FIVE CHOICE COMPLETION

Directions: Select the **SINGLE** best choice

1. Which of the following statements about drug antagonism is **TRUE**?

   A. In the presence of a competitive antagonist, the maximum effect that an agonist can induce is always reduced.
   B. A partial agonist can reduce the effect of a full agonist by no more than 50%.
   C. A competitive antagonist binds covalently to a different site on the receptor than that occupied by an agonist acting at the same receptor.
   D. A competitive antagonist binds irreversibly to a different site on the receptor than that occupied by an agonist acting at the same receptor.
   E. An irreversible antagonist binds covalently to the receptor.

2. Repeated or sustained exposure of a cell to an agonist that acts via a specific receptor to increase the intracellular concentration of cyclic AMP can lead to a reduced ability of the agonist to increase cyclic AMP concentration. At the same time, another agonist acting through different receptor types can still increase cyclic AMP levels to the same extent as before. This phenomenon is **BEST** described by the phrase

   A. homologous desensitization.
   B. heterologous desensitization.
   C. irreversible agonism.
   D. competitive antagonism.
   E. partial agonism.

3. Drugs that have been used therapeutically for many years are often available in proprietary and generic formulations. Which of the following statements is **CORRECT**?

   A. Proprietary medicines and their generic equivalents are always formulated identically.
   B. FDA approval of a generic drug preparation requires that it is bioequivalent to the original proprietary medicine.
   C. Generic medicines are usually chemically less pure than their proprietary equivalents.
   D. Proprietary medicines are usually chemically less pure than their generic equivalents.
   E. The proprietary form of a medicine should always be prescribed even if a generic form is available.

4. Botulinum toxin

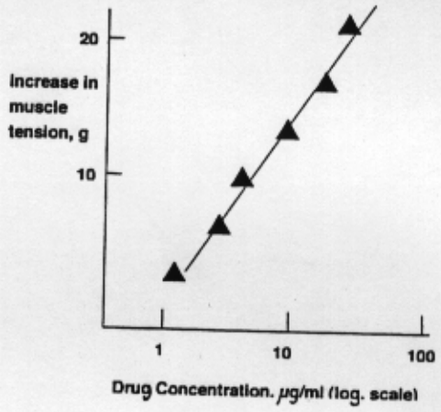
   A. acts by blocking nicotinic, but not muscarinic receptors.
   B. is useful in treating strabismus, achalasia, and spasmodic dysphonia.
   C. is a nondepolarizing (competitive) neuromuscular blocking agent that shifts the log dose-response curve for acetylcholine to the right.
   D. produces a rapidly reversible blockade of acetylcholine release from nerve terminals.
   E. is useful in treating myasthenia gravis.

FIVE CHOICE COMPLETION

Directions: Select the **SINGLE** best choice

* *

5. Considering the following dose-response curve, which of the following statements is **CORRECT?**



D

A. The graph describes a quantal response.
B. It is obvious that the maximum possible response of the muscle is included on the graph. Ø
C. Drug concentrations less than 10 µg/ml produce no measurable response. Ø
D. The graph describes a graded response.
E. It is obvious from the graph that no more than 50% of similar muscle preparations exposed to the same drug will contract at a concentration of 10 µg/ml.

* *

6. A weak base with pKa = 8.5, is poorly absorbed from the stomach (pH=1.5) into the plasma (pH=7.5) because the drug

A. is insoluble in the acid environment of the stomach. F
B. does not carry a charge in acid solution and so cannot pass across the cells of the stomach.
C. exists mainly in the charged form in acid solution and so cannot pass across the cells of the stomach. T
D. is degraded by enzymes in saliva and gastric juices.
E. is converted to an active metabolite in the stomach.

C

7. Which of the following pairs of factors are the most important determinants of the bioavailability of an orally administered drug?

