

## ANS Test Bank

1) What distinguishes the autonomic nervous system (ANS) from the motor somatic nervous system?

- A) The innervation of skeletal muscle
- B) The speed of impulse transmission
- C) The origin of efferent paths
- D) The regulation of heart rate
- E) The presence of ganglia in the CNS

2) Which of the following functions are controlled by the ANS in conjunction with hormones?

- A) Control of heart rate
- B) Regulation of blood pressure
- C) Digestion and intestinal motility
- D) Emptying of the urinary bladder
- E) Secretory activity of the respiratory tract

3) Which division of the ANS mediates the immediate response to threatening stimuli?

- A) Sympathetic division
- B) Parasympathetic division
- C) Enteric division
- D) Somatic division
- E) Adrenal medulla division

4) Which physiological response is NOT associated with the sympathetic nervous system's fight or flight response?

- A) Bronchodilation
- B) Vasoconstriction
- C) Bradycardia
- D) Increased metabolic rate
- E) Widely dilated pupils

5) How are preganglionic fibers organized in the sympathetic nervous system?

- A) They synapse with postganglionic cells at the same segmental level
- B) They turn cranial or caudal and synapse with postganglionic neurons at different segmental levels
- C) They pass without synapse at the paravertebral ganglia and continue to prevertebral ganglia
- D) They pass without synapse in paravertebral ganglia and continue to the adrenal gland
- E) All of the above

6) What is the primary neurotransmitter released from the postganglionic terminals of parasympathetic fibers?

- A) Acetylcholine (Ach)
- B) Norepinephrine (NE)
- C) Epinephrine (EP)
- D) Dopamine
- E) Serotonin

7) Which receptor subtype is found on effector cells of parasympathetic neuro-effector junctions?

- A) Alpha receptors
- B) Beta receptors
- C) Muscarinic receptors
- D) Nicotinic receptors
- E) Adrenergic receptors

8) What is the primary effect of stimulation of muscarinic receptors in the heart?

- A) Bronchodilation
- B) Vasodilation
- C) Tachycardia
- D) Bradycardia
- E) None of the above

9) How do beta blockers primarily affect the cardiovascular system?

- A) By causing bronchodilation
- B) By increasing heart rate
- C) By dilating blood vessels
- D) By decreasing heart rate
- E) By promoting vasoconstriction

10) Which neurotransmitter is released from sympathetic nerve fibers to sweat glands?

- A) Acetylcholine (Ach)
- B) Norepinephrine (NE)
- C) Epinephrine (EP)
- D) Dopamine
- E) Serotonin

11) All the following receptors are negatively coupled to Gi proteins EXCEPT:

- A) Beta 1 receptors
- B) M2 receptors
- C) Alpha 2 heteroreceptors
- D) Inhibitory Muscarinic receptors
- E) A+C

12) Which type of receptors gates ligand gated Na<sup>+</sup> channels?

- A) Muscarinic receptors
- B) Nicotinic receptors
- C) Alpha receptors
- D) Beta receptors
- E) Adrenergic receptors

13) Some preganglionic fibers pass without synapse in paravertebral or celiac ganglion, these fiber then:

- A) Enter the sympathetic chain ganglia
- B) Join the pelvic nerves
- C) Synapse in at the inferior mesenteric ganglion
- D) Innervate the adrenal medulla
- E) Terminate in the enteric nervous system

14) Which division of the ANS is involved in regulating blood pressure by enhancing blood flow to skeletal muscle and reducing blood flow to the skin and mesentery?

- A) Sympathetic division
- B) Parasympathetic division
- C) Enteric division
- D) Somatic division
- E) Adrenal division

15) How are postganglionic neurons in vertebral ganglia of the sympathetic nervous system organized?

- A) Each postganglionic neuron receives signals from many preganglionic fibers
- B) One preganglionic neuron can relay impulses to many postganglionic neurons at different segmental levels
- C) Each postganglionic neuron receive signals from one preganglionic fiber
- D) Postganglionic neurons are not present in vertebral ganglia
- E) All of the above

16) Which neurotransmitter is primarily responsible for stimulating alpha receptors?

- A) Acetylcholine (Ach)
- B) Norepinephrine (NE)
- C) Epinephrine (EP)
- D) Dopamine
- E) B+C

17) Besides the tracheal and bronchial smooth muscle, where else are beta2 receptors found?

- A) Liver cells
- B) Intestinal epithelial cells
- C) Adipose tissue
- D) Renal tubules
- E) Cardiac myocytes

18) What unique characteristic distinguishes the physiological effects of beta 1 receptors from beta 2 receptors?

- A) Beta 1 receptors primarily cause relaxation of smooth muscle, while beta 2 receptors cause contraction.
- B) Beta 1 receptors exhibit higher affinity for norepinephrine compared to beta 2 receptors.
- C) Beta blockers are used to decrease heart rate as an antiarrhythmic drug while Beta 2 selective agonist will cause bronchodilation.
- D) Beta 1 receptors are exclusively coupled to adenylyl cyclase via Gs protein, while beta2 receptors can couple to multiple signaling pathways.
- E) Beta 1 receptors are preferentially activated by epinephrine, while beta 2 receptors are preferentially activated by norepinephrine.

