



Physiology final-past papers

2020-2021

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1. In a lab experiment, cultured endothelial cells were treated with a drug that increases synthesis of a hormone. After treatment, levels of cyclic GMP were significantly increased, which of the following hormones might have been stimulated?
- Epinephrine
 - Glucagon
 - Nitric oxide (NO)
 - Acetyl choline
 - Growth hormone

Answer : C

2. About the absolute refractory (A.R.P) period in the heart, all the following is true EXCEPT:
- It is longer than the A.R.P of neurons.
 - It lasts approximately as long as the cardiac contraction.
 - It is due mainly to phase 2 (plateau) of the contractile cardiac muscle action potential.
 - During it, the heart cannot be stimulated.
 - It corresponds in time with the whole duration of the action potential.

Answer : E

3. Receptors that respond when a stimulus is first applied, but continues to apprise the brain about the sensation is called?
- Phasic receptors
 - Nociceptors
 - Exteroceptors
 - Tonic receptors
 - None of the above

Answer : D

4. All the following may describe the sympathetic system EXCEPT :
- When stimulated, it has less diffuse receptors than the parasympathetic stimulation
 - When stimulated, it reduces blood flow to gastrointestinal tract
 - The transmission at the level of prevertebral ganglia appears by the secretion of acetylcholine.
 - It has short preganglionic and long postganglionic fibres.
 - It is stimulated during fear or stress.

Answer : A

5. Which of the following has the shortest half-life ?

- a. Insulin
- b. Cortisol
- c. Thyroxine
- d. Testosterone
- e. Aldosterone

Answer : A

6. All of the following turn off G Protein Coupled Receptor GPCR signal EXCEPT :

- a. Phosphodiesterases activation
- b. Phosphatases activation
- c. Phospholipases activation
- d. G_{α} hydrolyses GTP.
- e. Beta-Arrestin binding to receptor.

Answer : C

7. Intensity discrimination is better the :

- a. The unmyelinated neurons activated.
- b. Shape of receptor
- c. Decreased number of receptors activated.
- d. Greater amplitude of action potential
- e. Higher frequency of action potential

Answer : E

8. After giving a person healthy intravenous saline solution (isotonic NaCl), the properties of extracellular fluid will be?

- a. Hypertonic and hypervolemic
- b. Isotonic and normovolemic
- c. Isotonic and hypervolemic
- d. Hypotonic and hypervolemic
- e. Hypotonic and normovolemic

Answer : C

9. A 65-year-old man has a 20-year history of nephrotic syndrome (kidney disease). He visits his physician complaining of swelling of his extremities. A decrease in which of the following is one of the most likely cause of his lower limb edema?

- a. Arteriole conductance
- b. Interstitial hydrostatic pressure
- c. Plasma colloid osmotic pressure
- d. Capillary hydrostatic pressure
- e. Interstitial colloid osmotic pressure

Answer : C

10. Which of the following hormones has intracellular receptors ?

- a. Thyroid hormone (T3)
- b. Glucagon
- c. Insulin
- d. Growth hormone
- e. Thyroid stimulating hormone (TSH)

Answer : A

11. Localisation of sensation is made by :

- a. Shape of receptor
- b. Greater amplitude of action potential
- c. The sensory pathway ending at specific area in the brain.
- d. Type of receptor
- e. Number of sensory neurons activated.

Answer : C

12. In sensory receptors

- a. Stimulus energy is converted into local depolarisation.
- b. Serving touch sensation, constant suprathreshold stimulation causes an action potential to be generated at a constant rate.
- c. The frequency of action potential generated doubles when the strength of the stimulus doubles
- d. A generator (receptor) potential can be produced by only one form of energy.
- e. The generator (receptor) is graded, self-propagating.

Answer : A

13. Listed below are the hydrostatic and oncotic pressures across a muscle capillary wall. Mean capillary hydrostatic pressure = 25 mmHg. Plasma colloid osmotic pressure = 28 mmHg. Interstitial colloid osmotic pressure = 5 mmHg. Interstitial hydrostatic pressure = -5 mmHg. What is the net filtration pressure (in mmHg) for fluid movement across the capillary wall?

