1: Of the many types of adrenergic receptors found throughout the body, which is most likely responsible for the cardiac stimulation that is observed following an intravenous injection of epinephrine?

A) a1-adrenergic receptors B) a2-adrenergic receptors

C) β1-adrenergic receptors D) β2-adrenergic receptors E) β3-adrenergic receptors

2: Which of the following is correct regarding the autonomic nervous system (ANS)?

A) Afferent neurons carry signals from the CNS to the effector organs.

B) The neurotransmitter at the parasympathetic ganglion is norepinephrine (NE).

C) The neurotransmitter at the sympathetic ganglion is acetylcholine (ACh).

D) Sympathetic neurons release ACh in the effector organs.

E) Parasympathetic neurons release NE in the effector organs.

3: The enzyme that is inhibited by Echothiophate iodide is …..

A) Tyrosine hydroxylase

B) Acetylcholinesterase (ACHE)

C) Catechol-O-methyltransferase (COMT)

D) Monoamine oxidase (MAO)

E) Carbonic anhydrase

4: Which of the following is correct regarding somatic motor neurons?

A) The neurotransmitter at the somatic motor neuron ganglion is acetylcholine.

B) The neurotransmitter at the somatic motor neuron ganglion is norepinephrine.

C) Somatic motor neurons innervate smooth muscles.

D) Somatic motor neurons do not have ganglia.

E) Responses in the somatic motor neurons are generally slower than in the autonomic nervous system.

5: Which of the following is correct regarding neurotransmitters and neurotransmission?

A) Neurotransmitters are released from the presynaptic nerve terminals.

B) Neurotransmitter release is triggered by the arrival of action potentials in the postsynaptic cell

C) Intracelluar calcium levels drop in the neuron before the neurotransmitter is released.

D) Serotonin and dopamine are the primary neurotransmitters in the ANS.

6: All of the following statements regarding central control of autonomic functions are correct except:

A) Baroreceptors are pressure sensors located at various cardiovascular sites.

B) The parasympathetic system is activated by the CNS in response to a sudden drop in blood pressure.

C) The parasympathetic system is activated by the CNS in response to a sudden increase in blood pressure.

D) The sympathetic system is activated by the CNS in response to a sudden drop in blood pressure.

7: 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) Reduced heart rate.

8: If an ophthalmologist wants to dilate the pupils for an eye examination, which of the following drugs/classes of drugs could be theoretically useful?

A) Muscarinic receptor activator (agonist). B) Muscarinic receptor inhibitor (antagonist).

C) Acetylcholine. D) Pilocarpine.

9: Applied to the skin in a transdermal patch (transdermal therapeutic delivery system), this drug is used to prevent or reduce the occurrence of nausea and vomiting that are associated with motion sickness.

A) Diphenhydramine B) Chlorpromazine

C) Ondansetron D) Dimenhydrinate

E) Scopolamine

10: In Alzheimer's disease, there is a deficiency of cholinergic neuronal function in the brain Theoretically, which of the following strategies will be useful in treating the symptoms of Alzheimer's disease?

A) Inhibiting cholinergie 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.

11: An elderly female who lives in a farm house was brought to the emergency room in serious condition after ingesting a liquid from an unlabeled bottle found near her bed, apparently in a suicide attempt. She presented with diarrhea, frequent urination, convulsions, breathing difficulties, constricted pupils (miosis), and excessive salivation. Which of the following is correct regarding this patient?

A) She most likely consumed an organophosphate pesticide.

B) The symptoms are consistent with sympathetic activation.

C) Her symptoms can be treated using an anticholinesterase agent.

D) Her symptoms can be treated using a cholinergic agonist.

12: Pralidoxime chloride is a drug that …

A) Reduces the vesicular stores of catecholamines in adrenergic and dopaminergic neurons.

B) Blocks the active transport of choline into cholinergic neurons.

C) Reactivates cholinesterase that have been inhibited by organophosphate cholinesterase inhibitors.

