

BDS SECOND PROFESSIONAL EXAMINATION 2007
PHARMACOLOGY (SEQs)

Model Paper

Marks: 45

Time 2 hours 15 min

Total No. of SEQs 15

Note: 3 Marks for each question.

Q.1 Write down three important factors affecting bioavailability of a drug.

Topic Specification: General Pharmacology.

KEY:

Factors Influencing Bioavailability:

1. First-Pass metabolism: due to extensive metabolism of a drug while passing through walls of GIT and hepatic metabolic sites the unchanged form of that drug may be decreased in systemic circulation. **1**
2. Solubility of the drug: lipid soluble drugs are readily absorbed from the site of administration leading to increased plasma levels of the drug. **1**
3. Nature of the drug formulation: drug particle size, formulation, crystal polymorphism and presence of excipients can also influence the ease of dissolution and therefore alter the rate of absorption. **1**

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.2 Give three cardiovascular uses of Propranolol.

Topic Specification: Drugs Acting on Autonomic Nervous System.

KEY:

Cardiovascular uses of Propranolol:

1. Hypertension: used in mild to moderate hypertension. It lowers blood pressure initially by decreasing cardiac output. Later on blood pressure falls due to possible effects of decreased renin activity, sympathetic derive and vasodilation due to unknown reason. **1**
2. Ischemic Heart Diseases: by reducing cardiac load it decreases oxygen requirement of myocardium and thus useful in exertional angina. It is also useful in prophylaxis of second attack of myocardial infarction due to reduction of size of infarct and improvement of coronary circulation. **1**
3. Arrhythmias: useful in supraventricular arrhythmias and ventricular ectopics because it slows AV conduction velocity and increases its refractory period. **1**

Reference: Lippincott's Pharmacology, 3rd Ed.

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Model Paper

Q.3 What are the therapeutic uses of Barbiturates?

Topic Specification: Drugs Acting of CNS.

KEY:

Therapeutic Uses of Barbiturates:

1. Anesthesia: according to desired duration of action barbiturate is selected e.g. for induction of anesthesia the ultra-short-acting barbiturates such as thiopental are used. **1**
2. As Anticonvulsants: Phenobarbitone has been regarded as the drug of choice for treatment of recurrent febrile seizures in young children. It is also used in long-term management of tonic-clonic seizures, status epilepticus and eclampsia. **1**
3. As Anti-anxiety: Barbiturates have been replaced by benzodiazepines but may be used as mild sedatives to relieve anxiety, nervous tension and insomnia. They suppress REM sleep more than other stages. **1**

Reference: Lippincott's Pharmacology, 3rd Ed.

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Model Paper

Q.4 Classify Neuromuscular blocking agents.

Topic Specification: Skeletal Muscle Relaxants.

KEY:

Classification of Neuromuscular Blocking Agents:

Neuromuscular Blockers:

- | | | |
|-----------------------------|-----------------|----------|
| a. <u>Non-Depolarizing:</u> | Tubocurarine. | 2 |
| (upto 3 hrs.) | Cis-atracurium. | |
| | Metocurine. | |
| | Doxacurium. | |
| | Rocuronium. | |
| | Vecuronium. | |
| | Pancuronium. | |
| | Pipecuronium. | |
| b. <u>Depolarizing:</u> | | 1 |
| | Succinylcholin. | |
| | Decamethonium | |

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.5 What are the three dose-related therapeutic uses of Aspirin?

Topic Specification: Non-Steroidal Anti-inflammatory Drugs.

