

1. Which statement regarding ligands, agonists and antagonists is INCORRECT?

- A. Agonists and antagonists can bind to the same receptor
- B. All of them lead to activation of receptors after binding
- C. Antagonists can prevent agonists from activating receptors
- D. Agonists have affinity for receptors and intrinsic efficacy

2. Which statement regarding drug specificity is CORRECT?

- A. All drugs can bind the same receptors
- B. Drugs-receptor binding depends on the 3D shape alone
- C. Most drugs bind to their targets through covalent bonds
- D. Not all drugs act through receptors

3. Which of the following is an INCORRECT statement regarding drug-receptor interactions:

- A. Covalent bonds can produce long-term effects
- B. Hydrogen bonds may contribute to drug-receptor binding
- C. Van der Waals interactions act over short distances
- D. Hydrophobic interactions favor the binding of lipid-soluble drugs in polar pockets

4. Which statement regarding drug-receptor interactions is INCORRECT :

- A. Small changes in a drug's chemical structure can affect affinity or efficacy
- B. Drug selectivity may decrease at higher doses
- C. Increasing the drug concentration beyond the level required to produce the maximal response will further increase that response
- D. Receptor number and function can change in response to disease and drug exposure

5. Which receptor type generally mediates the fastest cellular response?

- A. Intracellular receptors
- B. Receptor tyrosine kinases

- C. G protein coupled receptors
- D. Ligand-gated ion channels

6. A patient takes a prescribed drug but experiences a reduced response because another drug competes with it for binding to the same receptor. Which explanation best accounts for this interaction?

- A. The drug has high affinity for its receptor
- B. The drug has high efficacy
- C. A competitive antagonist is being administered concurrently
- D. An allosteric antagonist is being administered concurrently

7. Which of the following statements regarding G protein-coupled receptors is INCORRECT:

- A. A typical GPCR has seven transmembrane segments
- B. GPCRs can couple to heterotrimeric G proteins consisting of alpha, beta, and gamma subunits
- C. The alpha subunit binds ATP and hydrolyzes it to ADP to terminate signaling
- D. The beta-gamma complex can also regulate downstream signaling pathways

8. Which of the following is a drug that primarily produces its therapeutic effect through direct chemical reactions rather than by acting on receptors?

- A. An antacid that neutralizes gastric acid
- B. A receptor antagonist
- C. A nuclear receptor agonist
- D. A ligand-gated channel opener

9. Fluoxetine is prescribed to a patient with depression. Which option best describes its primary mechanism of action?

- A. It inhibits the serotonin transporter, reducing serotonin reuptake into presynaptic nerve terminals
- B. It blocks an ion channel responsible for serotonin transport
- C. It directly activates the enzyme responsible for serotonin synthesis
- D. It acts as an agonist at serotonin receptors, mimicking its response

10. Which of the following best describes how a positive allosteric modulator work:

- A. It mimics the endogenous ligand
- B. It directly switches on gene transcription
- C. It enhances the response of the endogenous ligand
- D. It increases enzyme activity

11. A patient with asthma receives salbutamol (albuterol). Which mechanism produces the desired therapeutic effect?

- A. B₂-receptor antagonism in the heart
- B. B₂-receptor agonism causing bronchial smooth muscle relaxation
- C. Muscarinic receptor agonism causing bronchoconstriction
- D. Inhibition of the serotonin transporter

12. Activation of a Gq-coupled receptor stimulates phospholipase C. Which second messengers are generated?

- A. cAMP and cGMP
- B. ATP and ADP
- C. IP₃ and DAG
- D. GDP and GTP

13. Ibuprofen reduces pain and inflammation primarily by inhibiting which target?

- A. B₂-adrenergic receptors
- B. Cyclooxygenase enzymes
- C. Voltage-gated calcium channels
- D. The serotonin transporter

14. A drug blocks a receptor by binding to a different site and changing the receptor's conformation. Increasing the agonist concentration does not restore the normal response. Which mechanism best fits?

