



**Physiology  
mid-past  
papers**

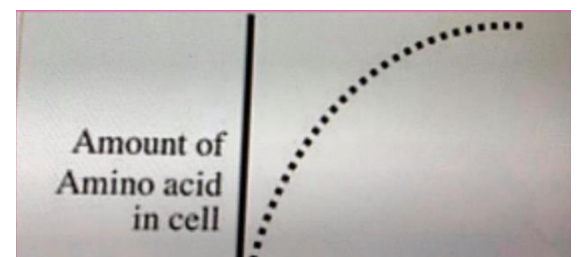
## INTRODUCTION TO PHYSIOLOGY AND TRANSPORT:

**1) When the blood sugar control system is not functioning, and the blood sugar rises from the normal level 90 to 200 mg/100 ml of plasma, if at another time when the blood sugar control system is functioning the blood sugar increases from the normal level 90 mg to 100/100 ml of plasma, calculate the gain of the blood sugar control system:**

- A) 10 and positive feedback
- B) 10 and negative feedback
- C) 2 and negative feedback
- D) 0 neither negative or positive feedback
- E) 2 and positive feedback

**2) An experiment is done to measure the uptake of an amino acid into a cell. The above data are obtained. If  $\text{Na}^+$  is removed from the extracellular bathing solution, or a drug is added that prevents the cell from making ATP, the uptake of amino acid into the cell is markedly reduced. Based on this information which of the following mechanisms is likely responsible for the transport of the amino acid into the cell?**

- A) Uniporter (one molecule unidirectional)
- B) Transport ATPase (pump)
- C)  $\text{Na}^+$  symporters (co-transport)
- D) Passive diffusion through the lipid bilayer
- E)  $\text{Na}^+$  antiporter (counter transport)



**3) Which of the following transport mechanisms is NOT rate limited by an intrinsic transport maximum ( $V_{\text{max}}$  or  $T_{\text{max}}$ )?**

- A) Facilitated diffusion via carrier proteins
- B) Primary active transport via carrier
- C) Secondary counter-transport (antiport)
- D) Secondary co- transport (symport)
- E) Simple diffusion through protein channels

**4) The body system LEAST concerned with homeostasis?**

- A) Cardiovascular system
- B) Respiratory system
- C) Urinary system
- D) Reproductive system
- E) Nervous system

**5) The type of membrane protein enables cells to respond to specific hydrophilic ligand by changes in the level of intracellular c AMP?**

- A) Ligand
- B) Cholesterol
- C) Phospholipid
- D) Enzymes
- E) Receptors.

**6) Which of the following substances has the highest intracellular fluid to extracellular fluid concentration ratio for most mammalian cells?**

- A) Carbon dioxide
- B) Proteins
- C) Calcium

- D) Sodium
- E) Potassium

**8) A blood sample is taken from an individual whose blood osmolality is 300 mOsm/kg H<sub>2</sub>O, Red blood cells from this sample are then replaced in the following solution, in which solution cells will shrink?**

- A) 1
- B) 2
- C) 3
- D) 4
- E) 5

	Molar concentration (mM/liter)
1. Na Cl	150
2. Fructose	300
3. Na HCO <sub>3</sub>	150
4. Ca Cl <sub>2</sub>	150
5. K Cl	100

**9) The cell membrane is most permeable to which of the following substances?**

- A) Sodium fluoride
- B) Oxygen
- C) Potassium Chloride
- D) Albumin protein

**10) The forces governing the diffusion of a gas through a biological membrane are listed below. Which of the following changes DECREASE the diffusion of gas through a biological membrane?**

- A) A
- B) B
- C) C
- D) D
- E) E

	$\Delta C$	A	S	T	MW
A.	↓	↓	↓	↓	↓
B.	↓	↓	↓	↑	↑
C.	↓	↑	↑	↓	↓
D.	↓	↓	↑	↓	↓
E.	↑	↑	↑	↑	↑

