PHARMACY INDIA

# MODEL PAPER

# B.PHARMA

# 5th SEMESTER

## PHARMACOLOGY-II

## (BP-503T)

# PHARMACOLOGY-II MODEL PAPER

## SECTION A

### VERY SHORT ANSWERS TYPE QUESTIONS (10 × 2 = 20)

**1. Define inotropic agents with suitable examples.**

**Answer**

- Inotropic agents, or inotropes, are medicines that change the force of your heart's contractions. There are 2 kinds of inotropes: positive inotropes and negative inotropes. Positive inotropes strengthen the force of the heartbeat. Negative inotropes weaken the force of the heartbeat.
- **Examples:** Digoxin, Milrinone, Dobutamine.

**2. Write the mechanism of action and uses of statins.**

**Answer**

**Statins**

**Mechanism of Action**

**Statins → Inhibits HMG-CoA reductase → decreases synthesis of cholesterol → decreases LDL**

**Uses**

1. HMG-CoA reductase inhibitors are the first-line drugs both for familial and secondary hyperlipidaemias as in diabetes mellitus.
2. Statins to be useful in lowering morbidity and mortality in patients with coronary heart disease.
3. They are used in patients with MI, angina, stroke and transient ischaemic attacks to lower cholesterol levels.

**3. Give example and uses of plasma volume expander.**

**Answer**

**Plasma Volume Expander**

- Plasma volume expanders (PVEs) are fluids given intravenously to increase or retain the volume of fluid in the circulatory system.
- **Examples –** Dextran, Hydroxyethyl starches, Polyvinylpyrrolidone.
- **Uses -** These are used as plasma substitutes in
  - hypovolaemic shock,
  - burns
  - extensive fluid loss—as an emergency measure to restore plasma volume.

**4. Write mechanism of action and uses of streptokinase.**

**Answer**

**Streptokinase**

**Mechanism of action**

- Proteolytic enzyme lysis of Streptodornase Parenteral nucleoproteins in dead cells and pus.

**Uses**

- Fibrinolytic
- Topically to liquefy clotted blood, pus and clear debris in chronic ulcers.

## 5. Write a short note on 5-HT antagonists.

**Answer**

### 5-HT Antagonist

| | | |
|---|---|---|
| Antagonist | $5HT_{2A}$ | Ketanserin ( Antihypertensive ), Cyproheptadine |
| | $5HT_{2A/2C}$ | Clozapine, methysergide ( used in migraine ) |
| | $5HT_3$ | Ondansetron<br>Granisetron ( choice for chemotherapy-induced vomiting ) |

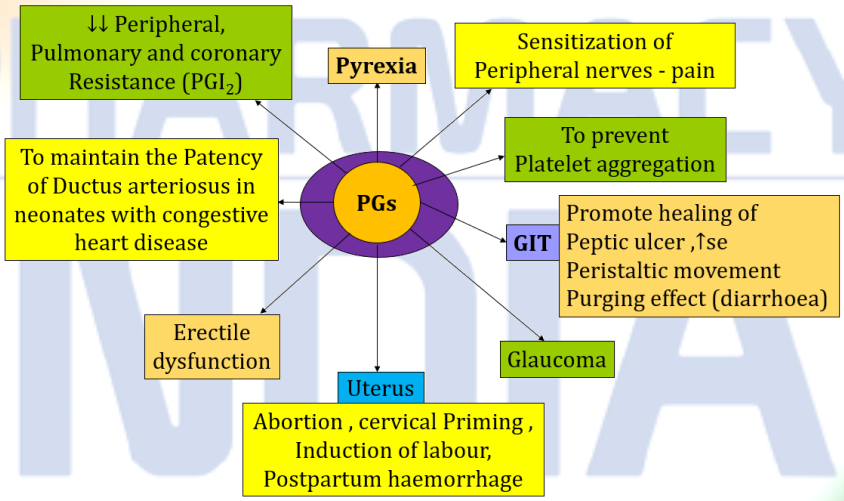
### Ketanserin

- $5HT_{2A}$ receptor antagonists also block $5HT_{2C}$ Receptor.
- Effective antihypertensive agents with mild effects-Dizziness, Lethargy, nausea and drymouth.

## 6. Write uses of prostaglandin analogues.

**Answer**

### Uses of Prostaglandin Analogues




## 7. Enlist hormones regulating plasma calcium level.

**Answer**

### Hormones regulating Plasma Calcium Level

1. Parathormone
2. Calcitonin
3. Vitamin D

## 8. How thyroid hormones play a crucial role in metabolism.

**Answer**

### Role of Thyroid Hormone in metabolism

These are catabolic hormones.

- **Lipid:** $T_4$ and $T_3$ indirectly enhance lipolysis by potentiating the action catecholamines and other lipolytic hormone.
- **Carbohydrate:** Carbohydrate metabolism is stimulated causes

hyperglycemia.

- **Protein Synthesis** of certain protein is increased but overall effect of T3, is catabolic-increase amount of protein being used as energy source.

**9. What do you mean by tocolytics?**

**Answer**

**Uterine Relaxants (Tocolytics):** These are drug which decrease uterine motility used to delay or postpone labour, arrest threatened abortion and in dysmenorrhoea.