D) Stimulates the activity of phospholipase C with increased formation of inositol triphosphate.

E) Inhibits the reuptake of biogenic amines into nerve terminals.

13: Atropa belladonna is a plant that contains atropine (a muscarinic antagonist). Which of the following drugs or classes of drugs will be useful in treating poisoning with belladonna?

A) Malathion B) Physostigmine

C) Muscarinic antagonists D) Nicotinic antagonists

14: We administer therapeutic dose of a drug that selectively and competitively blocks the postsynaptie α-adrenergic (α1) receptors. It has no effects on presynaptic α -adrenergic receptors (α2) or β-adrenergie receptors found anywhere in the periphery, whether as an agonist or antagonist.

What is the most likely drug?

A) Clonidine B) Phentolamine

C) Phenoxybenzamine D) Phenylephrine E) Prazosin

15: Ritodrine hydrochloride is used in the management of

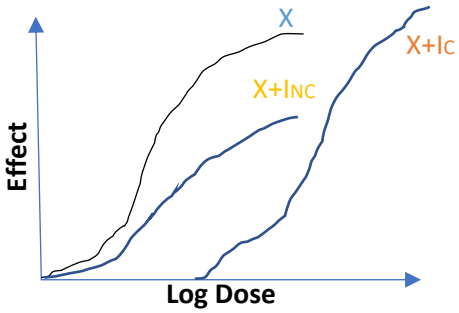
A) Parkinson's disease B) Bronchial asthma C) Depression D) Hypertension E) Premature labor

16: The non-selective B-adrenergic blocking agent that is also a competitive antagonist at aj-adrenoceptors is

A) Timolol B) Nadolol

C) Pindolol D) Acebutolol E) Labetalol

17: The contractile effect of various doses of norepinephrine (NE) (X) alone on vascular smooth muscle is represented in the figure.



When combined with an antagonist (Ic or Inc), a shift in the dose response curve occurs. The curve labeled X+ Inc would most likely occur when vascular smooth muscle is treated with NE in the presence

A) Terazosin B) Phentolamine

C) Labetalol D) Phenoxybenzamine E) Prazosin

18: The reversible cholinesterase inhibitor indicated in the treatment of Alzheimer's disease is …

A) Tacrine B) Edrophonium C) Neostigmine E) Ambenonium D) Pyridostigmine

19: The skeletal muscles that are most sensitive to the action of tubocurarine are the …

A) Muscles of the trunk B) Muscles of the arms and legs

C) Respiratory muscles D) Muscles of the head, neck, and face

20: The skeletal muscle relaxant that acts directly on the contractile mechanism of the muscle fibers is

A) Gallamine B) Baclofen C) Pancuronium D) Cyclobenzaprine E) Dantrolene

21: A predictably dangerous side effect of Nadolol that constitutes a contraindication to its clinical use in susceptible patients is the induction of ….

A) Hypertension B) Cardiac arrhythmia C) Asthmatic attacks

D) Respiratory depression E) Hypersensitivity

22: All of the following drugs are used topieally in the treatment of chronic open-angle glaucoma. Which of these agents reduces intraocular pressure by decreasing the formation of the aqueous humour?

A) Timolol B) Echothiophate C) Pilocarpine D) Isofluorphate E) Physostigmine

23: Which of the following anti-muscarinic drugs is used by inhalation in the treatment of bronchial asthma?

A) Dicyclomine hydrochloride B) Cyclopentolate hydrochloride C) Ipratropium bromide

D) Methscopolamine bromide E) Trihexyphenidyl hydrochloride

24: Which of the following B2-adrenoceptor agonist drugs is used once daily in the treatment of bronchial asthma?

A) Formoterol B) Clenbuterol C) Pirbuterol D) Indacaterol E) Salbutamol

25: The cholinesterase inhibitor that is used in the diagnosis of myasthenia gravis is ….

A) Edrophonium chloride B) Ambenonium chloride C) Malathion

D) Physostigmine salicylate E) Pyridostigmine bromide

26: Which of the following is correct regarding the neuromuscular blockers (NMBS)?