- a. Cannot be calculated.
- b. 7 mmHg toward reabsorption
- c. 7 mmHg toward filtration
- d. 3 mmHg toward filtration
- e. 3 mmHg toward reabsorption

Answer : C

14. Growth hormone releasing hormone (GHRH) may have the following second messenger/s :

- a. cAMP
- b. Ca^{++}
- c. IP3
- d. DAG
- e. All of the above mentioned are correct.

Answer : E

15. Which of the following pairs are NOT having similar effects on Na^+ level of body fluids:

- a. Increased ADH secretion and drinking of high amounts of portable (normal) water.
- b. High release of aldosterone and ingestion of high amounts of salts
- c. Hypoaldosteronism (decreased aldosterone secretion) and deficiency of ADH
- d. Loss of hypotonic fluids from the body and activation of renin-angiotensin-aldosterone system
- e. High release of ANP (atrial natriuretic peptide) and intravenous infusion of hypotonic solution

Answer : C

16. Myocardial contractility is best corrected with the intracellular concentration of :

- a. HCO_3^-
- b. Na^+
- c. Ca^{++}
- d. K^+
- e. Cl^-

Answer : C

17. Which of the following reactions can be developed by giving atropine to a healthy person :

- a. Increased heart rate (tachycardia)
- b. Increased intestinal movements.
- c. High sweating
- d. Miosis (constriction of pupil)
- e. Increased salivation

Answer : A

18. All of these receptors are skin receptors EXCEPT :

- a. Ruffini endings
- b. Golgi tendon
- c. Naked free nerve endings
- d. Pacinian corpuscle
- e. Merkel's discs

Answer : B

19. Deficiency of the following vitamin will affect thyroid hormones (T3 and T4) intracellular signalling?

- a. Vitamin K
- b. Vitamin C
- c. Vitamin A
- d. Vitamin D
- e. Vitamin B12

Answer : C

20. The following is CORRECT about second messenger cAMP cellular actions :

- a. It can activate JAK mediated phosphorylation of STAT which translocates to the nucleus and modulate gene expression.
- b. It can translocate to the nucleus to bind and activate cAMP response element.
- c. It can only modulate cytosolic enzymes functions by activating PKA.
- d. It can stimulate gene expression by activating PKA.
- e. Once cAMP is generated, the signal is amplified and can't be turned off.

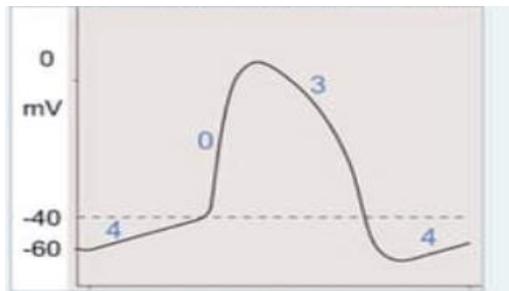
Answer : D

21. Sinoatrial node cells are characterized by one of the following:

- a. Able to generate intrinsic and rhythmic impulses because their membrane potential is unstable.
- b. Unable to generate impulses when completely denervated.
- c. Innervated by the vagus (parasympathetic) only.
- d. Connected to the AV node by fine bundles of Purkinje tissue.
- e. Found in both atria.

Answer : A

22. The curve below represents the slow response action potential of the sinoatrial node of the conduction system. Which of the above phases is due to leakiness of the cells to Na⁺ ions :



- Phase 4
- Phase 0
- Phase 3
- Phase 4 and 0
- None of the above

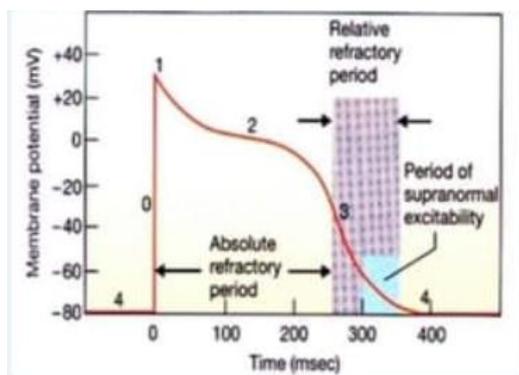
Answer : A

23. Which of the following is a derivative of Tyrosine ?

- Insulin
- Acetyl choline
- Thyroid stimulating hormone (TSH)
- Growth hormone
- Norepinephrine

Answer : E

24. In which phase of the ventricular muscle action potential is the potassium permeability the lowest ?



- 4
- 1
- 0
- 3
- 2

Answer : E

25. Low k_d (dissociation) constant for a hormone to a certain receptor means :

- a. Clearance rate of that hormone is low.
- b. Half life of that hormone is short.
- c. Concentration of the hormone needed to bind the receptors is high.
- d. Binding percentage to plasma protein is low.
- e. Affinity of the hormone to the receptor is high.