**10. Highlight the advantages of multipoint bioassay.**

**Answer**

**Advantages of Multipoint Bioassay**

- Reduced error
- Reduced variability

## SECTION B

### LONG ANSWERS TYPE QUESTIONS (2 × 10 = 20)

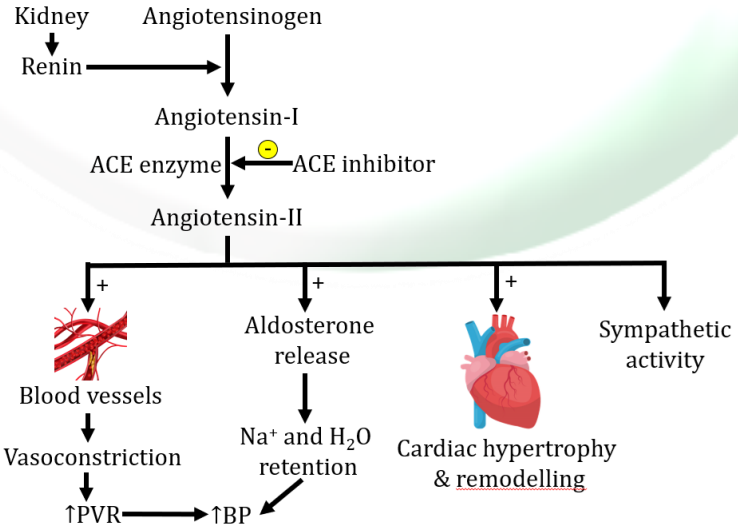
**1. Illustrate pharmacology of antihypertensive drugs and design drug therapy for management of hypertension during pregnancy.**

**Answer**

**Pharmacology of Antihypertensive Drugs**

**A. ACE Inhibitor**

- **Drug are:** Captopril, Enalapril, Lisinopril, Perindopril, Ramipril
- Frequently use on first line antihypertensive drugs.
- **Mechanism of action**
  - Inhibits the generation of angiotensin II resulting:
    - Dilation of arteries result in decreasing peripheral resistance (PVR) result in decrease BP.
    - Decrease aldosterone production cause decrease in $Na^+$ and $OH^-$ retention result in Decrease BP.
    - Decrease in sympathetic nervous system activity.




  - Inhibit degradation of **bradykinin** which is a potent vasodilator.

- Stimulate synthesis of **vasodilating prostaglandin** through **bradykinin**.

- **Pharmacokinetics**
  - ACE inhibitors are usually given orally.
  - Presence of food in stomach reduces the bioavailability of captopril (not by other ACE inhibitors).
- **Adverse effect** (Trick: CAPTOPRIL)
  - C = Cough (dry cough) due to increase bradykinin level in the lungs
  - A = Angioedema (swelling of lips)
  - P = Proteinuria
  - T = Teratogenic effect
  - O = Severe hypOtension
  - P = neutroPenia
  - R = Rashes
  - I = Itching
  - L = Loss of taste sensation[dysgeusia)

- **Drug interaction**
  - **ACE inhibitors X Potassium sparing diuretics:** Dangerous hyperkalemia
  - **ACE inhibitors X Lithium:** Retard renal elimination of lithium and potentiate toxicity.
  - **ACE inhibitors X NSAIDS:** Decrease the antihypertensive effect of ACE inhibitor by retaining water and salt
  - **ACE inhibitors X Antacid:** Reduce bioavailability of captopril.

- **Therapeutic uses**
  - Hypertension
  - Cardiac failure
  - Diabetic nephropathy
  - Myocardial infarction
  - Scleroderma crisis
  - Prophylaxis in high cardiovascular risk subjects

## B. Angiotensin Receptor Antagonist

- Drug are Losatran, Candesartan Irbesartan. Vakartan. Telmisartan
- The most prominent action of angiotensin II is vasoconstriction.
- The two types of angiotensin II receptors are $AT_1$ and $AT_2$ most of the action of angiotensin Il are mediated by $AT_1$ receptor.
- Angiotensin receptor blockers do not affect bradykinin production.
- **Pharmacokinetic**
  - Oral absorption of ARBS is not affected by food but oral bioavailability is 33% due first pass metabolism.
  - It is partially carbonylated in liver to an active metabolism (E3174).

- **Pharmacological action**
  - Vasocontraction.

- Central and peripheral sympathetic stimulation.
- Release of aldosterone, and adrenaline from adrenal gland.
- Salt and water retention.
- Central action like thirst, Vasopressin release and growth promoting action.

- **Advantages over ace inhibitors**
  - It does not inhibit bradykinin and thus no cause cough and angioedema.
  - It does not cause dysgeusia.
  - It does not cause first does hypotension.

- **Adverse effect**
  - Hypotension (but not first dose).
  - Hyperkalaemia.
  - Olmestetron is associated with sprue like syndrome characterized by nausea weight loss and abdominal pain.
- **Therapeutic use**
  - Hypertension
  - CHF
  - Myocardial infarction
  - Diabetic nephropathy

**Drug Therapy for the Management of Hypertension during Pregnancy**

- The antihypertensives found to be safe in pregnancy are methyldopa orally for maintenance and hydralazine parenterally for reduction of BP in emergencies.
- However, they should be used only after the first trimester.
- Dihydropyridine CCBs like nifedipine may be used but should be withdrawn during labour as they may inhibit uterine contractions.
- Other drugs like prazosin and clonidine can also be used.
- Cardioselective □-blockers like atenolol and acebutolol may be used in pregnancy but nonselective □-blockers should be avoided as they may reduce blood supply to the placenta leading to reduced size of the placenta and low birth weight.

