

MID EXAM

020

1-Which one of the following is NOT consistent with secondary active transport?

- A. It is usually saturable.
- B. Cotransport and exchange are variations of secondary active transport.
- C. The movement of an ion down its concentration gradient is coupled to the movement of another molecule against its concentration gradient.
- D. In secondary active transport ATP is directly hydrolyzed.
- E. In secondary active transport, the ion that is moving down concentration gradient is referred to as the driving ion.

2- At the synaptic cleft, increased neurotransmitter concentration is resulted by:

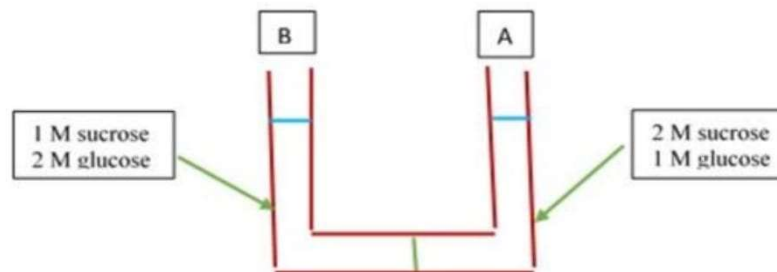
- a. Activation of adenylate cyclase.
- b. Activation of chemical gated Ca^{++} channels.
- C. Activation of phospholipase C.
- d. Increased Ca^{++} concentration in terminals.
- e. Inhibition of adenylate cyclase.

3-Which of the following transport systems require energy?

- A. Osmosis.
- B. Phagocytosis.
- C. Filtration through aquaporins.
- D. Diffusion.
- E. Facilitated diffusion.

4-The solutions in the two arms of this U - tube are separated by membrane that is permeable to water and glucose but not to sucrose Side A is filled with a solution of 2 M sucrose and 1M glucose. Side B is filled with 1 M sucrose and 2 M glucose. Initially, the liquid levels on both sides are equal. At the beginning, in terms of tonicity, the solution inside A with respect (as compared) to that:

- A. Hypotonic.
- B. Saturated.
- C. Hypertonic.
- D. Isotonic.
- E. Plasmolyzed.



5-One of the followings is NOT true regarding a membrane at the overshoot of an action potential:

- A. Activity of K⁺ channels is increasing.
- B. At a given region, during that time the membrane is in refractory period.
- C. The potential is positive inside with regard to outside.
- D. During that time, highest driving force will be for Na⁺.
- E. Will result in generation of ionic currents between the region with overshoot and polarized regions of the membrane.

6-Regarding resting membrane potential of an excitable cell, which of the followings is TRUE:

- A. It is established by the high protein content inside cells.
- B. It creates low driving force for Cl⁻.
- C. It is closer to the equilibrium potential for Ca⁺².
- D. It is closer to the equilibrium potential for Na⁺ (E_{Na⁺}).
- E. At that potential, the conductance for Na⁺ is higher for K⁺.

7- Two control systems for Blood pressure. The first (A) brings the blood pressure from 160 mmHg back to 110 mmHg when the normal was 100 mmHg. The second (B) brings the blood pressure from 180 mmHg back to 110 mmHg when the normal was 100 mmHg. Then we can say that

- A. Cannot be compared since system A has a positive feedback but system B has a negative feedback.
- B. Cannot be compare since system B has a positive feedback and system A has a negative feedback.
- C. System A is a better control system than system B.
- D. System B is a better control system than system A.
- E. Both systems are similar in their control.

8- Na^+ , K^+ , Ca^{+2} , and Cl^- permeation through their respective ion channels represents an example of :

- A. Primary active transport.
- B. Secondary active transport.
- C. Osmosis.
- D. Pinocytosis.
- E. Passive transport.

9- Which of the following pairs are TRUE with regard to conduction along nerve fiber:

- A. Nodes of Ranvier and saltatory conduction.
- B. Schwann cells and continuous conduction.
- C. Saltatory conduction and unmyelinated fibers.
- D. Myelination and slowest conduction.
- E. Continuous conduction and fastest conduction.

10- What is the major difference between simple diffusion and facilitated diffusion?