19) How do muscarinic receptors on smooth muscle and glands primarily exert their effects?

- A) By activating adenylyl cyclase
- B) By increasing cAMP production
- C) By inhibiting phospholipase C
- D) By stimulating Ca<sup>++</sup> release from internal stores
- E) By promoting K<sup>+</sup> efflux

20) Which effect is NOT associated with activation of muscarinic receptors?

- A) Salivation
- B) Bronchodilation
- C) Urination
- D) Bradycardia
- E) Vomiting

21) In which segmental levels of the spinal cord do the cell bodies of preganglionic neurons for the sympathetic nervous system primarily reside?

- A) S1 & S5
- B) S3 & S5
- C) S5 & S2
- D) S3 & S2
- E) S3 & S4

22) How could an imbalance in sympathetic and parasympathetic tone contribute to cardiovascular disorders?

- A) Increase heart rate variability
- B) Induce persistent vasoconstriction
- C) Lead to bradycardia and hypotension
- D) Have no effect on cardiovascular health
- E) Promote cardiac rhythm regulation

23) What role do the sympathetic and parasympathetic divisions play in regulating digestion, and how might disruptions contribute to gastrointestinal disorders?

- A) Sympathetic activation stimulates digestion
- B) Parasympathetic activation inhibits digestion
- C) Both divisions independently regulate digestion
- D) A+B
- E) Neither division affects digestive functions

24) How can pharmacological interventions targeting sympathetic receptors be tailored to treat specific medical conditions?

- A) Develop drugs targeting only alpha receptors
- B) Target beta receptors to increase heart rate
- C) Focus on both alpha and beta receptors
- D) Avoid drugs targeting sympathetic receptors
- E) Solely focus on parasympathetic receptors

25) Which of the following statements accurately describes nicotinic receptors in the autonomic nervous system?

- A) Nicotinic receptors are primarily found on effector cells of the parasympathetic nervous system.
- B) Nicotinic receptors are only present at ganglionic synapses in the sympathetic nervous system.
- C) Nicotinic receptors are coupled to G protein signaling pathways.
- D) Nicotinic receptors found at neuromuscular junctions have a different subunit structure than those found at ganglionic synapses.
- E) Nicotinic receptors found in the autonomic nervous system are always excitatory in nature.

26) How might muscarinic receptors activation on effector cells influence medical interventions for asthma and urinary retention?

- A) Improve symptoms by allowing bladder emptying easily
- B) Provide relief for asthma patients through bronchodilation
- C) Muscarinic receptor function to treat both symptoms
- D) Worsen symptoms by stimulating bronchoconstriction
- E) Have no effect on medical interventions

27) Where are the cell bodies of preganglionic neurons of the sympathetic nervous system located?

- A) In the ganglia of the sympathetic chain
- B) In the vertebral ganglia at segmental levels T1 through L3
- C) In the lateral gray of the spinal cord at segmental levels T1 through L3
- D) In the CNS, in appropriate nuclei in the brain
- E) In the paravertebral ganglia at segmental levels T1 through L3

28) Which of the following best describes the effect of stimulation of beta 1 ( $\beta_1$ ) adrenergic receptors?

- A) Increase in cardiac output by enhancing volume of blood pumped per minute.
- B) Constriction of bronchial smooth muscle.
- C) Inhibition of gastrointestinal motility and secretion.
- D) Decrease in heart rate and force of contraction.
- E) Promotion of relaxation of bronchial muscle resulting in bronchodilation.

29) When muscarinic receptors (M2) are activated, which intracellular signaling pathway is initiated?

- A) Activation of phospholipase C leading to an increase in inositol-1,4,5-trisphosphate (IP3) levels.
- B) Inhibition of adenylyl cyclase causing a decrease in cAMP production.
- C) Opening of ligand-gated Na<sup>+</sup> channels resulting in membrane depolarization.
- D) Stimulation of Ca<sup>++</sup> gated channels causing release of intracellular calcium stores.
- E) Activation of G protein-coupled K<sup>+</sup> channels leading to hyperpolarization of the cell membrane.

30) How does the parasympathetic nervous system differ from the sympathetic nervous system in terms of synaptic organization?

- A) Parasympathetic preganglionic fibers diverge, whereas sympathetic fibers exhibit convergence.
- B) Parasympathetic ganglia receive signals from many preganglionic fibers, while sympathetic ganglia receive signals from one preganglionic neuron.
- C) The ratio of pre to post ganglionic neurons is higher in the sympathetic nervous system compared to the parasympathetic nervous system.
- D) Parasympathetic postganglionic neurons have longer axons compared to sympathetic postganglionic neurons.
- E) In the parasympathetic nervous system, preganglionic fibers synapse with postganglionic neurons at the same segmental level.

31) How is epinephrine primarily deactivated in the body?

- A) Breakdown by acetylcholinesterase.
- B) Reuptake by postganglionic nerve varicosities.
- C) Inhibition of adenylyl cyclase activity.
- D) Conversion into norepinephrine
- E) Reuptake by presynaptic nerve terminals.

