Faculty of Health Sciences

First Continuous Assessment

HSC 205 (Medical Physiology)

Date: Tuesday the 4th of January 2011 (10-11.45)

Name……UB No…….

SECTION ONE

Question 1:

N is the given value in the table in mEq/L or g/L where applicable. Complete the table by choosing the approximate multiple or fraction of N from the following:

N,30N,N/30,8N,N/8,5N,N/5,14N,N/14,25N,N/25,3N,N/3,50N,N/50,40N,N/40,20N,N/20,100N,N/100, 1000N,N/1000,90N,N/90.

Substance	Intracellular fluid compartment	Extracellular fluid compartment
Na		140
Glucose		0.9
Cl	4	
Mg	58	
HCO		28
Phosphates		4
k	140	
Proteins	16	

Question 2:

Two 70kg young men will take part in the mountain race next month in Buea. One of them A will drink 3liters of water while B will drink only 0.5liters. Complete the table below on water balance.

	Normal A or B	Mt race A	Mt race B
Intake		3liters	0.5liters
drinking			
Metabolism			
Total			
Output			
Insensible loss			
Sweat			
Urine			
faeces			
Total			

<u>Section 2</u>: For each of the following, choose the <u>single</u> best response. (Each right answer is 0.5 Mrks: Total 7.5/15)

(1) Osmosis is (a) The passive transmembrane diffusion of water. (b) The active transmembrane transport of water. (c) The flux of water due to a transmembrane hydrostatic pressure gradient. (d) The passive transmembrane diffusion of solute. (e) The active transmembrane transport of solute.

(2) Intracellular K^+ concentration is higher than extracellular owing to (a) K^+ channels. (b) Na/K ATPase. (c) Osmosis. (d) Action potentials. (e) Endocytosis of K^+ .

(3) If the membrane is permeable only to K^+, what is the Na^+ equilibrium potential, E_{Na}?

(a) +240 mV (b) +120 mV (c) +60 mV (d) +0 mV (e) -60 mV

(4) If the membrane is permeable only to Na^+ and K^+ and we can neglect any currents due to active transport, what is the resting voltage when the K^+conductance is three times the Na^+ conductance, $G_K = 3\ G_{Na}$? (a) +60 mV (b) 0 mV (c) -35 mV (d) -120 mV (e) -75 mV

(5) During a nerve action potential, the opening of Na^+ channels is responsible for (a) The absolute refractory period. (b) The relative refractory period. (c) Rapid hyperpolarization. (d) Rapid depolarization. (e) The hyperpolarizing after the potential.

(6) During an action potential, the voltage dependent increase in Na^+ current is due to (a) An increase in E_{Na}. (b) An increase in the number of Na^+ channels. (c) A transient increase in the open channel probability of Na^+ channels. (d) A transient increase in the open channel conductance of K^+ channels. (e) An increase in Na/K pump activity.

(7) Voltage dependent inactivation occurs when (a) Membrane capacitance inactivates. (b) Voltage dependent K^+ channels inactivate. (c) Voltage dependent Na^+ channels activate. (d) Na/K pumps inactivate. (e) Voltage dependent Na^+ channels inactivate.

(8) The relative refractory period is due to (a) An increase in the open probability of K^+ channels and inactivation of Na^+ channels. (b) Saltatory conduction. (c) The action potential upstroke. (d) The cardiac action potential plateau phase. (e) A reduction in threshold.

(9) At the neuromuscular junction, botulinum poisoning blocks the entry of Ca^{2+} into the presynaptic nerve terminal. This will result in which of the following changes in end plate potential (EPP)? (a) An increase in EPP amplitude. (b) A decrease in EPP amplitude. (c) An increase in EPP frequency. (d) A decrease in EPP frequency. (e) A prolongation of the EPP.

(10) At the neuromusclular junction, curare binds to the ACh receptor and prevents activation of the channel by ACh. This will result in which change to the miniature end plate potential (MEPP)? (a) An increase in MEPP frequency. (b) A decrease in MEPP amplitude. (c) A decrease in MEPP frequency. (d) An increase in MEPP amplitude. (e) A prolongation of the MEPP.

(11) The membrane conductance does not directly depend on: (a) the open probability of membrane channels. (b) the Nernst potential for each ion. (c) the number of channels in the membrane. (d) random gating of membrane channels. (e) the single channel conductance of each contributing channel.

12. A genetically altered squid has no voltage dependent K^+ channels in its nerves. The effect on action potentials is to: (a) There is no effect. (b) decrease propagation velocity. (c) increase (more positive) threshold. (d) increase the relative refractory period. (e) decrease the relative refractory period.

13. Which of the following gating processes has the most rapid kinetics? (a) Na^+ channel inactivation (b) Na^+ channel activation (c) K^+ channel activation (d) Ca^{2+} Channel activation (e) Ca^{2+} channel inactivation

14. Which of the following would result from a demyelinating disease? (a) Increased propagation velocity (b) Decreased conductance per length of axon (c) Decreased capacitance per length of axon (d) Decreased safety factor (e) Increased frequency of action potentials

15. At the neuromuscular junction, the miniature end plate potential (MEPP) is due to: (a) the release of one molecule of ACh. (b) the activation of one ACh receptor. (c) one presynaptic action potential. (d) the release of one quanta of ACh. (e) one muscle action potential.

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