YR 2 PHARMACOLOGY UNIT EXAMINATION 2 -- April 06, 1998.

CHOOSE THE SINGLE BEST ANSWER FOR QUESTIONS 1 - 44.

1. Properties of **local anesthetics** include **all** of the following **EXCEPT**:

   A. Blockade of voltage-dependent sodium channels

   B. Preferential binding to resting channels

   C. Slowing of axonal impulse conduction

   D. An increase in membrane refractory period

   E. Amphiphilic molecules with a hydrophobic aromatic group

2. The pKa of lidocaine is 7.9. In infected tissue at pH 6.9, the fraction in the ionized form will be:

   A. 1%

   B. 10%

   C. 80%

   D. 90%

   E. 95%

3. All of the following factors affect either the onset or duration of nerve blockade by procaine **EXCEPT**:

   A. The density of potassium channels in the membrane

   B. Blood flow to the injection site

   C. Content of myelin around neurons

   D. Inclusion of epinephrine

   E. pH surrounding the nerve

4. With which of the following anesthetic agents is the use of **epinephrine** contraindicated?

   A. Nitrous oxide

   B. Thiopental

   C. Halothane

   D. Ketamine

   E. Methoxyfluorane

5. Of the following drugs, which is used only sparingly and for short durations because of the high incidence of nephrotoxicity?

   A. Thiopental

   B. Ketamine

   C. Nitrous oxide

   D. Halothane

   E. Methoxyflurane

6. All of the following statements about the onset of general anesthesia using inhalational agents are accurate **EXCEPT**:

   A Onset of anesthesia is very rapid with agents that have a high blood:gas solubility.

   B. Onset of anesthesia is accelerated by increasing the inspired anesthetic gas concentration.

   C. Changes in pulmonary blood flow have minimal effects on the rate of onset for nitrous oxide.

   D. Decreasing ventilation rate will slow onset.

   E. Equilibrium between arterial and venous gas tension is achieved very slowly with methoxyflurane.

7. Heart rate, arterial blood pressure, and cardiac output are all increased following administration of this anesthetic agent:

   A. Thiopental

   B. Methoxyflurane

   C. Ketamine

   D. Propofol

   E. Fentanyl

8. All of the following are **TRUE** of the **neuroleptics <u>EXCEPT</u>**:

   A. Retinitis pigmentosa is an irreversible side effect of thioridazine typically not seen at doses less than 800mg/day.

   B. In addition to being effective in treating schizophrenia, neuroleptics such as haloperidol are quite effective in the treatment of Tourette's syndrome.

   C. In the acutely psychotic and agitated state, benzodiazepines such as lorazepam can be used to reduce the total dose of neuroleptic uses, thereby helping to reduce side effects.

   D. High potency neuroleptics such as haloperidol pose the smallest risk for neuroleptic malignant syndrome.

   E. Typical neuroleptics are less effective in the treatment of negative symptoms of schizophrenia

9. All of the following are **true** about the atypical neuroleptic, **clozapine**, **EXCEPT**:

   A. Can cause a fatal agranulocytosis necessitating weekly monitoring of blood counts

   B. Should be avoided in patients with a history of epilepsy

   C. Drooling is a common side effect often indicative of toxicity

   D. Is very effective in the treatment of negative symptoms of schizophrenia

   E. Is comparably effective to typical neuroleptics such as haloperidol so is now considered a first-line drug of choice, particularly in schizophrenic patients with negative symptoms

10. The antihypertensive effect of **hydrochlorothiazide** is due to:

   A. Decreased excitability of arterial smooth muscle.

   B. Weak alpha1 adrenergic blockade.

   C. Increased synthesis of NO.

   D. An effect on the central nervous system.

   E. Both A and C.

11. Which of the following drugs can be used to reduce cardiac work in the treatment of classic angina pectoris.

   A. Labetalol

   B. Nitroglycerin

   C. Propranolol

   D. A and C

   E. A, B and C

12. The antihypertensive activity of **losartan** is due to:

A. Adrenergic blockade

B. AT_1 receptor blockade

C. Sodium depletion

D. Inhibition of angiotensin converting enzyme

E. None of the above

13. A 79 year-old woman who is being treated for diabetes mellitus with an oral hypoglycemic is presented. The woman has dyspnea, complains of being exhausted after moderate exercise and has swollen ankles. After being given an echocardiogram, digoxin is prescribed. Which of the following diuretics or drug combinations would be most appropriate for this patient?

