REVIEW Exam 1, 2016 **Name** _____

MCBII

1. Which is found in both prokaryotes and eukaryotes (4 pts)?
   A. Messenger RNA
   B. Endoplasmic reticulum
   C. Nuclear envelope
   D. Trafficking vesicles

2. Fluorescence Recovery After Photobleaching (FRAP) is a technique mainly used to measure _____. (4 pts)
   A. the cholesterol contents of the membrane.
   B. the action potentials of a neuron.
   C. the mobility of a molecule.
   D. the substrate-binding rates of chaperones.

3. Embryonic stem (ES) cells and induced pluripotent stem (iPS) cells are both widely used by scientists to model human diseases in petri dishes. This is mainly because ES and iPS cells _____ (4 pts)
   A. are generated by Yamanaka factors.
   B. can differentiate into a variety of cell types.
   C. are derived from blastocysts.
   D. are eukaryotic cells.

4. Prior to synaptic transmission, neurotransmitters are stored in _____. (4 pts)
   A. the vesicles in presynaptic terminals.
   B. the vesicles in postsynaptic terminals.
   C. the vesicles in synaptic clefts.
   D. the cavities of ion channels and receptors.

5. Briefly explain how an action potential is generated. (8 pts)

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6. On the plasma membrane of epithelial cells, you find two types of amino acid transporters: facilitative transporter and sodium-coupled transporter. Briefly describe the properties of these transporters. (8 pts)

7. Triglycerides are hydrophobic molecules found in the organelle called lipid droplet. How can the hydrophobic triglycerides be stored in the lipid droplets? (4 pts)

   A. Coating the triglycerides with a lipid bilayer.

   B. Coating the triglycerides with a lipid monolayer.

   C. Coating the triglycerides with glycogen.

   D. Coating the triglycerides with peptides composed of aspartic acid residues.

8. Which is INCORRECT regarding the plasma membrane? (4 pts)

   A. All membrane proteins are mobile.

   B. Some lipids may form lipid rafts.

   C. Some lipids may be conjugated to both proteins and oligosaccharides.

   D. Lipids may move in different ways within the plasma membrane.

9. Which ion channel is most important in establishing the resting potential of neurons? (4 pts)

   A. Sodium channel

   B. Potassium channel

   C. Chloride channel

   D. Calcium channel

10. If you use a drug to lock Na^+/K^+ pump at the E2 stage, what will most likely happen?

   A. Intracellular Na^+ concentration arises.

   B. Intracellular K^+ concentration arises.

   C. Intracellular Na^+ concentration decreases.

   D. More ATP is consumed.

11. Which molecule is NOT known to bind ATP? (4 pts)

    A. Chaperonin

    B. Hsp70

    C. Facilitative glucose transporter

    D. Na^+/K^+ pump

12. Imagine that you have discovered a new lipid species that is enriched at the extracellular/exoplasmic face of the cell. The new lipid has a positive charge and interacts with a protein. At the lipid/protein binding interface, which amino acid will you most likely find? (4 pts)

    A. Aspartic acid

    B. Lysine

    C. Arginine

    D. Glycine

    E. Proline

13. Briefly explain why phospholipids spontaneously assemble into lipid bilayers in water. (4 pts)

    Explain why detergents such as Triton X-100 can disrupt lipid bilayers. (4 pts)

14. Briefly describe how Hsp70 and chaperonin cooperate to facilitate protein folding in the cell. (8 pts)

15. What is the primary determinant of the final folded states (native conformations) of proteins? (4 pts)

A. The number of Hsp70 binding sites on the protein.

B. Primary sequence of the protein.

C. Availability of chaperonin.

D. Activation of the heat shock response.

16. A drug is known to interfere with protein folding in the cytosol. You find that treatment of human cells with the drug increases the expression levels of Hsp70 and chaperonin. Explain how this is achieved. (8 pts)

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17. Which is likely the equilibrium potential of chloride (Cl^-) in neurons? Hint: consider both the charge and gradient of chloride ions. (4 pts)

    A. 0 mv.

    B. -65 mv.

    C. +40 mv.

    D. +100 mv.

18. What ion directly triggers the release of neurotransmitters from synaptic vesicles? (4 pts)

    A. K^+

    B. Na^+

    C. Cl^-

    D. Ca^{2+}

19. If you place some human cells in a solution, you find the cells quickly shrink. Which of the following statements is most likely correct? (4 pts)

    A. The cells lack aquaporin.

    B. The solution is hypertonic.

    C. The solution is hypotonic.

    D. The Na^+/K^+ pump is defective.

20. If you use a toxin to block neurotransmitter receptors, what will most likely happen? (4 pts)

    A. Presynaptic calcium channels no longer open.

    B. Postsynaptic response is inhibited.

    C. Presynaptic action potential is not generated.

    D. Synaptic vesicles fail to fuse with the plasma membrane.