

***DENTAL PHARMACOLOGY
EXAMINATION #1***

February 2, 2009

You have one (1) hour and 15 minutes to complete this examination. The examination contains 50 questions, each worth 2 points.

Answer all questions on the computer sheet provided; use a soft lead pencil. Be sure that you have correctly identified your answer sheet by **PRINTING** your name and TU id number and correctly filling in the grid spaces. You may keep your exam booklet. Answers and grades will be posted on Blackboard.

This examination is being administered under the Honor Code of Temple University Dental School.

All Questions: Select the single, most appropriate answer.

1. Which one of the following is the best measure or indicator of the potency of a drug?

- ☒ A. ED_{50}
- B. E_{max}
- C. Clearance
- D. Receptor concentration (R_t)
- E. Half-life

2. The chief disadvantage of nitrous oxide as a general anesthetic is

- A. Prolonged recovery time due to retention in fat
- B. Poor analgesic
- C. Excessive relaxation of skeletal muscles
- D. Slow induction
- ☒ E. Low potency (high MAC)

3. Which following intravenous drugs used in general anesthesia 1) has relatively low redistribution to fat cells 2) decreases cerebral blood flow?

- ☒ A. Propofol
- B. Thiopental
- C. Midazolam
- D. Etomidate
- E. Ketamine

4. Which of the following routes of drug administration is most susceptible to first pass metabolism?

- A. Sublingual
- B. Rectal
- C. Transdermal
- ☒ D. Oral
- E. Intravenous

5. Which one of the following antiepileptic drugs may be used against absence seizures when ethosuximide is not satisfactory?

- A. Gabapentin
 - B. Fosphenytoin
 - B. Pregabalin
 - ☒ C. Valproic acid
 - ☒ D. Phenobarbital
- Both*

6. Which of the following is the most common toxic side effect in patients receiving L-dopa?

- A. Bleeding
- ☒ B. Nausea and vomiting
- C. Colitis
- D. Skin rash
- E. Low white cell count

7. A 55-year-old woman is spraying plants in her greenhouse with malathion, an organophosphate insecticide. She accidentally inhales the chemical and begins to experience signs of intoxication. Her symptoms are most likely to include:

- A. Constipation
- ☒ B. Bronchoconstriction
- C. Mydriasis and cycloplegia
- D. Fever and xerostomia
- E. Hepatotoxicity

7. 8. Which of the following is true of receptors that are coupled to guanine-nucleotide binding proteins?

- A. Receptors of this type have a single transmembrane domain.
- ☒ B. Receptors of this type activate GDP:GTP exchange.
- C. Receptors of this type inhibit phospholipase C.
- D. Receptors of this type change conformation when an antagonist binds.
- E. Receptors of this type contain a transmembrane ion channel.

9. Local anesthetics are weak bases. If you administer a local anesthetic with a pKa of 9.4, what would be the ratio of ionized to non-ionized drug in the plasma, with a pH of 7.4?

- A. 1/100
- B. 1/10
- C. 1/1
- D. 10/1
- ☒ E. 100/1

10. The combination of L-dopa and carbidopa is used in Parkinsonism. Carbidopa is important in this preparation because:

- A. It is a type 1 dopamine receptor agonist
- B. It is a dopamine reuptake blocker
- ☒ C. It prevents the breakdown of L-dopa to dopamine in the periphery
- D. It releases stores of endogenous dopamine in the central nervous system
- E. It enhances the conversion of L-dopa to dopamine in the brain

11. To which one of the following compounds is tolerance to the anticonvulsant effect most likely to occur?

- A. Lamotrigine
- B. Carbamazepine
- C. Phenytoin
- D. Sodium valproate
- ☒ E. Clonazepam

12. Which of the following terms is best defined as the movement of drug from the general circulation to its site of action?

