3.1

Q3.1.1 Short Answer: What is psychopharmacology, and why do we study it?
Answer:

Q3.1.2 Multiple Choice: Which of the following is NOT a function of psychopharmacology?

(A) Study the effects of drugs on the nervous system

(B) Study the effects of drugs on behavior

(C) Study the effects of drugs on the immune system

(D) Study the effects of drugs on neurotransmitter systems

Q3.1.3 Fill in the Blank: The location at which a drug interacts with the body to produce its effects is called the _____.

Q3.1.4 Short Answer: What is the difference between an agonist and an antagonist?
Answer:

Q3.1.5 True or False: Drugs directly create effects in the body.
Answer:

Q3.1.6 Multiple Choice: Which of the following is an example of a drug that acts as an agonist?

(A) Naloxone (B) Morphine (C) Curare (D) Atropine

Q3.1.7 Short Answer: What is selective action?
Answer:

Q3.1.8 Short Answer: What is an example of how an agonistic effect can become antagonistic?
Answer:

Q3.1.9 Multiple Choice: What is a precursor?

(A) A substance that inhibits neurotransmitter release

(B) A substance that enhances neurotransmitter release

(C) A substance from which another substance is formed

(D) A substance that blocks neurotransmitter receptors

Q3.1.10 Fill in the Blank: The process of creating a neurotransmitter from its precursors is called _____.

Q3.1.11 Fill in the Blanks: A(n) _____ agonist binds to the same receptor as the neurotransmitter and _____ its effects, while a(n) _____ agonist binds to a different site on the receptor and _____ the effects of the neurotransmitter.

Q3.1.12 Fill in the Blanks: A(n) _____ antagonist binds to a different site on the receptor and _____ the effects of the neurotransmitter, while a(n) _____ antagonist binds to the same receptor as the neurotransmitter and _____ its effects.

Q3.1.13 Multiple Choice: Drugs that cause the action potential to stay in a depolarized state are called:

(A) Agonists

(B) Depolarizing agents

(C) Antagonists

(D) Inverse agonists

Q3.1.14 Fill in the Blanks: In the following diagram, label the specific enzyme for each arrow, and identify the outcome:

$$\text{Precursor} \xrightarrow{\text{\_\_\_\_\_ Enzyme}} \text{NT} \xrightarrow{\text{\_\_\_\_\_ Enzyme}} \text{\_\_\_\_\_}$$

Q3.1.15 Long(-ish) Answer: Describe the difference between a neurotransmitter and a neuromodulator.
Answer:

Q3.1.16 Matching: Match the following examples with them either being an antagonist or an agonist. (Some of these may be direct or indirect. Specify each one.)

Choices

(a) *Curare*

(b) *Atropine*

(c) *Morphine*

(d) *Naloxone*

(e) *Botulinum Toxin*

(f) Interfering with docking proteins

(g) Blocking the reuptake of a neurotransmitter

(h) *Sarin*

(i) Interfering with vesicles

(j) Blocking receptors

(k) Black widow spider venom

(l) Cobra and Krait Venom

(m) Parathion

(n) DFP

(o) *Physostigmine*

(1) Direct antagonist ..... _____
(2) Indirect antagonist ..... _____
(3) Direct agonist ..... _____
(4) Indirect agonist ..... _____
(5) Antagonist ..... _____
(6) Agonist ..... _____

3.2

Q3.2.1 Multiple Choice: Which of the following neurochemicals does NOT transmit information (according to our notes)?

(A) Dopamine (B) Glutamate
(C) GABA (D) Glycine

Q3.2.2 Fill in the Blank: Peptides are short chains of _____.

Q3.2.3 Fill in the Blanks: The difference between opioids and opiates are that opioids are _____ and opiates are _____.

Q3.2.4 Short Answer: What is the pain pathway for the face? What about from the neck down? (Generally speaking.)
Answer:

Q3.2.5 Fill in the Blanks: The three types of opioid receptors are _____, _____, and _____.

