PHA311: PHARMACODYNAMICS AND CHEMOTHERAPY I

DEPARTMENT-NURSING

LECTURER: PHARMACIST EBUBE SAMUEL I.

YEAR: 2025

PHARMACOLOGY: BASIC PRINCIPLES AND USES OF DRUGS

1. Definition of Pharmacology

Pharmacology is the scientific study of drugs, their origin, composition, effects, mechanisms of action, and therapeutic uses on living organisms.

Drug: Any substance that, when taken into a living organism, alters its physiological functions.

Therapeutics: The branch of medicine concerned with the use of drugs to prevent and treat diseases.

2. Branches of Pharmacology

Branch	Description	Example
Pharmacokinetics	Study of what the body does to the drug — absorption, distribution, metabolism, excretion (ADME)	How paracetamol is absorbed and excreted
Pharmacodynamics	Study of what the drug does to the body — mechanism of action and effects	How beta-blockers lower blood pressure
Pharmacotherapeutics	Application of drugs in treatment of diseases	Use of insulin in diabetes
Toxicology	Study of harmful effects of drugs	Lead poisoning
Clinical Pharmacology	Study of drugs in humans — safety, efficacy, dosing	Drug trials in patients
Chemotherapy	Use of chemicals to destroy microorganisms or cancer cells	Use of antibiotics, anticancer drugs
Pharmacognosy	Study of drugs from natural sources	Plant-based drugs like quinine

3. Pharmacodynamics And Pharmacokinetics

Introduction

Pharmacology is divided into two major branches:

Pharmacokinetics – What the body does to the drug

Pharmacodynamics – What the drug does to the body

Understanding both helps determine the right drug, dose, and route to achieve maximum benefit with minimal side effects.

Pharmacokinetics (ADME)

Definition:

Pharmacokinetics is the study of the absorption, distribution, metabolism, and excretion (ADME) of drugs in the body.

It describes how drug concentration changes over time in different body compartments.

A. Absorption

Definition:

The process by which a drug moves from its site of administration into the bloodstream.

Factors affecting absorption:

- Route of administration (IV > IM > Oral > Topical)
- Blood flow to absorption site
- Drug solubility and formulation
- pH and ionization (lipid-soluble drugs absorb faster)
- Presence of food (some drugs absorb better on empty stomach)

Examples:

Oral paracetamol → absorbed from small intestine

IM injection → absorbed into systemic circulation

B. Distribution

Definition:

The transport of a drug through the bloodstream to tissues and organs.

Factors affecting distribution:

- Blood flow to tissues
- Plasma protein binding (only free drug is active)
- Permeability of tissue barriers (e.g. blood–brain barrier)
- Lipid solubility

Examples:

Lipid-soluble drugs (e.g. diazepam) cross the blood–brain barrier easily

Protein-bound drugs (e.g. warfarin) stay longer in circulation

C. **Metabolism (Biotransformation)**

Definition:

The chemical alteration of drugs in the body, mainly in the liver, to make them easier to excrete.

Phases:

1. Phase I (Functionalization):

Oxidation, reduction, hydrolysis

Involves cytochrome P450 enzymes

Example: Codeine → Morphine

2. Phase II (Conjugation):

Drug combines with polar molecules (e.g. glucuronic acid)

Forms inactive, water-soluble metabolites

Results of metabolism:

Drug inactivation

Activation of prodrugs (e.g. enalapril → enalaprilat)

Detoxification or sometimes toxic metabolites

D. Excretion

Definition:

Removal of drugs or metabolites from the body.

Main routes:

Kidneys (urine) – most common

Liver (bile/feces)

Lungs (volatile substances like anesthetics)

Sweat, saliva, and breast milk (minor)

Examples:

Penicillin → excreted in urine

Chloroquine → excreted slowly through kidneys

Summary of Pharmacokinetics (ADME):

Process	**Main Organ**	**Example**
Absorption	GIT, skin, muscle	Oral Paracetamol
Distribution	Blood & tissues	Diazepam → brain
Metabolism	Liver	Codeine → Morphine
Excretion	Kidneys	Penicillin → urine

3. **Pharmacodynamics**

Definition:

Pharmacodynamics is the study of biochemical and physiological effects of drugs and their mechanisms of action on the body.

In essence, it explains how drugs produce their effects.