Answer : E

26. The progressive decline in a synaptic transmission with repetitive stimulation is due to:

- a. The up regulation of the receptors
- b. The synaptic delay
- c. The diffusion of the transmitters across the synaptic cleft
- d. Depletion of the stored neurotransmitters
- e. The high pH of the blood

Answer : D

27. The following hormone signals to the nucleus by activating JAK-STAT pathway :

- a. Calcitonin
- b. Epinephrine
- c. Dopamine
- d. Insulin
- e. Leptin

Answer : E

28. Regarding the autonomic nervous system, which of the following pairs are NOT related to each other :

- a. Acetylcholine and Stimulation of muscarinic receptors
- b. Sympathetic division and Release of norepinephrine
- c. Atropine and Blocking of nicotinic receptors.
- d. Medication with beta adrenergic blockers and Decreasing heart rate.
- e. Sweating and Sympathetic stimulation

Answer : C

29. The most important effect of lateral inhibition is to

- a. Allow for stimulus intensity to be encoded in the firing frequency of a neuron.
- b. Enable two points of skin contact to be felt separately rather than as one.
- c. Sharpen perception of the precise location of a stimulus.
- d. Increase the signal time of perception.
- e. Enable the brain to distinguish between one sensory modality and another.

Answer : C

30. Which of the following conditions at the sinoatrial node will cause heart rate to decrease?

- a. Increased norepinephrine levels
- b. Increased calcium permeability
- c. Increased calcium sodium permeability
- d. Increased potassium permeability
- e. Decreased acetylcholine levels.

Answer : D

31. All of the following must have plasma membrane receptors to transduce their effects EXCEPT:

- a. Aldosterone
- b. Glucagon
- c. Growth hormone
- d. Follicle stimulating hormone.
- e. ACTH

Answer : A

32. About the cardiac conductivity, all the following are true EXCEPT:

- a. It is increased by sympathetic stimulation.
- b. It is slowest in the A-V node.
- c. It is slowest in the ventricular muscle.
- d. It is decreased by vagal stimulation.
- e. It is maximal in the Purkinje fibres.

Answer : C

33. Sympathetic stimulation cause all of the following in the heart EXCEPT:

- a. It has a positive inotropic action on the heart.
- b. It decreases the conduction time in the atrioventricular (AV) node.
- c. It decreases the permeability of sinoatrial (SA) node to K⁺
- d. It decreases the slope of phase 4 of the slow response potential of the SA node.
- e. It increases the heart rate.

Answer : D

34. Use the following to answer the question below:
1. Diabetes insipidus (deficiency of ADH)
 2. Increased antidiuretic hormone (ADH) secretion.
 3. Intravenous infusion of hypotonic solution
 4. Drinking of high amounts of potable (normal) water
 5. Increased release of aldosterone

Which conditions are having highest potential to cause hypernatremia in extracellular fluids with dehydration of cells?

- a. 2 and 3
- b. 1 and 5
- c. 2 and 5
- d. 1 and 4
- e. 3 and 5

Answer : B

35. Receptor (Generator) potential :

- a. Generated in the node of Ranvier only.
- b. Local response
- c. Propagated
- d. Occur in myelinated nerve.
- e. Obey all or none law.

Answer : B

36. An experimental drug was designed to inhibit phosphodiesterase hormone. What do you expect to occur intracellularly ?

- a. Increase in DAG.
- b. Increase in cAMP.
- c. Increase in STAT.
- d. Decrease in inositol triphosphate IP3.
- e. Decrease in intracellular Ca levels.

Answer : B

37. Edema at interstitial fluids can be generated by all the following EXCEPT :

- a. Increased hydrostatic pressure in capillaries.
- b. Decreased lymph flow from interstitial fluids.
- c. Decreased albumin concentration in plasma.
- d. Increased wash down of protein from interstitial fluid
- e. Increased venous pressure.