Q3.2.6 Long Answer: What are each of the three opioid receptors responsible for, and what neurochemicals bind to each the most?
Answer:

Q3.2.7 Multiple Choice: Prostaglandins become active during

(A) Resting-and-Digesting (B) Crying
(C) Daydreaming (D) Bleeding

Q3.2.8 True or False: *Celecoxib* (**Celebrex**), a COX-2 Inhibitor, was removed from the market because it causes heart attacks and stroke.
Answer:

Q3.2.9 Fill in the Blank: *Cylooxygenase (COX)* is an enzyme that converts inactive _____ to its active state.

Q3.2.10 Long Answer: List the characteristics for the direct pain pathway and the indirect pain pathway.
Answer:

Q3.2.11 Fill in the Blanks: Pain arrives at the _____, then travels to the _____. Once there, it is processed by several brain regions. First, the _____ contributes to arousal. Then, the _____, particularly the

anterior cingulate cortex (ACC), processes the emotional aspects of pain. When the pain is overwhelming, the _____ activates and releases endogenous opioids to reduce the sensation—this allows a person, for example, to escape danger despite a severe injury. Finally, the _____ and other areas help interpret and associate the pain with context.

Q3.2.12 Matching: Match the following drugs with their respective NSAID class.

Choices

(a) Ibuprofen

(b) Aspirin

(c) Diflunisal

(d) Naproxen

(e) Salsalate

(f) Ketoprofen

(1) Proprionic Acid Derivatives ..... _____

(2) Salicylates ..... _____

Q3.2.13 Long Answer: Some studies show that both the placebo effect and acupuncture can be blocked by Naloxone, an opioid antagonist. What does this suggest about the mechanism of acupuncture's pain-relieving effects? Does this prove that acupuncture is not entirely a placebo?
Answer:

Q3.2.14 Short Answer: What are some of the functions of opioids? (List the main effects and the side effects.)
Answer:

Q3.2.15 True or False: The term *colocalized* means two or more neurotransmitters are released from two separate neurons at the same time.
Answer:

Q3.2.16 Short Answer: What is the definition of pain? (DO NOT say this exam!!!!!!!!)
Answer:

3.3

Q3.3.1 True or False: The amines (monoamines) are derived from amino acids.
Answer:

Q3.3.2 Short Answer: Name three neurotransmitters that fall under the amino acid category.
Answer:

Q3.3.3 Fill in the Blank: The two indolamines are _____ and _____.

Q3.3.4 Multiple Choice: What amino acid are indolamines derived from?

(A) Tryptophan (B) Tyrosine (C) Glutamate (D) Glycine

Q3.3.5 Fill in the Blank: The precursor to glutamate is _____, and the enzyme that synthesizes glutamate from it is _____.

Q3.3.6 Short Answer: What receptor does ketamine bind to, and what is its effect?
Answer:

Q3.3.7 Fill in the Blank: The enzyme _____ deactivates anandamide.

Q3.3.8 True or False: The most common excitatory neurotransmitter in the brain is GABA.
Answer:

Q3.3.9 Fill in the Blank: The drug _____ is a direct antagonist of the NMDA receptor and can cause hallucinations and dissociation.

Q3.3.10 Short Answer: What transporters are responsible for glutamate reuptake, and why is this process important?
Answer:

Q3.3.11 Multiple Choice: Which receptor is closely associated with glutamate and is important for synaptic plasticity and memory formation?

(A) GABA receptor (B) NMDA receptor
(C) Serotonin receptor (D) Dopamine receptor

Q3.3.12 Short Answer: What enzyme converts glutamate into GABA, and what type of neurotransmitter is GABA?
Answer:

Q3.3.13 Fill in the Blanks: The three catecholamine neurotransmitters are _____, _____, and _____.

Q3.3.14 Multiple Choice: What do all catecholamines contain, and what amino acid are they derived from?

(A) Catechol and are derived from tryptophan

(B) Catechol and are derived from tyrosine

(C) Indole and are derived from tryptophan

(D) Indole and are derived from tyrosine

Q3.3.15 Fill in the Blank: The enzyme _____ converts tyrosine into L-DOPA.

Q3.3.16 Short Answer: Explain how botox interferes with emotional expression.
Answer:

Q3.3.17 Fill in the Blank: The orbicularis oculi muscle influences _____.