- A. Simple diffusion does not require energy but facilitated diffusion requires energy.
- B. Simple diffusion only operates across a cell membrane.
- C. Simple diffusion only moves substances inside a cell.
- D. Simple diffusion requires energy but facilitated diffusion does not requires energy.
- E. Facilitated transport requires a specific carrier.

11-Are the neurons carrying impulses away from the central nervous system to the muscles or glands

- A. Extensors.
- B. Flexors.
- C. Afferent nerves.
- D. Efferent nerves.
- E. Sensory nerves.

12- For answering question below use the following statements

- 1. increased conductance to K^+
- 2. increased conductance to Na^+ .
- 3. increased conductance to Cl^-
- 4. blocking of Na^+ / K^+ pump.

Question: Depolarization of a membrane can occur by

- A. 1 and 3.
- B. 1 and 2.
- C. 2 and 3.
- D. 2 and 4.

E. 3 and 4.

13-Which of the followings is TRUE with regard action potential at neurons:

- A. At threshold, there will be inactivation of voltage gated K⁺ channels.
- B. Positive after potential is more negative than the resting potential.
- C. Action potentials can appear by activation of Na⁺ / K⁺ pumps.
- D. At the overshoot, the membrane potential is negative inside with regard to outside.
- E. Depolarization can appear by activation of Cl⁻ channels.

14- If more K⁺ channels have been activated the membrane was at resting potential, which of the following statements is CORRECT:

- A. The membrane potential becomes closer to threshold.
- B. The membrane is in refractory period.
- C. More Na⁺ channels become in the state of closed and capable for opening.
- D. More Cl⁻ can move inward.
- E. The membrane potential can exceed (more negative) the -95mv.

15- Which of the following classical neurotransmitter molecules is an amino acid molecule?

- A. Epinephrine.
- B. Acetylcholine.
- C. Carbon Monoxide.
- D. Glycine.
- E Dopamine.

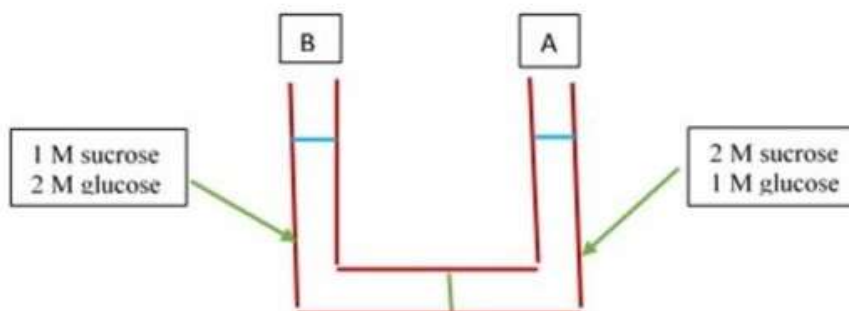
16 - Which channel membrane protein is specifically important in the process of neurotransmitter release?

- A. Neurotransmitter receptor sodium channels.
 - B. Voltage - dependent (gated) calcium channels.
 - C. Voltage - dependent (gated) chloride channels.
 - D. Voltage - dependent (gated) potassium channels.
 - E. Neurotransmitter receptor potassium channels
- Clear my choice.

17- Assuming that we have a membrane that is NOT permeable to Cl^- , K^+ and Na^+ , and permeability for Ca^{++} is the highest . Which of the following potentials is expected to develop at that membrane?

- A. More positive than +160 mV.
- B. Between +100 and +130 mV.
- C. Between 0 and + 60 mV.
- D. More negative than -30mV.
- E. Between -30 and 0 mv.

18 - The solutions in the two arms of this U- tube are separated by a membrane that is permeable to water and glucose but not to sucrose. Side A is filled with a solution of 2 M sucrose and 1M glucose. Side B is filled with 1 M sucrose and 2 M glucose. Initially, the liquid levels on both sides are equal. After the system reaches equilibrium, what changes are observed?



- A. The water level is higher inside A than inside B.
- B. The molarity of glucose is higher inside A than inside B.
- C. The water level is higher inside B than inside A.
- D. The water level is unchanged.
- E. The molarity of sucrose and glucose are equal on both sides.

19- Small rapidly acting transmitter molecules are

- A. Packaged in small synaptic vesicles and synthesized in synaptic terminals.
- B. Soluble gases packaged in small vesicles that freely cross lipid membranes.
- C. Packaged in large synaptic vesicles derived from Golgi body.
- D. Made in the soma, packaged in small synaptic vesicles and transported down axons.
- E. Neuropeptides that are synthesized in synaptic terminals.