KEY:

Therapeutic Uses of Aspirin (Dose-Related):

1. Low-dose (less than 300mg/ day):

Anti-platelet Use: Aspirin in low doses inhibits platelet aggregation so is useful prophylactically to decrease the incidence of transient ischemic attack and unstable angina, etc. **1**

2. Intermediate Dose (2400mg/ day):

Antipyretic/ Analgesic Use: Aspirin inhibits PgE_2 at anterior hypothalamic regulatory center and at sub-cortical and peripheral inflammatory sites to reduce minor to moderate pain. **1**

3. High Dose (upto 4000mg/ day):

Anti-inflammatory Use: Aspirin irreversibly inhibits COX and reduces eicosanoid mediators and chemical mediators of kallikrein system. Thus it inhibits granulocyte adherence to damaged vasculature, stabilizes lysosomes and inhibits migration of polymorphonuclear leukocytes and macrophages into the site of inflammation. **1**

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.6 Give very briefly six pharmacological effects of Morphine?

Topic Specification: Opioid Analgesics and Antagonists.

KEY:

Pharmacological Effects of Morphine:

1. Analgesia: by raising pain threshold at the spinal cord levels and by altering the brain's perception of pain it can relieve severe constant pain. 1/2
2. Euphoria: by stimulating ventral tegmentum it produces a powerful sense of contentment and well-being. 1/2
3. Respiratory Depression: by reducing sensitivity of respiratory center neurons to carbon dioxide. 1/2
4. Cough-suppression: by suppressing cough-reflex. 1/2
5. Miosis: by stimulation of m & μ receptors present at oculomotor nerve nucleus leading to enhanced parasympathetic stimulation of iris. 1/2
6. Emesis: by direct stimulation of CTZ. 1/2

Note:

Other effects including on GIT (decreasing motility and increasing tone), spinal cord (Truncal rigidity by acting at supra spinal level), etc may also be awarded accordingly.

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.7 Classify local anesthetic agents according to duration of action.

Topic Specification: Local Anesthetics.

KEY:

Classification of Local Anesthetics:

I. Esters: **1 ½**

1. Short-Acting: Procaine.
2. Medium-Acting: Cocaine.
3. Long-Acting: Tetracaine.
4. Topically only: Benzocaine.

II. Amides: **1 ½**

1. Medium-Acting: Lidocaine.
Mepiracaine.
Prilocaine.
2. Long-Acting: Bupivacaine.
Etidocaine.
Ropivacaine.

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.8 What are the uses of Ketamine?

Topic Specification: General Anesthetics.

KEY:

1. In combination with intravenous and inhaled anesthetics Ketamine is popular as alternative to opioid analgesics. 1/2
2. For poor risk geriatric patients & high risk patients in cardiogenic or septic shock. 1/2
3. In low doses, for out-patient anesthesia in combination with propofol. 1/2
4. In children undergoing painful procedures like dressing changes of burn. 1/2
5. Currently Useful for: 1
 - Skin grafting in burn patients.
 - Superficial surgical procedures.
 - Operative procedures of ENT, Eye, Dental extractions.
 - Cervix-dilation by obstetricians.

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.9 Give the adverse effects of Heparin.

Topic Specification: Drugs Acting on Blood.

KEY:

Adverse Effects of Heparin:

1. Bleeding: major adverse effect especially in elderly women and patients with renal failure. **1**
2. Allergic Reactions: due to animal origin of heparin; increase loss of hair and reversible alopecia. **½**
3. Bone Defects: Osteoporosis, spontaneous fractures, mineralocorticoid deficiency. **½**
4. Heparin-induced Thrombocytopenia: in patients treated with unfractional heparin for about 7 days. Surgical patients are more at risk related to thrombotic events including venous thrombosis, occlusion of peripheral or central arteries. It appears due to immune response to heparin. **1**

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.10 What is the antiemetic mechanism of metoclopramide?

Topic Specification: Drugs Acting on GIT.

KEY:

Antiemetic Mechanism of Metoclopramide:

1. It inhibits vomiting centre at CTZ; primarily it blocks dopamine-2 receptor. **1 ½**
2. It appears to block 5-HT₃ receptors in the gut and CNS. **1**
3. It also inhibits afferent impulses from the gut. **½**

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.11 Write down the antimicrobial mechanism of Amoxicillin?

Topic Specification: Antimicrobial Agents

KEY:

Amoxicillin like all β -lactam antibiotics inhibit bacterial growth by interfering with the transpeptidation reaction of bacterial cell wall synthesis.

1

It covalently binds to the active site of Penicillin Binding Proteins; this inhibits the transpeptidation reaction, halting peptidoglycan synthesis and thus cell dies. The reason of cell death may be autolysins and disruption of cell wall morphology leading to sudden leakage of intracellular contents. **2**

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.12 What are the adverse effects and drug interactions of Aminoglycosides?

Topic Specification: Antimicrobials.

KEY:

($\frac{1}{2} \times 6 = 3$)

a) Adverse Effects of Aminoglycosides:

1. Ototoxicity: Auditory damage especially with Amikacin and Kanamycin; vestibular damage especially with Gentamicin and Tobramycin. It is usually dose related and may be irreversible. $\frac{1}{2}$
2. Nephrotoxicity: It is in the form of acute tubular necrosis; more common in elderly patients and with Gentamicin and Tobramycin. $\frac{1}{2}$
3. Neuromuscular Blockade: Rare and seen with high doses; reversible with calcium and neostigmine. $\frac{1}{2}$

b) Drug- Interaction of Aminoglycosides:

1. With Loop-Diuretics: Ototoxicity. $\frac{1}{2}$
2. Amphotericin-B, Cephalosporins, etc: Renal Toxicity. $\frac{1}{2}$
3. Skeletal Muscle Relaxants: Paralysis of Skeletal Muscles, may lead to respiratory paralysis. $\frac{1}{2}$

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.13 Enumerate important three uses of each:

- a. Nystatin.
- b. Methotrexate.

Topic Specification: Antifungal, Anticancer, Antivirals.

KEY:

Uses of:

a. Nystatin:

- i. Oro-pharangeal candidiasis. 1/2
- ii. Vaginal candidiasis. 1/2
- iii. Intertriginous candidal infections. 1/2

b. Methotrexate:

- i. Anticancer uses – choriocarcinoma, acute lymphocytic leukemia, non-Hodgkin's lymphomas. 1/2
- ii. Anti-inflammatory uses – Rheumatoid Arthritis, severe Psoriasis, Crohn's disease. 1/2
- iii. Immunosuppressive use – Graft-versus-host disease. 1/2

Reference: Lippincott's Pharmacology, 3rd Ed.

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Q.14 Enumerate six uses of Antiseptics & Disinfectants in Dental problems with one example each.

Topic Specification: Dental Pharmacology/ Antiseptic Disinfectants.

KEY:

Uses of Antiseptic & Disinfectants:

- | | |
|--|---|
| 1. Root Canal Debridement – Sodium Hypochlorite. | ½ |
| 2. Relief of Pulpal Pain – Eugenol. | ½ |
| 3. Plaque – disclosing – Iodine or Povidone-iodine. | ½ |
| 4. Tooth bleaching and wound cleansing – Hydrogen Peroxide (30%, 30%). | ½ |
| 5. Fixation of Biopsy Tissue – Formaldehyde (4%). | ½ |
| 6. Sore Throat – Phenol (0.5%). | ½ |

Reference: Pharmacology and Therapeutic for Dentistry by Yagiela, Dowd, Neidle 5th Ed.

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Q.15 Enumerate the drugs/ chemicals used in Root Canal Therapy.

Topic Specification: Dental Pharmacology / Desensitizing Agents

KEY:

Drugs/ Chemicals Used in Root Canal Therapy:

- a. For Irrigation: **1 ½**
1. Sodium hypochlorite (2.5%).
 2. Hydrogen peroxide (3%) or combination of both.
 3. Ethylene diaminetetra acetic acid.
- b. For Dressing: **1 ½**
1. Cresophene.
 2. Formocresol.
 3. Ledermix.
 4. Calcium Hydroxide paste.
 5. Septomixine.
 6. Miscellaneous drugs like camphorated Para Chlorophenol or with Penicillin, Quaternary Ammonium compound.

Reference: Pharmacology and Therapeutic for Dentistry by Yagiela, Dowd, Neidle 5th Ed.