Q3.3.18 True or False: Tyrosine is the precursor for serotonin.
Answer:

Q3.3.19 Short Answer: What are the names of the systems that use dopamine, norepinephrine, and epinephrine? *Answer:*

Q3.3.20 Fill in the Blanks: Melatonin is synthesized from _____ and is involved in regulating _____.

Q3.3.21 Short Answer: What is another name for peptides in the context of neurotransmitters, and give an example. *Answer:*

Q3.3.22 Multiple Choice: What is the name of the endogenous cannabinoid neurotransmitter whose name means "bliss" in Sanskrit?

(A) Anandamide

(B) Cannabidiol

(C) Tetrahydrocannabinol (THC)

(D) 2-Arachidonoylglycerol (2-AG)

Q3.3.23 Short Answer: How are lipid-based neurotransmitters synthesized and stored?
Answer:

Q3.3.24 Fill in the Blank: The gaseous neurotransmitter that is required for an erection is _____.

Q3.3.25 Long Answer: Describe the study that addressed the question, "Does Botox decrease emotional experience?" Describe the population, the method, and the results
Answer:

Q3.3.26 Short Answer: Name one neurotransmitter that is a nucleoside. What is its function?
Answer:

Q3.3.27 Fill in the Blanks: Fill in the following spaces that describe the process of dopamine metabolism: DA is broken down by _____ into _____. Then, _____ converts it into _____.

Q3.3.28 Short Answer: What are the results of the study into depression that asks "Can Botox be used as a good thing?"
Answer

3.4:

Q3.4.1 Short Answer: What does cholinergic mean?
Answer:

Q3.4.2 Multiple Choice: Who first discovered acetylcholine in 1921?

(A) Otto von Loewy (B) James Olds
(C) Neal Miller (D) Peter Milner

Q3.4.3 Short Answer: What experiment led to the discovery of acetylcholine?
Answer:

Q3.4.4 Fill in the Blank: The original name given to acetylcholine by its discoverer was _____.

Q3.4.5 Short Answer: What are the two types of ACh receptors?
Answer:

Q3.4.6 True or False: Acetylcholine is the only neurotransmitter used in the parasympathetic branch of the autonomic nervous system.
Answer:

Q3.4.7 Fill in the Blanks: In the sympathetic nervous system, ACh is used at the _____, while NE is used at the _____.

Q3.4.8 Multiple Choice: Which of the following is NOT a function of ACh in the CNS?

(A) Learning and alertness
(B) Memory
(C) REM sleep generation
(D) Pain modulation

Q3.4.9 **Short Answer:** Describe the synthesis of acetylcholine.
Answer:

Q3.4.10 **Fill in the Blanks:** The precursor to acetylcholine is _____ and the enzyme that synthesizes acetylcholine is _____.

Q3.4.11 **Short Answer:** Explain how acetylcholine is metabolized.
Answer:

Q3.4.12 **Multiple Choice:** Which type of ACh receptor is ionotropic?

(A) Nicotinic receptors
(B) Muscarinic receptors
(C) Both nicotinic and muscarinic receptors
(D) Neither nicotinic nor muscarinic receptors

Q3.4.13 **Short Answer:** Explain what the sympathetic chain is, and where it is located.
Answer:

Q3.4.14 **Fill in the Blank:** The drug _____ is a direct antagonist of nicotinic receptors, causing paralysis.

Q3.4.15 **True or False:** Atropine blocks muscarinic receptors and is derived from the plant known as belladonna alkaloids (deadly nightshade).
Answer:

Q3.4.16 **Short Answer:** How does Botulinum Toxin interfere with acetylcholine function?
Answer:

Q3.4.17 **Fill in the Blanks:** Black Widow Spider venom causes _____ of ACh, while Cobra venom _____ ACh receptors.

Q3.4.18 **Multiple Choice:** Which of the following is a reversible AChE blocker used to treat myasthenia gravis?

