Questions

1- If 10 mg of oxycodone produces a greater analgesic response than aspirin at any dose, which of the following is the correct statement?

A. **Oxycodone is more efficacious than aspirin.**
B. Oxycodone is less potent than aspirin.
C. Aspirin is a full agonist, and oxycodone is a partial agonist.
D. Oxycodone and aspirin act on the same drug target.

▭ Efficacy refers to the maximum effect a drug can produce, regardless of the dose. In this case, since oxycodone produces a greater analgesic response than aspirin at any dose, it suggests that oxycodone has higher efficacy in producing pain relief.

Questions

2- Methylphenidate helps patients with attention deficit hyperactivity disorder (ADHD) maintain attention and perform better at school or work, with an ED50 of 10 mg. However, methylphenidate can also cause significant nausea at higher doses (TD50 = 30 mg). Which is correct regarding methylphenidate?

A. **The therapeutic index of methylphenidate is 3.**
B. The therapeutic index of methylphenidate is 0.3.
C. Methylphenidate is more potent at causing nausea than treating ADHD.
D. Methylphenidate is more efficacious at causing nausea than treating ADHD.

→ The therapeutic index (TI) is a ratio used to assess the safety of a drug. It is calculated as the TD50 / ED50, where:
→ TD50 is the dose at which 50% of individuals experience a toxic effect.
→ ED50 is the dose at which 50% of individuals achieve the desired therapeutic effect.
→ TI= TD50/ED50 = 30mg/10mg = 3

Questions

3- Which of the following is correct in regards to the safety of using warfarin which has a small therapeutic index, versus penicillin which has a larger therapeutic index?

A. Warfarin is a safer drug because it has a low therapeutic index.

B. Warfarin treatment has a high chance of resulting in dangerous adverse effects if bioavailability is altered.

C. The high therapeutic index makes penicillin a safe drug for all patients.

D. Penicillin treatment has a high chance of causing dangerous adverse effects if bioavailability is altered

▭ Therapeutic index (TI) is a measure of a drug's safety. A small therapeutic index means there is a narrow margin between the effective dose (ED50) and the toxic dose (TD50), making the drug more likely to cause harmful effects if dosages are not carefully managed. In contrast, a large therapeutic index means the drug is generally safer because the difference between effective and toxic doses is larger.

Questions

4- Which of the following patients are most at risk of suffering from an adverse drug reaction?

A. **A 2-month-old infant receiving a prescription for an antibiotic.**
B. A 22-year-old patient with asthma receiving prescriptions for inhalers to relieve and prevent their asthma.
C. A 48-year-old patient who has hypertension and receives a prescription for an ACE inhibitor.
D. A 50-year-old patient who has edema receiving a prescription for a diuretic.

▭ Infants, especially those under 6 months old, are at higher risk for adverse drug reactions due to immature liver and kidney function: These organs are not fully developed in infants, which can lead to slower drug metabolism and elimination, increasing the risk of toxicity.

Questions

5- Which of the following is correct regarding the sympathetic nervous system?

A. It generally mediates body functions in “rest and digest” mode.
B. The neurotransmitter at the sympathetic ganglion is norepinephrine (NE).
C. The neurotransmitter at the sympathetic ganglion is acetylcholine (ACh).
D. Sympathetic neurons release ACh in the effector organs

→ The neurotransmitter at the sympathetic and parasympathetic ganglia is acetylcholine.
→ The sympathetic system generally mediates body functions in “fight-or-flight” mode and the parasympathetic system generally mediates body functions in “rest-and-digest” mode.
→ Sympathetic neurons release NE, and parasympathetic neurons release ACh in the effector cells.

Questions

6- Regarding the activation of receptors on the effector organs in the ANS, which of the following statement is correct?

A. Acetylcholine activates adrenergic receptors.
B. Acetylcholine activates muscarinic receptors.
C. Epinephrine activates nicotinic receptors.
D. Norepinephrine activates muscarinic receptors.

→ Acetylcholine is the neurotransmitter in the cholinergic system, and it activates both muscarinic and nicotinic cholinergic receptors, not adrenergic receptors.

→ Norepinephrine and epinephrine activate adrenergic receptors, not muscarinic receptors.

Questions

7- Which of the following is true in regards to the parasympathetic nervous system?

A. The parasympathetic system often discharges as a single, functional system.
B. **The parasympathetic division is involved in near vision, movement of food, and urination.**
C. The postganglionic fibers of the parasympathetic division are long, compared to those of the sympathetic nervous system.
D. The parasympathetic system controls the secretion of the adrenal medulla.

▭ The parasympathetic nervous system maintains essential bodily functions, such as vision, movement of food, and urination. It uses acetylcholine, not norepinephrine, as a neurotransmitter, and it discharges as discrete fibers that are activated separately. The postganglionic fibers of the parasympathetic system are short compared to those of the sympathetic division. The adrenal medulla is under the control of the sympathetic system.

Questions

8- Which of the following statements about neurotransmitters and neurotransmission is true?

A. Arrival of an action potential in the postsynaptic cell triggers release of neurotransmitter.
B. Intracellular calcium levels drop in the neuron before the release of neurotransmitter.
C. Serotonin and dopamine are the primary neurotransmitters in the ANS.
D. Neurotransmitters are released from the presynaptic nerve terminals.

