- which of the following characteristic is shared by simple and facilated diffusion of glucose ?

a. occurs down an electrochemical gradient

b. is saturable

c. requires metabolic energy

d. is inhibited by the presence of galactose

e. requires a Na+ gradient

- during the upstroke of the action potential :

a.   there is net outward current and cell interior become more negative

b.   there is net outward current and cell interior become less negative

c.   there is net inward current and cell interior become more negative

d.   there is net inward current and cell interior become less negative

- solution A and B are separated by a semi permeable membrane that is permeable to K+ but not to Cl- . solution A is 100 mM KCl , and solution B is 1 Mm KCl . which of the following statement about solution A and B is true ?

a. K+ ions will diffuse from solution A to solution B until the concentration of K+ of both solutions is 50.5 Mm

b. K+ ions will diffuse from solution B to solution A until the concentration of K+ of both solutions is 50.5 Mm

c. KCl will diffuse from solution A to solution B until the concentration of KCl of both solutions is 50.5 Mm

d. K+ ions will diffuse from solution A to solution B until a membrane potential develops with solution A negative with respect to solution B

e. K+ ions will diffuse from solution A to solution B until a membrane potential develops with solution A positive with respect to solution B

- the correct temporal sequence for events at the neuromuscular junction is :

a. action potential in motor nerve , depolarization of muscle end plate , uptake of Ca++ into presynaptic nerve terminal

b. uptake of Ca++ into the presynaptic terminal , release of actyel choline (Ach) , depolarization of the muscle end plate

c . release of Ach ; action potential in motor nerve ; action potential in the muscles

d. uptake of Ca++ into the motor end plate ; action potential in the motor end plate , action potential in the muscle

e . release of Ach; action potential in the muscle end plate ; action potential in the muscle

- which characteristic or component is shared by skeletal and smooth muscle :

a . thick and thin filaments are arranged in sacromeres

b. troponin

c. elevation of intracellular [Ca++] for excitation –concentration coupling

d. spontaneous depolarization of membrane potential

e. high degree of electrical coupling between cells

- repeated stimulation of a skeletal muscle fiber cause titanic contraction because the intracellular concentration of which solute increase and remains at high level :

a. Na+

b. K+

c. Mg++

d. Troponin

f . Calmodulin

g. ATP

- Solution A and B are separated by a membrane that is permeable to Ca++ and impermeable to Cl- . solution A contains 10 Mm $CaCl_2$ and solution B contains 1 Mm $CaCl_2$, assuming that 2.3 RT/F = 60 mv , Ca++ will at electrochemical equilibrium when :

a. solution A is +60mv

b. solution A is +30mv

c. solution A is -60mv

d. solution A is -30mv

e. solution A is +120mv

f. solution A is -120mv

g. the [Ca++] of 2 solutions are equal

h. the [Cl-] of 2 solutions are equal

-a person with myasthenia gravis notes increased muscle strength when treated with an Acytelcholine esterase inhibitor .the basis of his improvement is increased :

a. amount of Ach released from motor nerve

b. level of Ach at muscle end plate

c. number of Ach receptors on the muscle end plate

d. amount of norepinephrine released from motor end plate

e. synthesis of norepinephrine in motor nerve

- in error , a patient is infused with large volume of solution that cause lysis of his RBCs . the solution was most likely :

a. 0.9% NaCl

b.2% NaCl

c. isotonic manitol

d. hypertonic manitol

e. hypotonic urea

f. hypertonic urea

- during a nerve action potential , a stimulus is delivered as indicated by the arrow showen in the following figure . in response to the stimulus a second action potential :

a. of smaller magnitude will occur

b. of normal magnitude will occur

c. of normal magnitude will occur , but will be delayed

d. will occur but will not have an overshoot

e. will not occur

- Solution A and B are separated by a membrane that is permeable to urea. solution A contains 10 Mm urea and solution B contains 5 Mm urea ¸if the [urea] in A is doubled the flux of urea across the membrane will :
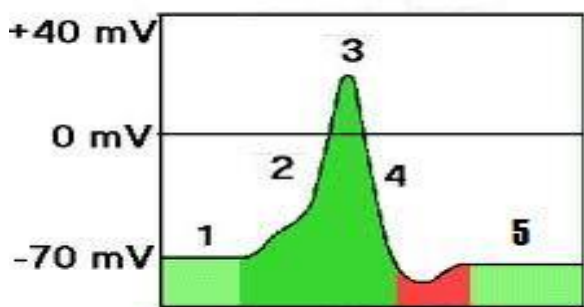
a. double