(A) Sarin
(B) Parathion
(C) Neostigmine (Prostigmin)
(D) DFP (Diisopropylfluorophosphate)

Q3.4.19 **True or False:** *Donepezil* (**Aricept**) crosses the blood-brain barrier and is used to treat the cognitive symptoms of Alzheimer's disease.
Answer:

Q3.4.20 **True or False:** Nicotinic recptors are antagonists at low does, but agonists at high doses.
Answer:

Q3.4.21 **Multiple Choice:** In the PNS, where are nicotinic receptors predominantly located?

(A) Brain and spinal cord
(B) Neuromuscular junctions
(C) Autonomic ganglia
(D) All of the above

Q3.4.22 **Long Answer:** Define the neuromusclar junction and the paravertebral ganglion.
Answer:

Q3.4.23 **Multiple Choice:** In the sympathetic nervous system, which neurotransmitter is used at the neuromuscular junction with smooth muscles and glands?

(A) Acetylcholine
(B) Norepinephrine
(C) Dopamine
(D) Serotonin

Q3.4.24 **True or False:** In the sympathetic nervous system, acetylcholine is the neurotransmitter used at the neuromuscular junction with sweat glands.
Answer:

Q3.4.25 **Fill in the Blanks:** The _____ is a chain of ganglia that runs parallel to the spinal cord. This is why when you get anxious, _____ of your body responds at once.

Q3.4.26 **Short Answer:** Compare the neurotransmitters used in the parasympathetic nervous system versus the sympathetic nervous system.
Answer:

Q3.4.27 **Multiple Choice:** Which of the following statements about acetylcholine in the autonomic nervous system is FALSE?

(A) ACh is the only neurotransmitter in the parasympathetic branch
(B) ACh is used at preganglionic synapses in both sympathetic and parasympathetic branches
(C) ACh is used at postganglionic synapses to sweat glands in the sympathetic branch
(D) ACh is the primary neurotransmitter at the neuromuscular junction with smooth muscles in the sympathetic branch

Q3.4.28 **Fill in the Blank:** In the somatic nervous system, ACh _____ the neuromuscular junction.

Q3.4.29 Short Answer: Explain the role of acetylcholine in the somatic nervous system.
Answer:

Q3.4.30 Matching: Match each brain structure with its projection target.

Choices

(a) Nucleus Basalis

(b) Medial Septal Nucleus and Nucleus of Diagonal Band

(c) Pedunculopontine nucleus (PPT) and Laterodorsal Tegmental Nucleus (LDT)

(1) Projects to the cortex ..... _____

(2) Projects to the hippocampus through the fornix ..... _____

(3) Projects to the pons and thalamus ..... _____

Q3.4.31 Multiple Choice: Which structure in the basal forebrain that uses ACh is primarily responsible for activating the cortex and facilitating learning?

(A) Nucleus Basalis (B) Medial Septal Nucleus

(C) Nucleus of Diagonal Band (D) Pedunculopontine nucleus

Q3.4.32 True or False: The Medial Septal Nucleus, which uses ACh, primarily modulates the amygdala.
Answer:

Q3.4.33 Long Answer: Explain the function of acetylcholine in REM sleep generation, including the specific brain structures involved.
Answer:

Q3.4.34 Fill in the Blanks: The _____ and _____ are structures that use acetylcholine and project to the hippocampus through the fornix.

Q3.4.35 Short Answer: What are the four main functions of acetylcholine in the central nervous system?
Answer:

Q3.4.36 True or False: When comparing the sympathetic and parasympathetic nervous systems, both use ACh at their preganglionic synapses.
Answer:

Q3.4.37 Multiple Choice: Which of the following correctly describes the neurotransmitter pathway in the parasympathetic nervous system?

(A) ACh at preganglionic synapse, ACh at postganglionic synapse

(B) ACh at preganglionic synapse, NE at postganglionic synapse

(C) NE at preganglionic synapse, ACh at postganglionic synapse

(D) NE at preganglionic synapse, NE at postganglionic synapse

Q3.4.38 Shoet Answer: What is the connection between vikings, Koryaks and ACh?
Answer:

3.5:

Q3.5.1 Fill in the Blanks: The three catecholamines are _____, _____, and _____.

Q3.5.2 Multiple Choice: What is the precursor for dopamine?