- A. Absorption
- B. Excretion
- C. Redistribution
- ☒ D. Distribution
- E. Elimination

13. Which of the following local anesthetics is metabolized by butyrylcholinesterase?

- A. Lidocaine
- ☒ B. Tetracaine *ester*
- C. Bupivacaine
- D. Ropivacaine
- E. Etidocaine

14. Muscarinic receptor blockers are most useful

- ~~A.~~ To constrict the pupils of the eye
- ~~B.~~ To treat cardiac tachycardias
- C. To increase motility of the gastrointestinal tract
- ~~D.~~ To treat atony of the bladder *agonist*
- ☒ E. To treat bronchial asthma

15. A 60-year-old man is treated with pilocarpine for xerostomia. Adverse reactions are most likely to include

- ☒ A. Abdominal cramps and diarrhea
- B. An increase in intraocular pressure
- C. Fever and mental confusion
- D. Tachycardia and hypertension
- E. Skeletal muscle weakness

*Musl agonist
↑ fluids ?*

16. An individual diagnosed with schizophrenia is started on a traditional antipsychotic agent that immediately causes facial grimacing and spastic movements of the neck patient. Which one of the following should be administered to treat these acute dystonic reactions?

- A. Propranolol
- B. Haloperidol
- C. Dantrolene
- ☒ D. Bantropine Bantropine
- E. Fluphenazine

? 17. Which of the following intravenous drugs used in general anesthesia 1) increases cardiac output 2) increases cerebral blood flow and possibly intracranial pressure?

- A. Propofol
- B. Thiopental - not
- C. Midazolam - not
- x D. Etomidate
- ☒ E. Ketamine

? 18. A 75-year-old man is diagnosed with Alzheimer's disease, and is given a prescription for rivastigmine. Which of the following statements best describes its mechanism of action?

- A. Blocks beta-1 adrenoceptors not
- ☒ B. Stimulates muscarinic receptors
- ☒ C. Inhibits cholinesterase
- D. Stimulates alpha-adrenoceptors
- E. Blocks nicotinic receptors

? 19. Which of the following is true of physiological receptors?

- A. They bind to RNA
- ☒ B. They contain tyrosine protein kinases
- C. They contain adenylyl cyclase activity
- D. They contain phospholipase C activity
- E. They contain ion pumps

20. A competitive antagonist in concentration 10^{-6} M shifts the agonist dose-response curve to the right so that 1000 times as much agonist is needed. Based on this information the dissociation constant of the antagonist (K_B) is approximately:

- A. 10^{-3} M
- B. 10^{-6} M
- C. 10^{-8} M
- ☒ D. 10^{-9} M
- E. 10^{-12} M

21. Which one of the following drugs is a potent bronchodilator?

- A. Nadolol
- ☒ B. Albuterol
- C. Doxazosin
- D. Phenoxybenzamine
- E. Prazosin

22. Among the listed antipsychotic medications, which one can best ameliorate negative symptoms of schizophrenia?

- A. Haloperidol
- ☒ B. Risperidone
- C. Chlorpromazine
- D. Fluphenazine
- E. Thioridazine

23. A young child accidentally eats a plant, containing a toxic substance. His symptoms include dry mouth and eyes; his skin is flushed, red and dry; he has a fever and is tachycardic; his vision is blurred; and he becomes confused. He most likely has ingested

- ☒ A. Atropine
- B. Propranolol
- C. Nicotine
- D. Pralidoxime
- E. Phentolamine

24. All of the following influence the rate of alcohol metabolism *Except*

Zero order

- A. Genetics
- ☒ B. Eating habits
- ☒ C. Drinking habits
- D. Body weight
- E. Body type

25. Which of the following drugs would be the best choice for controlling seizures in patients with epilepsy? *status epilepticus*

- A. Haloperidol
- B. Topiramate
- C. Lorazepam
- ☒ D. Phenobarbital
- E. Oxycodone

26. A 50-year-old woman is going on a cruise in the Caribbean. She is given a prescription for scopolamine to reduce to possibility of motion sickness. Which of the following best describes its mechanism of action?

