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**DENTAL PHARMACOLOGY
EXAMINATION # 1**

February 3, 2005

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 social security 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.

50
12
36

12
50

12
50

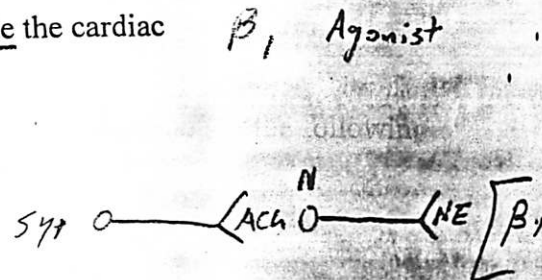
Questions 1 - 50: Select the single, most appropriate answer.

1. Which of the following local anesthetics has a prolonged half-life in patients with liver disease compared to patients with normal hepatic function?

- A. Procaine
- B. Tetracaine
- C. Benzocaine
- D. Cocaine
- ☒ E. Mepivacaine - Amide

2. Which of the following drugs is most likely to potentiate the cardiac effects of norepinephrine?

- ~~A. Metoprolol - β_1 Blocker Lungs~~
- ~~B. Acetylcholine - ACh Agonist~~
- ~~C. Amphetamine~~
- ☒ D. Phenylephrine - α_1 Agonist
- ~~E. Propranolol - β_1, β_2 Blocker~~



3. Which of the following drugs would be most useful for the relief of bronchoconstriction?

- A. Terazosin
- B. Guanethidine
- C. Timolol
- ☒ D. Terbutaline
- E. Naloxone

β_2 Agonist

Albuterol, Ten

\uparrow H.R.
 \uparrow B.P.

4. Which of the following drugs activates alpha-2 adrenoceptors located presynaptically in the central nervous system?

- A. Prazosin
- B. Albuterol
- C. Phentolamine
- D. Metoprolol
- ☒ E. Clonidine

α_2

β_1, β_2 Blocker

5. All of the following statements apply to propranolol EXCEPT:

- ~~A. Reduces elevated blood pressure~~
- ☒ B. Possesses low lipid solubility, therefore it does not enter the CNS
- ~~C. Is a competitive antagonist of beta-1 and beta-2 receptors~~
- ~~D. Is used for the prophylactic management of angina pectoris~~
- ~~E. Is contraindicated in patients with bronchial asthma~~

\downarrow H.R

\downarrow Bronchodilation

Cause
Broncho
const

Broncho-
constriction

Anti-Psychotic

6. All of the following statements apply to chlorpromazine EXCEPT:

- A. Stimulates histamine receptors T
- B. Causes orthostatic hypotension T
- ☒ C. Blocks muscarinic receptors
- D. Increases the rate of secretion of prolactin T
- E. Is a member of the phenothiazine class of antipsychotic agents T

7. All of the following drugs have a latency period of at least one week before the onset of their therapeutic action EXCEPT:

- A. Tranylcypromine MAOI - Anti-dep.
- B. Imipramine - Anti-Dep
- C. Lithium - Mania
- D. Fluoxetine - Anti-Dep
- ☒ E. Diazepam - Benzo -

8. Which of the following drugs is an antidepressant that selectively inhibits serotonin re-uptake with minimal effect on norepinephrine re-uptake?

- A. Desipramine
- B. Diazepam
- C. Protriptyline
- ☒ D. Fluoxetine
- E. Mirtazepine

→ S.S.R.I.

9. Which of the following drugs is most useful to control the manic phase of bipolar depression?

- A. Fluoxetine
- B. Doxepine
- C. Protriptyline
- D. Paroxetine
- ☒ E. Lithium

10. All of the following statements concerning buspirone are true EXCEPT:

- T A. Acts as a partial agonist at the serotonin (5HT_{1A}) receptor
- T B. Lacks muscle relaxant activity
- T C. Is used in the management of generalized anxiety disorder
- T D. Lacks sedative activity
- ☒ E. Is used in the management of panic attacks and psychosis

Non-Benzodiazepine

11. Which of the following drugs would be the best choice for controlling seizures associated with status epilepticus?

- A. Gabapentin
- B. Topiramate
- ☒ C. Lorazepam
- D. Haloperidol
- E. Ethosuximide