b. triple

c. be unchanged

d. decrease to one half

e. decrease to one third

- muscle cell has an intracellular [Na+] of 14 Mm and extracellular [Na+] of 140 Mm . assuming that 2.3 RT/F = 60 mv , what would the membrane potential be if the muscle cell membrane were permeable only to Na+ ?

a. 80 mv

b. -60 mv

c. 0 mv

d. +60 mv

e.+80 mv

- answer the following 3 Q.s according to the diagram below :

-at which labeled point on the action potential is the K+ closest to electrochemical equilibrium ?

a.1

b.2

c.3

d.4

e.5

-what process is responsible for the change in membrane potential that occur between point one & point 3 ?

a. movement of Na+ into the cell

b. movement of Na+ out of the cell

c. movement of K+ into the cell

d. movement of K+ out of the cell

e. activation of Na+ _K+ pump

f. inhibition of Na+_K+ pump

-what process is responsible for the change in membrane potential that occurs between point 3 and point 4 ?

a. movement of Na+ into the cell

b. movement of Na+ out of the cell

c. movement of K+ into the cell

d. movement of Na+ out of the cell

e. activation of Na+_K+ pump

f. inhibition of Na+_K+ pump

-the rate of conduction of action potential will be increased by :

a. stimulating the Na+_K+ pump

b. inhibiting the Na+_K+ pump

c. decreasing the diameter of nerve

d . myelinating the nerve

- solution A and B are separated by a semi permeable membrane . solution A contains 1Mm sucrose and 1Mm urea . solution B contains 1 Mm sucrose . the reflection coefficient for sucrose is 1 and the reflection coefficient for urea is zero , which of the following statements about these solutions is correct ?

a. solution A has a higher effective osmotic pressure than solution B

b. solution A has a lower effective osmotic pressure than solution B

c. solution A and B are isosmotic

d. solution A is hyperosmotic with respect to solution B , & the solutions are isotonic

e. solution A is hyposmotic with respect to solution B , & the solutions are isotonic

-transport of D- and L- glucose proceeds at the same rate down an electrochemical gradient by which of the following process ?

a. simple diffusion

b. facilitated diffusion

c. primary active transport

d. cotransport

e. counter transport

- the permeability of a solute in lipid bilayer will be increased by the increase of :

a. molecular radius of solute

b. oil/water partition coefficient of the solute

c. thickness of the bilayer

d. concentration difference of the solute across the bilayer

- a drug completely blocks Na+ channels in nerves . which of the following effects on the action potential would it be expected to produce ?

a. block the occurrence of action potential

b. increase the rate of rise the upstroke of the action potential

c. shortens the absolute refractory period

d. abolish the hyperpolerization after potential

e. increase the Na+ equilibrium potential

- at the muscle end plate ,Ach causes the opining of :

a. Na+ channels and depolarization toward the Na+ equilibrium potential

b. K+ channels and depolarization toward the K+ equilibrium potential

c. Ca++ channels and depolarization toward the Ca++ equilibrium potential

d. Na+ and K+ channels and hyperpolerization to a value halfway between the Na+ and K+ equilibrium potentials

e. Na+ and K+ channels and depolarization to a value halfway between the Na+ and K+ equilibrium potentials

- an inhibitory post synaptic potential :

a. depolarizes the postsynaptic membrane by opining Na+ channels

b. depolarizes the postsynaptic membrane by opining K+ channels

C. hyperpolarizes the postsynaptic membrane by opining Ca++ channels

d. hyperpolarizes the postsynaptic membrane by opining Cl- channels

- which of the following would occur as a result of the inhibition of Na+ , K+ ATPase :

a. decrease intracellular Na+ concentration

b. increase intracellular K+ concentration

c. increase intracellular Ca++ concentration

d . increase Na+_ Glucose cotransport

e. increase Na+ _ Ca++ exchange

- which of the following temporal sequences is correct for excitation-contraction coupling in skeletal muscle ?