Neurotransmitters are released from presynaptic neurons, triggered by the arrival of an action potential in the presynaptic neuron (not in the postsynaptic cell). When an action potential arrives in the presynaptic neuron, calcium enters the presynaptic neuron and calcium levels increase in the neuron before neurotransmitter is released. The main neurotransmitters in the ANS are norepinephrine and acetylcholine.

Questions

9- Botulinum toxin blocks the release of acetylcholine from cholinergic nerve terminals. Which of the following is a possible effect of botulinum toxin?

A. **Skeletal muscle paralysis**
B. Improvement of myasthenia gravis symptoms
C. Increased salivation
D. Reduction in heart rate

▭ Acetylcholine released by cholinergic neurons acts on nicotinic receptors in the skeletal muscle cells to cause contraction. Therefore, blockade of ACh release causes skeletal muscle paralysis. Myasthenia gravis is an autoimmune disease where antibodies are produced against nicotinic receptors and inactivate nicotinic receptors. A reduction in ACh release therefore worsens (not improves) the symptoms of this condition. Reduction in Ach release by botulinum toxin causes reduction in secretions including saliva (not increase in salivation) causing dry mouth and an increase (not reduction) in heart rate due to reduced vagal activity.

Questions

10- A 34 years old male underwent an abdominal surgery and developed urinary retention afterward. Urinary obstruction was ruled out in this patient. Which of the following will be beneficial in endorsing urination?

A. Activating nicotinic receptors.
B. Inhibiting the release of acetylcholine.
C. Inhibiting cholinesterase enzyme.
D. Blocking muscarinic receptors.

→ Activation of muscarinic receptors in the detrusor muscles of urinary bladder can promote urination in patients where the tone of detrusor muscle is low.

→ Inhibiting cholinesterase enzyme increases the levels of acetylcholine, and acetylcholine can increase the tone of the detrusor muscle.

→ There are no nicotinic receptors in the detrusor muscles; therefore, activation of nicotinic receptors is not helpful.

→ Inhibiting the release of acetylcholine or blocking muscarinic receptors worsens urinary retention

Questions

11- Which of the following agents would help in dilating the pupils of the eye?

A. Muscarinic receptor activator (agonist)
B. Muscarinic receptor inhibitor (antagonist)
C. Pilocarpine
D. Neostigmine

▭ Muscarinic agonists (for example, pilocarpine) contract the circular smooth muscles in the iris sphincter and constrict the pupil (miosis). Anticholinesterases (for example, neostigmine and physostigmine) also cause miosis by increasing the level of ACh. Muscarinic antagonists, on the other hand, relax the circular smooth muscles in the iris sphincter and cause dilation of the pupil (mydriasis).

Questions

12- In Alzheimer disease, there is a deficiency of cholinergic neuronal function in the brain. Which of the following would help in relieving symptoms of Alzheimer?

A. Inhibiting cholinergic receptors in the brain.
B. Inhibiting the release of acetylcholine in the brain.
C. Inhibiting the acetylcholinesterase enzyme in the brain.
D. Activating the acetylcholinesterase enzyme in the brain.

▭ Because there is already a deficiency in brain cholinergic function in Alzheimer disease, inhibiting cholinergic receptors or inhibiting the release of ACh worsens the condition. Activating the acetylcholinesterase enzyme increases the degradation of ACh, which also worsens the condition. However, inhibiting the acetylcholinesterase enzyme helps to increase the levels of ACh in the brain and thereby, relieve the symptoms of Alzheimer disease.

Questions

13- A 60-year-old female who had a cancerous growth in the neck region underwent radiation therapy. Her salivary secretion was reduced due to radiation and she suffers from dry mouth (xerostomia). Which of the following drugs would be most useful in treating xerostomia in this patient?

A. Acetylcholine
B. Pilocarpine
C. Echothiopate
D. Atropine

→ Salivary secretion may be enhanced by activating muscarinic receptors in the salivary glands. This can be achieved in theory by using a muscarinic agonist or an anticholinesterase agent. Pilocarpine is a muscarinic agonist administered orally for this purpose.

→ Acetylcholine has similar effects as that of pilocarpine; however, it cannot be used therapeutically as it is rapidly destroyed by cholinesterase in the body.

→ Echothiopate is an irreversible cholinesterase inhibitor, but it cannot be used therapeutically because of its toxic effects.

→ Atropine is a muscarinic antagonist and worsens dry mouth.

Questions

14- During an ophthalmic surgical procedure, the surgeon wanted to constrict the pupil using a miotic drug. However, he accidentally used another drug that caused dilation of the pupil (mydriasis). Which drug was most likely used?

A. Acetylcholine
B. Pilocarpine
C. Tropicamide
D. Bethanechol

Muscarinic agonists such as ACh, pilocarpine, and bethanechol contract the circular muscles of iris sphincter and cause constriction of the pupil (miosis), whereas muscarinic antagonists such as tropicamide prevent contraction of the circular muscles of the iris and cause dilation of the pupil (mydriasis).

Questions

15- Which is the most effective anti-motion sickness drug for a person planning to go on a cruise?