- A. Stimulates nicotinic receptors
- B. Stimulates alpha adrenoceptors
- C. Inhibits cholinesterase
- ☒ D. Blocks muscarinic receptors
- E. Blocks beta-2 adrenoceptors

27. Which of the following lettered drugs has the fastest rate of induction?

Drug	Blood/gas P.C.	MAC
<input checked="" type="radio"/> A	0.42	1.0
B	0.69	2.0
C	1.80	6
D	1.40	1.4
E	2.30	0.75

28. Which of the following statements is most accurate about absorption of a lipid-soluble drug from the gastrointestinal tract?

- ☒ A. The higher the concentration, the slower the rate of absorption
- ☒ B. The larger the surface area at the site of absorption, the slower the rate of absorption
- ☒ C. Co-administration of a vasoconstrictor drug will reduce drug absorption into the plasma
- D. Charged molecules are rapidly absorbed from the gastrointestinal tract
- E. Weak acids are primarily absorbed from the stomach

29. Diazepam is suitable for all of the following indications **EXCEPT:**

- A. Acute alcohol withdrawal
- B. Musculo-skeletal disorders
- ☒ C. Obsessive-compulsive disorder
- D. Oral sedation in dentistry
- E. Generalized anxiety disorder

30. Which of the following statements regarding nerve blockade by local anesthetics is most correct?

- A. The onset is faster in infected tissues than in uninfected tissues.
- ☒ B. The onset is fastest in C-fibers
- C. The onset is faster after repeated injection than after the first injection
- D. The onset is faster for nerve fibers in the inside of a nerve bundle than for those on the outside
- E. The onset is faster for nerve fibers with lower firing frequencies than those with higher firing frequencies.

7 31. A patient with chronic open-angle glaucoma is treated with a topical ophthalmic beta adrenoceptor blocker. Which one of the following is the most likely mechanism by which this drug lowers intraocular pressure?

- A. Contracting the iris dilator muscles
- B. Contracting the circular papillary constrictor muscle
- ☒ C. Decreasing aqueous humor synthesis/secretion
- ☒ D. Dilating the uveoscleral veins
- E. Directly opening the trabecular meshwork

*α vaso dilation
β1 vaso dilation
β2 vaso constriction smooth muscle*

32. Which one of the following drugs, applied topically to the eye, causes mydriasis without producing cycloplegia?

- A. Atropine
- B. Neostigmine
- C. Pilocarpine
- ☒ D. Phenylephrine
- E. Phentolamine

7 33. Which of the following directly regulates the activity of adenylyl cyclase?

- ☒ A. Diacylglycerol
- B. Cyclic GMP
- ☒ C. G-alpha-s
- D. Inositol trisphosphate
- E. Steroid receptors

34. Which of the following receptors in the central nervous system is the site of action of barbiturates?

- A. Glutamate receptor
- B. Serotonin receptor
- C. Histamine receptor
- D. Thromboxane receptor
- ☒ E. GABA_A receptor

35. The competition between an active and an inactive drug for a common receptor (e.g., phentolamine and norepinephrine on vascular smooth muscle) represents a drug interaction termed

- A. Additivity
- B. Functional antagonism
- C. Chemical antagonism
- D. Synergism
- ☒ E. Pharmacological antagonism

36. A patient has ingested a toxic overdose of aspirin, which is a weak acid. Which of the following measures can increase the excretion of aspirin in the urine?

- A. Administration of a weak base
- B. Administration of an acidifying agent, ammonium chloride
- ☒ C. Administration of an alkalinizing agent, sodium bicarbonate
- D. Administration of another weak acid
- E. You have no control over the excretion rate

37. Which following intravenous drugs used in general anesthesia 1) minimal effect on the cardiovascular system 2) causes involuntary muscle movements (myoclonic)?