**2. Classify NSAIDs and explain pharmacology of aspirin.**

**Answer**

| Class | Examples |
|---|---|
| **Nonselective COX inhibitors (traditional NSAIDs)** | |
| • **Salicylates** | Aspirin |
| • **Propionic acid derivatives** | Ibuprofen, Naproxen, Ketoprofen, Flurbiprofen |
| • **Fenamate** | Mephenamic acid |
| • **Enolic acid derivatives** | Piroxicam, Tenoxicam |
| • **Acetic acid derivatives** | Ketorolac, Indomethacin, Nabumetone. |
| • **Pyrazolone derivatives** | Phenylbutazone, Oxyphenbutazone |

| | |
|---|---|
| **Preferential COX-2 inhibitors** | Nimesulide, Diclofenac, Aceclofenac, Meloxicam, Etodolac |
| **Selective COX-2 inhibitors** | Celecoxib, Etoricoxib, Parecoxib |
| **Analgesic-antipyretics with poor anti-inflammatory action** | |
| • **Para-aminophenol derivative** | Paracetamol (Acetaminophen) |
| • **Pyrazolone derivatives** | Metamizol (Dipyrone), Propiphenazone |
| • **Benzoxazocine derivative** | Nefopam |

## Pharmacology of Aspirin

### Actions of Aspirin

1. **Analgesia:** Aspirin is a good analgesic and relieves pain of inflammatory origin. This is because PGs are formed during inflammation and they sensitize the tissues to pain and aspirin inhibits PG synthesis.
2. **Antipyretic action:** In presence of fever, salicylates bring down the temperature to normal level. But, in normal individuals, there is no change in temperature.
3. **Anti-inflammatory action:** At higher doses of 4–6 g/day, aspirin acts as an antiinflammatory agent.
4. **Respiration:** In therapeutic doses of 4–6 g/day, salicylates increase consumption of oxygen by skeletal muscles. As a result, there is increased CO2 production. This increased CO2 stimulates the respiratory centre.
5. **Metabolic effects:** Salicylates enhance the cellular metabolism due to uncoupling of oxidative phosphorylation. More of O2 is used and more CO2 is produced, especially in skeletal muscles, leading to increased heat production.
6. **Gastrointestinal tract:** Aspirin is a gastric irritant. Irritation of the gastric mucosa leads to epigastric distress, nausea and vomiting. Aspirin also stimulates the CTZ to produce vomiting.
7. **CVS:** In therapeutic doses, no significant cardiovascular effects are seen.
8. **Immunological effects:** In higher doses, salicylates suppress several antigen–antibody reactions including inhibition of antibody production, Ag–Ab aggregation and antigen-induced release of histamine.
9. **Blood:** Even in small doses, aspirin irreversibly inhibits platelet cyclo-oxygenase (acetylates COX) and thereby TXA2 synthesis by the platelets. It, therefore, interferes with platelet aggregation and prolongs the bleeding time.

### Pharmacokinetics

- Aspirin is rapidly deacetylated in gut wall liver, plasma and other tissue to release salicylic acid
- Both aspirin and salicylic acid are conjugated in liver with glycine → Salicyluric acid (major pathway) and with glucoronic acid.
- $t_{1/2}$ - 15 to 20 minute.

### Contraindication

- Contraindicated in peptic ulcer patients and asthmatic patients.

- Contraindicated in childrean suffering from chicken pox and influanza.
- Due to risk of Reye's Sydrome Aspirin is prohibited to pediatric formulation.
- If given during pregnancy it may be responsible for low weight baby.
- In liver disease hepatic necrosis have been reported.
- Possibility of premature closure of ductus arteriosus.
- Avoids high dose in G-6-PD deficient individual haemolysis can occur.

**Interaction**

- Aspirin antagonises the uricosuric effect of probencid
- Aspirin with oral anticoagulant Risk of bleeding.
- Blunt the diuretic effect of furesemide and thiazide.
- Aspirin complete with canrenone (active metabolite of spironolactone) for tubular secretion block effect
- **Benorylate** - An ester of Aspirin + Paracetamol Cause less gastric irritation and bleeding.
- **Diflunisal -** Fluorine Containing long acting salicylates.

**Uses**

1. Analgesic
2. Fever
3. Anti-inflammatory
4. Acute rheumatic fever
5. Osteoarthritis
6. Post-myocardial infraction and post stroke
7. Inflammatory bowel disease

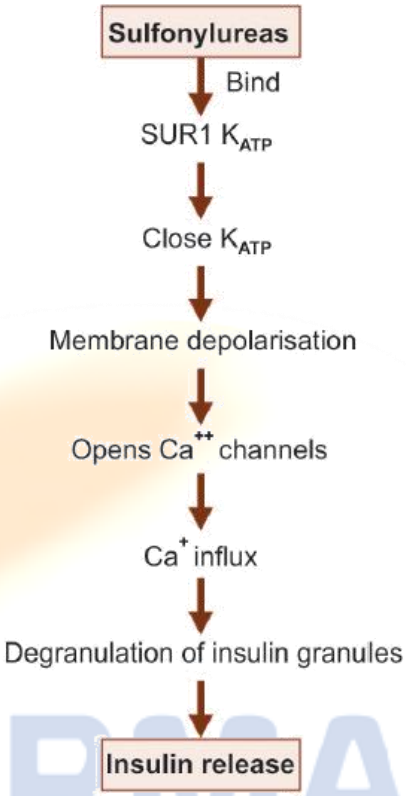
### 3. Explain pharmacology of oral hypoglycaemic agents.