A. Atropine
B. Fesoterodine
C. Scopolamine
D. Tropicamide

All muscarinic antagonists (anticholinergic drugs) listed above are theoretically useful as anti–motion sickness drugs; however, scopolamine is the most effective in preventing motion sickness. Tropicamide mostly has ophthalmic uses, and fesoterodine is used for overactive bladder

Questions

16- Which of the following is true in regards of ganglionic blockers agents?

A. **Blockade of sympathetic ganglia could result in reduced blood pressure.**
B. Blockade of parasympathetic ganglia could result in reduced heart rate.
C. Nicotine is a nondepolarizing ganglion blocker.
D. Atropine is a nondepolarizing ganglion blocker.

→ Selective blockade (in theory) of the sympathetic ganglion causes reduction in norepinephrine release and, therefore, reduction in heart rate and blood pressure.

→ Selective blockade (in theory) of the parasympathetic ganglion causes reduction in ACh release and an increase in heart rate.

→ Receptors at both sympathetic and parasympathetic ganglia are of the nicotinic type. Nicotine is an agonist at nicotinic receptors and produces a depolarizing block in the ganglia. Atropine is a muscarinic antagonist and has no effect on the nicotinic receptors found in the ganglia

Questions

17- Which of the following drugs is used in the treatment of sinus bradycardia?

A. Neostigmine
B. Cisatracurium
C. Atropine
D. Succinylcholine

→ Sinus bradycardia is a condition where the heart rate is below normal, and most often caused by increased vagal tone [increased release of ACh in the sinoatrial (SA) node that acts on muscarinic receptors to reduce heart rate]. A muscarinic antagonist such as atropine is useful in this situation to bring the heart rate back to normal.

→ Succinylcholine and cisatracurium are nicotinic antagonists and have no effect on muscarinic receptors in the SA node. Neostigmine is a cholinesterase inhibitor and can worsen bradycardia by increasing the level of ACh in the SA node.

Questions

18- Which of the following classes of adrenergic agents is used in the management of hypertension?

A. α1 agonist
B. α2 agonist
C. β1 agonist
D. β3 agonist

→ α2 agonists activate α2 receptors located in the presynaptic terminal of sympathetic neurons and cause a reduction in the release of norepinephrine from sympathetic nerve terminals. This leads to a reduction in blood pressure. α2 agonists such as clonidine and methyldopa are therefore used as antihypertensive agents.

→ α1 agonists cause vasoconstriction, and β1 agonists cause increased cardiac output and renin release, so these agents may increase blood pressure.

→ β3 agonists are not used in the management of hypertension.

Questions

19- An asthmatic patient was given a nonselective β agonist to relieve bronchoconstriction. Which adverse effect would you expect in this patient?

A. Bradycardia
B. Tachycardia
C. Hypotension
D. Worsening bronchoconstriction

▭ A nonselective β agonist activates both β1and β2 receptors. β1 activation causes an increase in heart rate (tachycardia), contractility, and subsequent increase in blood pressure. It relieves bronchoconstriction because of the β2 receptor activation.

Questions

20- suspected cocaine overdose. Which of the following symptoms is most likely in this patient?

A. Hypertension

B. Bronchoconstriction

C. Bradycardia

D. Miosis.

▭ Cocaine is a sympathomimetic drug that increases the release and inhibits the reuptake of norepinephrine, dopamine, and serotonin, leading to heightened adrenergic activity. This results in symptoms such as hypertension, and tachycardia.

Questions

21- An elderly patient is brought to the emergency room with a blood pressure of 76/60 mm Hg, tachycardia, and low cardiac output. He is diagnosed with acute heart failure. Which of the following drugs is most appropriate to improve his cardiac function?

A. Epinephrine
B. Fenoldopam
C. Dobutamine
D. Isoproterenol

▭ Among the choices, the ideal drug to increase contractility in acute heart failure is dobutamine, since it is a selective β1-adrenergic agonist. Fenoldopam is a dopamine agonist used to treat severe hypertension. The other drugs are nonselective adrenergic agonists that could cause unwanted side effects

Questions

22- A 30-year-old male patient was brought to the ER with amphetamine overdose. He presented with high blood pressure and arrhythmias. Which of the following agents is used in the management of cardiovascular symptoms of amphetamine overdose?

A. Metoprolol
B. Prazosin
C. Labetalol
D. Nebivolol

→ Amphetamine is an indirect adrenergic agonist that mainly enhances the release of norepinephrine from peripheral sympathetic neurons. Therefore, it activates all types of adrenergic receptors (that is, α and β receptors) and causes an increase in blood pressure. Since both α and β receptors are activated indirectly by amphetamine, α-blockers (prazosin) or β-blockers (metoprolol, nebivolol) alone cannot relieve the cardiovascular effects of amphetamine poisoning.

→ Labetalol blocks both α1 and beta receptors and can minimize the cardiovascular effects of amphetamine overdose.

Questions

23- A β-blocker was prescribed for hypertension in a patient with asthma. After a week of treatment, the asthma attacks got worse, and the patient was asked to stop taking the β-blocker. Which β-blocker would you suggest as an alternative that is less likely to worsen the asthma?