12. Which of the following antiepileptic drugs is most likely to cause hepatic failure?

- A. Clonazepam
- B. Valproic acid
- ~~C. Phenytoin~~
- ☒ D. Carbamazepine
- ~~E. Ethosuximide~~

13. Pilocarpine is most likely to produce which of the following effects?

- ☒ A. Increase in salivary secretions
- ~~B. Increase in intraocular pressure~~
- ~~C. Constipation~~
- ~~D. Tachycardia~~
- ~~E. Seizures~~

14. Treatment of organophosphate intoxication should include which of the following drugs?

- A. Physostigmine
- B. Bethanechol
- ☒ C. Pralidoxime
- D. Pilocarpine
- E. Propranolol

15. Atropine is **LEAST** likely to produce

- ~~A. Mydriasis will~~ dilation
- ~~B. Tachycardia will~~
- ~~C. Dry mouth will~~
- ☒ D. Bronchoconstriction
- ~~E. Fever won't~~ Vasodilator

16. The major site of drug metabolism by the cytochrome P450 enzyme system is

liver/protein

- A. Plasma
- B. Lungs
- ☒ C. Liver
- D. Gastrointestinal tract
- E. Kidney

17. A 45-year-old man enters the emergency room with an overdose of a weak acid ($pK_a=6$). The drug is excreted by the kidney. Approximately what percent of drug is passively reabsorbed when the pH of the tubular filtrate and urine is 5?

- A. 1%
- B. 10%
- C. 50%
- ☒ D. 90%
- E. 100%

$$\log \frac{NI}{I^+} = pK_a - pH$$

$6 - 5$

\log

$= 1$

$$\frac{NI}{I^+}$$

$$\frac{10}{1} = 10 - 90\%$$

10^1

18. All of the following statements about drug excretion are true EXCEPT:

- ☒ A. An inhalational drug (e.g. nitrous oxide) is excreted through the lungs
- ☒ B. Lipid soluble drugs can enter breast milk, causing effects in a nursing infant
- ☒ C. Drugs with a molecular weight greater than 450 can be excreted in the bile
- ☒ D. Both free and protein-bound drugs in the plasma are susceptible to glomerular filtration
- ☒ E. Water soluble drugs and metabolites are susceptible to renal excretion

19. Drugs A and B have similar pharmacokinetic parameters, except that Drug A is 95% bound to plasma proteins (Drug B is not bound). Which of the following statements is most likely true?

- ☒ A. Drug A is more slowly absorbed
- ☒ B. Drug A is more rapidly distributed to its site of action
- ☒ C. Drug A has a smaller volume of distribution
- ☒ D. Drug A is more rapidly metabolized
- ☒ E. Drug A is more rapidly excreted

Para

20. All of the following responses are a result of activation of cholinergic muscarinic receptors EXCEPT:

- A. Decrease of heart rate \uparrow
- B. Constriction of the pupil (miosis) \uparrow
- C. Increased gastrointestinal tract motility and tone \uparrow
- ☒ D. Relaxation of bronchial smooth muscle \uparrow
- E. Dilation of erectile tissue \uparrow

21. Immediately following intravenous injection of a drug, the plasma concentration was measured as 300 ng/ml. Four hours later, the plasma concentration was determined to be 75 ng/ml. Assuming first-order kinetics, which of the following values represents the half-life of the drug?

- A. 30 minutes
- B. 60 minutes
- ☒ C. 2 hours
- D. 4 hours
- E. 6 hours

22. A drug with an elimination half-life of 2 hours is given by intravenous infusion of 5 $\mu\text{g}/\text{min}$. The minimum time needed for the drug to achieve 95% of its steady-state value is which of the following?

- A. 2 hours
- B. 4.3 hours
- ☒ C. 8.6 hours
- D. 18 hours
- E. 24 hours

Halothane - causes

23. Identify the drug most useful to treat malignant hyperthermia.

- ☒ A. Dantrolene
- B. Atracurium
- C. Diazepam
- D. Succinylcholine
- E. Thiopental

24. Selegiline is used to treat Parkinsonism. It acts by

- A. Acting as an agonist to the D_1 dopamine receptor
- ☒ B. Increasing dopamine activity by inhibiting MAO-B activity
- C. Decreasing acetylcholine activity by blocking muscarinic receptors
- D. Inhibiting dopamine decarboxylase activity in the periphery
- E. Stimulating dopamine release