**Answer**

**Pharmacology of Oral Hypoglycaemic Agents**

**SULFONYLUREA**

- Second generation are most potent than first generation agent.
- All of the cause hypoglycaemia (maximum with chlorpropamide)
- Chlorpropamide can cause dilution hyponatremia (ADH like action), cholestic jaundice and disulfiram like action.
- Gliclazide has additional antiplatelets action
- Sulfonyurea are contraindicated in liver and kidney disease (1" generation > 2 generation) failure due to risk of hypoglycemia.
- Due to its shorter duration of action Tolbutamide is safest in renal failure and other contraindication in pregnancy in Lactation.
- Tolbutamide - Shortest acting sulfonylurea ($t_{1/2}$ 6-8 hours)
- Chlopropamide -Longest action ($t_{1/2}$ 30-36 hours)
- Glyburide (Glibenclamide) has maximum insulinotropic potency whereas tolbutamide has least.
- **Mechanism of Action**




- **Interactions**

  Drug that enhance SU action (may be precipitate hypoglycaemia) are:
  - Displace from protein binding: Phenylbutazone. Sulfinpyrazone, Salicylates, Sulfonamide.
  - Inhibit metabolism / excretion: Cimetidine Ketoconazole Sulfonamide Warfarin Chloramphenicol Acute alcohol intake (also syngersis by causing hypoglycaemia)
  - Synergise with or prolong pharmacodynamics action: Salicylates, Propranolol sympatholytic antihypertensives lithium Theophylline. Alcohol (by gluconeogenesis)

- **Adverse Effects**
  - Hypoglycemia Lower risk with tolbutamide due to low potency and short duration of action.
  - Weight gain, Hypersensitivity, Teratogenic not safe during pregnancy
  - Chlorpropamide gives disulfiram like reaction.

**BIGUANIDES (AMPK activators)**

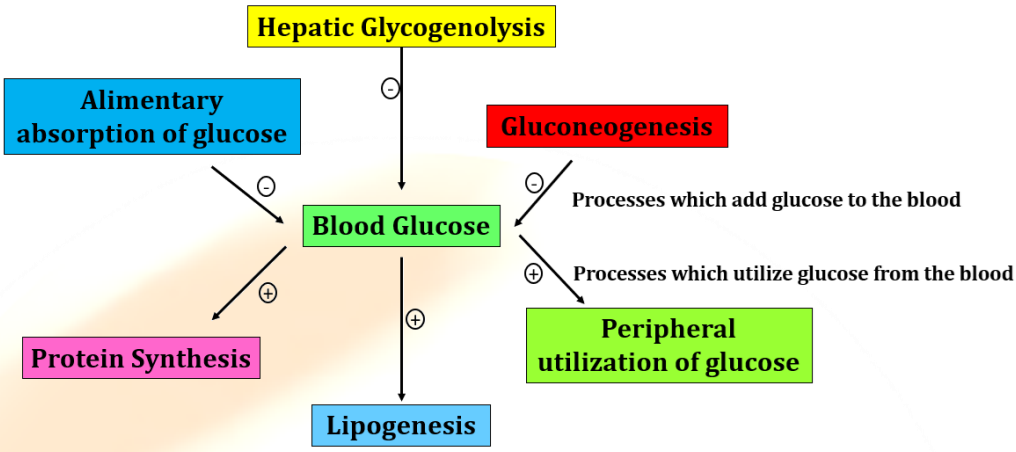
**Drugs:** Metformin, Phenformin

- Because of higher risk of lactic acidosis, Phenformin has been banned in India.
- Preferred for obese patient as these cause weight loss.

**Metformin:**

- It does not stimulate pancreatic ß cells

- Does not cause hypoglycaemia
- Improved lipid profile as well as type 2 diabetics
- It accumulates in renal failure and increase the risk of lactic acidosis.
- **Mechanism of action**




- **Adverse effects**
  - Lactic acidosis more common with Phenformin
  - Megaloblastic anaemia-more common with metformin due to B12 deficiency.

- **Contraindications**
  - Metformin contraindicated in renal insufficiency because of lactic acidosis.
  - Also not given with in hypotensive states, heart failure, severe respiratory /hepatic disease as well as alcoholic.

- **Uses**
  - Metformin is first choice drug for all type 2 Diabetes mellitus.
  - It is useful for polycystic ovarian disease (PCOD).

## SECTION C

### SHORT ANSWERS TYPE QUESTIONS (5 × 7 = 35)

**1. Classify anti-arrhythmic drugs and discuss the role of digitalis in arrhythmia.**

**Answer**

**Classification of Anti-arrhythmic Drugs**

| CLASSES | DRUGS |
|---|---|
| Class I - Sodium Channel Blocker | **Class IA (Prolong repolarization)-** Quinidine, Procainamide, Disopyramide |
| | **Class IB (Shorten repolarization)-** Lidocaine, Mexiletine |

| | |
|---|---|
| | **Class IC (Little effect on repolarization) -** Flecainide, Propafenone |
| **Class II – Beta Adrenergic Blockers** | Propanolol, esmolol, sotalol |
| **Class III – K+ Channel Blockers** | Amiodarone, dronedarone, vernakalant, bretylium, sotalol, dofetilide, ibutilide. |
| **Class IV – Calcium Channel Blockers** | Verapamil, Diltiazem |
| **Miscellaneous** | **Purine nucleotide:** Adenosine |

**Role of Digitals in Arrhythmia**

1. **Atrial fibrillation:**
   - Digitalis reduces ventricular rate in atrial fibrillation depressing the velocity of AV conduction.
   - It enhances the ERP of the AV node. Thus the number of impulses reaching the ventricles from the atrium are reduced which means ventricular rate is reduced.
   - The vagal tone is also increased. The effect is dose dependent and, therefore, the dose should be adjusted to get the required ventricular rate (70–80/min).
   - A beta blocker or verapamil may be added which also help to reduce the dose of digoxin needed.

2. **Atrial flutter:**
   - Atrial rate of 200–350/min is atrial flutter.
   - Digoxin slows the AV conduction and produces a degree of AV block by increasing the ERP of the AV node.
   - It thus reduces the ventricular rate as in atrial fibrillation.
   - Cardioversion and radiofrequency ablation may also be employed to abolish atrial flutter but prevention of recurrence can be done with digoxin.