A. Propranolol
B. Metoprolol
C. Labetalol
D. Carvedilol

→ The patient was most likely given a nonselective β-blocker (antagonizes both β1 and β2 receptors) that made the asthma worse due to β2 antagonism. An alternative is to prescribe a cardioselective (antagonizes only β1) β-blocker that does not antagonize β2 receptors in the bronchioles.

→ Metoprolol is a cardioselective β-blocker.

→ Propranolol, labetalol, and carvedilol are nonselective β-blockers and could worsen the asthma.

Questions

24- A 50-year-old male was in anaphylactic shock after being stung by a wasp. The medical team tried to reverse the bronchoconstriction and hypotension using epinephrine; however, the patient did not fully respond to the treatment. The patient's wife mentioned that he is taking a prescription medication for blood pressure. Which medication is he most likely taking that contributed to a reduced response to epinephrine?

A. Doxazosin
B. Propranolol
C. Metoprolol
D. Acebutolol

▭ Epinephrine reverses hypotension by activating β1 receptors and relieves bronchoconstriction by activating β2 receptors in anaphylaxis. Since epinephrine was not effective in reversing hypotension or bronchoconstriction in this patient, it could be assumed that the patient was on a nonselective β-blocker (propranolol). Doxazosin (α1-blocker), metoprolol, or acebutolol (both β1-selective blockers) would not have completely prevented the effects of epinephrine.

Questions

25- Which of the following drugs has the highest potential to worsen orthostatic hypotension when given together with prazosin?

A. Propranolol
B. Atenolol
C. Nebivolol
D. Labetalol

→ Labetalol is a nonselective β-blocker with α1-blocking activity. Prazosin causes orthostatic hypotension due to its α1 blockade, which could be enhanced by adding labetalol.

→ Propranolol, atenolol, and nebivolol do not have α1-blocking effects.

Questions

26- A 59-year-old patient presents for treatment of hypertension. His past medical history also includes diabetes and hyperlipidemia. The patient's blood pressure is 150/93 (both today and at the last visit). Which of the following agents is used as an initial therapy to treat hypertension in this patient?

A. **Enalapril**
B. Hydralazine
C. Verapamil
D. Metoprolol

▭ Enalapril is an ACE inhibitor and is recommended for first-line therapy in various patient populations, including those who have a compelling indication such as diabetes. The other therapies are not considered first-line therapy.

Questions

27- A 52-year-old female has uncontrolled hypertension (blood pressure 154/82 mm Hg) on treatment with lisinopril. She recently had a myocardial infarction, and her past medical history includes diabetes, hypertension, hyperlipidemia, and osteoarthritis. Considering her compelling indications, which agent may be appropriate to add to her antihypertensive therapy?

A. Clonidine
B. Olmesartan
C. Furosemide
D. Metoprolol

Individual patient care is warranted particularly in the case of a compelling indication for certain medication. Considering her recent myocardial infarction, the best choice is a β1 blocker (metoprolol). It is not appropriate to combine an ACE inhibitor (lisinopril) and ARB (olmesartan). The other agents are not considered first-line therapy and do not have a compelling indication for addition to the regimen.

Questions

28- An elderly patient with a history of heart disease has difficulty breathing and is diagnosed with acute pulmonary edema. Which of the following agents is indicated for the management of this patient?

A. Acetazolamide
B. Chlorthalidone
C. Furosemide
D. Spironolactone

▭ This is a potentially fatal situation. It is important to administer a diuretic that reduces fluid accumulation in the lungs and improves oxygenation and heart function. The loop diuretics are most effective in removing large fluid volumes from the body and are the treatment of choice in this situation. In this situation, furosemide should be administered intravenously. The other choices are inappropriate.

Questions

29- Which of the following statements best describes the action of ACE inhibitors on the failing heart?

A. ACE inhibitors increase vascular resistance.
B. ACE inhibitors decrease cardiac output.
C. ACE inhibitors reduce preload.
D. ACE inhibitors increase aldosterone.

▭ ACE inhibitors decrease vascular resistance, decrease preload, decrease afterload, and increase cardiac output. In addition, ACE inhibitors reduces aldosterone release.

Questions

30- How is spironolactone beneficial in the management of heart failure?

A. Promotes potassium secretion
B. Acts as aldosterone agonist
C. Prevents cardiac hypertrophy
D. Decreases blood glucose

▭ Spironolactone is a potassium-sparing diuretic and an aldosterone antagonist. In heart failure, elevated levels of aldosterone contribute to cardiac remodeling, fibrosis, and hypertrophy. By blocking aldosterone, spironolactone reduces these effects, thereby preventing cardiac hypertrophy and improving overall cardiac function.

Questions

31- Which of the following describes the mechanism of action of milrinone in heart failure?

A. Decreases intracellular calcium
B. Increases cardiac contractility
C. Decreases cAMP
D. Activates phosphodiesterase

▭ Milrinone is a phosphodiesterase inhibitor that leads to increased cAMP, increased intracellular calcium, and therefore increased contractility.

Questions

32- Which arrhythmia can be treated with lidocaine?