Abbreviations: ( $\Delta C$ ): concentration difference across the membrane; (A): the cross sectional area of the membrane; (S) the solubility of the gas; (T) thickness of the membrane and (MW) the molecular weight of the gas. ↓=decrease, and ↑=increase

**11) A cell is equilibrated in an aqueous solution of 300 mOsm/L sodium chloride. Which of the following best describes what will happen to cell volume when the cell is placed in an aqueous solution of 300 mOsm/L Calcium Chloride?**

- A) Decrease and then increase.
- B) Increase and then decrease.
- C) No change.
- D) Increase
- E) Decrease

1-B	6-E
2-C	8-D
3-E	9-B
4-D	10-B
5-E	11-C

## **CONTROL OF TRANSPORT + ACTION POTENTIAL+ ANS:**

**1) One of the followings with regard to refractory periods during an action potential is true:**

- A) The membrane can generate a new action potential by subthreshold stimuli
- B) The relative refractory period precedes the absolute refractory period
- C) Na<sup>+</sup> voltage gated channels are closed and capable for opening
- D) Before reaching threshold, the membrane is out of refractory period
- E) Highest Na<sup>+</sup> diffusion is during relative refractory period

**2) Assuming that we have a membrane is highly permeable to  $\text{Na}^+$  and  $\text{Ca}^{++}$  and permeability for  $\text{Cl}^-$  and  $\text{K}^+$  is zero. Which of the following membrane potentials is expected?**

- A) More positive than +160 mV
- B) Between +61 mv and +130 mv
- C) Between 0 and +30 mv
- D) Between 0 and -80 mv
- E) More negative than -94 mv

**3) One of the followings with regard to electrical activity along nerve fibers (axons) is true:**

- A) Nodes of Ranvier refer to the parts of neurons that are covered with myelin sheath
- B) Conduction is continuous in myelinated fibers
- C) Saltatory conduction refers to jumping of impulse from Schwann cell to the next Schwann
- D) Local currents are depolarizing axonal membrane to reach the threshold potentials
- E) Activation of  $\text{Ca}^{++}$  at the axon hillock is important for generation of action potentials at motor neurons

**4) Generation of an action potential at the axon hillock of a motor neuron can take place by**

- A) Development of more EPSPs at the post synaptic neurons
- B) Activation of more chemical gated  $\text{Cl}^-$  channels at the post synaptic membrane
- C) Activation of more chemical gated  $\text{k}^+$  channels at the post synaptic membrane
- D) Increasing concentration of neurotransmitter in synaptic cleft that can generate IPSPs

E)None of the above

**5) An excitable membrane at a resting membrane potential of -80 mv can depolarize by :**

A)More diffusion of K<sup>+</sup>

B)Activation of Cl<sup>-</sup> channels

C)Decreasing Na<sup>+</sup> concentration in extracellular fluids

D)Increasing K<sup>+</sup> concentration in extracellular fluids

E)Activation of Na<sup>+</sup>/K<sup>+</sup> pump

**6)One of the followings is NOT true with regard to summation:**

A)Summation can have place between IPSPs and EPSPs

B)Temporal summation refers to summation of potentials from the same presynaptic neurons

C)Spatial summation refers to summation of potentials from different presynaptic neurons

D)The duration of postsynaptic potentials is less than the duration of action potentials at the presynaptic axons

E)High frequency of action potentials by inhibitory presynaptic neurons can reduce generation of action potentials at the postsynaptic neurons

**7)One of the followings with regards to synaptic function is NOT true:**

A)Neurotransmitters from presynaptic terminals are released by diffusion

B)Upon release of neurotransmitters, chemical gated channels over post synaptic membranes are activated

C)Transmission from presynaptic to postsynaptic neurons is chemical

D)Destruction of neurotransmitter by enzymes at the post synaptic membrane is reducing concentration of neurotransmitter at the synaptic cleft