300

150

2

75

4.3

2

8.6

25. All of the following effects occur with acute or chronic alcohol ingestion EXCEPT:

- A. Korsakoff's psychosis *Does*
- ☒ B. Decrease in high density lipoproteins *↑*
- C. Cutaneous vasodilation *Does*
- D. Increased fat production in the liver *Does*
- E. Inhibition of antidiuretic hormone *Does*

26. Which benzodiazepine is preferred as a hypnotic because of its relative short duration of action? *T*

- A. Chlordiazepoxide
- B. Flurazepam
- C. Diazepam
- D. Nitrazepam
- ☒ E. Triazolam

27. All of the following drugs achieve muscular relaxation via action in the central nervous system EXCEPT: *Dantrolene*

- A. Mephenesin
- B. Diazepam
- C. Baclofen
- ☒ D. Dantrolene
- E. Chlordiazepoxide

28. Sinemet, a combination of levodopa and carbidopa, is used to treat parkinsonism. Carbidopa is important in this preparation because it

- A. Releases stores of endogenous dopamine
- ☒ B. Inhibits the breakdown of levodopa to dopamine in the periphery
- C. Enhances the breakdown of levodopa to dopamine in the central nervous system
- D. Is a dopamine receptor agonist
- E. Is a dopamine receptor antagonist acting in the area postrema to prevent nausea

29. Phase II block at the neuromuscular junction occurs when succinylcholine

- A. Releases excessive amounts of histamine
- ☒ B. ~~Is used in combination with d-tubocurarine~~
- ☒ C. ~~Is used in a patient who has recently engaged in excessive muscular activity~~
- ☒ D. ~~Is used in a patient who has had excessive bed rest~~
- ☒ E. ~~Is used for a prolonged period and in excessive amounts~~

For questions 30 and 31:

| Agent | Blood/Gas P.C. | MAC |
|-------------|----------------|------|
| Desflurane | 0.42 | 6 |
| Sevoflurane | 0.69 | 2.0 |
| Enflurane | 1.80 | 1.7 |
| Isoflurane | 1.40 | 1.4 |
| Halothane | 2.30 | 0.75 |

30. Which of the following drugs has the most rapid rate of induction?

- ☒ A. Desflurane
- B. Sevoflurane
- C. Enflurane
- D. Isoflurane
- E. Halothane

31. Which of the following drugs is the LEAST potent?

- ☒ A. Desflurane
- B. Sevoflurane
- C. Enflurane
- D. Isoflurane
- E. Halothane

32. Which of the following enzymes is directly regulated by the guanine nucleotide binding protein Gq?

- A. Protein kinase A
- B. Protein kinase C
- ☒ C. Phospholipase C
- D. Adenyl cyclase
- E. Guanylyl cyclase

$G_i + G_s (?)$

33. A drug that binds to the receptor for epinephrine, without activating the receptor is called

- A. A physiologic antagonist
- ☒ B. A competitive antagonist
- C. A partial agonist
- D. A reverse agonist
- E. A chemical antagonist

34. An ultra-short acting barbiturate administered intravenously for induction of anesthesia:

- B →
- A. Nitrous oxide
 - B. Thiopental
 - ☒ C. Midazolam
 - D. Enflurane
 - E. Propofol

35. A benzodiazepine that enhances GABA activity, produces sedation, skeletal muscle relaxation and amnesia:

- A. Nitrous oxide ✓
- B. Thiopental - Barb
- ☒ C. Midazolam
- D. Enflurane
- E. Desflurane } General Anes

36. All of the following statements about local anesthetics are true **EXCEPT**:

- C →
- T A. Benzocaine can only be used topically
 - T B. Local anesthetics block sodium channels
 - T C. The charged form of lidocaine is important for penetrating neuronal cell membranes, while the uncharged form is the most active at its binding site
 - ☒ F D. Epinephrine is included in lidocaine preparations to decrease the absorption of lidocaine
 - T E. Seizures, induced by lidocaine, can be treated with diazepam

37. All of the following statements apply to ^{Epinephrine} phenylephrine **EXCEPT**:

- 2 →
- ☒ F A. Reduces secretions by inhibiting parasympathetic stimulation
 - T B. Is a direct-acting alpha adrenergic receptor agonist
 - T C. Reverses hypotension during anesthesia
 - T D. Is added to local anesthetic solutions to prolong anesthesia
 - T E. Constricts small vessels in the nasal mucosa

α_1 agonist
→ mydriasis without Cyclopleg.