A. Hydrochlorothiazide and a potassium supplement

B. Mannitol

C. Furosemide and a potassium supplement

D. Amiloride

E. Spironolactone

14. Which of the following drugs or drug combinations would be best choice for treatment of Liddle
has a history of breast cancer in her family?

A. Amiloride

B. Amiloride and a potassium supplement

C. Spironolactone

D. Spironolactone and a potassium supplement

E. None of the above

15. Concerning hypotheses for the pathophysiologic basic of **schizophrenia**, all of the following statements are **accurate** **EXCEPT**:

A. Positron emission tomography has shown increased dopamine receptors in the brains of both untreated and drug-treated schizophrenics.

B. In a patient with parkinsonism, psychotic effects may occur during treatment with dopamine receptor agonists.

C. The clinical potency of many antipsychotic drugs correlates well with their alpha adrenoceptor-blocking actions.

D. All effective antipsychotic drugs have high affinity for D2 receptors.

E. Drug treatment of schizophrenics sometimes results in changes in the cerebrospinal fluid levels of the dopamine metabolite, homovanillic acid.

16. Clinical uses of **antipsychotic** drugs include all of the following **EXCEPT**:

A. Management of psychosis caused by phencyclidine intoxication.

B. Treatment of schizoaffective disorders.

C. Management of Tourette syndrome.

D. Treatment of the amenorrhea-galactorrhea syndrome.

E. Acute management of the manic phase of bipolar disorder.

17. Akinesia, rigidity, and tremor occur more frequently during treatment with haloperidol than with thioridazine. The most likely explanation is that:

A. Haloperidol has a low affinity for D2 receptors.

B. Thioridazine has greater alpha adrenoceptor-blocking actions.

C. Haloperidol activates GABAergic neurons in the striatum.

D. Thioridazine has greater blocking actions on brain muscarinic receptors.

E. Haloperidol acts presynaptically to block dopamine release.

18. A 30-year-old male patient is on drug therapy for a psychiatric problem. He complains that he feels "flat" and that he gets confused at times. He has been gaining weight and has lost his sex drive. As he moves his hands you notice a slight tremor. He tells you that since he has been on medication he is always thirsty and frequently has to urinate. The drug he is most likely to be taking is:

    A. Fluphenazine hydrochloride.

    B. Clozapine.

    C. Thioridazine hydrochloride.

    D. Lithium carbonate

    E. Clonazepam.

19. Concerning the proposed mechanisms of action of **antidepressant** drugs, all of the following statements are **accurate** **EXCEPT**:

    A. The acute effect of most tricyclic drugs is to block the neuronal reuptake of norepinephrine and serotonin in the CNS.

    B. Endogenous depression has been postulated to result from decreased functional activity at certain central noradrenergic or serotonergic synapses.

    C. Chronic treatment with selective serotonin reuptake inhibitors leads to a down-regulation of adrenoceptors.

    D. MAO inhibitors decrease the metabolism of norepinephrine, serotonin, and dopamine.

    E. Elevation in the cerebrospinal fluid levels of amine metabolites prior to drug therapy occurs in most depressed patients.

20. Effects of the **tricyclic antidepressant** drugs include all of the following **EXCEPT**:

    A. Sympathomimetic actions

    B. Alpha adrenoceptor blockade

    C. Elevation of the seizure threshold

    D. Sedation

    E. Muscarinic receptor-blocking action

21. Regarding the clinical use of antidepressant drugs, all of the following statements are **accurate EXCEPT**:

A. Antidepressant drugs may have to be administered for several weeks before a noticeable improvement in depressive symptoms occurs

B. In selecting an appropriate drug for treatment of depression, the past history of patient response to specific drugs is a valuable guide