A) Non-depolarizing NMBS are administered orally.

B) Cholinesterase inhibitors reduce the effects of non-depolarizing NMBS.

C) Non-depolarizing NMBS affect diaphragm muscles first.

D) Effects of depolarizing neuromuscular blockers can be reversed using cholinesterase inhibitors.

27: The drug of choice for the treatment of anaphylactic shock is ….

A) Epinephrine B) Norepinephrine C) Isoproterenol D) Diphenhydramine E) Atropine

28: Which of the following is correct regarding drug interactions with non-depolarizing neuromuscular blockers (NMBS)?

A) Desflurane reduces the effects of non-depolarizing NMBS.

B) Cholinesterase inhibitors increase the effects of non-depolarizing NMBS.

C) Aminoglycosides increase the effects of non-depolarizing NMBS.

D) Calcium channel blockers reduce the effects of non-depolarizing NMBS.

29: A 35-year-old male with a pheochromocytoma is treated with labetalol. Select the mechanism of action of labetalol.

A) α-adrenergic agonist B) a-adrenergic antagonist C) B-adrenergic agonist

D) β-adrenergic antagonist E) Mixed α and β agonist F) Mixed α and β antagonist

30: 16-year-old male treated for bronchial asthma develops skeletal muscle tremors. Which of the following agents may be responsible for this finding?

A) Ipratropium B) Zileuton C) Beclomethasone D) Cromolyn E) Salmeterol

31: Which of the following agents should a patient take for a stuffy, runny nose?

A) Oxymetazoline B) Albuterol C) Clonidine D) Terbutaline E) Metoprolol

32: Which of the following beta-blocker drugs most widely used in prevention of bleeding veins in people with portal hypertension caused by cirrhosis?

A) Nadolol B) Bisoprolol C) Acebutolol D) Labetalol

33: A 10-year-old male displays hyperactivity and is unable to focus on his schoolwork because of an inability to focus on the activity. Which of the following might prove effective in this patient?

A) Methylphenidate B) Terbutaline C) Dobutamine D) Pancuronium E) Prazosin F) Scopolamine

34: Which of the following phosphodiesterase type-5 inhibitors act rapidly (faster onset of action):

A) Tadalafil B) Sildenafil C) Avanafil D) Vardenafil

35: Which of the following agents might mask the hypoglycemia in treated diabetics?

A) An a-adrenergic agonist B) An a-adrenergic antagonist C) A B-adrenergic agonist
D) A B-adrenergic antagonist E) A cholinergic agonist F) A cholinergic antagonist

36: A 60-year-old male with congestive heart failure (CHF) is treated with dobutamine. Select the mechanism of action of dobutamine.

A) a-adrenergic agonist B) a-adrenergic antagonist C) B-adrenergic agonist

D) B-adrenergic antagonist E) Mixed a and B antagonist

37: Short acting amino-steroid used as non-depolarizing neuromuscular blocker is …..

A) Atracurium B) Gallamine C) Rocuronium D) Rapacuronium

38: For each patient, which drug was given?

A) Diazepam **B) Doxazosin** **C) Scopolamine** **D) Cyclobenzaprine**

E) Propantheline **F) Atracurium.** **G) Atenolol** **H) Timolol**

I) Baclofen **J) Phentolamine**

I: A 65-year-old male complains of losing his vision. Retinal examination reveals optic nerve cupping. Peripheral vision loss is observed on visual field tests, and his intraocular pressure increased. Following treatment with a drug, he has improved visual acuity and decreased intraocular pressure.

A	B	C	D	E	F	G	H	I	J

II. A 30-year-old female is being prepared for anesthesia before exploratory surgery for a mass in her neck. In addition to using an inhalation anesthetic, a drug is given that causes complete paralysis of the skeletal muscles.

A	B	C	D	E	F	G	H	I	J

39: Match the descriptions of use (or mechanism) with the appropriate drug.