A. degree of ionization in the stomach and the therapeutic ratio for the drug
B. extent of absorption from the G.I. tract and the extraction ratio in the liver
C. extraction ratio in the liver and the renal clearance of the drug x
D. blood flow in the liver and the renal clearance of the drug x
E. binding of the drug to plasma proteins and degree of ionization in the stomach

B

FIVE CHOICE COMPLETION

Directions: Select the **SINGLE** best choice

* *

THE INFORMATION AND DIAGRAM BELOW PERTAIN TO THE NEXT 5 QUESTIONS:

A tablet containing 1020 mg theophylline was administered by mouth to a patient and was rapidly absorbed. The plasma concentration versus time curve is shown below:

8. The half-life of theophylline in this patient is about

   A. 24 hours.
   B. 16 hours.
   C. 8 hours.
   D. 4 hours.
   E. 2 hours.

9. The apparent volume of distribution (Vd) of theophylline in this patient is about

   A. 42 L.
   B. 35 L.
   C. 25 L.
   D. 20 L.
   E. 8 L.

10. The clearance of theophylline in this patient is about

    A. 10 L/hr.
    B. 8 L/hr.
    C. 6 L/hr.
    D. 3 L/hr.
    E. 1.5 L/hr.

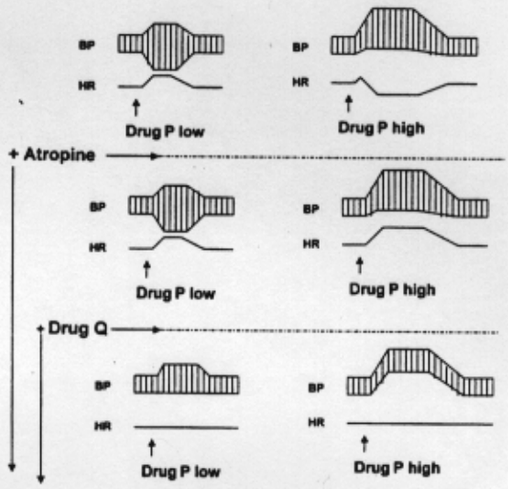
11. If the tablet is given orally every 6 hrs, the time required to reach steady state drug concentration is about

    A. 6 hours.
    B. 16 hours.
    C. 20 hours.
    D. 24 hours.
    E. 40 hours.

* *

* *

12. A novel pharmacological agent, drug P, is being tested on an anesthetized dog preparation in which selected cardiovascular functions are being monitored. The following records are obtained:



Which of the following describes the **MOST LIKELY** mechanism of actions of drugs P and Q?

	Drug P	Drug Q
A.	agonist at muscarinic receptors	antagonist at nicotinic receptors
B.	agonist at alpha-receptors	antagonist at alpha-receptors no action at beta-receptors
C.	agonist at beta-receptors	antagonist at alpha-receptors no action at beta-receptors
D.	agonist at alpha- & beta-receptors	antagonist at alpha-receptors
E.	agonist at alpha- & beta-receptors	non-selective antagonist at beta-receptors

* *

13. Which of the following is a Phase II reaction?

A. hydroxylation
B. S-oxidation
C. epoxidation
D. deamination
E. glucoronidation

14. 6 Mercaptopurine (6-MP) is a drug used to treat pediatric leukemia. Genetic alteration of what drug-metabolizing enzyme can necessitate a significant dose reduction in 6-MP?

D

A. glutathione transferase
B. CYP3A4
C. CYP2D16
D. thiopurine methyltransferase
E. phosphoribosyltransferase

6MP

15. Toxic exposure to which of the following metals is best treated by alkalinization of the urine and increasing urine output without using specific chelation therapy?

D

A. elemental mercury
B. iron
C. lead
D. uranium
E. organic mercury

16. Cyanide toxicity is caused by

A

A. binding and inhibition of mitochondrial cytochrome oxidase.
B. binding and inhibition of cytochrome P450 oxidase.
C. competition with oxygen for hemoglobin binding.
D. binding and inhibition to sulfhydryl groups in heme synthesis enzymes.
E. binding and inhibition of rhodanase.

17. Identify the **INCORRECT** toxin-antidote combination:

C

A. cyanide - thiosulfate
B. carbon monoxide - oxygen
C. lead - deferoxamine
D. bromide - chloride
E. methanol - ethanol

18. Which statement concerning procainamide metabolism and its drug-induced adverse effect (lupus erythematosus) is **CORRECT?**

E

A. Fast acetylators accumulate toxic metabolic products at a faster rate than slow acetylators.
B. Fast acetylators generate reactive intermediates that are directly toxic.
C. Slow acetylators have an alternative metabolic pathway not present in fast acetylators.
D. Slow acetylators do not excrete procainamide in the urine.
E. Acetylation independent pathways may lead to drug-induced lupus.