E) Post synaptic membranes are bearing specific receptors for released neurotransmitters

**8) Which of the following is NOT true with regard to conduction along nerve fibers:**

- A) Higher velocity of conduction is in myelinated than unmyelinated fibers
- B) The velocity of conduction is increased by increasing diameter of nerve fibers
- C) Refractory periods are important for ensuring propagation of action potentials in one direction only from the site where they have been generated
- D) Higher velocity of conduction is achieved by saltatory than by continuous conduction
- E) Higher resistance for internal currents is in large nerve fibers

**9) Resting membrane potential at excitable cells is:**

- A) Positive inside with regard to outside
- B) Established by high permeability of membrane to  $Cl^-$  ion
- C) Determined mainly by the activity of adenylate cyclase
- D) Generated by high protein content inside cells
- E) Established just across the membrane

**10) Which of the followings is NOT true with regard to an action potential at neurons:**

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



**11) Which of the following is NOT characterizing a membrane during absolute refractory period?**

- A) The membrane potential is closer to zero mv than the resting potential
- B) The membrane is having higher conductance for K<sup>+</sup> than for Na<sup>+</sup>
- C) Voltage gated Na<sup>+</sup> channels are opened
- D) Voltage gated k<sup>+</sup> channels are activating
- E) High conductance is for Na<sup>+</sup>

**12) Which of the followings pairs are NOT related to each other:**

- A) Activation of chemical gated Na<sup>+</sup> channels : Excitatory post synaptic potentials (EPSPs)
- B) Activation of chemical gated K<sup>+</sup> channels : Inhibitory post synaptic potentials (IPSPs)
- C) Activation of adenylate cyclase at the terminals of axons : release of neurotransmitters from terminals
- D) Action potentials at presynaptic axons : Activation of voltage gated Ca<sup>++</sup> channels at the terminals
- E) Summation of postsynaptic membrane potentials : Action potentials at the postsynaptic neurons

**13) After hyperpolarization wave recorded with an action potential refers to:**

- A) The membrane potential before reaching threshold
- B) The membrane potential when becoming positive inside with regard to outside
- C) The resting membrane potential before starting action potential
- D) The membrane potential during absolute refractory period
- E) The more negative potential than the resting potential after repolarization phase

**14) Regarding action potentials, which of the following pairs are NOT related to each other?**

- A) Firing stage : High conductance of Na<sup>+</sup>
- B) Depolarization : More diffusion for Na<sup>+</sup>
- C) Overshoot : Highest driving force for Na<sup>+</sup>
- D) Threshold potential : Activation of voltage gated Na<sup>+</sup> channels
- E) Resting potentials : High permeability for K<sup>+</sup>

**15) The highest conductance for K<sup>+</sup> during an action potential is at the :**

- A) Depolarization before reaching threshold
- B) Firing stage of an action potential
- C) Overshoot of an action potential
- D) Repolarization phase
- E) At resting potentials

**16) At the resting membrane potential of an excitable cell the driving force for ions is:**

- A) The highest for K<sup>+</sup>
- B) The highest for Na<sup>+</sup>
- C) The highest for Cl<sup>-</sup>
- D) Equal for all ions
- E) None of the above

**17) Na<sup>+</sup> channels are in the state of closed and NOT capable for opening during :**

- A) Resting membrane potential

- B) Depolarization and before reaching threshold
- C) Firing stage of an action potential
- D) Falling phase of an action potential
- E) Positive after potentials

**18) One of the followings with regard to electrical properties of excitable membrane is true:**

- A) All are establishing the same value for resting membrane potentials
- B) All are having the same value for threshold potential
- C) In all excitable tissues, only  $\text{Na}^+$  and  $\text{K}^+$  are involved in generation of action potentials
- D) Neurons can develop more negative potentials than the equilibrium potential for  $\text{K}^+$
- E) Equilibrium potential for  $\text{Na}^+$  is never reached during action potentials