Answer : D

38. Prolonged high levels of glucose and sustained release of insulin on the long term will cause Diabetes Type II due to :

- a. Decreased metabolism of insulin.
- b. Increased clearance of insulin
- c. Death of insulin secreting cells
- d. Desensitization of insulin receptors
- e. Upregulation of insulin receptors

Answer : D

39. With regard to measurements of body fluids, which of the following is TRUE:

- a. ^{51}Cr -labeled RBCs can be used for measuring total blood volume.
- b. $^{40}\text{K}^+$ radioisotope is used for measuring intracellular fluid volume.
- c. Insulin is used to measure intravascular fluid volume.
- d. ^{125}I -albumin is used to measure interstitial fluids volume.
- e. $^{22}\text{Na}^+$ radioisotope is used to measure total body fluids.

Answer : A

40. The net loss of fluid from capillaries to the interstitial fluid in the legs is decreased by:

- a. Decrease plasma albumin.
- b. Lymphatic obstruction and increased interstitial hydrostatic pressure.
- c. Arteriolar dilation to increase capillary pressure.
- d. Change from the recumbent to the standing position
- e. Leg exercise and capillary hydrostatic pressure

Answer : B

41. Sympathetic stimulation of the heart normally causes which of the following conditions?

- a. Decreased force of contraction (negative inotropic) of the atria.
- b. Decreased rate of conduction (negative dromotropic effect) of the cardiac impulse.
- c. Acetylcholine release at the sympathetic endings
- d. Negative chronotropic effect on the heart rate
- e. Increased force of contraction (positive inotropic) of the ventricles

Answer : E

42. In a lab experiment, 2 plates of cultures liver cells were pre-treated with 2 different specific adrenergic receptors inhibitors (blockers) before adding epinephrine hormone to both plates. First plate was pre-treated with inhibitor (X). Second plate was pre-treated with inhibitor (Y). Then both were treated with epinephrine. cAMP was measured before adding epinephrine and was (10 micro-M) in both plates. After treatment with epinephrine : plate 1 cAMP was (1 micro-M) and plate 2 was (100 micro-M). X and Y drugs have inhibited the following adrenergic receptors : (NB: receptor inhibitor binds to a receptor and blocks its actions)

- a. X: alpha 1 adrenergic receptor, Y: beta adrenergic receptors
- b. X: alpha 1 adrenergic receptor, Y: alpha 2 adrenergic receptors
- c. X: alpha 2 adrenergic receptors, Y: beta adrenergic receptor
- d. X: beta adrenergic receptors, Y: alpha 2 adrenergic receptors
- e. X: alpha 2 adrenergic receptors, Y: alpha 1 adrenergic receptor

Answer : C

43. Which of the following changes would be expected to occur with increased binding of a hormone to plasma proteins?

- a. Increase in hormone activity.
- b. Decrease in half-life of the hormone.
- c. Increase in metabolism and breakdown of the hormone.
- d. Decrease in plasma clearance of the hormone.
- e. Increase in degree of negative feedback exerted by the

Answer : D

44. Which of the following types of neuronal circuits is self-stimulating once activated?

- a. Diverging
- b. One that incorporates lateral inhibition.
- c. Converging
- d. Reverberating
- e. Negative feedback circuit (corticofugal)

Answer : D

45. TGF beta (transforming growth factor) receptor is an example of :

- a. G Protein Coupled Receptor (GPCR)
- b. Voltage gated channel
- c. Enzyme linked receptor.
- d. Ionotropic receptors
- e. Metabotropic receptors

Answer : C

46. Which of the following is NOT a normal intracellular calcium homeostatic mechanism?

- a. Na^+ - Ca^{++} exchanger exchanges one sodium for one calcium ions.
- b. Ca^{++} pump in the cardiac muscle sarcolemma is low affinity but high-capacity pump.
- c. Mitochondrial Na^+ - Ca^{++} exchanger
- d. Na^+ - Ca^{++} exchanger is found in cardiac as well as in skeletal muscle.
- e. Ca^{++} -pump of the sarcoplasmic reticulum is not found in the cardiac muscle cells.