C. In the treatment of depressions characterized by psychomotor retardation, poor appetite, and weight loss, amitriptyline is usually more effective than imipramine

D. MAO inhibitors are more likely to be effective in depressions with attendant anxiety, phobic features, and hypochondriasis

E. Fluoxetine may be effective in depression refractory to tricyclic drugs

22. A patient under treatment for a major depressive disorder is brought to the emergency room after ingesting 50 times the normal therapeutic dose of amitriptyline. Signs and symptoms in this patient are likely to include all of the following **EXCEPT:**

A. Pinpoint pupils

B. Hypotension

C. Coma and shock

D. Hot dry skin

E. Acidosis

23. Concerning the clinical uses of sedative-hypnotics, all of the following are recognized indications **EXCEPT**:

A. Diazepam is used for muscle spasticity in patients with cerebral palsy

B. Symptoms of the alcohol withdrawal state may be alleviated by treatment with chlordiazepoxide

C. Alprazolam has selective anxiolytic effects in patients who suffer from panic attacks and phobic disorders

D. Phenobarbital is effective in the long-term management of patients with psychotic disorders

E. Intravenous diazepam is used in status epilepticus

24. Characteristics properties of sedative-hypnotic drugs include all of the following **EXCEPT:**

A. A patient who regularly uses alcoholic beverages is likely to be tolerant to the CNS actions of sedative-hypnotics

B. Administration to a pregnant patient during the immediate predelivery period will result in depression of neonatal vital functions

C. High doses lead to increases in the time spent in REM sleep

D. Sedative-hypnotics may cause respiratory depression in patients with chronic obstructive pulmonary disease

E. Toxic levels depress myocardial contractility and reduce vascular tone

25. Which ONE of the following best describes the mechanism of action of **benzodiazepines**?

A. They act as GABA receptor agonists in the CNS

B. They inhibit GABA transaminase leading to increased levels of GABA

C. They block glutamate receptors in the CNS

D. They facilitate GABA-mediated increases in chloride ion conductance

E. They inhibit brain monoamine oxidase

26. An 82-year-old woman, otherwise healthy for her age, has difficulty sleeping. Triazolam is prescribed for her at one-half of the conventional adult dose. All of the following statements about the use of triazolam in this 82-year-old patient are **accurate <u>EXCEPT</u>**:

    A. The drug may cause ambulatory difficulties in the elderly patient

    B. She may experience rebound insomnia when she stops taking the drug

    C. Additive CNS depressant effects are likely if she takes over-the-counter cold medications

    D. Hypertension is a common problem with triazolam in patients over 75 years of age

    E. She may experience amnesia, especially if she also drinks alcoholic beverages

27. The most likely explanation for the increased sensitivity of elderly patients to single dose of triazolam and other sedative-hypnotic drugs is:

    A. Changes in brain function that accompany the aging process

    B. Decreased renal function

    C. Increased cerebral blood flow

    D. Decreased hepatic metabolism of lipid-soluble drugs

    E. Changes in plasma protein binding

28. Which of the following statements is **incorrect** regarding **morphine** analgesia?

    A. Is obtained without general effects on other senses

    B. Is mediated through supraspinal and spinal sites

    C. Involves an affective (emotional) component

    D. Generally increases with repeated drug administration

    E. Produces remarkable relief in the treatment of pulmonary edema

29. Which of the following is **not** converted to morphine in vivo:

A. Meperidine

B. Codeine

C. Heroin

D. Morphine-6-glucuronide

30. Which of the following is a general principal of **opiate** use?

A. Titrate dose to lowest possible amount to relieve the pain of terminal disease as it reoccurs

B. Side effects of all opiates are close enough so that there is little reason to change agents

C. Underdosing due to concerns of drug dependence can be as big a problem as overuse

D. Opiates should never be combined with nonopiate analgesics

E. Psychotomimetic effects are lessened by the use of mixed agonist-antagonist agents.

31. Which of the following is **CORRECT** regarding cardiac slow response-type action potentials and slow responses ?

A. Found in working atrial and ventricular myocardium

B Enhanced by verapamil

C. Cycle through functional resting, open, and deactivated states

D. Typical of sino-atrial and AV-nodal action potentials

E. Responsible for the ventricular action potential upstroke

32. Which of the following mechanisms is **not** involved in the initiation of reentry?

A. Unidirectional block

B. Recovery of excitability

C. Normal automaticity

D. Anatomical obstacles

E. Fast or slow responses

33. Which of the following is **INCORRECT** regarding recovery of excitability of cardiac "fast responses"?

A. Can be attributed to voltage- and time-dependent kinetics of calcium channels

B. Determines whether a premature beat may propagate

C. Limits the maximal frequency of responses

D. Is faster than recovery of excitability of cardiac "slow responses"

E. Occurs during phase 3 and phase 4 repolarization of the action potential

34. "Reverse rate-dependence" by Class III antiarrhythmic agents:

A. Results in greater prolongation of the cardiac action potential duration at slower heart rates

B. Results in greater block of sodium current at faster heart rates

C. Amplifies the effects of Class II agents including myosinolol at slow heart rates

D. Is approximately equal for all class 1A and class II agents

E. Is evident in the EKG as shortening of the Q-T interval at slow heart rates

35. Class II antiarrhythmic agents have been shown to:

A. Enhance calcium current

B. Directly inhibit Na-K-ATPase and thereby reduce pump current

C. Cause nystagamus

D. Decrease mortality in post myocardial-infarction patients

E. Require conversion to active metabolites via hepatic metabolism

36. Which effects are related to the positive inotropic effects of cardiac glycosides?

A. Sympathomimetic effects on vagal afferents

B. Reduced Na/K ATPase pump function (block of electrogenic Na-K pump)

C. Decreased release of Ca^{++} from sarcoplasmic reticulum with each action potential

D Decreased intracellular sodium activity

E. Increased conduction velocity in the AV node

37. Which of the statements are <u>CORRECT</u>?

A. Digoxin is extensively metabolized by the kidneys

B. Toxic concentrations of digoxin produce a different spectrum of cardiac arrhythmias compared to toxic concentrations of digitoxin

C. Since quinidine enhances the elimination of digoxin, the dosage of digoxin should be increased with co-administration of quinidine

D. Digoxin has a shorter half-life for elimination than digitoxin

E. Digoxin increases sympathetic effects by facilitating norepinephrine release

38. Which factors predispose to **digitalis** toxicity?

A. High plasma Ca^{++}

B. Low plasma K^{+}

C. Heart failure and older age

D. All of the above (A,B, and C)

E. None of the above (A,B,C)

39. All of the following statements regarding the pharmacology of the **oral anticoagulant** agents are **CORRECT <u>EXCEPT</u>**:

A. Their anticoagulant action is immediate and profound.

B. The mechanism of action involves inhibition of the carboxylation of coagulation factors.

C. Because they are lipophilic molecules, their use in pregnant women is contraindicated.

D. They are highly bound to plasma proteins.

E. Induction or inhibition of hepatic Cytochrome P450 can greatly alter the actions of these agents.

40. Which of the following correctly describes the mechanism of action for one of the **thrombolytic** agents?

A. Combines with plasminogen to form an active complex

B. Converts plasmin to plasminogen

C. Provides a template for combination of thrombin and antithrombin III

D. Inhibits platelet cyclooxygenase activity

E. Competitively blocks binding of plasminogen to fibrin

41. Each of the following statements about **erythropoietin** is **TRUE <u>EXCEPT</u>**:

A. Erythropoietin is effective in the treatment of anemia associated with cancer chemotherapy.

B. Adequate body stores of iron are required for a proper response to administration of erythropoietin.

C. Increases the hematocrit within one hour by releasing mature erythrocytes from the spleen.

D. Erythropoietin is the most important regulator of proliferation of committed progenitor cells of the hematopoietic system.

