Questions #1-40. 2.5 Points Each. Use the separate answer sheet to indicate the LETTER of the most appropriate SINGLE answer to each question. Make sure your NAME is clearly indicated on the answer sheet!

1. All of the following are examples of drugs that can act as agonists at opiate receptors EXCEPT:
   
   A. Meperidine ✓
   B. Fentanyl ✓
   C. Buprenorphine
   D. Naltrexone ✗ antagonist
   E. Codeine

2. Indicate which one of the following statements concerning anesthetic treatment is CORRECT:

   A. Nitrous oxide has a minimum alveolar concentration (MAC) of less than 50% ✓
   B. Ether has a lower blood:gas partition coefficient compared to halothane ✓
   C. Tubocurarine produces skeletal muscle relaxation by desensitizing the neuromuscular nicotinic receptor
   D. Enflurane produces greater cardiac sensitization to catecholamine effects compared to halothane ✓
   E. The lower the blood:gas partition coefficient of a gaseous anesthetic, the more rapid the induction of anesthesia

3. All of the following statements concerning psychoses are correct EXCEPT:

   A. Haloperidol produces less muscarinic receptor blockade compared to chlorpromazine ✓
   B. Haloperidol produces fewer Parkinsonian symptoms compared to risperidone ✓
   C. Olanzapine is more effective in treating type II schizophrenic symptoms compared to haloperidol
   D. One potential side effect of clozapine treatment is a lowering of white blood cell count ✓
   E. Type I schizophrenic symptomatology can be produced as a result of chronic amphetamine usage ✓
4-8. Match the following diuretic drugs with the *single* most appropriate lettered *primary site of action* in the kidney. Each lettered choice may be used once, more than once, or not at all.

4. Furosemide
5. Acetazolamide
6. Triamterene
7. Chlorthalidone
8. Bumetanide

A. Distal tubule
B. Proximal tubule
C. Ascending Loop of Henle
D. Collecting tubule

9. In the *Ames* toxicity test:

A. Bacterial cultures are treated with the test agent to determine if the agent makes the bacteria lose their ability to synthesize histidine  
B. Rats are injected with the test agent to determine if the agent produces tumors
C. Rats are injected with the test agent to determine if the agent induces the production of cytochrome P450 enzymes in the liver  
D. Pregnant rats are administered the test agent at various times during pregnancy to determine if fetal malformations are produced by the test agent
E. Bacterial cultures which depend upon extracellular histidine for growth are treated with the test agent to determine if the agent makes them lose their dependence on extracellular histidine for growth

10. Food and Drug Administration (FDA) *approval for marketing* a drug is most commonly sought after the *completion* of which *Phase* of *drug testing* indicated below?

A. Phase I
B. Phase II
C. Phase III
D. Phase IV
E. Phase V

11. Your patient is suffering from both high blood pressure (160/108 mm Hg) and congestive heart failure. Indicate which of the following you would choose as the most appropriate drug for this patient:

A. Verapamil
B. Enalapril
C. Propranolol  
D. Hydralazine
E. Atenolol
12. A 25-year-old male is seen in the hospital Emergency Department. He is disoriented, but states that he has had nausea, vomiting and abdominal pain since he took “too many pain pills.” Upon examination, his eyes appear yellow. Laboratory tests indicate abnormal liver function (as determined by measurements of serum bilirubin and liver-associated enzymes in the blood). In addition to gastric lavage, what is the appropriate treatment?

A. N-Acetylcysteine  
B. Atropine  
C. Vitamin K  
D. Albumin via parenteral administration  
E. Fluphenazine

13. **Morphine** may be **best characterized** by which of the following statements?

A. It is classified as a mixed agonist-antagonist drug  
B. It has an addiction potential equal to that of codeine  
C. It is a pure opioid **agonist** at mu, kappa and delta opioid receptors  
D. At high doses it **causes death** by respiratory depression  
E. It fails to inhibit withdrawal symptoms in heroin addicts experiencing withdrawal

14. **Hyperkalemia** is a **contraindication** to the use of which of the following drugs?