A) Pilocarpine	**1: Used in pheochromocytoma**
B) Methylphenidate	**2: Used in glaucoma**
C) Propranolol	**3: Used in Thyrotoxicosis**
D) Ritodrine	**4: Used in ADHD**
E) Labetalol	**5: Used in premature labor**
F) Lofexidine	**6: Used to relief of interstitial cystitis**
G) Mirabegron	**7: Used in open-angle glaucoma**
H) Flavoxate	**8: Used in withdrawal symptoms of heroin dependency**
I) Modafinil	**9: Is a β3-agonist used in overactive bladder (OAB)**
J) Dipivefrin	**10: Is a wakefulness-promoting agent.**
K) Alprostadil	**11: Is a selective a1A receptor antagonist**
L) Silodosin	**12: Used in erectile dysfunction**

40: New drug used to quit smoking by partial stimulation of nicotinic receptor is ..

A) Salmeterol B) Varenicline C) Cevimeline D) Carbachol E) Echothiophate

41: Drug used in treatment of Sjögren's syndrome

A) Salmeterol B) Varenicline C) Cevimeline D) Carbachol E) Echothiophate

42: A 75-year-old man who was a smoker is diagnosed with chronic obstructive pulmonary disease and suffers from occasional bronchospasm. Which of the following would be effective in treating him?

A) Ipratropium aerosol B) Scopolamine patches C) Mecamylamine D) Oxygen

43: The prolonged apnea sometimes seen in patients who have undergone an operation in which succinylcholine was employed as a muscle relaxant has been shown to be due to:

A) Urinary atony. B) Depressed levels of plasma cholinesterase.

C) A mutation in acetylcholinesterase. D) A mutation in the nicotinic receptor at the NMJ.

44: A 50-year-old male farm worker is brought to the emergency room. He was found confused in the orchard and since then has lost consciousness. His heart rate is 45, and his blood pressure is 80/40 mm Hg. He is sweating and salivating profusely. Which of the following treatments is indicated?

A) Physostigmine. B) Norepinephrine. C) Trimethaphan. D) Atropine E) Edrophonium.

45: Drug used in BPH and selective antagonist on α_{1A} receptor on the smooth muscle of prostate

A) Alfuzosin B) Doxazosin C) Terazosin D) Tamsulosin E) Finasteride

46: Beta-blocker agent may be effective in asthmatic patient and may even promote bronchodilation:

A) Metoprolol B) Celiprolol C) Nebivolol D) Atenolol

47: Which of the following phosphodiesterase type-5 inhibitors has longer duration of action:

A) Tadalafil B) Vardenafil C) Sildenafil

48: One of your patients who is hypertensive and gets mild asthma attacks occasionally bought an herbal remedy online to help with his asthma. He is not on any asthma medications curremtly but is receiving a Bi-selective blocker for his hypertension. The herbal remedy seems to relieve his asthma attacks, but his blood pressure seems to increase despite the B- blocker therapy. Which of the following drugs is most likely present in the herbal remedy he is taking?

A) Phenylephrine B) Ephedrine C) Norepinephrine D) Dobutamine E) Salmeterol

49: Which of the following is correct regarding B-blockers?

A) Treatment with B-blockers should not be stopped abruptly.

B) Propranolol is a cardioselective B-blocker.

C) B-Blockers may cause orthostatic hypotension.

D) Cardioselective B-blockers worsen asthma.