**19) Which of the followings is taking place last during transmission of action potentials at the synapse ?**

- A) Release of neurotransmitters
- B) Activation of voltage gated  $\text{Ca}^{++}$  channels at the terminals of presynaptic neurons
- C) Generation of action potentials at the post synaptic neurons
- D) Generation of postsynaptic potentials
- E) Summation of postsynaptic membrane potentials

**20) All the following structures are bearing muscarinic receptors EXCEPT:**

- A) Postganglionic neurons
- B) Sweat glands

- C) Intestine
- D) Salivary glands
- E) Heart conductive tissue

**21) All the followings may describe the parasympathetic system EXCEPT:**

- A) When stimulated it causes an increase in intestinal movements
- B) Second neurons release a neurotransmitter that binds to muscarinic receptors
- C) It dominates in quiet and relaxed situation
- D) Its postganglionic neurons can also be stimulated by nicotine
- E) When stimulated it is increasing sweating

**22) The opening of which of the following ion channels would have the least effect on the receptor membrane potential?**

- A) The opening of any ion channels would effect the resting membrane potential to a similar degree
- B) Sodium
- C) Calcium
- D) Chloride
- E) Potassium

**23) One of the followings does NOT characterize the sympathetic nervous system:**

- A) Has acetylcholine as transmitter in preganglionic neuron
- B) Is always giving excitatory responses
- C) Is a part of the autonomic nervous system
- D) Has short preganglionic and long post ganglionic fibers
- E) Promotes responses for fight or flight reaction

**24) By muscarinic intoxication, all the followings are taking place EXCEPT:**

- A) Vomiting and diarrhea
- B) Dilation of pupil (mydriasis)
- C) Hypersalivation
- D) High sweating
- E) Decrease heart rate

**25) In Hyperkalemia, initially:**

- A) The resting membrane potential becomes more negative.
- B) The membrane becomes partially hyper-polarized.
- C) This increases membrane excitability.
- D) This decreases membrane excitability.

**26) During depolarization, which of the following statements about voltage-gated ion channels is TRUE?**

- A)  $K^+$  gates open before  $Na^+$  gates.
- B)  $Na^+$  gates open after  $K^+$  gates.
- C)  $Na^+$  and  $K^+$  gates get activated at the same time in different rates.
- D)  $Na^+$  gates open while  $K^+$  gates remain closed.
- E)  $K^+$  gates open while  $Na^+$  gates remain closed.

**27) Depolarization occurs because:**

- A) more  $K^+$  diffuse into the cell than  $Na^+$  diffuse out of it.
- B) more  $K^+$  diffuse out of the cell than  $Na^+$  diffuse into it.
- C) more  $Na^+$  diffuse into the cell than  $K^+$  diffuse out of it.
- D) more  $Na^+$  diffuse out of the cell than  $K^+$  diffuse into it.

E) both  $\text{Na}^+$  and  $\text{K}^+$  diffuse into the cell.

**28) Part of a neuron that receives information from other neurons**

- A) axon.
- B) dendrites.
- C) myelin sheath.
- D) synapse.

**29) Which term describes the cell membrane potential of a neuron at rest?**

- A) polarized.
- B) Hyper-polarized.
- C) neutral.
- D) repolarized.

**30) At what membrane voltage do neuronal voltage-gated  $\text{Na}^+$  channels become activated?**

- A)  $-90 \text{ mV}$
- B)  $-65 \text{ mV}$
- C)  $0 \text{ mV}$
- D)  $+35 \text{ mV}$

**31) At what membrane voltage do neuronal voltage-gated  $\text{K}^+$  channels become activated?**

- A)  $-90 \text{ mV}$
- B)  $-65 \text{ mV}$
- C)  $0 \text{ mV}$

D) +35 mV

**32) Choose the most accurate statement regarding the relative refractory period:**

- A) It coincides (occurs at the same time) with the period of lowest K<sup>+</sup> channel activity.
- B) It mostly takes place when Na<sup>+</sup> channels are closed but not capable of opening.
- C) It precedes the absolute refractory period
- D) It occurs during the firing stage
- E) The sodium channels during this period do not respond even to stronger stimuli