20 - The rate at which diffusion takes place is determined by the following conditions EXCEPT:

- A. The size of the area of diffusion
- B. The direction of the diffusion
- C. The temperature
- D. The concentration gradient
- E. The distance for diffusion

21- One of the following statements is NOT true with regard to Na⁺ channels :

- A. Almost all voltage dependent channels become active at threshold potential.

- B. They transform into the state of closed and capable for opening during the positive after potential.
- C. Chemical gated channels can be activated by excitatory transmitter.
- D. The voltage dependent channels are activating at a slower rate than K^+ channels during action potential.
- E. Voltage dependent channels are closed and not capable for opening during falling phase of action potential.

22- Regarding action potentials, which of the following pairs are NOT related to each other?

- A. Resting potential: High conductance for K^+ .
- B. Relative refractory period: Highest conductance of K^+ .
- C. Threshold potential: Activation of voltage gated Na^+ channels.
- D. Overshoot: Highest electrical driving force for Na^+ .
- E. Hyperpolarization: More diffusion for K^+ .

23- Generation of action potentials by post synaptic neurons can be reduced by all the followings EXCEPT:

- A. Inhibition of Ca^{++} channels at presynaptic terminals releasing excitatory neurotransmitters.
- B. Activation of chemical gated Cl^- channels at the post synaptic membranes.
- C. inhibition of Na^+ channels at the post synaptic membranes.
- D. Generation of more IPSPs (Inhibitory of post synaptic potentials)
- E. Inhibition of K^+ channels at the postsynaptic membranes.

24- Nitric oxide (NO) is a gas neurotransmitter that

- A. Freely cross lipid membranes.
- B. Is stored in synaptic vesicles.
- C. Is transported to the synaptic terminals via microtubules.
- D. Is synthesized in the nucleus by nissle granules.
- E. Does not cross lipid membranes.

25- Which statement is CORRECT about small molecules rapidly acting neurotransmitters?

- A. Depending on the frequency of the incoming signal, a neuron will always synthesise and release more than one neurotransmitter.
- B. Depending if the incoming signal is inhibitory or stimulatory a neuron will synthesise and release one or another neurotransmitter.
- C. Depending on the integrated signal derived from both inhibitory and excitatory signals, a neuron will synthesise and release one or another neurotransmitter.
- D. Both A and C choices are correct.
- E. Each neuron will usually synthesize, store and release one neurotransmitter.

26- An increase in the concentration of carbon dioxide above it's normal range is detected by a (n)

- A. Messenger.
- B. Sensor.
- C. Afferent.
- D. Effector.
- E. Integrator.

27- Regarding depolarization one of the followings is true:

- A. Can be induced by activation of more K^+ channels.
- B. Can be induced by increasing activity of Na^+/K^+ pump.
- C. Represents a change in membrane potential to a more negative potential.
- D. Can be induced by increasing Cl^- influx.
- E. Can be induced by decreasing K^+ efflux.

28- What determines the effect of neurotransmitter released on the post-synaptic neurons?

- A. The neurotransmitter contained in the synaptic vesicles.
- B. The post-synaptic receptors.
- C. The size of the synaptic vesicles.
- D. The concentration of calcium ions reached in presynaptic terminals.
- E. The size of the action potential.

29- One of the followings with regards to synaptic function is NOT true:

- A. Post synaptic membranes are bearing specific receptors for released neurotransmitters.
- B. Upon release of neurotransmitters, chemical gated channels over post synaptic membranes are activated.
- C. Neurotransmitters are released by exocytosis.
- D. Destruction of neurotransmitters by enzymes at the post synaptic membrane is reducing concentration of neurotransmitters at the synaptic cleft.
- E. Transmission from presynaptic to postsynaptic neurons is electrical.

30- One of the followings with regard to neural activities is NOT true:

- A. By temporal and/or spatial summation, postsynaptic neurons can generate action potentials at axon hillock.
- B. At post synaptic membranes there is generation of either excitatory or inhibitory potentials.
- C. Spatial summation can result by having two or more presynaptic neurons stimulating a postsynaptic neuron at the same time.
- D. Generated action potentials at the axon hillock are propagating toward axon terminals.
- E. When EPSPs are generated the membrane is in refractory period.