Answers and Explanations

1: The answer is C: β1-adrenergic receptors found in the heart and it responsible for Increase heart rate and force of contraction after endogenous or exogenous agonists binding.
2: The answer is C: The neurotransmitter at the sympathetic and parasympathetic ganglia is acetylcholine. Sympathetic neurons release NE and parasympathetic neurons release ACh in the effector cells.
3: The answer is B : Acetylcholinesterase (ACHE) enzyme inhibited by echothiophate, prevents acetylcholine breakdown
4: The answer is D: Somatic motor neurons supply skeletal muscle and don't relay in ganglia.
5: The answer is A: Neurotransmitters are released from the presynaptic nerve terminals.
6: The answer is B: When there is a sudden drop in blood pressure, the baroreceptors send signals to the brain, and the brain activates the sympathetic System (not the parasympathetic system) to restore blood pressure to normal values.
7: The answer is A: The release of ACh can be blocked by botulinum toxin, cause skeletal muscle paralysis.
8: The answer is B: Muscarinic receptor inhibitor (antagonist) e.g. Atropine, used before eye examination to dilate the pupils.
9: The answer is E: Scopolamine is used in prevention of motion sickness and postoperative nausea and vomiting. It is available as a topical patch (Transderm Scop) that provides effects for up to 3 days.
10: The answer is C: Inhibiting the acetylcholinesterase enzyme in the brain with selective CNS anticholinesterase drugs (e.g. rivastigmine) used in Alzheimer's disease.
11: The answer is A: Signs of organophosphate poisoning (DUMBBELSS) →Diarrhea, Urination, Bradycardia, Miosis, Bronchoconstriction, Emesis, Lacrimation, Salivation and Sweating.
12: The answer is C: Pralidoxime reactivates inhibited ACHE by displaces the phosphate group of the organophosphate and regenerates the enzyme. It is unable to penetrate into the CNS (not useful in treating the CNS side effects).
13: The answer is B: Physostigmine used as antidote for atropine to reverse the central and peripheral side effect of atropine.
14: The answer is E: Prazosin is a selective competitive a1- receptors blocker.
15: The answer is E: Ritodrine is a tocolytic drug, used to stop premature labor.
16: The answer is E: Labetalol is a non-selective B-adrenergic blocker and selective a1-adrenergic blocker.
17: The answer is D: is a non-selective irreversible non- competitive a-adrenoceptor antagonist.
IC= Competitive antagonist, the curve→ Parallel shift to the right.
INC = Non-competitive antagonist, the curve → Non-Parallel shift to the right.
18: The answer is A: Tacrine is anticholinesterase with selective CNS action, Used to delay the progression of Alzheimer's disease (Deficiency of cholinergic neurons in the CNS).
19: The answer is D: Not all muscles are equally sensitive to blockade. Small, rapidly contracting muscles of the face and eye are most susceptible and are paralyzed first, followed by the fingers, limbs, neck, and trunk muscles. Next, the intercostal muscles are affected and, lastly, the diaphragm.
20: The answer is E: Dantrolene (Direct skeletal muscle relaxant) → Prevent release of Ca^{2+} from sarcoplasmic reticulum.
21: The answer is C: Nadolol is a non-selective B-block drugs, blocking B2 receptors in the lungs of susceptible patient's causes contraction of bronchiolar smooth muscle.
22: The answer is A: Timolol is a non-selective B-blockor drugs. Used topically in the treatment of chronic open-angle glaucoma due to it reduces the production of aqueous humour in the eye.
23: The answer is C: Ipratropium is an anti-muscarinic drugs is used by inhalation in the treatment of bronchial asthma.
24: The answer is D: Indacaterol is an ultra-long acting B2 agonist. Used once daily at the same time of day.
25: The answer is A: Edrophonium is a short-acting ACHE inhibitors used in diagnosis of myasthenia gravis (IV injection of Edrophonium → rapid increase in muscle strength).
26: The answer is B: Cholinesterase inhibitors: such as Neostigmine and Physostigmine can overcome (reduce) the action of non-depolarizing neuromuscular blocker. If the neuromuscular blocker has block the ion channel, cholinesterase inhibitors are not as effective in overcoming blockade.
27: The answer is A: Epinephrine is the drug of choice for the treatment of type-I hypersensitivity reactions (including anaphylaxis) in response to allergens (increase release of histamine). Epinephrine is a physiological antagonism of histamine

