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DENTAL PHARMACOLOGY

Examination 1

January 31, 2008

You have 1 hour and 15 minutes to complete this examination, consisting of 50 questions of equal value. Please print your answers clearly on the answer sheet provided.

Print your name and TUID number on the answer sheet and return it at the end of the examination.

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

All Questions : Select the single, most appropriate answer.

1. A 36-year-old man is treated with pilocarpine for xerostomia. Which of the following statements best describes the drug's mechanism of action?
 - A. Stimulation of beta-1 adrenergic receptors
 - B. Inhibition of alpha-1 adrenergic receptors
 - ☒ C. Stimulation of muscarinic receptors — \uparrow secretion
 - D. Inhibition of beta-2 adrenergic receptors
 - E. Stimulation of nicotinic receptors

2. Which of the following drugs is most useful for the treatment of myasthenia gravis?
 - A. Carbachol
 - ☒ B. Pyridostigmine
 - C. Pralidoxime
 - D. Nicotine
 - E. Propranolol

3. Which of the following drugs is most useful in preventing the symptoms of motion sickness?
 - A. Mecamylamine
 - B. Clonidine
 - C. Bethanechol
 - ☒ D. Scopolamine
 - E. Albuterol

4. 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 pralidoxime
 - 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

5. All of the following factors are true about absorption of a lipid-soluble drug EXCEPT:
 - A. The higher the concentration, the faster the rate of absorption \uparrow
 - B. The larger the surface area at the site of absorption, the faster the rate of absorption \uparrow
 - ☒ C. Co-administration of a vasoconstrictor drug will enhance drug absorption into the plasma \uparrow
 - D. Charged molecules are poorly absorbed from the gastrointestinal tract \uparrow
 - E. Weak acids are mostly absorbed from the small intestine \uparrow

6. The protein that couples a receptor to the inhibition of adenylyl cyclase is called

- ☒ A. Gi
- ☐ B. Gs
- ☐ C. Gq
- ☐ D. G12
- ☐ E. G13

7. Which of the following statements best describes the signaling involved in steroid hormone action?

- ☐ A. Stimulation of a tyrosine kinase – linked receptor
- ☐ B. Diffusion across the cell membrane followed by action on soluble guanylyl cyclase
- ☐ C. Activation of a G-protein that inhibits adenylyl cyclase
- ☐ D. Opening of a transmembrane ion channel
- ☒ E. Activation of an intracellular receptor, that then binds to DNA

8. Given the following information concerning general anesthetics, which drug will induce anesthesia at the fastest rate if given at the MAC concentration?

	MAC	Blood: <u>Gas</u> Partition Coef.
A.	23.0	1.5
B.	5.0	14.0
C.	1.0	6.0
D.	0.2	4.0
<input checked="" type="radio"/> E.	12.0	<input checked="" type="radio"/> 0.7

9. Which of the following drugs is the most rapid acting inhalational anesthetic, but has low potency; it is useful in minor dental procedures?

- ☐ A. Isoflurane
- ☐ B. Halothane
- ☒ C. Nitrous oxide
- ☐ D. Enflurane
- ☐ E. Desflurane

10. A drug with apparent volume of distribution = 10 L is administered intravenously as a bolus dose of 100 mg. The initial plasma concentration (mg/L) attained is

- ☐ A. 0.15
- ☐ B. 4.30
- ☒ C. 10
- ☐ D. 100
- ☐ E. 1500

$$C = \frac{D_{bolus}}{V_d} = \frac{100}{10}$$

11. The potency of a drug is indicated by which one of the following terms?

- ☒ A. ED50
- B. E_{max}
- C. Clearance
- D. Receptor concentration (R_t)
- E. Half-life

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

13. Cocaine enhances the effect of norepinephrine or epinephrine by

- ?
b
- A. Blocking the alpha-adrenergic receptors
 - B. Blocking tyrosine hydroxylase
 - C. Inhibiting monoamine oxidase
 - ☒ D. Inhibiting the amine transporter into the presynaptic terminal
 - E. Facilitating the release of norepinephrine or epinephrine

14. While as effective as diazepam in reducing spasticity, baclofen has the therapeutic advantage of

- ?
- A. Producing less gastrointestinal disturbance
 - B. Requiring less frequent administration
 - C. Causing less running nose
 - ☒ D. Producing less sedation
 - E. Causing less malignant hyperthermia

15. What is the most common side effect of levodopa?

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

↑ Dopamine

16. Which one of the following sedative-hypnotic drugs has the longest half life?

- ~~A.~~ Triazolam
- ☒ B. Flurazepam
- C. Alprazolam
- D. Zolpidem
- E. Methohexital

17. Allergic reactions are more likely to occur to some local anesthetics than to others. Patients who are allergic to tetracaine are most likely to be allergic to

- A. Etidocaine
- B. Propivacaine
- C. Lidocaine
- ☒ D. Procaine
- E. Mepivacaine