A. Acetazolamide  
B. Chlorothiazide  
C. Ethacrynic acid  
D. Chlorthalidone  
E. Spironolactone

15. A 70-year-old woman is admitted to the Emergency Room because of a “fainting spell” at home. She appears to have suffered no trauma from her fall, but her blood pressure is 110/60 when lying down and 60/40 when she sits up. Neurologic exam and an ECG are within normal limits when she is lying down. Questioning reveals that she has been on “water pills” (diuretics) for a heart condition. All of the following statements about this case are reasonable **EXCEPT**:

A. The fainting spell could have resulted from postural hypotension caused by an inadvertent overdose with furosemide  
B. The fainting spell could have resulted from a transient arrhythmia caused by furosemide-induced hyperkalemia  
C. The fainting spell could be unrelated to her diuretic therapy  
D. The fainting spell could have resulted from furosemide-induced hyperuricemia  
E. Management should include careful examination of her apparent blood volume
16. *Fluphenazine* has been prescribed for a 20-year-old male patient. His schizophrenic symptoms have improved enough for him to reside in a “halfway house” in the community. He visits his physician with a list of *complaints* about his medications. Which one of the following is **LEAST** likely to be on his list?

A. He is constipated
B. He **salivates excessively**
C. His sex drive has decreased
D. He gets dizzy if he stands up too quickly
E. He has difficulty reading the newspaper

17. All of the following statements concerning the anesthetic *minimum alveolar concentration* (MAC) are accurate **EXCEPT**:

A. At a given level of anesthesia, measurement of alveolar concentrations of different anesthetics allows potency comparisons
B. The MAC is evaluated based upon the percentage of patients not showing movement in response to a painful stimulus
C. The MACs give information about the **slope of the dose-response curve**
D. The combination of nitrous oxide and halothane reduces the MAC to a value lower than the value for either of these agents alone
E. The MAC value for isoflurane is less than 50%

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

A. Blockade of voltage-dependent sodium channels
B. Preferential binding to resting channels
C. An increase in membrane refractory period
D. Slowing of axonal impulse conduction
E. At doses used clinically, blockade of both sensory and motor neurons

19. Which one of the following antihypertensive drugs is **least likely** to cause *bradycardia*?

A. Hydralazine
B. Propranolol
C. Clonidine
D. Reserpine
E. Atenolol
20. The most appropriate agent to use to treat a paranoid psychosis produced by either chronic amphetamine or cocaine usage would be an agent whose mechanism of action involved:

A. Blockade of muscarinic receptors  
B. Inhibition of dopamine reuptake  
C. Blockade of catecholamine β receptors  
D. Activation of serotonin receptors  
E. Blockade of dopamine receptors ✓

21. Which of the following diuretics is least likely to produce hypokalemia?

A. Amiloride ✓  
B. Chlorthalidone  
C. Ethacrynic acid  
D. Chlorothiazide  
E. Bumetanide

22-26. Match the antihypertensive drugs below with the single most appropriate lettered mechanism related to their antihypertensive action. Each lettered choice may be used once, more than once, or not at all.

α2 agonist
22. Clonidine  
23. Hydralazine  
24. Reserpine  
25. Prazosin  
26. Losartan

A. Calcium channel antagonist  
B. Direct smooth muscle relaxant  
C. Angiotensin converting enzyme inhibitor  
D. Angiotensin receptor antagonist  
E. Catecholamine β1 receptor antagonist  
F. Catecholamine α1 receptor antagonist  
G. Catecholamine depletor  
H. Catecholamine CNS α2 receptor agonist

27. Which of the following drugs should not be given to a pregnant, hypertensive woman?

A. α-Methyldopa ✓  
B. Verapamil  
C. Enalapril  
D. Propranolol  
E. Hydrochlorothiazide
28. Below is a figure representing the transmission of pain signals from the periphery into the dorsal horn of the spinal cord via primary afferent sensory neurons. According to this scheme, what would be the most likely result of ablating the primary afferent sensory neurons on measurements carried out using the area of the spinal cord normally innervated by these neurons?

A. Decreased levels of substance P receptors  
B. Increased levels of enkephalin  
C. Decreased levels of enkephalin receptors  
D. An increase in both substance P and enkephalin  
E. Increased levels of enkephalin receptors

29. All of the following matches between toxicological agent:antidote are appropriate EXCEPT:

A. Cyanide:Sodium nitrite  
B. Warfarin:Protamine  
C. Morphine:Naloxone  
D. Methanol:Ethanol  
E. Lead:Calcium disodium edetate (EDTA)
30. The release of which of the transmitters below in the nucleus accumbens is associated with the reinforcing properties of opiates and nicotine?