**33) Which of following statements about transmission of action potentials along the axon of the nerve fiber is NOT TRUE:**

- A) Continuous conduction is slower than saltatory conduction.
- B) As the diameter of the nerve fiber decreases, speed of conduction increases.
- C) In saltatory conduction, the action potential travels from one node of Ranvier to another.
- D) Saltatory conduction involves opening voltage-gated sodium channels at the nodes of Ranvier
- E) Speed of transmission is fastest in myelinated nerve fibers.

**34) The onset of the action potential causes voltage gated K<sup>+</sup> channels to open:**

- A) TRUE.
- B) FALSE.

1-D	2-B	3-D	4-A	5-D	6-D
7-A	8-E	9-E	10-D	11-B	12-C
13-E	14-C	15-D	16-B	17-D	18-E

19-C	20-A	21-E	22-D	23-B	24-B
25-C	26-C	27-C	28-B	29-A	30-B
31-B	32-B	33-B	34-A		

## **THE NEUROTRANSMITTERS MATERIAL:**

**1) Which of the following is NOT a way neurotransmitter inactivation?**

- A) Re-uptake by surrounding glial cells
- B) Re-uptake into the postsynaptic terminal
- C) Enzymatic degradation
- D) Diffusion
- E) Re-uptake into presynaptic terminals.

**2) Small molecules neurotransmitter in contrast to neuropeptide are?**

- A) Packaged in large synaptic vesicles.
- B) Their action can be terminated by peptidase enzymes.



- C) They act through binding to presynaptic receptors.
- D) Synthesized in the presynaptic receptors.
- E) Made in soma, and transported down by axonal transport.

**3) Binding to gamma-aminobutyric acid (GABA) an inhibitory neurotransmitter to GABA receptors may lead to an increase in membrane permeability to:**

- A) Proteins
- B) Proton (H<sup>+</sup>)
- C) Calcium (Ca<sup>+</sup>)
- D) Sodium (Na<sup>+</sup>)
- E) Potassium (K<sup>+</sup>)

**4) Serotonin – specific re-uptake inhibitors (SSRIs) are widely prescribed to treat clinical depression. Which of the following procedures do you think would most likely make symptoms worse in untreated depressed patients?**

- A) Decrease the concentration of serotonin in the brain.
- B) Give serotonin presynaptic receptor antagonist (inhibit receptor function) s or reduce presynaptic.
- C) Give a dopamine receptor antagonist (reduce the function of dopamine receptors)
- D) Give a drug that increases the vesicular release (in the synapse) of serotonin
- E) Increase the concentration of serotonin in the brain.

**5) Which of the following types of sensory nerve fibers has the fastest transmission rate for action potentials?**

- A) Type III
- B) Type A gamma.

- C) Type A beta.
- D) Type IV.
- E) Type A delta.

**6) Which channel membrane protein is specifically important in the process of neurotransmitter release?**

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

**7) Binding of gama-aminobutyric acid (GABA) an inhibitory neurotransmitter to GABA receptors may lead to an increase in membrane permeability to :**

- A)Sodium
- B)Chloride
- C)Calcium
- D)Proton
- E)Protein

**8) All the following with regard to beta adrenergic receptors are true EXCEPT:**

- A)Their stimulation increases heart rate
- B)They are present in the heart
- C)They are stimulated by a neurotransmitter released by sympathetic nervous system
- D)They are blocked by atropine
- E)Their stimulation increases the air flow to the lung