- A. Propofol
- B. Thiopental
- C. Midazolam
- ☒ D. Etomidate
- E. Ketamine

38. Which one of the following is most useful in relieving symptoms of benign prostatic hyperplasia?

- A. Amphetamine
- B. Methoxamine
- C. Clonidine
- ☒ D. Terazosin
- E. Ephedrine

7 39. All of the following statements about local anesthetics are true EXCEPT:

- ~~A.~~ Local anesthetics block voltage-sensitive sodium channels
- ~~B.~~ When the pKa of a local anesthetic is 8.0 and the extracellular fluid has a pH in the physiological range, the ionized form is the predominant form.
- ~~C.~~ The purpose of adding epinephrine in lidocaine preparations is to reduce absorption into systemic circulation.
- ☒ D. Tetracaine preferentially binds to resting states of its target channels.
- E. The ionized form of mepivacaine is its most active form at the binding site.

40. A 30-year old male is rushed to the emergency room having taken an overdose of a chlordiazepoxide. Which one of the following drugs would be most effective in reversing his symptoms?

- A. Amphetamine
- B. Ephedrine
- C. Atropine
- D. Propranolol
- ☒ E. Flumazenil

41. All of the following are true about drug elimination **EXCEPT**:

- A. Inhalation anesthetics (e.g., nitrous oxide) are excreted via the lungs
- B. Drugs and metabolites, with molecular weights greater than 450 may be excreted in the bile
- C. Free drug in the plasma is susceptible to glomerular filtration
- D. Drugs may be metabolized to active or inactive products
- ☒ E. Enterohepatic recirculation reduces the duration of action of a drug

? 42. Tardive dyskinesia has often been associated with the long-term use of which one of the following drugs?

- A. Methadone
- B. Isocarboxazid
- ☒ C. Haloperidol
- D. Protriptyline
- E. Midazolam

43. Propranolol is most useful in the treatment of:

- A. Hypoglycemia
- B. Bronchial asthma
- ☒ C. Angina pectoris
- D. Attention-deficit hyperactivity disorder
- E. Glaucoma

? 44. Which of the following drugs is most likely to cause the "cheese effect" if taken in parallel with tyramine-containing foodstuffs? *Tranylcypromine*

- A. Desimipramine
- B. Haloperidol
- ☒ C. Nialamid
- D. Nortriptyline
- E. Amitriptyline

? 45. What is the first medical therapeutic approach for a subject with a recent diagnosis of idiopathic Parkinson's disease?

- A. Cholinergic therapy
- B. GABAergic therapy
- ☒ C. Dopaminergic therapy
- D. Glutamate therapy
- E. Serotonergic therapy

46. Buspirone is an anti-anxiety agent that acts as
- A. A selective serotonin reuptake inhibitor
 - B. An agonist at GABA receptors
 - ☒ C. A partial agonist at serotonergic-1A receptors
 - D. A pro-drug for nordiazepam
 - E. An agonist at dopamine D-2 receptors in the striatum
7. 47. Which one of the following drugs produces its sympathomimetic effects by releasing adrenergic transmitters stored by nerve endings and the adrenal gland?
- A. Norepinephrine
 - ☒ B. Tyramine
 - C. Timolol
 - D. Isoproterenol
 - E. Epinephrine
48. Which one of the following drugs is the most appropriate for the treatment of pheochromocytoma?
- ☒ A. Phentolamine
 - B. Isoproterenol
 - C. Dopamine
 - D. Atropine
 - E. Phenylephrine
49. As a class, tricyclic antidepressants cause blurred vision, dry mouth, constipation and difficulty initiating urination because of blockade of which set of receptors?
- A. Alpha adrenergic
 - B. Nicotinic
 - C. GABA
 - D. Serotonergic
 - ☒ E. Muscarinic
50. Which one of the following drugs is a centrally acting alpha-2 adrenoceptor agonist, producing dry mouth, drowsiness and bradycardia?
- A. Guanethidine
 - B. Phenoxybenzamine
 - ☒ C. Clonidine
 - D. Doxazosin
 - E. Prazosin

END OF EXAM