A. Acetylcholine  
B. Serotonin  
C. GABA  
D. Dopamine  
E. Norepinephrine

31. All of the following statements concerning anesthetic treatments are correct EXCEPT:

A. Thiopental produces respiratory depression  
B. The administration of tubocurarine allows for the use of a lower amount of gaseous anesthetic during abdominal wall surgery  
C. Midazolam has a shorter half-life compared to diazepam  
D. Neuromuscular relaxation produced by succinylcholine can be reversed by neostigmine  
E. If epinephrine is administered along withprocaine the absorption of procaine will be delayed

32-33. R.S., a 55-year-old obese male with a history of mild asthma and hypertension has come to the clinic for a flu shot and annual physical examination. Patient history reveals an ongoing 8-month treatment with hydrochlorothiazide for the elevated blood pressure. Other medications include an albuterol inhaler, Metamucil (a dietary bulk forming fibrous laxative) and a daily multivitamin tablet. During the exam, the patient complains of cramps and fatigue that have been continuous over the previous month. Laboratory blood tests performed 8 months ago were within normal ranges. Physical examination shows a blood pressure of 143/92 mm Hg with no other abnormal signs.

32. Which of the following statements concerning R.S.'s symptoms is most appropriate?

A. The Metamucil is leading to dehydration, which gives rise to fatigue and cramps. The patient should stop taking the Metamucil.  
B. The patient has come down with the flu, which is responsible for the fatigue and cramps. The symptoms will disappear as the flu disappears.  
C. Continued high blood pressure is responsible for the symptoms. Better control of blood pressure will lead to relief of the symptoms.  
D. The albuterol is responsible for the symptoms. The patient should switch to a different asthmatic medication.  
E. The thiazide therapy is causing potassium depletion, resulting in cramps and fatigue. Treatment to maintain normal potassium levels should be initiated.
33. What additional antihypertensive medication will most benefit R.S.?

A. Enalapril
B. Propranolol
C. Nitroglycerin
D. Hydralazine
E. Atenolol

34. Gaseous anesthetic X has a MAC of 1.0%. If it were to be used as the sole anesthetic agent, what concentration of anesthetic should be used (expressed as the % of the inhaled gas that is represented by the anesthetic gas at 1 atm)?

A. 1.0%
B. 1.3%
C. 2.0%
D. 2.5%
E. 4.0%

35. Which of the following would be the most appropriate agent to use to produce emesis following ingestion of a toxic compound?

A. Activated charcoal
B. Chlorpromazine
C. Naloxone
D. Syrup of ipecac
E. N-Acetylcysteine

36. Indicate which of the following would be the most effective in reducing Parkinsonian symptoms brought on by a neuroleptic anti-schizophrenic drug.

A. Pralidoxime
B. Phystostigmine
C. Benztropine
D. Fentanyl
E. Thioridazine

37. If a local anesthetic such as procaine gets into the general circulation at a high concentration it can cause CNS-mediated convulsions. These convulsions can be treated with:

A. Clozapine
B. Diazepam
C. Thiopental
D. A and B
E. B and C
38. Which of the following would be most useful in treating a patient with cerebral edema?

A. Amiloride
B. Furosemide
C. Chlorthalidone
D. Acetazolamide
E. Mannitol

39. It has been found that sympathetic nervous system-related symptoms of withdrawal from opiates can be reduced by treatment with clonidine. Indicate the most likely explanation for this effect.

A. Clonidine has direct opiate receptor agonist activity
B. Clonidine reduces sympathetic outflow from the brain
C. Clonidine diminishes catecholamine stores in sympathetic nerve terminals
D. Clonidine blocks sympathetic receptors in the periphery
E. Clonidine stimulates the release of endogenous opioids in the brain

40. Drug X, when injected into a rat via intraperitoneal (i.p.) administration, increases blood pressure and also increases locomotor activity. The increase in blood pressure is inhibited by treatment with prazosin but not by treatment with nifedipine or enalapril. The locomotor activity is inhibited by treatment with haloperidol but not by treatment with atropine or naloxone. The most likely identity of Drug X:

A. Methadone
B. LSD
C. Olanzapine
D. Amphetamine
E. Neostigmine

END OF EXAM: HAPPY NEW YEAR!
BIO 273: PHARMACOLOGY

EXAM #4

Dec. 12, 2001

NAME: ________________________________

7. A  17. C  27. A

95 out of 95