18. Tetracaine acts at which of the following sites to produce local anesthesia?

- ~~A.~~ Chloride channel
- ☒ B. Sodium channel
- C. Potassium channel
- D. Nicotinic receptor
- E. Calcium channel

19. Which one of the following effects is most likely to occur from stimulation of beta-2 adrenoceptors?

- A. Constriction of blood vessels
- B. Secretion from sweat glands
- C. Decrease in heart rate
- D. Decrease in mental cognition
- ☒ E. Bronchial smooth muscle relaxation

β_2

20. Which one of the following drugs is a cardioselective (beta-1) adrenergic receptor blocker?

- A. Dobutamine
- ☒ B. Metoprolol
- C. Timolol
- D. Pseudoephedrine
- E. Methoxamine

21. A 9-year-old boy is seen by a neurologist because he is having difficulties at school. During the day, he experiences numerous brief losses of consciousness and minor muscular twitching. The EEG reveals a wave pattern characteristic of absence epilepsy. After a course of treatment with carbamazepine, his symptoms worsen. The best medical management plan is to
- A. Determine the blood levels of carbamazepine
 - B. Increase the dose of carbamazepine
 - C. Supplement the carbamazepine with phenobarbital
 - D. Replace carbamazepine with phenytoin
 - ☒ E. Replace carbamazepine with ethosuximide
22. Which one of the following antiepileptic drugs is most likely to produce nystagmus, hirsutism and gingival hyperplasia?
- A. Clonazepam
 - ☒ B. Phenytoin
 - C. Carbamazepine
 - D. Phenobarbital
 - E. Valproic acid
23. A 30-year-old male is rushed to the emergency room having taken an overdose of diazepam. Which one of the following drugs would be most effective in reversing his symptoms?
- A. Amphetamine
 - B. Atropine
 - C. Propranolol
 - D. Ephedrine
 - ☒ E. Flumazenil
24. Which of the following drugs is most likely to stimulate excessive release of prolactin, causing galactorrhea and menstrual irregularities?
- A. Pergolide
 - B. Atropine
 - C. Fluoxetine
 - ☒ D. Haloperidol
 - E. Chlordiazepoxide
25. All of the following statements apply to phenylephrine EXCEPT:
- A. Constricts small vessels in the nasal mucosa
 - B. Is added to local anesthetic solutions to prolong anesthesia τ
 - C. Reverses hypotension during anesthesia τ
 - ☒ D. Reduces secretions by inhibiting parasympathetic stimulation
 - E. Is a direct-acting alpha-adrenergic receptor agonist

26. A 50-year-old woman is spraying plants in her greenhouse with malathion. She accidentally inhales the chemical and begins to experience signs of intoxication. Her symptoms are most likely to include
- ☒ A. Bronchoconstriction and diarrhea —
 - B. Urinary retention and constipation
 - C. Mydriasis and cycloplegia
 - D. Fever and xerostomia
 - E. Hepatotoxicity
27. 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
28. Muscarinic receptor blockers are most useful *phenylephrine*
- ☒ A. To produce mydriasis and cycloplegia for eye examinations
 - B. To treat cardiac tachycardia
 - C. To treat paralytic ileus
 - D. To treat atony of the bladder
 - E. To treat orthostatic hypotension
29. Local anesthetics are weak bases. If you administer a local anesthetic with a pKa of 8.4, what would be the ratio of ionized to non-ionized drug in the plasma, with a pH of 7.4?
- $8.4 - 7.4 = 1$
- ~~A.~~ 1/100
 - B. 1/10
 - ~~C.~~ 1/1
 - ☒ D. 10/1
 - ~~E.~~ 100/1
- $\frac{10}{1}$
30. A patient has been taking warfarin to reduce blood clotting following a stroke. While on vacation, a physician prescribes a second drug (drug B) for an infection. Several days later, the patient presents to the emergency room with a clot, causing a pulmonary embolism. The most likely explanation is that drug B
- A. Displaced warfarin from plasma proteins
 - B. Competed with warfarin for tubular secretion
 - C. Enhanced the oral absorption of warfarin
 - ☒ D. Is an inducer of cytochrome P450
 - E. Is an anticoagulant

31. Which of the following regulates the activity of protein kinase C?
- ☒ A. Diacylglycerol (DAG)
 - B. Cyclic GMP (cGMP)
 - C. Gs
 - D. Inositol trisphosphate (IP3)
 - E. Steroid receptors
32. Which of the following drugs: 1) is used as a general anesthetic; 2) is given intravenously; 3) is useful as an ICU sedative; and 4) allows the patient to recover most rapidly so he feels less groggy?
- ☒ A. Propofol
 - B. Enflurane
 - C. Etomidate
 - D. Nitrous Oxide
 - E. Fentanyl
33. Which of the following drugs is an ultrashort acting barbiturate; administered intravenously for induction of anesthesia?
- A. Nitrous oxide
 - ☒ B. Thiopental
 - C. Midazolam
 - D. Enflurane
 - E. Propofol
34. Which of the following drugs is a potent inhalational anesthetic whose use is most associated with production of seizure activity?
- A. Nitrous oxide
 - B. Thiopental
 - C. Midazolam
 - ☒ D. Enflurane
 - E. Desflurane
35. A drug that is rapidly and completely absorbed is given in a dose of 100mg. The half-life of the drug is 4 hrs. After 8 hrs. the quantity remaining in the plasma is
- 100
50
25
- A. 2mg
 - B. 4mg
 - C. 9mg
 - ☒ D. 25mg
 - E. 43mg