E. Erythropoietin is synthesized in both the kidney and the liver.

42. Anemia or hypoxia can increase renal production of this by up to 100-fold:

A. Ferritin

B. Tetrahydrofolate

C. Transferrin

D. Intrinsic factor

E. Erythropoietin

43. Deficiency of vitamin B-12 is:

A. Relatively common in Western society.

B. Associated with highly abnormal DNA synthesis.

C. Associated with microcytic, hypochromic anemia.

D. Associated primarily with liver damage.

E. Easy to distinguish from folate deficiency.

44. Which of the following items shows a term and description that are CORRECTLY paired?

A. Erythropoietin - Primarily synthesized in the liver.

B. Myeloid growth factors - Side effects are mild and rare.

C. Iron prosthetic group of hemes - Most bioavailable form of iron.

D. Pregnant women - Low requirement for iron.

E. Oral cupric sulfate - Should be taken by most people to prevent copper deficiency.

MATCHING ITEMS

In each of the following groups there are two numbered lists. Mark on the answer sheet in the line corresponding to each question number in the lower list (45-67) the letter of the related item of the upper list.

DIRECTIONS: Match the descriptions (A-E below) which are best related to the agents numbered 45-48.

A. Is converted to NO

B. Is differentially acetylated by fast and slow acetylator phenotypes

C. Causes potassium efflux from arteriolar smooth muscle cells

D. Selectively dilates coronary arteries

E. Decreases digoxin s clearance

45. Minoxidil

46. Hydralazine

47. Nitroprusside

48. Verapamil

DIRECTIONS: Select the option (A-E below) which best fits the descriptions numbered 49-52. Choices may be used more than once.

A. Mannitol

B. Furosemide

C. Spironolactone

D. Acetazolamide

E. Hydrochlorothiazide

49. Contraindicated with angiotensin converting enzyme inhibitors such as captopril.

50. Decreases calcium and magnesium accumulation in the ascending loop of Henle.

51. Inhibits the Na/Cl symporter in the distal convoluted tubule.

52. A receptor antagonist.

DIRECTIONS: Match the agents (A-E below) which are best related to the descriptions numbered 53-57.

A. Codeine, hydrocodone

B. Morphine

C. Pentazocine, nalbuphine

D. Dextromethorphan

E. Fentanyl

53. High first pass metabolism limits oral use

54. Short duration of action makes ideal for anesthetic uses

55. Complex interactions with morphine; psychotomimetic effects

56. Only use as antitussive

57. High oral activity; often used in combination formulations

DIRECTIONS: Match the agents or class of agents (A-E below) which are best related to the descriptions numbered 58-60. CHOICES MAY BE USED MORE THAN ONCE.

A. Metoprolol

B. Furosemide

C. Captopril

D. Amrinone

E. Dobutamine

58. Phosphodiesterase inhibitor that elevates cAMP levels to augment contractility in the short-term management of congestive heart failure

59. Pro-drug commonly employed to treat mild heart failure and prevent ventricular remodelling

60. Agent that acts selectively on cardiac beta1 adrenergic receptors to elevate cAMP levels and increase contractility in cardiogenic shock

DIRECTIONS: Match the agents or class of agents (A-E below) which are best related to the descriptions numbered 61-64. CHOICES MAY BE USED MORE THAN ONCE.

A. Quinidine

B. Lidocaine

C. Ibutilide

D. Bretylium

E. Amiodarone

61. An effective broad-spectrum antiarrhythmic agent whose use must be considered in relation to its extremely slow equilibration (days to weeks), as well as numerous serious side effects and drug interactions

62. Toxic effects typically manifest on central nervous system, not cardiac electrical or contractile properties

63. Useful for the termination of atrial flutter and atrial fibrillation of recent onset

64. Considered a broad-spectrum antiarrhythmic agent which may be proarrhythmic in the presence of hypokalemia

DIRECTIONS: Select the option (A-E below) which best fits the descriptions numbered 65-67. Choices may be used more than once.

A. Gemfibrozil

B. Lovastatin

C. Niacin

D. Cholestyramine

E. Probucol

65. Agent which lowers LDL through inhibition of HMG-CoA reductase and increased expression of LDL receptors

66. Agent which lowers elevated VLDL and produces troublesome cutaneous flushing

67. Agent which lowers LDL through stimulation of bile acid formation and de-repression of LDL receptor gene