32) What is the primary effect of activation of alpha 1 receptors?

- A) Inhibition of glandular secretions
- B) Stimulation of gastrointestinal motility
- C) Bronchodilation due muscle excitation
- D) Excitation of smooth muscle cells
- E) C+D

33) Which neurotransmitter is preferentially responsible for activating beta 2 receptors in the heart?

- A) Acetylcholine
- B) Norepinephrine
- C) Epinephrine
- D) Dopamine
- E) Serotonin

34) Some of \_\_\_\_\_ receptors are directly coupled to  $Ca^{++}$  gated channels:

- A) Beta 2
- B) Beta 1
- C) Muscarinic
- D) Nicotinic
- E) Alpha 1

35) How are inhibitory muscarinic receptors on effector cells of the parasympathetic nervous system coupled to intracellular signaling pathways?

- A) Via  $G_i$  protein to adenylyl cyclase
- B) Via  $G_s$  protein to phospholipase C
- C) Via  $G_q$  protein to inositol-1,4,5-trisphosphate
- D) Via  $G_s$  protein to adenylyl cyclase
- E) Via  $G_i$  protein to phospholipase C

36) Which division of the autonomic nervous system exhibits convergence at the ganglia?

- A) Sympathetic
- B) Parasympathetic
- C) Enteric
- D) Somatic
- E) Visceral

37) In which ganglia do preganglionic fibers synapse without any synapse occurring at the paravertebral ganglia, but continue to ganglia located in the abdomen?

- A) Vertebral ganglia
- B) Sympathetic chain ganglia
- C) Paravertebral ganglia
- D) Prevertebral ganglia
- E) Adrenal ganglia

38) Which receptor subtype is primarily responsible for the excitatory effects of acetylcholine on smooth muscle and glands in the parasympathetic nervous system?

- A) M1, M2, M4
- B) M1, M3, M5
- C) M1, M2, M3
- D) M2, M3, M4
- E) M3, M4, M5

39) What is the primary role of alpha 2 receptors found on sympathetic postganglionic nerve terminals?

- A) Stimulation of norepinephrine release
- B) Inhibition of norepinephrine release
- C) Stimulation of acetylcholine release
- D) Inhibition of acetylcholine release
- E) Activation of adenylyl cyclase

40) In which ganglia does preganglionic fibers synapse onto chromaffin cells?

- A) Adrenal ganglia
- B) Sympathetic chain ganglia
- C) Paravertebral ganglia
- D) Prevertebral ganglia
- E) Vertebral ganglia

41) Which neurotransmitter is released by the adrenal medulla as part of the sympathetic response to stress?

- A) Acetylcholine
- B) Norepinephrine
- C) Dopamine
- D) Epinephrine
- E) Serotonin

42) How does the autonomic nervous system contribute to the regulation of body temperature?

- A) By increasing blood flow to the skin during heat loss.
- B) By decreasing sweat gland activity during cooling.
- C) By promoting shivering to generate heat.
- D) By inhibiting vasoconstriction in response to cold.
- E) By stimulating heat loss through respiration.

43) How does the autonomic nervous system contribute to the regulation of pupil size in response to changes in light intensity?

- A) Sympathetic activation causes pupillary constriction.
- B) Parasympathetic activation causes pupillary dilation.
- C) Sympathetic activation causes pupillary dilation.
- D) Parasympathetic activation causes pupillary constriction.
- E) Both sympathetic and parasympathetic divisions cause pupillary dilation simultaneously.

44) How does synaptic organization differ between the sympathetic and parasympathetic divisions?

- A) Sympathetic preganglionic fibers synapse locally, while parasympathetic preganglionic fibers synapse more distally.
- B) Sympathetic fibers exhibit divergence, while parasympathetic fibers exhibit convergence.
- C) Sympathetic postganglionic neurons receive signals from one preganglionic fiber, while parasympathetic neurons receive signals from many.
- D) Sympathetic postganglionic neurons have longer axons than parasympathetic neurons.
- E) Sympathetic preganglionic fibers synapse with postganglionic neurons at the same segmental level, whereas parasympathetic fibers synapse at different levels.

45) Which of the following accurately describes the order of events for preganglionic neurons in the sympathetic nervous system?

- A) Axons exit the spinal cord via ventral roots then via gray rami, synapse with neurons at paravertebral ganglia, then return to the corresponding spinal nerve.
- B) Axons exit the spinal cord via dorsal roots then via gray rami, synapse with neurons at paravertebral ganglia, then return to the corresponding spinal nerve.
- C) Axons exit the spinal cord via ventral roots then via white rami, enter a vertebral ganglion of the sympathetic chain, then synapse with neurons at paravertebral ganglia.
- D) Axons exit the spinal cord via dorsal roots then via gray rami, enter a vertebral ganglion of the sympathetic chain, then synapse with neurons at paravertebral ganglia.
- E) Axons exit the spinal cord via ventral roots then via white rami, synapse with neurons at paravertebral ganglia, then returns to the corresponding spinal nerve.

**Good Luck!!!**

## **Answer Key**

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