3. **Paroxysmal supraventricular tachycardia (PSVT):**
   - Reentry in the SA and AV nodes is responsible for supraventricular tachyarrhythmia.
   - Digoxin can be used IV to terminate these arrhythmias and in AV nodal tachycardia.
   - Because of its vagomimetic effects and depression of AV conduction, digitalis is useful in these arrhythmias.
   - However, adenosine, verapamil and diltiazem are the preferred drugs in PSVT.

**2. Classify anti-coagulants. Discuss mechanism of action and uses of heparin.**

**Answer**

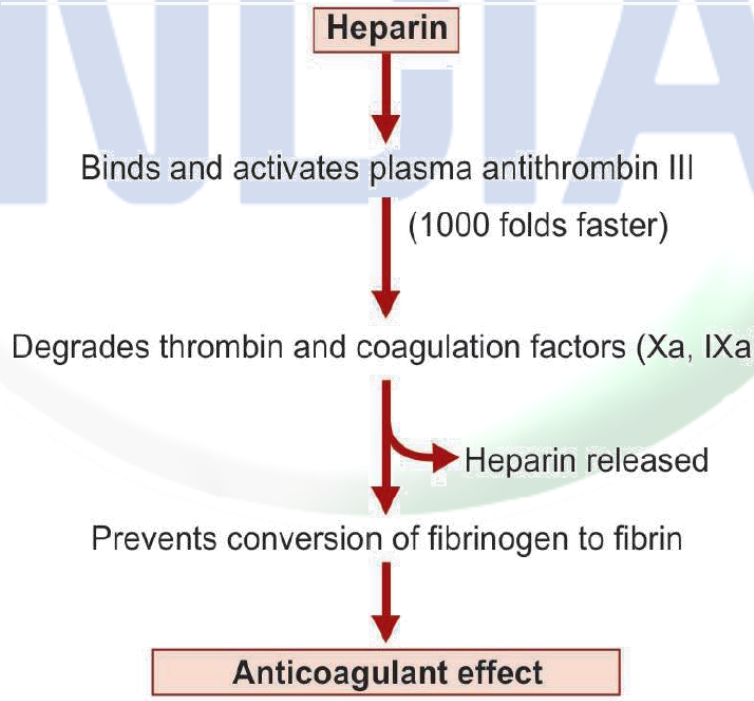
**Classification of Anti-coagulants**

| Use | Class | Sub-class | Drugs |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Used in vivo** | **Parenteral anticoagulants** | **Indirect thrombin inhibitors** | Heparin, Low molecular weight heparins, Fondaparinux, Danaparoid |
| | | **Direct thrombin inhibitors** | Lepirudin, Bivalirudin, Argatroban |
| | **Oral anticoagulants** | **Coumarin derivatives** | Bishydroxycoumarin (dicumarol), Warfarin sod, Acenocoumarol (Nicoumalone), Ethylbiscoumacetate |
| | | **Indandione derivative** | Phenindione |
| | | **Direct factor Xa inhibitors** | Rivaroxaban |
| | | **Oral direct thrombin inhibitor** | Dabigatran etexilate |
| **Used in vitro** | Heparin | | |
| | **Calcium complexing agents** | Sodium citrate | |

## Heparin

### Mechanism of Action




### Uses

- LMW heparins are used in the prevention and treatment of venous thrombosis and pulmonary embolism.

- They are also useful in unstable angina and to maintain the patency of tubes in dialysis patients.

### 3. Classify diuretics and describe the pharmacology of loop diuretics.

**Answer**

**Classification of Diuretics**

| Class | Sub-class | Drugs |
|---|---|---|
| High efficacy diuretics (Inhibitors of $Na^+$-$K^+$-$2Cl^-$ cotransport) | Sulphamoyl derivatives | Furosemide, Bumetanide, Torasemide |
| | Phenoxyacetic acid derivatives | Ethacrynic acid |
| | Organomercurials | Mersalyl |
| Medium efficacy diuretics (Inhibitors of $Na^+$-$Cl^-$ symport) | Benzothiadiazines (thiazides) | Hydrochlorothiazide, Benzthiazide, Hydroflumethiazide, Bendroflumethiazide |
| | Thiazide like (related heterocyclics) | Chlorthalidone, Metolazone, Xipamide, Indapamide, Clopamide |
| Weak or adjunctive diuretics | Carbonic anhydrase inhibitors | Acetazolamide |
| | Potassium sparing diuretics (TRICK → SEAT) | **Aldosterone antagonist:** Spironolactone, Eplerenone |
| | | **Inhibitors of renal epithelial Na+ channel:** Triamterene, Amiloride |
| | Osmotic diuretics (TRICK → MUG I) | Mannitol, Urea, Isosorbide, Glycerol |
| | Xanthine's | Theophylline |

**Pharmacology of Loop Diuretics**

**Frusemide (Furosemide)**

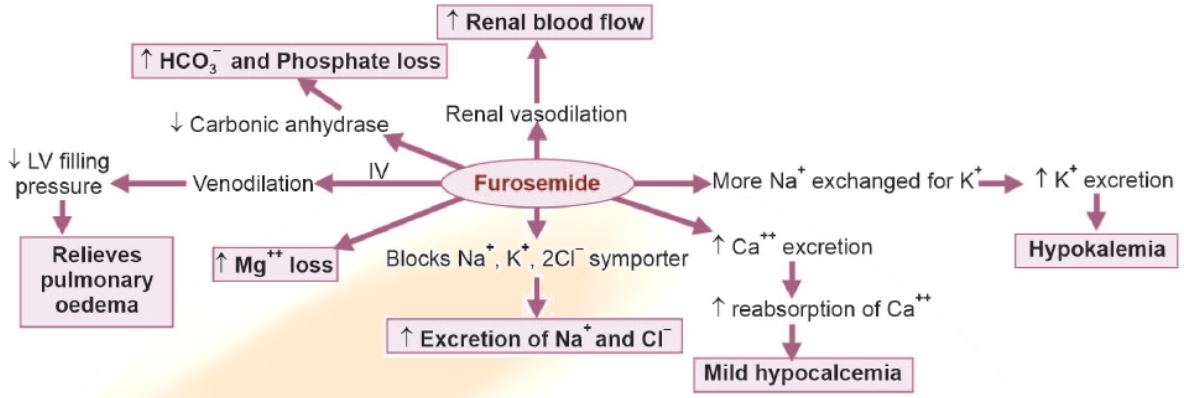
- Frusemide a sulfonamide derivative, is the most popular loop diuretic. It is a powerful diuretic.