36. It is desired to rapidly achieve a plasma concentration of 0.2 mg/L for a drug whose apparent volume of distribution is 50 L. The initial loading intravenous dose is

A. 4 mg
 B. 8 mg
 C. 10 mg
 D. 20 mg
 E. 100 mg

$$0.2 \text{ mg/L} = \frac{X}{50 \text{ L}}$$

$$\frac{100}{50}$$

$$50 \overline{) 100}$$

$$\begin{array}{r} 50 \\ \times 0.2 \\ \hline 10.0 \end{array}$$

37. A small boy who accidentally ingested an unknown quantity of pills prescribed for his grandfather, shows miosis, salivation, sweating, bronchial constriction bradycardia, vomiting and diarrhea. The medication is most likely

A. Propranolol
 B. Neostigmine
 C. Atropine
 D. Diazepam
 E. Baclofen

against Muscarinic

38. Blockade of release of which of the following transmitters is responsible for the toxic effects of botulinum toxin?

A. Glycine
 B. Glutamate
 C. Nicotine
 D. Acetylcholine
 E. Norepinephrine

39. Nondepolarizing muscle paralysis by tubocurarine can be pharmacologically antagonized by

A. Baclofen
 B. Diazepam
 C. Neostigmine
 D. Botulinum toxin
 E. Dantrolene

40. Bromocriptine is a dopaminergic drug. What is its mechanism of action? \uparrow Dopamine

A. It reduces levodopa metabolism by inhibiting catechol-o-methyltransferase (COMT) activity
 B. It is a dopamine receptor agonist
 C. It inhibits decarboxylase activity
 D. It increases the permeability of levodopa into the central nervous system
 E. It blocks the action of acetylcholine

41. Barbiturates act by enhancing the effects at which of the following receptors?

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

42. Epinephrine is included in lidocaine preparations to

- A. Enhance cardiovascular function
- B. Make patients more alert
- ☒ C. Reduce absorption of lidocaine into the systemic circulation *T*
- D. Reduce enzymatic degradation of lidocaine
- E. Reduce renal excretion of lidocaine

43. As a class, tricyclic antidepressants cause blurred vision, dry mouth, constipation and difficulty initiating urination because of blockade of which set of receptors?

- A. Serotonergic
- B. Nicotinic
- ☒ C. Muscarinic
- D. GABA
- E. Alpha adrenergic

44. Which one of the following drugs is the most appropriate for the treatment of pheochromocytoma? *PCC*

- A. Dopamine
- ~~B. Atropine~~
- C. Phenylephrine
- ☒ D. Phentolamine
- ~~E. Isoproterenol~~

Tren, Iso, Pheny

Drugs induces Parkinson
45. The haloperidol side effect which is most likely to be reduced by benztropine is

- A. Orthostatic hypotension *A D or E*
- ~~B. Weight gain~~
- ~~C. Neuroleptic malignant syndrome~~
- D. Tardive dyskinesia
- ☒ E. Tremor

46. Buspirone is an anti-anxiety drug that acts as
- A. A pro-drug for nordiazepam
 - B. An agonist at D-2 receptors in the striatum
 - C. An agonist at GABA receptors
 - ☒ D. A partial agonist at serotonergic-1A receptors
 - C. A selective serotonin reuptake inhibitor
47. Which one of the following drugs or drug combinations is the most effective treatment for status epilepticus?
- A. Gabapentin
 - B. Topirimate
 - C. Clonazepam followed by propranolol
 - D. Sodium valproate followed by lamotrigene
 - ☒ E. Lorazepam followed by fosphenytoin
48. Which one of the following drugs is most useful in treating the manic phase of bipolar depression?
- A. Ethosuximide
 - B. Amitriptyline
 - ☒ C. Lithium carbonate
 - D. Fluoxetine
 - E. Phenobarbital
49. Which of the following is a selective serotonin reuptake inhibitor, used as an antidepressant?
- SSRI - Paroxetine FL*
- A. Nortriptyline
 - B. Lithium carbonate
 - C. Oxazepam
 - D. Clonidine
 - ☒ E. Paroxetine
50. Diazepam is useful for all of the following indications **EXCEPT**:
- A. Musculo-skeletal disorders
 - B. Oral sedation in dentistry
 - C. Generalized anxiety disorder
 - ☒ D. Obsessive-compulsive disorder
 - E. Acute alcohol withdrawal
- SSRI's* ←

END OF EXAM