you add the sequence KDEL to the N-terminus of Golgi integral membrane protein, where will it end up (4 pts)?

   A. Still in the Golgi.

   B. ER.

   C. Both ER and Golgi.

   D. Cytosol.

6. Which of the following are most likely to be found stabilizing the interactions between a transmembrane domain and the lipid bilayer? (4 pts)

   A. Ionic bonds between cysteine residues.

   B. Ionic bonds between polar residues.

   C. Hydrophobic interactions.

   D. All of the above

7. Where will lysosomal enzymes be located if you delete the M6P Receptor? (4 pts)

   A. In the trans Golgi.

   B. They will be secreted.

   C. The lysosome.

   D. In the ER.

8. Draw the topology of a type I transmembrane protein on the plasma membrane that contains 3 TM domains –make sure to label the location of the N- and C-termini. (8pts)

Points this page _____

9. A mitochondrial protein contains an N-terminal signal sequence and no transmembrane domains. If you delete the signal sequence, where will the mutant protein end up? (4 pts)?

   A. ER.

   B. Extracellular Space.

   C. Cytosol.

   D. Mitochondria.

   E. Nucleus

10. Which is the pathway taken by lysosomal proteins during their biogenesis? (4 pts)

   A. ER – Golgi –PM - Lysosome

   B. ER - Lysosome

   C. ER – Golgi – Lysosome

   D. Cytosol – Lysosome

11. Which of the following does not occurs in the lumen of the ER? (4 pts)

   A. O-linked glycosylation.

   B. N-linked glycosylation.

   C. Disulfide bond formation on newly synthesized proteins.

   D. Chaperone mediated protein folding.

   E. None of the above.

12. Describe how a temperature sensitive viral protein and GFP was used to dissect the pathway taken by proteins in the secretory pathway (8 pts)

13. If you use a small molecule drug to inhibit the opening of the translocon, which will most likely happen? (4pts)

A. SRP will no longer recognize the signal sequence.

B. SRP binds normally to its receptor.

C. New ER proteins receive normal post-translational modifications.

D. Ribosomes fail to synthesize cytoplasmic proteins.

E. Nascent polypeptides cannot be recruited to ER surfaces.

14. Which of the following is not a key feature of the ER translocon. (4 pts)

A. A hydrophobic pore ring.

B. A plug blocks the aqueous channel until translocation begins.

C. The central channel is aligned with the exit tunnel from the ribosome.

D. A lateral gate opens to allow diffusion of TM domains into the membrane bilayer.

E. It requires the energy of ATP hydrolysis to translocate synthesized proteins.

15. ORDER the following events that occur during ER associated degradation (ERAD)? (4pts)

A. Chaperones fail to fold the protein in the ER lumen.

B. The protein is transported through the retro-translocation channel.

C. The protein is ubiquitinated.

D. The protein is degraded by the proteasome.

E. The protein is expelled into the cytosol.

16. You think that you have identified the ER retrieval signal for lumenal proteins as KDEL. How will you prove that this signal is necessary and sufficient. Be clear about what constructs you will use to test your hypothesis. (8pts)

17. Which of the following charged phospholipids is enriched in the cytoplasmic leaflet of the ER relative to the lumenal leaflet? (4pts).

    A. Phosphatidylcholine (PC).

    B. Phosphatidylethanolamine. (PE)

    C. Phosphatidylinositide (PI).

    D. Cholesterol.

18. What would happen if Sec13/31 could not bind to Sec 23/24? (4 pts)

    A. COPII vesicles would not bud.

    B. Cargo could not be concentrated.

    C. Sar1 would not bind GTP.

    D. All lumenal proteins would be lost from the ER.

    E. Sec24 would no longer bind cargo.

19. GPI-anchored proteins are found on the outer leaflet of the plasma membrane facing the outside of the cell. So, where are GPI-anchors added onto these proteins during their synthesis? (4pts)

    A. On the cytoplasmic leaflet of the plasma membrane.

    B. In the lumen of the endoplasmic reticulum.

    C. On the cytoplasmic leaflet of the endoplasmic reticulum.

    D. None of the above.

20. Why don't Lysosomal proteins degrade the components of other secretory organelles before they reach the lysosome? (8pts)