38. All of the following statements are true concerning amphetamine **EXCEPT**:

- ★ 2 →
- T A. Tolerance develops to the appetite suppressant effects
 - T B. Is used to reverse the sleepiness of narcolepsy
 - C. Is a Schedule III controlled substance
 - ☒ D. Prevents the release of dopamine from nerve endings in the central nervous system
 - T E. Is used in the management of attention-deficit hyperactivity disorder

Benz

39. Diazepam is useful for all of the following indications EXCEPT:

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

useless

Benz antagonist

40. Flumazenil reverses the behavioral depressant effects of which one of the following drugs?

- ☒ A. Diazepam
- B. Morphine
- C. Phenobarbital
- D. Haloperidol
- E. Thioridazine

41. Which of the following drugs is most likely to increase heart rate and blood pressure, increase gastric acid secretion, and cause seizures at high doses?

- A. Bethanechol
- ☒ B. Nicotine
- C. Propranolol
- D. Edrophonium
- E. Atropine

42. Drugs that block muscarinic receptors are most useful in the treatment of

- ☒ A. Gastrointestinal spasm
- N B. Hypertension
- N C. Atony of the bladder
- N D. Xerostomia
- N E. Myasthenia gravis

43. All of the following statements are true about routes of administration EXCEPT:

- T A. A drug administered intravenously has a bioavailability of 100%
- ☒ B. Sublingual administration leads to delay in onset of action, compared to oral administration
- T C. Inhalation can lead to central nervous system effects
- T D. Transdermal administration is useful for producing a systemic effect
- F ☒ E. Inhalation is useful for a local effect in the lungs

44. Increased cardiac contractility and conduction, lipolysis, glycogenolysis, and relaxation of bronchial smooth muscle are due to activation of which of the following classes of receptors?

- ~~A. Cholinergic muscarinic receptors~~
- ~~B. Cholinergic nicotinic receptors~~
- ~~C. Alpha adrenergic receptors~~
- ☒ D. Beta adrenergic receptors
- ~~E. Serotonin receptors~~

45. When alcohol and disulfiram are present in the body, disulfiram inhibits _____ resulting in nausea and vomiting.

- ~~A. Alcohol dehydrogenase~~
- ~~B. Mixed function oxidase~~
- ~~C. Aldehyde oxidase~~
- ~~D. Alcohol oxidase~~
- ☒ E. Aldehyde dehydrogenase

Acetaldehyde

46. Which of the following compounds blocks acetylcholine release?

- ☒ A. Botulinum toxin
- ~~B. Chlordiazepoxide~~
- ~~C. Baclofen~~
- ~~D. Black widow spider toxin~~
- ~~E. Diazepam~~

A B N
Botulinum ACh↓

47. Which of the following drugs reverses the action of the curare-type drugs (non-depolarizing neuromuscular blockers)?

- ~~A. Isoflurane~~
- ~~B. Diazepam - Benz~~
- ☒ C. Neostigmine AChE In
- ~~D. Halothane~~
- ~~E. Propranolol $\beta_{1/2}$ B~~

Edrophonium

ACh Esterase

For question 48:

| Drug Dose | Percent Responding to Drug X | Percent responding to Drug Y |
|-----------|------------------------------|------------------------------|
| 0.1 mg | 1 | 10 |
| 0.3 mg | 5 | 20 |
| 1.0 mg | 10 | 50 |
| 3.0 mg | 50* | 68 |
| 10.0 mg | 70 | 92 |
| 30 mg | 90 | 100 |
| 100 mg | 100 | 100 |

48. Which of the following statements can be concluded from the table above?

- A. Drug X is safer than Drug Y ✓
- B. Drug Y is more effective than Drug X No
- C. The two drugs act on the same receptors ✓
- ☒ D. Drug X is less potent than Drug Y
- E. The therapeutic index of Drug Y is 10 ✓

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

- A. Action on 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. Diffusion into the cell and activating a receptor to allow binding to DNA ✓

50. Most rapid acting inhalational anesthetic, but low potency; useful in many dental procedures:

- ☒ A. Nitrous oxide
- B. Thiopental
- C. Midazolam
- D. Enflurane
- E. Propofol

END OF EXAM