A. Paroxysmal supraventricular ventricular tachycardia
B. Atrial fibrillation
C. Atrial flutter
D. Ventricular tachycardia

▪ Lidocaine has little effect on atrial or AV nodal tissue; thus, it used for ventricular arrhythmias such as ventricular tachycardia.

Questions

33- Which medication should be prescribed to all angina patients to treat an acute attack?

A. Isosorbide dinitrate
B. Nitroglycerin patch
C. Nitroglycerin sublingual tablet or spray
D. Ranolazine

▭ Nitroglycerin sublingual tablets or sprays are the first-line treatment for relieving acute angina attacks. They act rapidly by dilating coronary arteries and reducing myocardial oxygen demand, alleviating chest pain associated with ischemia. q

Questions

34- Which of the following correctly ranks the calcium channel blockers from most active on the myocardium to most peripherally active?

A. Diltiazem, amlodipine, verapamil
B. Verapamil, diltiazem, nifedipine
C. Nifedipine, verapamil, diltizem
D. Amlodipine, diltiazem, verapamil

Calcium channel blockers (CCBs) are categorized based on their primary effects on the heart (myocardium) versus peripheral vasculature. This ranking is based on their mechanism of action and target specificity:

1. **Verapamil**: Most active on the myocardium, primarily used to manage arrhythmias and reduce heart rate due to its significant effects on cardiac conduction and contractility.
2. **Diltiazem**: Intermediate activity, with effects on both the myocardium and peripheral vasculature, commonly used for angina and hypertension.
3. **Nifedipine**: Most peripherally active, predominantly causing vasodilation with minimal effects on myocardial contractility or conduction.

Questions

35- A 47-year-old woman presents to the emergency room with severe bleeding. Upon evaluation of the medical record, you discover that she takes dabigatran for a history of multiple deep vein thrombosis . What is the appropriate reversal agent to administer to the patient at this time?

A. Protamine
B. Vitamin K
C. **Idarucizumab**
D. A reversal agent does not exist for this medication.

→ Idarucizumab is used to reverse bleeding caused by dabigatran. By binding to dabigatran and its metabolites, idarucizumab neutralizes anticoagulation. It would be important to monitor this patient for any signs of thrombosis due to reversal of her anticoagulation.

→ Vitamin K is the antidote for warfarin, and protamine is the antidote for heparin.

Questions

36- Which of the following is the primary mechanism of action of Quinidine?

A. **Blocking Na+ channels**
B. Blocking K+ channels
C. Blocking Ca+ channels
D. Muscarinic receptor antagonist
E. Adrenergic receptor antagonist

▭ Quinidine is classified as a Class Ia antiarrhythmic drug, and its primary mechanism of action is **blocking Na^+ channels**. This reduces the rate of rise of the action potential (phase 0) in cardiac myocytes, slowing conduction velocity.

Questions

37- Which of the following is considered a therapeutic effect of digitalis on the ventricular rate in treating atrial fibrillation?

A. Decreases the refractory period of AV node.
B. Increases the refractory period of atrial myocardial muscle fibers.
C. Increases the AV node refractory period.
D. None of the above.

▭ Digitalis (e.g., digoxin) is often used in the treatment of atrial fibrillation, particularly when rate control is needed. Its primary therapeutic effect in this context is to increase the refractory period of the AV node. This reduces the conduction of atrial impulses to the ventricles, thereby lowering the ventricular rate.

Questions

38- Which of the following medication should be avoided while treating a urinary tract infection in a 26-year-old pregnant woman?

A. Ciprofloxacin.
B. Sulfacetamide.
C. Doxycycline.
D. Gentamicin.

▭ Doxycycline should be avoided during pregnancy due to its potential to cause permanent discoloration of the teeth and inhibition of bone growth in the developing fetus. It is a tetracycline antibiotic, and tetracyclines are contraindicated in pregnancy.

Questions

39- A 58-year-old man with a history of hepatitis C, cirrhosis, and ascites presents with a spontaneous bacterial infection. Which of the following antibiotics requires close monitoring and dosing adjustment in this patient given his liver disease?

A. Penicillin G.
B. Tobramycin.
C. Erythromycin.
D. Vancomycin.

→ Erythromycin is metabolized primarily by the liver via the cytochrome P450 enzyme system, and patients with liver disease, such as cirrhosis, are at increased risk of drug accumulation and toxicity. Close monitoring and dose adjustment are necessary to prevent adverse effects in such cases.

→ Penicillin G: While penicillin G is eliminated primarily by the kidneys, it does not require dose adjustment in liver disease, making it safer for this patient.

→ Tobramycin: An aminoglycoside eliminated almost entirely by the kidneys, requiring dose adjustments in renal insufficiency but not in liver disease.

→ Vancomycin: Eliminated renally, vancomycin does not require hepatic adjustment but requires close monitoring of renal function to avoid nephrotoxicity.

Questions

40- Which one of the following agents exerts their pharmaceutical effect by inhibiting the cell wall synthesis?

A. Clindamycin.
B. Fluoroquinolones.
C. Vancomycin.
D. Aminoglycosides.

Vancomycin inhibits bacterial cell wall synthesis by binding to the D-alanyl-D-alanine terminus of cell wall precursor units, preventing the formation of peptidoglycan chains necessary for cell wall integrity. This action makes vancomycin highly effective against Gram-positive bacteria, including MRSA and other resistant organisms.