28: The answer is C: Aminoglycoside antibiotics inhibits ACh release by competing with calcium ions →Synergistic effect with non-depolarizing NMBS.
29: The answer is F: Labetalol is a non-selective B-adrenergic blocker and selective a-adrenergic blocker (Mixed blocker).
30: The answer is E : Salmeterol is a long acting B-agonist used in asthma in combination with inhaled corticosteroids (such as fluticasone and budesonide) and chronic obstructive pulmonary disease (COPD).
31: The answer is A: Oxymetazoline, is a vasoconstrictor decongestant act by direct adrenergic a-receptor agonist constricting swollen blood vessels in the eye or nose reduces eye redness (relieve irritation) and nose congestion.
32: The answer is A: Nadolol (non-selective) widely used esophageal varices to prevent (prophylaxis) bleeding in people with portal hypertension caused by cirrhosis (decrease both cardiac output by B1-blockade and splanchnic blood flow by blocking vasodilating B2-receptors at splanchnic vasculature.
33: The answer is A: Methylphenidate is an amphetamine derivatives with less side effects. Most prescribed medications in ADHD.
34: The answer is C: Avanafil is a selective phosphodiesterase type-5 (PDE5) inhibitor, with rapid onset of action (15 minutes).
35: The answer is D: B-adrenergic antagonist, especially non- selective B-blockers, block B2-receptors in the liver Glycogenolysis, block B- receptors in the pancreas Glucagon. Glucagon hormone used to combat hypoglycemia effects, so; non-selective B-blockers used with caution in insulin-dependent diabetic patients.
36: The answer is C: Dobutamine is a selective B1-agonists.
37: The answer is D: Rapacuronium is a short acting amino- steroid compounds and used in short surgical operation
38: The answer is H-F: Timolol is a non-selective B- blocker drugs. Used topically in the treatment of chronic open-angle glaucoma due to it reduces the production of aqueous humour in the eye.
Atracurium is a non-depolarizing NMB (Competitive) used during surgery to facilitate tracheal intubation and provide complete muscle relaxation at lower anesthetic doses.
39: The answer is A-2 *B-4 * C-3* D-5* E-1* F-8 * G-9 * H-6* I-10* J-7* K-12* L-11.
40: The answer is B: Varenicline is an oral drug used to quit smoking (treat nicotine addiction). Act as a partial agonist in the nicotinic receptors (especially CNS receptors) Stimulates the receptors without producing a full effect like nicotine.
41: The answer is C: Cevimeline is a muscarinic agonist drug used in dry eye and dry mouth (xerostomia) associated with Sjögren's syndrome. Sjögren's syndrome is an autoimmune disease in which immune cells attack and destroy the exocrine glands that produce tears and saliva.
42: The answer is A: Ipratropium is an anti-muscarinic drugs is used by inhalation in the treatment of bronchial asthma.
43: The answer is C: Administration of Succinylcholine to a patient who is deficient in plasma cholinesterase (mutation in acetylcholinesterase) or who has an atypical form of the enzyme can lead to prolonged apnea.
44: The answer is D: Atropine is used for the treatment of organophosphate (insecticides) poisoning, it cause temporarily increase heart rate and block salivary secretion and decrease secretion in the trachea.
45: The answer is D: Tamsulosin is a selective α_{1A} receptor blocker most prescribed in symptoms of benign prostatic hyperplasia (BPH).
46: The answer is B: Celiprolol is a B1-selective blocker with modest capacity to activate B2-receptors.It may even promote bronchodilatation.
47: The answer is A: Tadalafil is a selective phosphodiesterase type-5 inhibitor with longer duration of action (36 hours).
48: The answer is B: Ephedrine is a natural alkaloid found in various plants act by direct and indirect mechanism of action, it increase systolic and diastolic blood pressures by VC (a1), cardiac stimulation (B1) & bronchodilation effect.
49: The answer is A: B-blockers must be tapered off gradually. Long-term treatment with a B-blocker→ up-regulation of the B-receptors. Sudden stop of B-blocker therapy → increased receptors sensitivity and can worsen angina or hypertension.