19. Which of the following is **NOT** an important part of the treatment of intoxication by the nerve agents sarin or VX?

A. therapeutic administration of diazepam to control nerve agent induced convulsions
B. rapid administration of atropine at the onset of signs of nerve agent intoxication
C. application of artificial respiration at the onset of respiratory arrest
D. therapeutic administration of pyridostigmine after the onset of signs of nerve agent intoxication
E. therapeutic administration of the oxime, 2-PAM-Cl, at the onset of signs of nerve agent intoxication

D

20. Which one of the following statements is **TRUE** about atropine?

A. It is known to combine directly with the nerve agents (sarin, soman, VX, GA) to inactivate the agent and inhibit further intoxication by these agents.
B. It binds to acetylcholinesterase to prevent the inhibition of this enzyme by the nerve agents.
C. It is administered to reverse the muscarinic signs of nerve agent (sarin) intoxication.
D. It binds to acetylcholinesterase to prevent "ageing" of the nerve agent (sarin) inhibited enzyme.
E. It is similar to 2-PAM-Cl in its ability to reactivate nerve agent (sarin) inhibited acetylcholinesterase before "ageing" has occurred.

C

21. Which patient would have a faster induction of anesthesia with the indicated inhalational anesthetic agent:

Patient	Resp Rate (min^{-1})	Tidal Volume (ml)	Cardiac Output (L/min)	Anesthetic Agent
A.	10	600	5	halothane
B.	20	300	3	halothane
C.	10	600	5	sevoflurane
D.	20	300	3	sevoflurane

D

↑ Induc
→ ↓ CO/P
→ ↑ TV ↓/Pul vent
→ ↑ I2R / inspired
↓ MAC / sol

22. You are called to provide anesthesia for a patient with increased intracranial pressure and impending brain herniation. Which anesthetic medication will decrease this patient's intracranial pressure?

A. ketamine
B. halothane
C. thiopental
D. morphine

C

23. All of the following are true of barbiturates **EXCEPT**

A. they decrease cerebral metabolic rate.
B. they cause significant respiratory depression.
C. their short half-life is due to rapid metabolism.
D. they affect $GABA_A$ receptors.

24. Which of the following statements concerning intravenous opioid administration is **TRUE?**

A. Minute ventilation decreases by means of decreased tidal volume.
B. Amnesia is reliably produced.
C. Opioids exert their effect by binding to Mu opioid and GABA receptors.
D. Opioids cause minimal cardiovascular depression in normovolemic patients

25. Which of the following is **TRUE** concerning minimum alveolar concentration (MAC)?

A. MAC is the concentration of an anesthetic that results in the immobility of 50% of patients at surgical incision.
B. All anesthetic agents at 2MAC will have the same effect on the cardiovascular system.
C. MAC is the concentration that results in the immobility of 95% of patients at surgical incision.
D. MAC values are synergistic not additive.

26. Which of the statements about neurotransmission in postganglionic sympathetic nerves is **TRUE?**

A. Acetylcholine activates the postganglionic neurons through nicotinic receptors of the N_M subtype.
B. Cocaine prolongs the presence of norepinephrine in the synaptic space because it inhibits the catecholamine metabolizing enzyme, monoamine oxidase.
C. The transport of dopamine and norepinephrine into the neuronal vesicle is blocked by succinylcholine.
D. The transporter located in the neuronal plasma membrane of sympathetic nerve terminals is selective for norepinephrine and does not transport other agents.
E. Activation of presynaptic α_2 adrenergic receptors decreases the amount of norepinephrine released with subsequent nerve impulses.

27. Sympathomimetic amines may have each of the following effects **EXCEPT**

A. reduction of nasal congestion in acute rhinitis.
B. deleterious effect on urinary outflow in benign prostatic hyperplasia.
C. production of miosis and cycloplegia.
D. bronchiolar dilation.
E. activation of reflex vagal bradycardia.

28. Which of the following agents is a selective D_1 dopamine receptor agonist that can be used to reduce severely elevated blood pressure and can improve renal blood flow in spite of the decreasing arterial pressure?

A. dobutamine
B. fenoldopam
C. metoprolol
D. prazosin
E. dopamine

29. Which of the following agents contracts smooth muscle by binding to adrenergic receptors and increasing intracellular inositol-1,4,5-trisphosphate (IP3)?