Questions

41- All of the following antimicrobial agents are considered bactericidal **EXCEPT:**

A. Penicillins.
B. Sulfonamides.
C. Carbapenems.
D. Vancomycin.
E. Cephalosporins.

▭ Sulfonamides are bacteriostatic agents, meaning they inhibit bacterial growth rather than directly killing bacteria. They achieve this by interfering with bacterial folic acid synthesis, specifically by inhibiting dihydropteroate synthase. This prevents the synthesis of nucleotides needed for DNA replication.

Questions

42- Which of the following antimicrobials acts by interfering with the DNA function in the bacteria?

A. Chloramphenicol.
B. **Ciprofloxacin.**
C. Streptomycin.
D. Vancomycin.

- Chloramphenicol: Binds reversibly 50S ribosomal subunit and inhibits protein synthesis at the peptidyl transferase reaction
- Ciprofloxacin: inhibit DNA gyrase and topoisomerase IV
- Streptomycin: Binds irreversibly to the 30s ribosomal subunit
- Vancomycin: Inhibits synthesis of bacterial cell wall phospholipids

Questions

43- Penicillins interfere with bacterial cell wall synthesis by:

A. Inhibiting synthesis of N-acetyl muramic acid pentapeptide.
B. Inhibiting transpeptidases and carboxypeptidases which cross link the peptidoglycan residues.
C. Inhibiting conjugation between N-acetyl muramic acid and N-acetyl glucosamine.
D. Counterfeiting for D-alanine in the bacterial cell wall.

▭ Penicillin inhibits a transpeptidase enzyme which is required to form cross links in the cell wall. These transpeptidase are protein in the cell wall called penicillin binding proteins (PBP).

Questions

44- If a patient gives a history of urticaria, itching and swelling of lips following the injection of penicillin G, then:

A. He will develop a similar reaction whenever penicillin is injected.
B. He can be given ampicillin safely.
C. He can be given oral phenoxymethyl penicillin safely.
D. All natural and semisynthetic penicillins are contraindicated for him.

▭ This is a type IV allergic reaction the patient has allergy to penicillins and therefore all penicillins are contraindicated.

Questions

45- The most important mechanism by which tetracycline antibiotics exert antimicrobial action is:

A. They chelate Ca2+ ions and alter the permeability of bacterial cell membranes.
B. **They bind to 30S ribosomes and inhibit bacterial protein synthesis.**
C. They bind to 50S ribosomes and interfere with the translocation of the growing peptide chain in the bacteria.
D. They interfere with DNA-mediated RNA synthesis in bacteria.

▭ Tetracyclines bind to **30S ribosomal** subunit and blocks access of tRNA.

Questions

46- An 8-year-old child presented with brownish discoloured and deformed anterior teeth. A history of having received an antibiotic about 4 years earlier was obtained. Which antibiotic could be responsible for the condition:

A. Chloramphenicol.
B. Tetracycline.
C. Erythromycin.
D. Gentamicin.

▭ Tetracycline antibiotics are well-known for causing permanent brownish discoloration and deformation of teeth when administered during the period of tooth development (during pregnancy to about 8 years of age). Tetracyclines bind to calcium in developing teeth, forming tetracycline-calcium orthophosphate complexes, which become oxidized and cause the discoloration.

Questions

47- Select the class of antibiotics which act by interfering with bacterial protein synthesis, but are bactericidal:

A. Tetracyclines.
B. Aminoglycosides.
C. Macrolides.
D. Lincosamides.

▭ Aminoglycosides (e.g., gentamicin, amikacin) are unique among antibiotics that interfere with bacterial protein synthesis because they are bactericidal rather than bacteriostatic. They irreversibly bind to the 30S ribosomal subunit.

Questions

48- Highest incidence of antibiotic associated pseudomembranous enterocolitis has been noted with the use of:

A. Ampicillin.
B. Chloramphenicol.
C. Vancomycin.
D. Clindamycin.

▭ Clindamycin has the highest association with antibiotic-associated pseudomembranous enterocolitis, which is caused by an overgrowth of Clostridium difficile (C. difficile) in the gut. Clindamycin's broad-spectrum activity, particularly against anaerobic bacteria, disrupts the normal gut microbiota, creating an environment for C. difficile proliferation and toxin production.

Questions

49- Which one of the following antibiotics is highly active against anaerobic bacteria including Bacteroides fragilis?

A. Ciprofloxacin.
B. Tobramycin.
C. Clindamycin.
D. Clarithromycin.

▭ Clindamycin is highly effective against anaerobic bacteria, including Bacteroides fragilis, a key pathogen in many anaerobic infections.

Questions

50- Which one of the following antibiotics could lead to the development of red man syndrome as an adverse effect?

A. **Vancomycin.**
B. Clindamycin.
C. Cefoperazone.
D. Piperacillin.

Red man syndrome is a well-known adverse effect of vancomycin. It is a histamine-mediated reaction caused by rapid infusion of the drug. Symptoms include flushing, erythema, pruritus, and sometimes hypotension, predominantly affecting the face, neck, and upper torso. It is not an allergic reaction but an infusion-related reaction.