MECHANISMS OF DRUG ACTION

1. Receptor Interaction:

Drugs bind to specific receptors on cells to produce effects.

Agonists → activate receptors (e.g. Adrenaline on β-receptors)

Antagonists → block receptors (e.g. Propranolol blocks β-receptors)

2. Enzyme Interaction:

Drugs can inhibit or activate enzymes.

Example: Aspirin inhibits COX enzyme → reduces prostaglandins (pain relief)

3. Ion Channel Action:

Drugs block or open ion channels in membranes.

Example: Calcium channel blockers (e.g. Amlodipine)

4. Non-Specific Actions:

Some drugs act through physical or chemical means.

Example: Antacids neutralize stomach acid

Osmotic diuretics increase urine output by altering osmotic balance.

DOSE–RESPONSE RELATIONSHIP

Describes how the response to a drug changes with increasing dose.

Threshold dose: Minimum amount needed to produce effect

Ceiling effect: Maximum effect beyond which no further response occurs

POTENCY AND EFFICACY

Term	Meaning	Example
Potency	Amount Of Drug Needed To Produce Effect	Morphine Is More Potent Than Codeine
Efficacy	Maximum Effect A Drug Can Produce	Paracetamol Has Lower Efficacy Than Morphine

THERAPEUTIC INDEX (TI)

Ratio of toxic dose to effective dose (TD_{50} / ED_{50})

A higher TI means a safer drug.

Example: Penicillin (high TI) vs. Digoxin (low TI)

RELATIONSHIP BETWEEN PHARMACOKINETICS AND PHARMACODYNAMICS

Both are interrelated:

Pharmacokinetics determines how much drug reaches its site of action.

Pharmacodynamics determines what effect that drug produces once it gets there.

For example:

IV Morphine → Rapid absorption (PK) → Pain relief via receptor activation (PD)

5. **SUMMARY TABLE**

Aspect	**Pharmacokinetics**	**Pharmacodynamics**
Definition	What the body does to the drug	What the drug does to the body
Focus	ADME – Absorption, Distribution, Metabolism, Excretion	Mechanism of action, effects
Main Organs	GIT, Liver, Kidneys, Blood	Target organs or tissues
Examples	Paracetamol metabolism in liver	Paracetamol reduces fever via hypothalamus
Importance	Determines dosage and duration	Determines drug efficacy and safety

3. Basic Principles of Pharmacology

A. Pharmacokinetics (ADME)

1. Absorption: How a drug enters the bloodstream

Depends on route (oral, IV, IM, topical)

Example: Oral drugs absorbed through the intestine

2. Distribution: How a drug moves through body tissues and fluids.

Affected by blood flow, plasma proteins, and tissue permeability

3. Metabolism (Biotransformation)

Conversion of drug into metabolites (active or inactive)

Mainly occurs in the liver

Example: Codeine → Morphine

4. Excretion:

Removal of drug/metabolites from the body

Mainly via kidneys, also bile, lungs, sweat, saliva

B. Pharmacodynamics

Describes how drugs act on the body to produce effects.

Most drugs act by:

1. Receptor binding (e.g. adrenaline on β-receptors)

2. Enzyme inhibition (e.g. aspirin inhibits COX enzyme)

3. Ion channel blockage (e.g. calcium channel blockers)

4. Non-specific actions (e.g. osmotic diuretics)

Dose-response relationship: Higher doses → stronger effects, until a maximum response.

Uses Of Drugs

Drugs are used for various purposes in healthcare:

Use	**Explanation**	**Example**
Therapeutic	To treat or cure diseases	Antibiotics for infections
Prophylactic	To prevent diseases	Antimalarials
Diagnostic	To aid in diagnosis	Contrast media in X-rays
Palliative	To relieve symptoms without curing	Morphine for cancer pain
Replacement therapy	To replace deficient substances	Insulin for diabetes
Curative	To completely eliminate cause of disease	Penicillin for bacterial infection
Suppressive	To control chronic infections	Antitubercular drugs
Research	To study physiological processes	Experimental drugs in lab

		studies

5. Factors Affecting Drug Action

Factor	**Effect**
Age	Children And Elderly Need Smaller Doses
Body Weight	Dosing Often Adjusted Per Kg
Sex	Hormonal Differences Affect Metabolism
Route Of Administration	Iv Acts Fastest; Oral Is Slower
Disease State	Liver Or Kidney Disease Slows Excretion
Drug Interactions	Some Drugs Enhance Or Inhibit Others
Genetic Factors	Influence Metabolism (E.G. Slow Acetylators)