(A) Tyrosine (B) L-DOPA (C) Tryptophan (D) Choline

Q3.5.3 Fill in the Blank: The rate-limiting enzyme in the synthesis of catecholamines is _____.

Q3.5.4 Short Answer: Describe the pathway of dopamine synthesis from its amino acid precursor.
Answer:

Q3.5.5 True or False: The word "tyrosine" is derived from a word meaning "tire."
Answer:

Q3.5.6 Multiple Choice: Which pathway is involved in movement and motor control?

(A) Nigrostriatal system (B) Mesocortical system

(C) Mesolimbic system (D) Tuberoinfundibular system

Q3.5.7 Fill in the Blanks: The nigrostriatal pathway starts in the _____ and ends in the _____.

Q3.5.8 **Short Answer:** List four symptoms of Parkinson's disease.
Answer:

Q3.5.9 **Multiple Choice:** What neurotoxin led to the development of an animal model for Parkinson's disease?

(A) MPTP (B) MPPP (C) MPP+ (D) MAO

Q3.5.10 **Fill in the Blank:** The misfolded proteins found in the brains of people with Parkinson's disease are called _____.

Q3.5.11 **True or False:** In Huntington's Chorea, there is too much GABA from the Striatum to the Substantia Nigra.
Answer:

Q3.5.12 **Long Answer:** Explain how the MPTP incident in 1982 contributed to our understanding of Parkinson's disease.
Answer:

Q3.5.13 **Fill in the Blank:** *Methylphenidate* (**Ritalin**) increases levels of _____ and _____ in the brain.

Q3.5.14 **Multiple Choice:** Which system is primarily responsible for reward and reinforcement?

(A) Nigrostriatal system (B) Mesocortical system
(C) Mesolimbic system (D) Tuberoinfundibular system

Q3.5.15 **Short Answer:** What neuropeptide, also called orexin, is involved in the regulation of sleep and wakefulness?
Answer:

Q3.5.16 **Fill in the Blank:** The drug _____ is an orexin receptor antagonist used to treat insomnia.

Q3.5.17 **True or False:** The mesocortical system is involved in short-term memory, planning, and problem-solving.
Answer:

Q3.5.18 **Multiple Choice:** Which researchers discovered that electrical stimulation of certain brain areas could be rewarding rather than aversive?

(A) Otto von Loewy and Vagusstoff
(B) James Olds and Peter Milner
(C) Neal Miller and Delgado
(D) Lateral hypothalamus researchers

Q3.5.19 Short Answer: What structure within the limbic system is considered the "pleasure center" of the brain?
Answer:

Q3.5.20 Fill in the Blanks: The following is a paragraph the describes dopamine synthesis: Tyrosine is converted to _____ by the enzyme _____. This converted form is then used to create dopamine by the enzyme _____.

Q3.5.21 Multiple Choice: Which of the following is NOT a function of dopamine in the CNS?

(A) Movement and motor control
(B) Reward and reinforcement
(C) Learning and memory
(D) Sleep-wake cycles and REM sleep

Q3.5.22 Short Answer: Describe the metabolism of dopamine.
Answer:

Q3.5.23 Short Answer: Define choreoathetotic movements.
Answer:

Q3.5.24 Fill in the Blanks: The term _____ refers to slow, continuous writhing movements, while _____ (from the Greek word for "dance") refers to rapid, purposeless, involuntary movements.

Q3.5.25 True or False: Both athetosis and choreic movements are characterized by too little movement.
Answer:

Q3.5.26 Short Answer: Where in the brain is hypocretin produced?
Answer:

Q3.5.27 Multiple Choice: Which drug increases both dopamine and norepinephrine in the brain and can be used to treat narcolepsy?

(A) Suvorexant (Belsomra)
(B) Methylphenidate (Ritalin)
(C) TAK-994
(D) Hypocretin

Q3.5.28 Short Answer: Explain the difference between athetosis and choreic movements.
Answer:

Q3.5.29 **Fill in the Blank:** _____ is a neuropeptide involved in the regulation of sleep and wakefulness that is also known as orexin.

Q3.5.30 **Short Answer:** What is the role of adenosine in the body?
Answer: