BIO 273: SEPARATE PHARMACOLOGY PART OF EXAM #1

9/24/02

Name

Note: Your score in this part of the exam will be combined with the Bio 273 pharmacology questions in the integrated exam to give you one pharmacology score for exam #1.

This part of the exam consists of 30 questions, each of equal value. For the multiple choice questions, choose the single most appropriate answer for entry onto the Pharmacology Answer Sheet.

1. You suspect that a patient has been exposed to an organophosphate insecticide (inhibitor of acetylcholinesterase). All of the following are symptoms you might expect to encounter EXCEPT:

A. Watery eyes
B. Involuntary urination
C. Dry Mouth
D. Constricted Pupils
E. Involuntary defecation

2. The increase in heart rate caused by norepinephrine is mediated intracellularly via:

- A. An inhibition of Na⁺-K⁺ ATPase
- B. An increase in calcium uptake by the sarcoplasmic reticulum (SR)
- C. An increase in cyclic GMP concentration
- D. An increase in inositol triphosphate (IP₃) concentration
- E. An increase in calcium channel phosphorylation

3. The ED₅₀ of a drug tells us something about:

A. The efficacy of the drug
B. The potency of the drug
C. The half-life of the drug
D. The specificity of the drug
E. The toxicity of the drug

4. The most appropriate drug for treatment of myasthenia gravis:

A. Neostigmine
B. Pirenzepine
C. Atropine
D. Succinylcholine
E. Physostigmine
5. Propranolol  [D]
6. Amphetamine  [E]
7. Verapamil  [E]
8. Aspirin  
   A. Ion channel
   B. Enzyme
   C. DNA
   D. Receptor
   E. Carrier molecule

9. Why does antihypertensive treatment with prazosin cause less tachycardia compared to antihypertensive treatment with phenolamine?
   A. Only prazosin blocks α1 receptors
   B. Only prazosin blocks β1 receptors
   C. Only phenolamine blocks α2 receptors
   D. Only phenolamine blocks β2 receptors
   E. Only prazosin activates β2 receptors

10. Match-up the numbered drugs below with the single most appropriate lettered description of their protein target in the body. Each lettered choice may be used once, more than once, or not at all.

10. Dobutamine  [E]
11. Captopril  [F]
12. Amrinone  [F]
13. Isosorbide  [D]

   A. Inhibition of cyclic AMP phosphodiesterase
   B. Activation of α1 receptors
   C. Inhibition of Na⁺-K⁺ ATPase
   D. Activation of cyclic GMP production
   E. Activation of β1 receptors
   F. Inhibition of angiotensin converting enzyme (ACE)
14. Which of the following anti-arrhythmic drugs would be the least appropriate to use in treating an arrhythmic patient who also has asthma?

A. Varapamil
B. Propranolol
C. Procainamide
D. Digoxin
E. Atenolol

15. For which form of angina would the use of nitroglycerin be appropriate?

A. Stable
B. Unstable
C. Variant (Prinzmetal's)
D. A and B
E. A, B and C

16. Drug A has an $ED_{50}$ of 6 mg/kg and a $TD_{50}$ of 3 mg/kg. What is the Therapeutic Index (TI) of drug A?

$$\frac{3}{6} = 0.5$$

A. 18
B. 9
C. 2
D. 0.5
E. 0.2

17. What mechanism of action is associated with the use of minoxidil as a vasodilator?

A. Increase in cyclic AMP levels
B. Increase in cyclic GMP levels
C. Increase in potassium permeability
D. Increase in calcium permeability
E. Increase in chloride permeability

18. Upon administration of Drug X, a marked vasoconstriction occurs. When phentolamine is now combined with the same dose of Drug X as before, vasodilation occurs. Drug X could be:

A. Epinephrine
B. Isosorbide
C. Nifedipine
D. Pilocarpine
E. $\alpha$-Methyltyrosine
19. All of the following statements concerning the cholinergic nicotinic receptor are correct EXCEPT:

A. It is easily desensitized in the constant presence of agonist
B. It is the receptor most responsible for transmission of excitatory signals from the preganglionic autonomic neurons to the postganglionic autonomic neurons
C. It’s effect is always initially excitatory
D. It consists of a single polypeptide chain with 7 membrane crossing hydrophobic regions
E. Tubocurarine is a competitive antagonist at this receptor site

20. The ability of aspirin to treat unstable angina is related to:

A. Vasodilation via inhibition of angiotensin converting enzyme
B. Inhibition of platelet aggregation via inhibition of cyclooxygenase enzyme
C. Vasodilation via production of nitric oxide
D. Inhibition of platelet aggregation via inhibition of prostacyclin formation
E. Decreased cardiac demand via inhibition of norepinephrine release

21. A drug which, when applied to the eyes, will cause the pupils to dilate:

A. Homatropine
B. Phenylephrine
C. Phentolamine
D. A and B
E. A, B and C

22. The increase in blood pressure produced by amphetamine is due to:

A. An increase in norepinephrine release at the heart
B. An increase in norepinephrine release at vascular smooth muscle
C. An increase in norepinephrine release in the brain
D. A and B
E. A, B and C

23. Indicate which of the following statements concerning nitroglycerin are CORRECT:

A. Rebound vasoconstriction is a major side effect
B. Headache is a common side effect
C. Vasodilating effect is diminished with constant exposure to a nitroglycerin transdermal patch
D. A and B
E. B and C
#24-25. Fig 1 below shows the effect of propranolol (propr) on the ability of isoproterenol (x-axis) to cause an increase in heart rate (y-axis).

![Graph showing the effect of isoproterenol concentration on response.](image)

**Fig. 1**

A. Increase  
B. Decrease  
C. No Change  
D. Cannot tell from the given data

Use one of the 4 lettered choices above to answer questions 24 and 25:

24. What is the effect of propranolol on the $ED_{50}$ value for the isoproterenol-induced increase in heart rate? __________

25. What is the effect of propranolol on the efficacy for the isoproterenol-induced increase in heart rate? __________

26. The main reason epinephrine would be better than norepinephrine in treating an emergency anaphylactic shock resulting from a bee sting:

A. Epinephrine has a longer half-life compared to norepinephrine  
B. Epinephrine has a greater potency at $\alpha_1$ receptors  
C. Epinephrine has a greater potency at $\beta_2$ receptors  
D. Epinephrine has a lesser potency at $\alpha_2$ receptors  
E. Epinephrine has a lesser potency at $\beta_1$ receptors
27. The vasoconstrictive effect of norepinephrine is mediated via:

A. An increase in inositol triphosphate (IP₃) levels following α₁ receptor stimulation
B. An increase in cyclic AMP concentration following β₁ receptor stimulation
C. An increase in nitric oxide concentration following β₂ receptor stimulation
D. A decrease in cyclic AMP concentration following α₂ receptor stimulation
E. A decrease in acetylcholine release at vascular smooth muscle following α₂ receptor stimulation

28. The first drug to be isolated in pure form from a plant (in 1805):

A. Aspirin
B. Morphine
C. Acetylcholine
D. Curare
E. Amphetamine

29. \( \text{ED}_{50} \) Maximal Increase In Heart Rate

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose (mg/kg)</th>
<th>Heart Rate (beats/minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug A</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Drug B</td>
<td>5</td>
<td>75</td>
</tr>
</tbody>
</table>

In comparing Drugs A and B, we can say that:

A. Drug A has a greater potency and greater efficacy
B. Drug A has a lesser potency and greater efficacy
C. Drug A has a lesser potency and lesser efficacy
D. Drug A has a greater potency and lesser efficacy
E. Cannot compare potencies and efficacies from these data

30. The following is characteristic of changes in agonist action produced by competitive receptor antagonists:

A. Increase the \( \text{ED}_{50} \) and increase the efficacy
B. Decrease the \( \text{ED}_{50} \) and decrease the efficacy
C. Increase the \( \text{ED}_{50} \) and no change in the efficacy
D. Decrease the \( \text{ED}_{50} \) and increase the efficacy
E. No change in \( \text{ED}_{50} \) and decrease the efficacy

**END OF PHARMACOLOGY SECTION!**
BIO 273: PHARMACOLOGY

EXAM #1 ANSWER SHEET

NAME:

1. C
2. E
3. B
4. A
5. D
6. E
7. B
8. A
9. C
10. E
11. F
12. A
13. D
14. B
15. E
16. D
17. C
18. A
19. D
20. B
21. A
22. D
23. E
24. A
25. C
26. C
27. A
28. D
29. D
30. C

2 6 + 6 = 32

36