31- One of the following events best describes the activity at the axon hillock during relative refractory period:

- A. That period is achieved by high activity of Na^+/K^+ pump.
- B. Has highest conductance for Na^+ .
- C. Has highest conductance for Ca^{++} .
- D. Will respond again by an action potential to subthreshold stimuli.
- E. Is having less negative potential than the resting potential.

32-The process whereby the content of synaptic vesicles is released into the synaptic cleft/gap is called:

- A. Phagocytosis.
- B. Endocytosis.
- C. Exocytosis.
- D. Osmosis.
- E. Pinocytosis.

33- One of the followings with regard to the refractory period is TRUE:

- A. Includes the period of time when most Na⁺ channels are closed and capable for opening.
- B. Serves to ensure unidirectional propagation of an action potential along nerve fiber.
- C. It appears by activation of adenylate cyclase.
- D. During the relative refractory period the membrane has the highest conductance for Na⁺.
- E. Includes the period of depolarization before reaching threshold.

34- One of the followings describes CORRECTLY the saltatory conduction:

- A. It refers to jumping of impulse from a node of Ranvier to the next node.
- B. It refers to saltation of impulse from presynaptic to postsynaptic neuron.
- C. It is slower than continuous condition.
- D. It appears in unmyelinated fibers.
- E. It involves jumping of impulse from one Schwann cell to adjacent Schwann cell.

35- Regulation of gene expression is associated with which membrane protein in a neuron?

- A. Voltage-dependent (sensitive) sodium channels.
- B. Voltage-gated calcium channels.
- C. Metabotropic receptors.
- D. Ionotropic receptors.

E. The second-messenger cyclic AMP (CAMP).

36- At the resting membrane potential of an excitable cell, the electrical driving force for Cl^- , Na^+ and K^+ ions is:

- A. Equal for all mentioned ions.
- B. High for Cl^- .
- C. Low for K^+ and high for Na^+ .
- D. Low for Na^+ .
- E. High for K^+ and low for Cl^- .

37- What is a hypotonic solution?

- A. An external solution with a higher concentration than inside a cell.
- B. An external solution of 0.9% NaCl (molecular weight of NaCl 58.5).
- C. An internal solution with 0.9% NaCl (molecular weight of NaCl= 58.5).
- D. An external solution with the same concentration as inside the cell.
- E. An external solution with a lower concentration than inside a Cell.

38- Which of the following mechanisms would you associate with an agonist drug action

- A. A drug that binds postsynaptic receptors and mimics the effect of the endogenous neurotransmitter.
- B. A drug that prevents the normal reuptake of neurotransmitters inside the post-synaptic terminals.
- C. A drug that binds and blocks normal presynaptic function.
- D. A drug that decreases the enzymatic synthesis of neurotransmitters.

E. A drug that binds postsynaptic receptors and mimics the effect of the endogenous neurotransmitter.

39- One of the following events best describes the excitable membrane during absolute refractory period:

- A. Is having highest conductance for K^+ .
- B. Has highest conductance for Na^+ .
- C. Including period of time before reaching threshold.
- D. Is having more negative potential than the threshold.
- E. Will respond again by an action potential to stronger (supra threshold) stimuli

40- The followings are events during synaptic transmission,

- 1. Activation of voltage gated Ca^{++} channels at terminals.**
- 2. Generation of EPSPS (Excitatory post synaptic potentials).**
- 3. Exocytosis of neurotransmitter.**
- 4. Generation of action potentials at post synaptic neurons.**

Question: The correct sequence of the events above according to their appearance during synaptic transmission is?

- A. 1, 3, 2, 4.
- B. 2, 1, 3, 4.
- C. 1, 2, 3, 4.
- D. 3, 1, 2, 4.
- E. 2, 3, 1, 4.

Answers

1	D	21	D
2	D	22	D
3	B	23	E
4	D	24	A
5	D	25	E
6	B	26	B
7	D	27	E
8	E	28	B
9	A	29	E
10	E	30	E
11	D	31	E
12	D	32	C
13	B	33	B
14	C	34	A
15	D	35	C
16	B	36	C
17	B	37	E
18	A	38	A
19	A	39	B
20	B	40	A

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