- A. Reversible competitive antagonism
- B. Agonism at the active site
- C. Noncompetitive allosteric antagonism
- D. Increased receptor sensitivity

- **15. A patient receives Drug A, which binds to a receptor with high affinity but produces no response when administered alone. It prevents Drug B from activating the same receptor. Which statement best describes Drug A?**
- A. It has high efficacy but low affinity
 - B. It has affinity but no intrinsic efficacy and may act as an antagonist
 - C. It has neither affinity nor efficacy
 - D. It must be an irreversible antagonist
- **16. A reversible competitive antagonist shifts an agonist dose-response curve to the right without reducing the maximal response. Which explanation is most appropriate?**
- A. The antagonist irreversibly destroys receptors
 - B. The antagonist reduces the agonist's intrinsic efficacy
 - C. Increasing agonist concentration can overcome the antagonism
 - D. The antagonist permanently inhibits the signaling pathway
- **17. Drug A and Drug B activate the same receptor, but Drug A produces a greater maximal response than Drug B under comparable conditions. Which property best explains this difference?**
- A. Drug A necessarily has greater affinity
 - B. Drug A has greater intrinsic efficacy
 - C. Drug B cannot bind the receptor
 - D. Drug B must be an allosteric antagonist
- 18. A toxin prevents the alpha subunit of a heterotrimeric G protein from hydrolyzing GTP to GDP. Which consequence is most likely?**
- A. The α subunit remains active for longer than normal
 - B. The α subunit becomes immediately inactive
 - C. The receptor can no longer bind any ligand
 - D. The receptor is converted into a ligand-gated ion channel
- 19. A drug activates a G_s -coupled receptor in cardiac cells. Which sequence best describes the downstream signaling pathway?**

- A. Gs activation → adenylyl cyclase inhibition → decreased cAMP → decreased PKA activity
- B. Gs activation → phospholipase C activation → IP3 formation as the primary pathway
- C. Gs activation → adenylyl cyclase stimulation → increased cAMP → increased PKA activity
- D. Gs activation → JAK activation → STAT translocation

20. A drug inhibits the phosphodiesterase responsible for degrading cAMP. If cAMP production continues, what is the most direct expected effect?

- A. Reduced cAMP concentration and shorter signaling
- B. Increased cAMP degradation
- C. Prolonged elevation of cAMP and downstream signaling
- D. Direct blockade of all G protein activation

21. A drug activates a Gq-coupled alpha-1 adrenergic receptor in vascular smooth muscle. Which sequence best explains the resulting contraction?

- A. Adenylyl cyclase activation → cAMP increase → PKA activation
- B. Phospholipase C activation → IP3 formation → increased intracellular Ca^{2+}
- C. Gi activation → cAMP increase → calcium release
- D. JAK activation → STAT phosphorylation → immediate ion-channel opening

22. Which of the following is an example of using drug selectivity in treatment?

- A. Using a nonselective beta agonist to activate both β_1 and β_2 receptors equally
- B. Using a β_2 -selective agonist to promote bronchodilation while minimizing β_1 -mediated cardiac effects
- C. Using a drug that activates all receptor subtypes to maximize its therapeutic effect
- D. Increasing a drug's dose to make it more selective for its target receptor

23. A patient receives a drug that acts through an intracellular steroid receptor. Although the drug is eliminated from plasma, its biological effects persist. Which explanation is best?

- A. The drug must remain permanently attached to a cell-surface receptor
- B. The drug-receptor complex alters gene transcription, and the resulting proteins can persist
- C. Intracellular receptors always open ion channels for days
- D. The drug continuously activates G proteins after elimination

****24. A drug inhibits the serotonin transporter responsible for reuptake into presynaptic nerve terminals. Which statement best describes its primary mechanism?**

- A. It directly activates serotonin receptors as its only action
- B. It inhibits transport, increasing serotonin availability in the synaptic space
- C. It inhibits cyclooxygenase to reduce serotonin degradation
- D. It blocks serotonin synthesis by inhibiting a receptor tyrosine kinase

25. Two drugs produce therapeutic effects though different mechanisms. One acts by binding a receptor, whereas the other neutralizes gastric acid through a chemical reaction. Which statement correctly distinguishes their mechanisms?

- A. Both must activate G protein-coupled receptors
- B. The acid-neutralizing drug must enter the nucleus
- C. The first acts through a receptor-mediated mechanism, the second acts through a direct chemical mechanism
- D. The acid-neutralizing drug must inhibit a transporter

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| 1 B | 14 C |
| 2 D | 15 B |
| 3 D | 16 C |
| 4 C | 17 B |
| 5 D | 18 A |
| 6 C | 19 C |
| 7 C | 20 C |
| 8 A | 21 B |
| 9 A | 22 B |
| 10 C | 23 B |
| 11 B | 24 B |
| 12 C | 25 C |
| 13 B | |

BY: EMAN ALAMMOURI