a. increase intracellular [Ca++] ; action potential ; cross bridge formation

b. action potential in muscle membrane ; depolarization ; depolarization of the T-tubules ; release of the Ca++ from the sacroplasmic reticulum

c. action potential in muscle membrane ; depolarization of the T-tubules ; release of Ca++ from the sacroplasmic reticulum

d. release of Ca++ from the SR ;depolarization of T-tubules ; binding of Ca++ to troponin C

-Which of the following transport processes is involved if transport of glucose from the intestinal lumen into a small intestinal cell is inhibited by abolishing the usual Na+ gradient across the cell membrane ?

a. simple diffusion

b. facilitated diffusion

c. primary active transport

d. cotransport

e. countertransport

- which of the following events occurs before depolarization of T-tubules in skeletal muscle in the mechanism of excitation –contraction coupling :

a. depolarization of sacrolemma membrane

b. opining of Ca++ release channels on the sacroplasmic reticulum

c. uptake of Ca++ into the sacroplasmic reticulum by Ca++ ATPase

d. binding of Ca++ to troponin C

e. binding of actin & myosin

- which of the following is an inhibitory neurotransmitter in the central nervous system ?

a. norepinephrine

b. glutamate

c. GABA

d. serotonin

e. histamine

- ATP is used indirectly in which of the following processes ?

a. accumulation of Ca++ by sacroplasmic reticulum

b. transport of Na+ from intracellular to extracellular fluid

c. transport of K+ from extracellular to intracellular fluid

d. transport of hydrogen from parietal cells into the lumen of the stomach

e. absorption of glucose by intestinal epithelial cells

- assuming complete dissociation of all solutes , which of the following solutions would be hyperosmotic to 1Mm NaCl ?

a. 1 Mm glucose

b. 1.5 Mm glucose

c. 1 Mm CaCl$_2$

d. 1 Mm sucrose

e. 1 Mm KCl

- secretion of H+ by gastric parietal cell occurs by which of the following processes ?

a. simple diffusion

b. facilitated diffusion

c. primary active transport

d. cotransport

e. countertransport

- which of the following causes rigor mortis ?

a. no action potential in motoneurns

b. an increase in intercellular Ca++ level

c. a decrease in Ca++ levels

d. a decrease in ATP level

- at which site the systolic blood pressure is the highest ?

a. aorta

b. central vein

c. pulmonary artery

d. right atrium

e.renal artery

f. renal vein

- a person ECG has no p waves , but has normal QRS complex and normal T wave . there for , his pacemaker is located in the :
a. SA node
b. AV node
c. bundle of his
d. purkinje system

-an increase in contractility is demonstrated on frank starling diagram by :
a. increase cardiac output for a given end diastolic volume
b. increase cardiac output for a given end systolic volume
c. decrease cardiac output for a given end diastolic volume
d. decrease cardiac output for a given end systolic volume

- in a capillary Pc is 30 mmHg , Pi is -2 mmHg ,II c is 25 mmHg , and Ili is 2mmHg . what is the direction of fluid movement and the net driving force ?
a. absorption 6 mmHg
b. absorption 9 mmHg
c. filtration 6 mmHg
d. filtration 9 mmHg
e. there is no net fluid

- the previous question , if K_f is 0.5 ml/min/mmHg . what is the rate of water flow across the capillary wall ?
a. 0.06
b. 0.45
c. 4.5
d. 9.00
e. 18.00

- a cute decrease in arterial blood pressure elicits which of the following compensatory changes :
a. decrease firing rate from the carotid sinus nerve
b. increase parasympathetic outflow to the heart
c. decrease heart rate
d. decrease contractility
e. decrease mean systolic pressure

- the tendency for edema to occur will be increased by :
a. arteriolar constriction
b. increased venous pressure
c. increased plasma protein concentration
d. muscular activity