A. albuterol
B. amphetamine
C. halothane
D. carbachol
E. norepinephrine

30. Each of the following drugs is paired with a likely therapeutic use **EXCEPT**

A. albuterol : hypotension
B. prazosin : benign prostatic hyperplasia
C. phentolamine : erectile dysfunction
D. dobutamine : acute heart failure
E. propranolol : open-angle glaucoma

31. In contrast to the actions of a non-selective α adrenergic receptor antagonist, a selective α_1 receptor antagonist causes

A. no adverse side effect of orthostatic hypotension.
B. an increase in renal vascular resistance.
C. bronchospasm.
D. less pre-synaptic enhancement of norepinephrine release.
E. bradycardia.

32. A 52 year-old sedentary woman receives effective oral drug treatment of her hypertension. She returns to her physician with complaints of weakness. She reports no postural hypotension. Physical examination reveals a slow resting heart rate (50 bpm) and evidence of slow conduction through the A-V node. Which of the following is **MOST LIKELY** to be the antihypertensive agent involved?

A propranolol
B phentolamine
C isoproterenol
D atropine
E. prazosin

FIVE CHOICE COMPLETION

Directions: Select the **SINGLE** best choice

33. Administration of atenolol can decrease mean arterial blood pressure because it

A. has intrinsic sympathomimetic activity.
B. activates β_2 receptors in smooth muscle vasculature.
C. increases plasma renin and angiotensin II.
D. decreases myocardial contractile force and heart rate.
E. stimulates adenyl cyclase and cAMP formation.

D

34. A patient arriving in your emergency room requires injection of a local anesthetic. In which case would you choose procaine over lidocaine?

A. The patient abused cocaine several years ago.
B. The patient is undergoing a course of therapy with a sulfonamide antibiotic.
C. The patient has a history of hypersensitivity (allergic dermatitis) to ester-type local anesthetics.
D. The patient has a recent history of liver dysfunction.
E. You wish to avoid increasing the patient's heart rate and blood pressure.

D

35. The major effect of local anesthetics is to

A. increase action potential conduction rate in myocardium.
B. prevent the increase in sodium permeability of the neuronal membrane during action potentials.
C. depolarize axons (make the resting membrane potential less negative).
D. block the sodium pump (Na/K ATPase) in all excitable tissue.
E. increase resting permeability of the neuronal membrane to potassium.

B

36. Which of the following sets of actions **BEST** describes the dose-related nature of the actions of atropine?

	Effect with low dose atropine	Additional effect seen ONLY with high dose atropine
A	decreased salivation	central nervous system (CNS) excitation
B	mydriasis and cycloplegia	tachycardia
C	decreased gastrointestinal secretions	decreased sweating
D	CNS medullary depression	decreased bladder smooth muscle contraction
E	increased gastrointestinal secretions	decreased gastrointestinal motility

A

37. Following major surgery, you administer bethanechol to the patient to prevent urinary retention. The **MOST LIKELY** side effect of this drug is

A. supersensitivity to light due to pupillary dilation.
B. dry mouth.
C. dyspnea due to bronchoconstriction.
D. constipation.
E. increased blood pressure due to increased arteriolar tone.

C

38. The cholinesterase reactivator pralidoxime (2-PAM)

A. is less effective than hydroxylamine.
B. is much more effective than atropine if administered in high dose.
C. must be administered before exposure to a carbamate anticholinesterase.
D. is used to treat narrow angle glaucoma.
E. is not very useful when administered to a soldier brought to a hospital after soman intoxication.

39. The insecticide parathion is

A. metabolized to the active metabolite paraoxon in the liver.
B. extremely safe, and causes almost no cases of poisoning.
C. a carbamate anticholinesterase.
D. rapidly metabolized to an inactive metabolite by the liver.
E. too highly charged to enter the body through the skin.

40. Succinylcholine should be chosen over tubocurarine in a patient undergoing surgery, if the

A. patient has a history of malignant hyperthermia.
B. nurse anesthetist wishes to avoid central nervous system (CNS) effects of the neuromuscular blocking agent.
C. patient has low levels of normal plasma cholinesterase.
D. nurse anesthetist wishes to avoid phase II block of neuromuscular transmission.
E. surgery is not expected to last more than a few minutes.