**9) local anesthetic drugs like curare take effect by which of the following mechanisms:**

- A) Blocking nicotinic acetylcholine receptors at synapse
- B) Blocking neurotransmitter uptake by axonal terminals
- C) Internal block of axonal voltage-gated sodium channels
- D) Inhibiting the propagation of the action potential through autonomic neurons
- E) Inhibiting the action of acetylcholinesterase in the synapse

**10) Which of the following mechanisms would you associate with agonist drug action?**

- A) A drug that binds and blocks normal presynaptic function
- B) A drug that binds postsynaptic receptors and has the same effect of the endogenous neurotransmitter
- C) A drug that blocks the enzymatic synthesis of neurotransmitter
- D) A drug that binds postsynaptic receptors and blocks the normal action of the endogenous neurotransmitter
- E) A drug that speeds the normal reuptake of neurotransmitters inside presynaptic terminals

1-B	5-C	9-A
2-D	6-D	10-B
3-E	7-B	
4-A	8-D	

**SENSORY RECEPTORS:**

**1)The intensity of a stimulus is generally encoded in the amplitude of \_\_\_\_\_ of a sensory neuron:**

- A)The mechanosensitive channels
- B)The accessory structures
- C)The receptive field
- D)The action potential
- E)The receptor potential

**2)Which of the following receptors are least adaptive?**

- A)Touch
- B)Pressure
- C)Taste
- D)Pain
- E)Position

**3)Synaptic fatigue is due to:**

- A)Block in the synthesis of neurotransmitters
- B)Failure of action potentials to open voltage-gated  $Ca^{++}$  channels in presynaptic terminal
- C)Inability to release neurotransmitters by exocytosis
- D)Synaptic fatigue does not occur in the central nervous system
- E)The rate of synthesis is less than the rate of release of neurotransmitters

**4)Pain is to \_\_\_\_\_ as cold is to \_\_\_\_\_.**

- A) Baroreceptor; chemoreceptors
- B) Chemoreceptors; nociceptors

- C) Baroreceptors; thermoreceptors
- D) Mechnoreceptors; nociceptors
- E) Nociceptors; thermoreceptors

**5) Different sensory modalities (light, sound, touch, etc) depend specifically on**

- A) Stimulating specific types of receptors and specific pathways
- B) Second messenger systems
- C) Neurotransmitters
- D) Action potential frequencies
- E) Electrical stimuli

**6) Receptors in the muscles, tendons, and joints that inform the brain of the position and movements of the body parts are functionally known as:**

- A) Interoceptors
- B) Nocioceptors
- C) Cutaneous receptors
- D) Exteroreceptors
- E) Proprioceptors

1-E	4-E
2-D	5-A
3-E	6-E

## **SIGNAL TRANSDUCTION AND HORMONE RECEPTORS:**

**1) Which of the following hormones has intracellular receptors:**

- A) Glucagon
- B) Follicle stimulating hormone
- C) Growth Hormone
- D) Estradiol
- E) ACTH (adrenocorticotrophic hormone)

**2) Location of cellular receptor proteins depends mainly on:**

- A) Chemical class of hormone
- B) Function of hormone
- C) Site of release
- D) Type of cell
- E) Half life of hormone

**3) When a G protein coupled receptor is activated, any of the following may occur EXCEPT:**

- A) Increase in cAMP
- B) Decrease in cAMP
- C) Increase in  $Ca^{++}$
- D) CREB (cAMP response element binding protein) activation
- E) STAT (signal transduction activator for transcription) phosphorylation

**4) All of the following are derivatives of Tyrosine EXCEPT:**

- A) Epinephrine

- B) Dopamine
- C) Thyroxine
- D) Thyroid Stimulating Hormone
- E) Norepinephrine

**5) Insulin receptor is an example of:**

- A) Ionotropic receptors
- B) Metabotropic receptors
- C) G Protein Coupled Receptor (GPCR)
- D) Receptor Tyrosine kinase
- E) Voltage gated channel

**6) Which of the following hormones has nuclear receptors that are typically associated with retinoic acid receptors (RXR)?**