6. **Summary Table**

Concept	**Description**
Pharmacology	Study of drugs and their effects
Pharmacokinetics	What the body does to the drug (ADME)
Pharmacodynamics	What the drug does to the body
Uses of drugs	Therapeutic, prophylactic, diagnostic, etc.
Major sites of action	Receptors, enzymes, ion channels
Elimination organs	Liver and kidneys

Drug Derivation, Sources, and Classification

1. Introduction

Drugs are chemical substances that modify the functions of living organisms. They are used in the prevention, diagnosis, treatment, or cure of diseases. Understanding how drugs are derived, their sources, and how they are classified helps in appreciating their development and clinical use.

2. Drug Derivation

Drug derivation refers to the process of obtaining or developing drugs from various origins through natural extraction, chemical synthesis, or biotechnology.

Drugs may be:

- Naturally derived (from plants, animals, or minerals)
- Semi-synthetic (natural compounds chemically modified to improve their properties)
- Synthetic (completely man-made in the laboratory)
- Biotechnological (produced using genetic engineering or recombinant DNA technology)

Examples:

- Natural: Morphine (from opium poppy)
- Semi-synthetic: Amoxicillin (from penicillin nucleus)
- Synthetic: Paracetamol, Ibuprofen

- Biotechnological: Insulin (human recombinant DNA form)

3. Sources of Drugs

Drugs are obtained from various sources, classified as follows:

A. Plant Sources

Many early drugs were derived from plants. Active constituents include alkaloids, glycosides, tannins, volatile oils, etc.

Examples:

Morphine – Papaver somniferum (opium poppy)

Atropine – Atropa belladonna

Quinine – Cinchona bark

Digoxin – Digitalis purpurea

B. Animal Sources

Animals provide hormones, enzymes, and other biological substances.

Examples:

Insulin – pancreas of pigs and cows (now mostly synthetic)

Heparin – intestinal mucosa of pigs

Thyroxine – thyroid gland of animals

C. Mineral Sources

Inorganic elements and salts are used therapeutically.

Examples:

Ferrous sulfate – source of iron

Magnesium sulfate – laxative

Zinc oxide – topical astringent

Sodium chloride – electrolyte replacement

D. Microbial Sources

Microorganisms produce antibiotics and other metabolites.

Examples:

Penicillin – Penicillium notatum

Streptomycin – Streptomyces griseus

Erythromycin – Streptomyces erythraea

E. Synthetic and Semi-synthetic Sources

Many modern drugs are produced synthetically for better purity, potency, and stability.

Examples:

Paracetamol – synthetic analgesic

Ampicillin – semi-synthetic derivative of penicillin

F. Biotechnological Sources

Recombinant DNA and genetic engineering techniques are used to produce proteins, hormones, and vaccines.

Examples:

Human insulin – by E. coli through recombinant DNA

Monoclonal antibodies – for cancer and autoimmune diseases

Vaccines – Hepatitis B, HPV

Source	Examples	Remarks
Plants	Atropine, Digoxin, Morphine	Alkaloids, glycosides, tannins, resins
Animals	Insulin, Thyroxine, Heparin	Hormonal or enzymatic origin
Minerals	Iron, Sulfur, Iodine	Inorganic compounds
Microbes	Penicillin, Streptomycin	Antibiotics and enzymes
Synthetic / Chemical	Paracetamol, Aspirin	Cheap and stable
Biotechnology / Recombinant DNA	Insulin analogues, vaccines	High specificity, costly
Marine Sources	Ziconotide (cone snail toxin)	Novel bioactive compounds

3. CLASSIFICATION OF DRUGS

Drugs can be classified in several ways:

A. Based on Source

Plant-based (e.g. Quinine)

Animal-based (e.g. Insulin)

Mineral-based (e.g. Iron)

Synthetic (e.g. Aspirin)

B. Based on Action (Pharmacological Classification)

Analgesics (Pain relievers)

Antipyretics (Fever reducers)

Antibiotics (Kill or inhibit bacteria)

Antihypertensives (Lower blood pressure)

Antidepressants (Affect mood)

C. **Based on Chemical Structure**

Alkaloids (e.g. Morphine)

Steroids (e.g. Prednisolone)