Questions

51- The most important reason for using a combination of antimicrobial agents in the treatment of tuberculosis is:

A. To obtain a bactericidal effect.
B. To broaden the spectrum of activity.
C. To reduce adverse effects of the drugs.
D. To prevent the development of resistance to the drugs.

▭ In the treatment of tuberculosis, the use of a combination of antimicrobial agents is critical to prevent the development of resistance. Mycobacterium tuberculosis has a high propensity to develop resistance to single-drug therapy due to its slow growth rate and the presence of dormant bacilli. Using multiple drugs with different mechanisms of action reduces the likelihood of resistant mutants surviving and proliferating.

Questions

52- In the standard short-course chemotherapy for tuberculosis, pyrazinamide and ethambutol are used for:

A. Initial one month.
B. Initial two months.
C. Last two months.
D. Throughout the course.

▭ In the standard short-course therapy for tuberculosis, pyrazinamide and ethambutol are used during the intensive phase, which typically lasts for the first two months. This phase also includes isoniazid and rifampin, forming a four-drug regimen. The purpose of the intensive phase is to rapidly reduce the bacterial load and prevent the emergence of drug resistance.

Questions

53- The most important toxicity associated with amphotericin B is:

A. Neurotoxicity.
B. Hepatotoxicity.
C. Nephrotoxicity.
D. Bone marrow depression.

→ The most significant and common toxicity associated with amphotericin B is nephrotoxicity.

Questions

54- Ganciclovir is preferred over acyclovir in which of the following infections:

A. Herpes simplex virus 1 and 2.
B. Varicella-zoster.
C. Epstein-Barr virus.
D. Cytomegalovirus.

▭ Ganciclovir is more effective than acyclovir in treating infections caused by Cytomegalovirus (CMV).

Questions

55- Which of the following mechanisms of action explains the cardioprotective effect from low-dose aspirin?

A. Aspirin preferentially inhibits COX-2 leading to a relative reduction in thromboxane A2 levels.
B. Aspirin preferentially inhibits COX-2 leading to a relative reduction in prostacyclin levels.
C. Aspirin preferentially inhibits COX-1 leading to a relative reduction in prostacyclin levels.
D. Aspirin preferentially inhibits COX-1 leading to a relative reduction in thromboxane A2 levels.

→ At low doses aspirin selectively inhibits COX-1, which reduces the production of thromboxane A2, a substance that promotes vasoconstriction and platelet aggregation. COX-2 activity is thought to lead to relatively higher levels of prostacyclin which causes vasodilation and inhibits platelet aggregation.

→ Selective COX-2 inhibitors, as well as all NSAIDs, may increase the risk for CV events by inhibiting the beneficial production of prostacyclin by COX-2, thereby leading to a relative imbalance of thromboxane A2 and promoting platelet aggregation and vasoconstriction.

Questions

56- Which one of the following analgesics does not have an anti-inflammatory effect?

A. **Paracetamol.**
B. Ibuprofen.
C. Diclofenac sodium.
D. Piroxicam.

▭ Paracetamol (acetaminophen) is an analgesic and antipyretic, but it lacks significant anti-inflammatory effects. Unlike nonsteroidal anti-inflammatory drugs (NSAIDs), paracetamol does not effectively inhibit peripheral cyclooxygenase (COX) enzymes in inflamed tissues, which are responsible for producing prostaglandins involved in inflammation.

Questions

57- Select the drug which inhibits cyclooxygenase irreversibly:

A. Mephenamic acid.
B. Naproxen.
C. Aspirin.
D. Diclofenac.

▭ Aspirin (acetylsalicylic acid) irreversibly inhibits cyclooxygenase (COX) enzymes. This leads to a permanent inactivation of COX-1 and COX-2, preventing the synthesis of prostaglandins and thromboxane. The irreversible nature of this inhibition is unique to aspirin among NSAIDs.

Questions

58- Aspirin is contraindicated in children suffering from influenza or similar viral infection because of increased risk of:

A. Gastric bleeding.
B. Reye's syndrome.
C. Thrombocytopenia.
D. Fancony syndrome.

▭ Aspirin is contraindicated in children and teenagers with influenza or other viral infections (e.g., varicella) due to the risk of Reye's syndrome, a rare but serious condition that causes acute encephalopathy and hepatic dysfunction. This condition is strongly associated with the use of aspirin during viral infections.

Questions

59- All of the following conditions get aggravated by NSAIDs administration EXCEPT:

A. Hypertension.
B. Chronic gout.
C. Congestive heart failure.
D. Peptic ulcer.

▭ Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used to treat acute gouty arthritis due to their ability to reduce inflammation. However, they do not typically aggravate chronic gout and may even be used as part of the treatment for gout flares. In contrast, NSAIDs can worsen conditions like hypertension, congestive heart failure, and peptic ulcers due to their systemic effects.

Questions

60- The selective COX-2 inhibitors have the following advantage(s) over the nonselective NSAIDs:

A. **They are less likely to cause gastric ulcers and their complications.**
B. They are likely to be more effective in rheumatoid arthritis.
C. They are not likely to produce renal complications.
D. All of the above.