- A) Insulin
- B) Leptin
- C) T3 (triiodothyronine)
- D) Testosterone
- E) Dopamine

**7) Which of the following is rarely bound to plasma proteins in blood:**

- A) Testosterone
- B) Insulin
- C) Cortisol
- D) Thyroxine
- E) Estrogen

**8)The following are G Protein Coupled Receptor (GRCR) EXCEPT:**

- A)Glucagon receptor
- B) $\beta$ -adrenergic receptor
- C)Growth factors and cytokines receptors
- D)Vasopressin (Antidiuretic hormone)
- E) $\alpha$ 2-adrenergic receptor

**9) $\alpha$ 1-Adrenergic receptors are coupled to which Enzyme-Product:**

- A)Adenylyl Cyclase-cAMP
- B)Guanylyl Cyclase-cGMP
- C)Phospholipase C-DAG(diacylglycerol),IP3 (inositol triphosphate )
- D)Phospholipase A-arachidonic acid
- E)Phosphodiesterase-cAMP

**10)All of the following are mechanism of turning off GPCR signal EXCEPT:**

- A) $G\alpha$  hydrolyzes GTP
- B)cAMP-induced Phosphodiesterases activation
- C) $\beta$ -Arrestin-induced endocytosis of GPCR
- D)Activation of phospholipases
- E)Activation of phosphatases

**11)Epinephrine may have the following second messenger/s:**

- A)cAMP
- B) $Ca^{++}$
- C)IP3



D)DAG

E)All of the above mentioned are correct

**12)Leptin hormone induces its effect mainly through:**

A)PKA-CREB pathway

B)JAK-STAT pathway

C)Ca<sup>++</sup> -Calmodulin pathway

D)Adenylyl cyclase -cAMP pathway

E)Guanylyl cyclase-cGMP pathway

**13)Receptor affinity to a ligand is judged by:**

A)Similarity of structure-directly related

B)Clearance rate of ligand-inversely related

C)Half life ligand-inversely related

D)K<sub>d</sub> (dissociation)-inversely related

E)Density of receptor in a given tissue-directly related

**14)In the lab experiment, cultured smooth muscle cells were treated with a drug that mimics (يشبه) a hormone. After treatment, levels of cyclic GMP were significantly increased, Which of the following hormones the drug might mimic and which type of receptors the drug stimulated?**

A)Epinephrine, G protein coupled receptors (alpha s)

B)Acetyl choline, G protein coupled receptors (alpha q)

C)Atrial Natriuretic Peptide (ANP), Enzyme linked receptor

D)Growth hormone, Enzyme linked receptor

E)Glucagon, G protein coupled receptors (alpha s)

**15) In a lab experiment, cultured liver cells were first treated with drug(X). After 15 minutes, they were treated with another drug (Y). cAMP measurements were; 1 uM (pretreatment), 100 uM (after X treatment), 10 uM (after Y treatment). X and Y Drugs may have activated the following receptors:**

- A) X: beta adrenergic receptors; Y: alpha 1 adrenergic receptors
- B) X: beta adrenergic receptors; Y: alpha 2 adrenergic receptors
- C) X: beta adrenergic receptors; Y: glucagon receptors
- D) X: serotonin receptors; Y: beta adrenergic receptors
- E) X: insulin receptors; Y: glucagon receptors

**16) Clearance of a hormone is high if:**

- A) The half-life is high
- B) The percentage of the hormone bound to plasma proteins is low
- C) The hormone is inactive
- D) The hormone is lipophilic
- E) The hormone is a prohormone

1-D	2-A	3-E	4-D
5-D	6-C	7-B	8-C
9-C	10-D	11-E	12-B
13-D	14-C	15-B	16-B

*-CLIMBING TO THE TOP IS HARD BUT THE SIGHT OF ACCESS IS WORTH IT FATIGUE ❤️*

**DONE BY: MAJDOLEEN HAMED.**