**Therapeutic Uses of Loop Diuretics**

1. Initial stages of renal and cardiac oedema.
2. Hypercalcaemia
3. Acute pulmonary oedema
4. Cerebral oedema

5. Hypertension

## Actions




## Mechanism of Action

- Frusemide acts by inhibiting $Na^+$-$Cl^-$ reabsorption in the thick ascending limb of the Henle's loop.
- It blocks the $Na^+$, $K^+$, $2Cl^-$ symporter in the thick ascending limb of the Henle's loop because of which it is called a loop diuretic.
- It greatly increases the excretion of Na+ and Cl– in the urine

## Adverse Effects of Loop Diuretics

1. Hypokalaemia
2. Hyponatraemia
3. Hypocalcaemia and hypomagnesaemia
4. Hyperglycaemia
5. Hyperuricaemia
6. Hyperlipidaemia
7. Ototoxicity

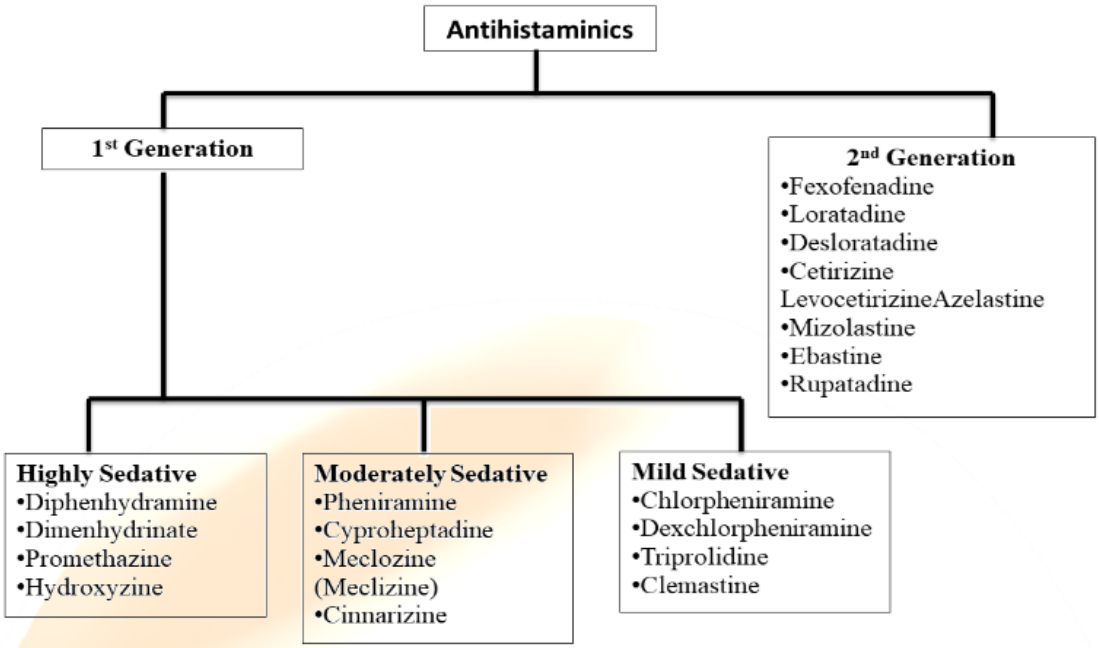
## Drug Interactions

1. Furosemide/Thiazides X digoxin: These diuretics cause hypokalaemia which increases the binding of digoxin to $Na^+$ - $K^+$ - ATPase leading to digoxin toxicity.
2. Furosemide X aminoglycosides: Both are ototoxic drugs and cause enhanced toxicity when used together.
3. Furosemide X nonsteroidal anti-inflammatory drugs: Nonsteroidal anti-inflammatory drugs (NSAIDs) inhibit PG synthesis and block prostaglandin mediated haemodynamic changes of loop diuretics.

**4. Classify H1 receptor antagonist. Give a comparative note on 1st and 2nd generation anti-histamines.**

**Answer**

**Classification of H1 Receptor Antagonist**




## Comparative Note on 1st and 2nd generation Anti-histamines

| Site of action | Pharmacological actions | | |
|---|---|---|---|
| **Antagonism of histamine** | They effectively block histamine induced **bronchoconstriction, contraction of intestinal and other smooth muscle and triple response**—especially wheal, flare and itch. | | |
| **Antiallergic action** | • Many manifestations of immediate hypersensitivity (type I reactions) are suppressed. Urticaria, itching and angioedema are well controlled.<br>• **Anaphylactic fall in BP** is only **partially prevented**. | | |
| **CNS** | • The older antihistamines produce **variable degree of CNS depression.**<br>• This appears to depend on the compound's ability to penetrate the blood-brain barrier and its affinity for the central (compared to peripheral) H1 receptors. | | |
| **Anticholinergic action** | Many H1 blockers in addition **antagonize muscarinic actions of ACh**. The anticholinergic action can be graded as: | | |
| | **High**<br>Promethazine<br>Diphenhydramine<br>Dimenhydrinate<br>Pheniramine | **Low**<br>Chlorpheniramine<br>Hydroxyzine<br>Triprolidine<br>Cyproheptadine | **Minimal/Absent**<br>Fexofenadine<br>Astemizole<br>Loratadine<br>Cetirizine<br>Mizolastine |
| **Local anaesthetic** | Some drugs like pheniramine, promethazine, diphenhydramine have strong while others have weak membrane stabilizing property. | | |
| **BP** | Most antihistaminics cause a fall in BP on i.v. injection (direct smooth muscle relaxation or α adrenergic blockade as in promethazine). | | |

