Name: Answer Key

QUIZ #4: Chapters 15 -18 (12 points)

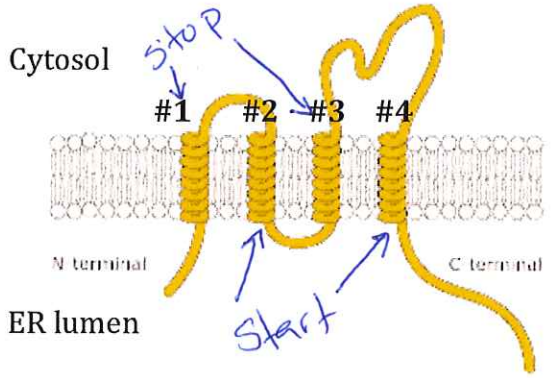
1. Circle the method of transport described. Descriptions may apply to more than one method of transport (0.5pt each. No partial credit):
   A. Protein must be unfolded for transport — pores (translocators) vesicles
   B. Permits indiscriminate transport of small molecules — (pores) translocators (vesicles)
   C. Can be used to transport non-protein macromolecules — (pores) translocators (vesicles)
   D. Used to move protein between organelles — pores translocators (vesicles)

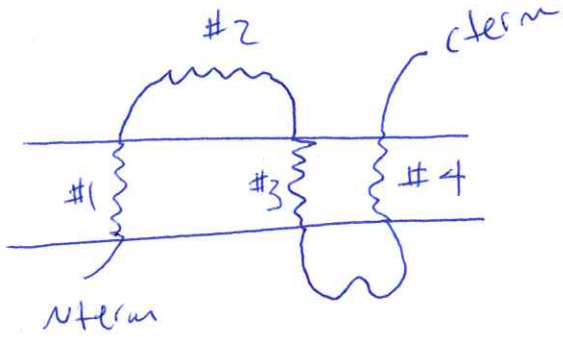
2. For each of the following sentences, fill in the blanks with the best word or phrase selected from the list below. Each word or phrase only once. (1pt, no partial credit):

amino acid sequence **Golgi apparatus** **sorting signal** **protein translocators** **endoplasmic reticulum** **plasma membrane** **transport vesicles** **folded** **unfolded**

Plasma membrane proteins are inserted into the membrane in the ER. The address information for protein sorting in a eukaryotic cell is contained in the amino acid seq. of the proteins. Proteins enter the nucleus in their folded form. Proteins that remain in the cytosol do not contain a sorting signal. Proteins are transported into the Golgi apparatus via transport vesicles. The proteins transported into the endoplasmic reticulum by protein translocators are in their unfolded form.

3. The following transmembrane protein crosses the ER lipid bilayer four times.
   A. Indicate on the diagram below where the start and stop transfer sequences would be found. (0.5pt)
   B. Imagine that this piece of membrane was packaged into a vesicle and trafficked to the cell membrane. Would the N and C termini of the protein be extracellular or cytoplasmic? (0.5pt)
   C. Given that any hydrophobic residue can act as a start or stop transfer region. Draw how the conformation of this transmembrane protein would look like if hydrophobic residues on alpha helix #2 were switched for hydrophilic residues? (0.5pt)





4. Which of the following protein families are ***not*** involved in directing transport vesicles to the target membrane? (0.5 pt)
   (a) SNAREs
   (b) Rabs
   (c) tethering proteins
   (d) adaptins

5. Indicate if the following statements are TRUE or FALSE. (0.5 pt each)
   A. T A signal molecule can have many potential target cells.
   B. F Each receptor can recognize multiple signal molecules.
   C. F A single signal molecule/receptor combination will initiate identical responses in all cell types.
   D. T Cellular response is dictated by intracellular effector proteins.

Name:

6. Match the class of cell-surface receptor with the best description of its function. (0.5 pt each)
   A. G-protein-coupled receptors __D__
   B. ion-channel-coupled receptors __A__
   C. enzyme-coupled receptors __E__

   a) alter the membrane potential directly by changing the permeability of the plasma membrane
   b) signal by opening and closing in a ligand-independent manner
   c) must be coupled with intracellular monomeric GTP-binding proteins
   d) all receptors of this class are polypeptides with seven transmembrane domains
   e) initiate kinase cascades

8. Match three of the statements below to each major class of cytoskeletal elements (actin, microtubule or intermediate filament; 0.5pts per cytoskeletal element):
   1. monomer that binds ATP: actin
   2. includes keratin and neurofilaments: IF
   3. are flexible but strong IF
   4. their stability involves a GTP cap: Microtubule
   5. used in the eukaryotic flagellum: microtubule
   6. a component of the mitotic spindle: microtubule
   7. can be connected through desmosomes: IF
   8. directly involved in muscle contraction: actin
   9. abundant in filopodia: actin

9. Indicate if the following statements about microtubules are ***true*** or ***false***? (0.5pt each)
   (a) __T__ Motor proteins move in a directional fashion along microtubules by using the inherent structural polarity of a protofilament.
   (b) __F__ microtubules are subject to dynamic instability so they are used only for transient structures in a cell.

10. Compared to the normal situation, in which actin monomers carry ATP, what do you predict would happen if actin monomers that bind a nonhydrolyzable form of ATP were incorporated into actin filaments? (0.5pt)
   (a) Actin filaments would grow longer.
   (b) Actin filaments would grow shorter because depolymerization would be enhanced.
   (c) Actin filaments would grow shorter because new monomers could not be added to the filaments.
   (d) No change, as addition of monomers binding nonhydrolyzable ATP would not affect filament length.

11. Progression through the cell cycle requires a cyclin to bind to a Cdk because _____. (0.5pt)
   (a) the cyclins are the molecules with the enzymatic activity in the complex.
   (b) the binding of a cyclin to Cdk is required for Cdk enzymatic activity.
   (c) cyclin binding inhibits Cdk activity until the appropriate time in the cell cycle.
   (d) without cyclin binding, a cell-cycle checkpoint will be activated.

BONUS QUESTION (for extra 1pt)

A. Describe one way in which the activity of the Cyclin/CDK complex can be regulated: include detail on whether this regulation would *activate* or *inhibit* complex function, whether this regulation is *fast* or *slow*, and whether such regulation is *reversible* or *irreversible*. (0.5pt) answers include

Inhibit
Degradation of cyclin: fast, irreversible
Binding of co-factors: slow, reversible
Phosphorylation of CDK: fast, reversible

Activate
expression of cyclin: slow, reversible
Release of co-factor: fast, reversible
dephosphorylation of CDK: fast, reversible

B. What effect does the above regulation have on the phosphorylation of Cyclin/CDK ***targets***? (0.5pt)

less active CDK = less phosphorylation of Cyclin/CDK targets.