▭ Selective COX-2 inhibitors (e.g., celecoxib) are designed to specifically inhibit the cyclooxygenase-2 enzyme, which is primarily involved in inflammation and pain, while sparing COX-1, which is involved in maintaining gastric mucosal integrity. This selectivity reduces the risk of gastric ulcers and related complications compared to nonselective NSAIDs.

Questions

61- Select the drug which inhibits cyclooxygenase in the brain but not at peripheral sites of inflammation:

A. Ibuprofen.
B. Acetaminophen.
C. Ketorolac.
D. Naproxen.

▭ Acetaminophen (paracetamol) selectively inhibits cyclooxygenase (COX) activity in the brain, leading to its antipyretic and analgesic effects. However, it has minimal or no effect on COX enzymes at peripheral sites of inflammation, which explains its lack of significant anti-inflammatory activity.

Questions

62- Which of the following is beneficial in acute acetaminophen poisoning?

A. N-acetyl cysteine.

B. Methadone.

C. Naloxone.

▭ N-acetylcysteine (NAC) is the antidote for acute acetaminophen (paracetamol) poisoning. It works by replenishing glutathione stores in the liver, which detoxifies the toxic metabolite NAPQI (N-acetyl-p-benzoquinone imine) formed during acetaminophen metabolism.

Questions

63- For a patient with peptic ulcer, the safest nonopioid analgesic is:

A. Celecoxib.
B. Diclofenac sodium.
C. Acetaminophen.
D. Ibuprofen.

▭ Acetaminophen (paracetamol) is considered the safest nonopioid analgesic for patients with peptic ulcer disease because it does not inhibit cyclooxygenase-1 (COX-1) or affect prostaglandin synthesis in the gastrointestinal (GI) tract. This makes it far less likely to cause gastric irritation, ulcers, or GI bleeding compared to NSAIDs.

Questions

64- Morphine produces analgesia by acting at:

A. Peripheral pain receptors.
B. A spinal site.
C. Supraspinal site.
D. Both spinal and supraspinal sites.

▭ Morphine produces analgesia by acting on opioid receptors located in both the spinal cord and the brain (supraspinal sites). These receptors are part of the body's endogenous pain modulation system.

Questions

65- Which of the following is a synthetic counterpart of morphine?

A. Codeine.
B. Papaverine.
C. Thebaine.
D. Levorphanol.

▭ Levorphanol is a synthetic opioid that acts as a counterpart of morphine. It mimics morphine's pharmacological effects, including potent analgesia, by acting on mu-opioid receptors. Levorphanol has similar efficacy to morphine but differs in pharmacokinetics and side-effect profile.

Questions

66- The antidote of choice for morphine poisoning is:

A. Nalbuphine.
B. Nalorphine.
C. Naloxone.
D. Naltrexone.

▭ Naloxone is the antidote of choice for morphine poisoning and other opioid overdoses. It is a pure opioid antagonist that competes with opioids like morphine at mu, kappa, and delta opioid receptors, rapidly reversing their effects, including respiratory depression, sedation, and hypotension.

Questions

67- Which one of the following analgesics is more potent than morphine?

A. Methadone.
B. Fentanyl.
C. Propoxyphene.
D. Tramadol.

▭ Fentanyl is significantly more potent than morphine as an analgesic, with an approximate potency 100 times greater. It is a synthetic opioid that acts on mu-opioid receptors and is commonly used for severe pain, especially in surgical settings and for cancer pain management.

Questions

68- Which of the following opioid antagonist is preferred for long-term opioid blockade therapy of post-addicts?

A. Nalorphine.
B. Naltrexone.
C. Naloxone.
D. Nalbuphine.

Naltrexone is the preferred opioid antagonist for long-term opioid blockade therapy in individuals recovering from opioid addiction. It is a long-acting opioid antagonist that blocks the effects of opioids at mu, kappa, and delta opioid receptors, preventing euphoria or other effects if opioids are used. Its long duration of action and oral administration make it ideal for maintenance therapy.

Questions

69- Which of the following enzyme is inhibited by corticosteroids to produce an anti-inflammatory effect?

A. Lipoxygenase.
B. Phospholipase-A.
C. Cyclooxygenase.
D. Phosphodiesterase.

▭ Corticosteroids exert their anti-inflammatory effects primarily by inhibiting the enzyme phospholipase-A2. This enzyme is responsible for releasing arachidonic acid from membrane phospholipids, which is a precursor for the production of inflammatory mediators like prostaglandins and leukotrienes. By blocking phospholipase-A2, corticosteroids effectively reduce the formation of these mediators, thereby suppressing inflammation.

Questions

70- Corticosteroid therapy can aggravate all of the following disorders EXCEPT:

A. Diabetes mellitus.
B. Congenital adrenal hyperplasia.
C. Hypertension.
D. Peptic ulcer.

▭ Corticosteroid therapy is actually beneficial in the treatment of congenital adrenal hyperplasia (CAH), a group of disorders caused by enzyme deficiencies in cortisol biosynthesis. Corticosteroids help by replacing the deficient cortisol and suppressing excessive adrenocorticotropic hormone (ACTH) secretion, which reduces adrenal hyperplasia and overproduction of androgens.