**5. Outline the pharmacology of glucocorticoids.**

**Answer**

**Pharmacology of Glucocorticoids**

**Pharmacological Actions**

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## 1. Mineralocorticoid Action

- It acts in DCT of the kidney to cause reabsorption of $Na^+$ and excretion of $K^+$ and $H^+$
- Excess of mineralocorticoids can lead to retention of Na+ and water causes hypertension.

## 2. Glucocorticoid Action

### a. Effect on metabolism

**Carbohydrate:**

- Glucocorticoids promote glycogen deposition in liver by inducing hepaticglycogen synthase and promoting gluconeogenesis.
- They inhibit glucose utilization by peripheral tissue.
- Breakdown of carbohydrate leads to hyperglycemia.

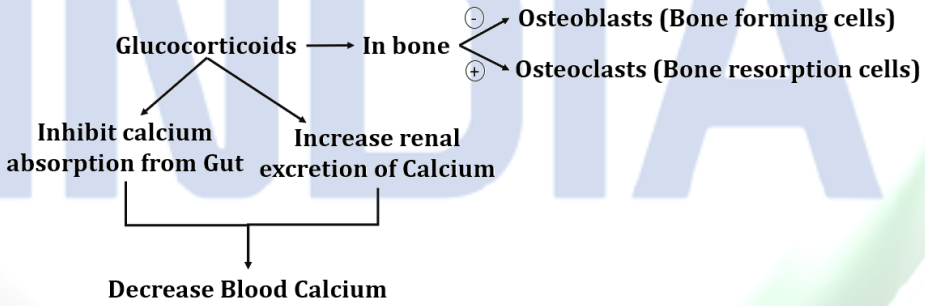
**Fat**

- They promote lipolysis due to glucagon, a growth hormone. Adr and thyroxine cAMP induced breakdown of triglyceride is enhanced
- Redistribution of fats resulting in over face (Moon face) Neck (Buffalo hump), Mouth (Fish mouth).

**Protein**

- Muscle wasting, negative nitrogen balance.
- Redistribution of body fat that is deposited over the neck, face, shoulder etc.

### b. Calcium metabolism




### c. CVS

- Restrict capillary permeability, maintain tone of arterioles and myocardial contractility.

### d. Skeletal muscles

- Hypocorticism: Diminished work capacity and weakness are primarily due to hypodynamic circulation.
- Hypercorticism: Excess mineralocorticoid action produce Hypokalemia and weakness.

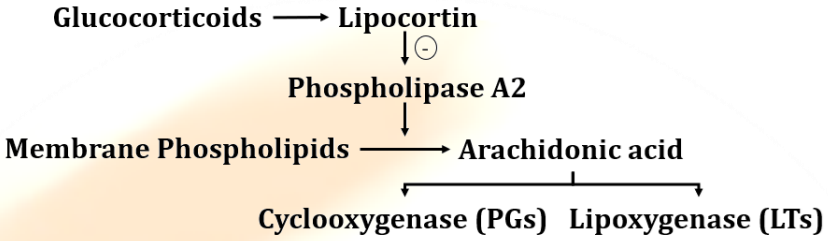
### e. GIT

- Secretion of gastric acid and pepsin increased and aggravate gastric ulcer

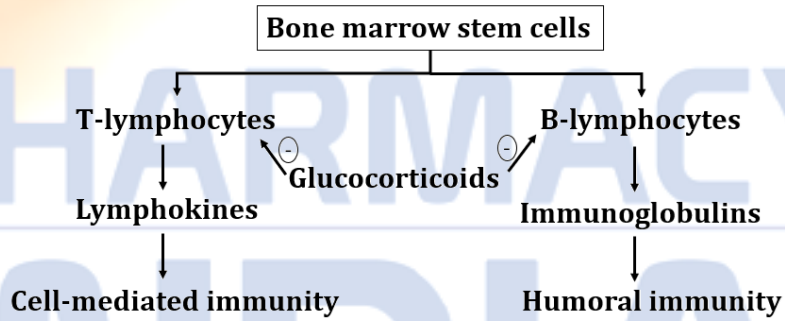
### f. Blood

- Decrease in lymphocyte.
- Eosinophils, Basophil and Monocytes therefore used in lymphomas and leukemias and Increase the number of RBCs, platelets and neutrophils in circulation.