Answer : C

47. The area of the motor cortex that is devoted to a particular region of the body is proportional to the

- a. Distance of the body are from the brain.
- b. Number of sensory receptors in the area of the body
- c. Size of the nerves that serve the area of the body.
- d. Size of the body area
- e. Number of motor units in that region

Answer : B

48. The SA node is the pacemaker of the heart because.

- a. Leakier to K^+ than other cells
- b. It is the only cells leaky to Na^+ in the heart.
- c. Its membrane property (reach threshold faster than any other cell)
- d. Its location in the right atrium between the venae cava
- e. It is connected to autonomic nervous system.

Answer : C

49. Which of the following is NOT true with regard to body fluids ?

- a. Higher Na^+ concentration in extracellular than in intracellular fluid
- b. Higher oncotic pressure is in interstitial fluids than inside vessels.
- c. Both extracellular and intracellular fluids are having isotonic environment
- d. Higher protein content inside cells that in plasma
- e. Almost the same concentration of Na^+ is found in plasma and interstitial fluids.

Answer : B

50. Which of the following statements concerning autonomic nervous system is TRUE:
- a. In the synaptic organization, more divergence and convergence are found in parasympathetic system than in sympathetic.
 - b. Norepinephrine is secreted by preganglionic neurons of sympathetic.
 - c. Smooth muscle cells of blood vessels are controlled directly only by sympathetic.
 - d. Parasympathetic fibres that originate in the brain are under the voluntary control.
 - e. Sympathetic fibres that innervate suprarenal glands are releasing norepinephrine.

Answer : C

51. Muscarinic receptors are blocked by :

- a. Nicotine
- b. Epinephrine
- c. Acetylcholine
- d. Muscarine
- e. Atropine

Answer : E

52. Which of the following conditions results in increasing volume and decreasing osmolarity of extracellular body fluids?

- a. High release of ANP (atrial natriuretic peptide)
- b. High use of diuretics
- c. High release of ADH
- d. Activation of renin-angiotensin-aldosterone system
- e. Drinking of salty water

Answer : C

53. Which of the following is the largest contributor to the plasma oncotic pressure?

- a. Small molecules (e.g., glucose, amino acids, vitamins, etc)
- b. Red blood cells and white blood cells
- c. Large proteins found in plasma (e.g., albumin and globulins)
- d. Cations and anions in plasma
- e. Fibrinogen

Answer : C

54. The type of signalling when the cell that secretes the signal is also the target is called:

- a. Contact-dependent
- b. Endocrine
- c. Paracrine
- d. Autocrine
- e. Synaptic

Answer : D

55. Activation of adrenergic receptors will result in all the following EXCEPT :

- a. Decreased salivation.
- b. Bronchodilation
- c. Sweating
- d. Increase heart rate.
- e. Constriction of blood vessels

Answer : C

56. By muscarine intoxication, all the followings are taking place EXCEPT:

- a. Vomiting and diarrhoea
- b. Hypersalivation
- c. Decrease heart rate.
- d. High sweating
- e. Dilation of pupil (mydriasis)

Answer : E

57. Which of the following pairs are NOT related to each other ?

- a. Negative pressure ranges in interstitial fluids and Low tissue compliance
- b. Increased capillary permeability and Generation of edema.
- c. Increased colloid pressure in capillaries and Development of edema.
- d. Increased lymph drainage and Wash down of proteins in interstitial fluid.
- e. Hydrostatic pressure in arterial end of capillaries and Filtration

Answer : C

58. The important function of cardiac Purkinje system is to :

- a. Increase the conduction of impulses.
- b. Has no function in conduction of the impulse.
- c. Increase the force of ventricular contraction.
- d. Amplify the cardiac impulses.
- e. Slow the conduction of impulses.

Answer : A

59. Which of the following are caused by acetylcholine ?

- a. Increased permeability of the cardiac muscle to calcium ions
- b. Depolarization of the atrioventricular node
- c. Decreased permeability of the sinoatrial node to potassium ions.
- d. Hyperpolarization of the sinoatrial node
- e. Increased heart rate

Answer : D

60. Prostaglandins are paracrine hormones that are classified as :

- a. Lipid soluble amine derivative
- b. Lipid soluble arachidonic acid derivative
- c. Water soluble amine derivative
- d. Water soluble polypeptide derivative
- e. Water soluble arachidonic acid derivative

Answer : E

Good luck