**Physiology 115 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**Spring 2015

**MIDTERM**

For the multiple choice questions, there is *one* and *only one* best answer.

1. Which kind of transport mechanism works on a substance dispersing itself from high concentration to low but requires a transport protein to get through the membrane?
   1. Simple passive diffusion/transport
   2. Facilitated diffusion/transport
   3. Coupled active transport
   4. Direct active transport
   5. None of the above
2. Which of these membrane proteins moves glucose into cells by a known *active* transport system?
   1. a sodium (Na)-glucose co-transporter, usually found in intestinal epithelial and kidney tubule cells
   2. a transport protein that moves glucose with its concentration (high to low) by facilitated diffusion
   3. a sodium-calcium (Na+/Ca2+) exchanger
   4. both (a) and (b)
   5. all of the above
3. Coupled active transport in a membrane protein means that:
   1. ATP is used directly by the protein to move substances across the membrane
   2. Glycolipids are converted into glycoproteins
   3. Protons (H+ ions) transfer into the nucleus to alter the structure of DNA
   4. ATP was used to pump some ion like sodium (Na+) to generate a concentration difference across the membrane which is then exploited to move other substances across the membrane
   5. Lipoproteins degrade chylomicrons into VLDL
4. Which of these has the lowest lipid-to-protein ratio: that is, which has much less lipid content relative to non-lipid content?
   1. VLDL
   2. chylomicrons
   3. HDL
   4. LDL
   5. both (a) and (b)
5. Which of these molecular forms will *add* or *increase* the fluidity of the cell (plasma) membrane?
   1. glycolipids
   2. cholesterol
   3. glycoprotein
   4. saturated fatty acid(s) as part of the phospholipid molecule structure
   5. unsaturated fatty acid(s) as part of the phospholipid molecule structure
6. The formation of alpha helices and beta sheets in a polypeptide corresponds to what level of protein structure?
   1. primary (1°)
   2. secondary (2°)
   3. tertiary (3°)
   4. quaternary (4°)
   5. quinternary (5°)
7. Which of these is a name for polymeric storage forms of glucose?
   1. glycolipid
   2. glycogen
   3. starch
   4. both (b) and (c)
   5. glycoprotein
8. A **connexon** is a principal feature of which type of cell junction?
   1. adherens junction
   2. desmosome
   3. gap junction
   4. tight junction
   5. both (a) and (b)
9. What kind of chemical bond is formed when one atom takes electrons from another atom and it acquires a negative charge while the other atom acquires a positive charge?
   1. covalent bond
   2. polar covalent bond
   3. ionic bond
   4. hydrophobic interaction
   5. hydrogen bond
10. A chemical that is an acid is put into water and it only partially ionizes, that is, gives up hydrogen ions (H+) to the solution: what kind of chemical is that?
    1. triglyceride
    2. strong base
    3. strong acid
    4. weak base
    5. weak acid
11. Where the signal or hormone for a receptor protein in the plasma membrane likely to bind on that receptor?
    1. nucleus
    2. intracellular domain
    3. transmembrane domain
    4. extracellular domain
    5. ATP
12. What part of an enzyme’s structure is responsible for catalyzing the chemical reaction?
    1. the active site
    2. the substrate-binding site
    3. an activating regulatory site
    4. an inhibitory regulatory site
    5. the glycoprotein site
13. The deposition of oxidized LDL resulting from inflammation consequent to injury of blood vessel endothelial cells has been shown to increase the risk of which of these disorders or diseases?
    1. diabetes
    2. atherosclerosis
    3. hypertension
    4. magnesium deficiency
    5. ATP storage disease
14. In the action potential, when sodium (Na+) ions cross the membrane of a neuron to cause a change in polarity (switching of positive and negative across the membrane), what is that event called?
    1. condensation
    2. dephosphorylation of the E2 conformation
    3. conformational change from E2 to E1
    4. repolarization
    5. depolarization
15. In the action potential, when potassium (K+) ions cross the membrane of a neuron to cause a change in polarity (switching back to negative and positive across the membrane), what is that event called?
    1. depolarization
    2. repolarization
    3. E2 phosphorylation
    4. hydrolysis
    5. unsaturation
16. (a) In an action potential, which happens first, depolarization or repolarization?   
      
      
    (b) Sodium ions have two “forces” that make them want to cross the membrane of the neuron when the voltage-gated sodium ion channel proteins are opened. What are those two forces?
17. (a) In G-protein coupled receptor activation, the G protein heterotrimer binds to something. What is that?   
      
      
      
    (b) After binding, what two more steps happen to the G protein heterotrimer to cause activation?
18. (a) What happens on the extracellular side in receptor tyrosine kinases (RTK) to start their activation?  
      
    (b) What happens on the intracellular side of RTKs to complete their activation? What kind of enzymatic (catalytic) activity do RTKs have?
19. Polysaccharides are known in nature to serve many types of functions. Just name or describe one.

1. Name two **monosaccharides**

1. Name two of the many types of **membrane proteins** discussed in lecture, and simply describe the function of that protein
2. (a) Name any one *similarity* between a **desmosome** and an **adherens junction**   
     
     
     
     
   (b) Name any one *difference* between a **desmosome** and an **adherens junction**
3. Consider the Na+/K+ ATPase pump:  
   (a) How many Na+ ions does it pump in one cycle and in what direction across the membrane?

(b) How many K+ ions does it pump in one cycle and in what direction across the membrane?

(c) How many ATP molecules does it use in one cycle and from which side of the membrane does the Na/K pump protein use ATP?   
(d) What is the role of ATP in the pumping mechanism?   
  
(e) Why does the Na/K pump these ions (your answer might describe an example)?