### g. Anti-inflammatory effect




### h. Immunosuppressants




### Uses

1. Collagen disease
2. Severe allergic reaction
3. Autoimmune disease
4. Bronchial asthma
5. Infective disease
6. Eye diseases
7. Skin disease
8. Intestinal disease
9. Nausea and vomiting
10. Malignancies
11. Septic shock
12. Thyroids storm
13 Organ transplantation and skin allograft

## 6. Describe the principle and application of bioassay.

**Answer**

**Principle of Bioassay**

- The basic principle of bioassay is to compare the test substance with the

international standard preparation of the same and to find out how much test substance is required to produce the same biological effect, as produced by the standard. The followings are the principles of bioassay:

1. All bioassays (lab studies, toxicity studies, clinical studies) must be comparative & compared against a standard drug or preparation. The potency of biologically assayed compounds is compared with the activity of internationally accepted standards.
2. The standard and new drugs should be as far as possible identical to each other, then their dose response curve (DRC) will have the same stop and would be constant all along the response level.
3. The biological response should be closely related to the therapeutic use of the drug as possible. For example, in estimating the potency of insulin, blood glucose levels would be of the ideal index, but the method commonly used is the mouse convulsion method, in which the
4. % of animals developing convulsions are recorded. Similarly for estimating digitaloid drug, the arrest of heart in pigeon or guinea pig is used as end point which is as the toxic effect of the drug and not the therapeutic effect.
5. An estimate of relative potency is made by comparing the log dose of the test and the log dose of the standard that produces an equal magnitude of effect.
6. The problem of biological variation must be minimized as far as possible. For that one should keep uniform experimental conditions and assure the reproducibility of the responses. The results of the test should be subjected to statistical analysis to minimize errors due to biological variations.

**Applications**

1. To standardize drugs of natural origin, especially when the chemical identity of the active has not been elucidated fully. e.g. parathyroid hormones, antitoxins etc.
2. To standardize those drugs from which no adequate chemical assay has been devised even though the chemical structure of the active principle has been established. e.g. hormones like insulin, oxytocin etc.
3. To standardize the drugs which are composed of a complex mixture of substances varying structure and activity. e.g. digitalis, posterior pituitary extract etc.
4. If the chemical assay is not a valid indication of the biological activity, e.g. due to lack ofdifferentiation between active and inactive isomers.
5. To standardize when the drugs have same pharmacological actions but different chemical structures existing together. e.g. glycosides in digitalis preparation.
6. To estimate the dose of a drug required to produce a therapeutic or toxic response. e.g.calculation of ED50, LD50 etc.
7. When the physical property of rotation (dextro or levo) shows difference in action. e.g. d-Chloramphenicol is active. Levo adrenaline is 80 times more active than dextro.

**7. Discuss pharmacology of oral contraceptives.**

**Answer**

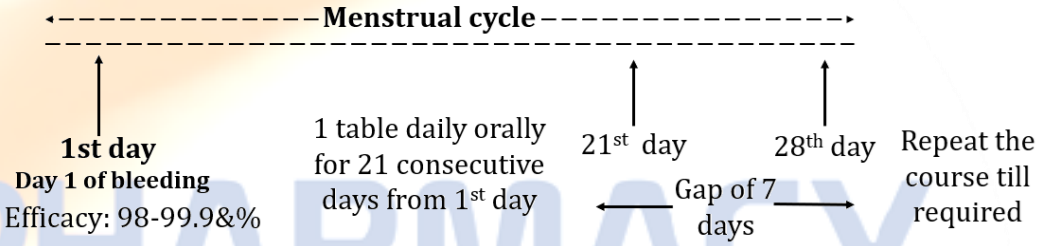
# PHARMACOLOGY-II MODEL PAPER

## Pharmacology of Oral Contraceptives

### Oral Pills

### 1. Combined oral contraceptive pills

- It contains an Estrogen and Progestin.
- Most effective and popular method.
- One tablet is taken daily for 21 days, starting on 5th day of menstruation. The next course is started after gap of 7 days in which bleeding occurs.
- Combined OCPs may be:
  - ✓ Monophasic: Content of estrogen and progesterone remain same in all the pills (for 21 Days).
  - ✓ Biphasic: Content of progesterone is different in pills for first 10 days and that for 11-21 days.
  - ✓ Triphasic: Content of progesterone is gradually increased

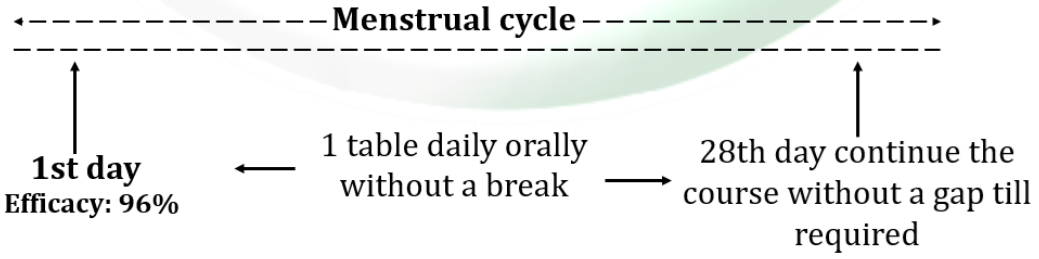



### 2. Phased pill:

- Triphasic regiment introduced to permit reduction in total steroid dose without compromising efficacy by mimicking in the normal hormonal pattern in a menstrual.
- Dose in gradually increases in respectively First, second and third phase.
- Phasic pills are particularly recommended for woman over 35 years of age.

### 3. Progestin only pills (Mini-pill)

- It has devised to eliminate the estrogen, because many of the long-term risks have been described to this component.
- A low dose progestin pills is taken daily without any gap.
- Preparation Norethindrone or Norgestrel.
- They efficacy is lower (96-98%) compared to (98-99.9%) with combined pills.




### 4. Emergency pills (Postcoital pills)

- These are for use in woman not taking any contraceptive who had a sexual intercourse risking unwanted pregnancy.
- Drugs that can be sued as emergency pills are levonorgestrel ethinylestradiol

and Mifepristone.

- Levonorgestrel alone 0.75 mg taken twice with 12 hour gap within 72 hours of unprotected intercourse.
- Mifepristone 600 mg single dose within 72 hours of unprotects intercourse.
- Ulipristal 30 mg single dose as soon as possible but within 120 hours of intercourse.