- curve A in the figure represents :

a. aortic pressure

c. atrial pressure

d. ventricular volume

- curve B in the figure represents :

a. left atrial pressure

b. ventricular pressure

c. atrial pressure

d. ventricular volume

-which of the following is result of an inward Na+ current ?

a. upstoke of the action potential in SA node

b. upstoke of the action potential purkenji fibers

c. plateau of action potential in the ventricular muscle

d. repolerization of the action potential on ventricular muscle

e. repolerization of the action potential in SA node

- in the SA node , phase 4 depolarization (pacemaker potential) is attributable to :

a. increase in K+ conductance

b. increase in Na+ conductance

c. decrease in Cl- conductance

d. decrease in Ca++ conductance

e. simultaneous increase in K+ and Cl- conductance

- during which phase of cardiac cycle is the aortic pressure highest (very difficult one)

a. atrial systole

b. isovolumetric ventricular contraction

c. rapid ventricular ejection

d. isovolumetric ventricular relaxation

e. rapid ventricular filling

f. reduced ventricular filling

- myocardial contractility is best correleated with the intercellular concentration of :

a. Na+

b. K+

c. Ca++

d.Mg++

- CO_2 regulates the blood flow to :

a. heart

b. skin

c. brain

d. skeletal muscle

- the physiological function of the delay of conduction in the AV node is to allow sufficient time for :

a. run off blood from the aorta to the arteries

b. venous return to the atria

c. filling of the ventricles

d. contraction of ventricles

e. repolerization of the ventricles

-which of the following substance crosses the capillary walls primarily through water filled clefts between the endothelial cells?

a. O_2

b.CO_2

c. CO

d. Glucose

-during which phase of the ventricular action potential is the membrane potential closest to the K+ equilibrium potential ?

a. phase 0

b. phase 1

c. phase 2

d. phase 3

e. phase 4

- during which phase of the ventricular action potential is the conductance to Conuctance to Ca++ is the highest ?

a. phase 0

b. phase 1

c. phase 2

d. phase 3

e. phase 4

-which phase of the ventricular action potential coincides with diastole ?

a. phase 0

b. phase 1

c. phase 2

d. phase 3

e. phase 4

- the low resistant pathway between myocardial cells that allow for spread of the action potential are the ?

a. gap junctions

b. T tubule

c. sacroplasmic reticulum

d. intercalated discs

e. mitochondria

- which agent is released after hemorrhage and causes an increase in renal Na+ reabsorption ?

a. aldsterone

b. anginotensine I

c. anginotensine II

d. ADH

e. atrial natriuretic peptide

-subjects A and B are 70 Kg . subject A drinks 2 L of distilled water , and subject B drinks 2L of isotonic NaCl . subject B will have :

a. greater change in intracellular fluid volume

b. higher positive free water clearance

c. greater change in plasma osmolarity

d. higher urine osmolarity

e. higher urine flow rate

- one gram of mannitol was injected in a woman . after equilibration , a plasma sample had a mannitol concentration of 0.08 g/L . during the equilibration period 20% of the injected mannitol was excreted in urine. The subject is :

a. ECF volume is 1 L

b. ICF volume is 1 L

c. ECF volume is 10L

d. ICF volume is 10L

e. interstitial volume is 12.5

-which of the following substance or combination could be used to measure the interstitial fluid volume a. manitol

b. D2O

c. evans blue

d. insulin and D2O

e. insulin and radioactive albumin

- compared with a person who ingests 2L OF distilled water , a person with water deprivation will have :

a. higher free water clearance

b. lower plasma osmolarity

c. lower level of ADH

d. higher rate of water reabsorption from the collecting ducts

- which of the following ions has a higher concentration in the ICF than ECF ?

a. Na+

b.K+

c. Cl-

d. HCO3

e. Ca++

- A woman runs a marathon in 90^0 F weather and replaces all volume lost in sweat by drinking distilled water . after the marathon she will have :

a. decrease total body water

b. decrease hematocrit

c. decrease ICF volume

d. decrease plasma osmolarity

e. increased intracellular osmolarity