Sulfonamides (e.g. Sulfamethoxazole)

Benzodiazepines (e.g. Diazepam)

D. Based on Therapeutic Use

Drugs used for Diabetes (e.g. Insulin, Metformin)

Drugs used for Hypertension (e.g. Amlodipine, Losartan)

Drugs used for Infections (e.g. Amoxicillin)

E. Based on Mechanism of Action

Beta-blockers (Block β-adrenergic receptors)

ACE inhibitors (Inhibit angiotensin converting enzyme)

Proton pump inhibitors (Block gastric acid secretion)

F. Based on Legal Classification

Over-the-counter (OTC) drugs

Prescription-only drugs (POM)

Controlled substances (e.g. Narcotics, psychotropics)

5. Conclusion

Drugs originate from diverse sources and can be classified in multiple ways depending on their structure, action, or use. Understanding their derivation and classification is essential for rational drug selection, safe administration, and effective patient care.

DRUG ACTIONS AND FUNCTIONS OF DRUGS IN THE BODY SYSTEMS

1. INTRODUCTION

Drugs are chemical substances that, when introduced into the body, alter normal physiological or biochemical processes.

They can stimulate, depress, replace, destroy, or modify body functions for therapeutic benefit.

The study of how drugs act on the body is called Pharmacodynamics, while their effects on body systems depend on their specific site and mechanism of action.

2. DRUG ACTIONS

Drugs act in different ways to bring about their effects. These can be grouped into the following:

A. STIMULATION

Drugs increase the activity of cells or organs.

Example:

Adrenaline stimulates the heart and nervous system.

Caffeine stimulates the central nervous system.

B. DEPRESSION

Drugs reduce the functional activity of body organs or cells.

Example:

Barbiturates and benzodiazepines depress brain activity.

Beta-blockers slow down heart rate

C. IRRITATION

Some drugs cause mild irritation that results in a therapeutic effect.

Example:

Counter-irritants like capsaicin creams relieve pain by diverting attention from deeper pain

.

D. REPLACEMENT

Drugs replace or supply substances normally produced by the body.

Example:

Insulin for diabetes mellitus.

Thyroxine for hypothyroidism.

Iron supplements for anemia.

E. CYTOTOXIC ACTION

Drugs destroy abnormal cells or microorganisms.

Example:

Antibiotics destroy bacteria.

Chemotherapeutic drugs kill cancer cells.

F. IMMUNOMODULATION

Drugs modify the immune system’s activity.

Example:

Immunosuppressants (e.g. cyclosporine) prevent organ rejection.

Immunostimulants (e.g. vaccines) boost immune defense.

3. FUNCTIONS OF DRUGS IN THE BODY SYSTEMS

A. NERVOUS SYSTEM

Functions:

Control and modify nerve transmission and brain activity.

Examples of Drug Actions:

Drug Type	**Action/Function**	**Example**
Analgesics	Relieve pain	Paracetamol, Morphine
Sedatives	Induce sleep or calmness	Diazepam
Antidepressants	Elevate mood	Fluoxetine
Anticonvulsants	Prevent seizures	Carbamazepine
Anesthetics	Block nerve sensation	Lidocaine

B. CARDIOVASCULAR SYSTEM

Functions:

Regulate blood pressure, heart rate, and blood composition.

Drug Type	**Action/Function**	**Example**
Antihypertensives	Lower blood pressure	Amlodipine, Losartan
Antiarrhythmics	Control irregular heartbeat	Amiodarone
Cardiac stimulants	Increase heart rate/force	Adrenaline, Dopamine
Anticoagulants	Prevent blood clotting	Heparin, Warfarin
Diuretics	Reduce blood volume and pressure	Furosemide

C. RESPIRATORY SYSTEM

Functions:

Improve breathing and treat airway disorders.

Drug Type	**Action/Function**	**Example**
Bronchodilators	Relax airway muscles	Salbutamol
Antitussives	Suppress cough	Codeine
Expectorants	Loosen mucus	Guaifenesin
Decongestants	Reduce nasal swelling	Pseudoephedrine

D. DIGESTIVE (GASTROINTESTINAL) SYSTEM

Functions:

Aid digestion, control acid secretion, and relieve GI discomfort.

Drug Type	**Action/Function**	**Example**
Antacids	Neutralize stomach acid	Magnesium hydroxide
Antiemetics	Prevent vomiting	Metoclopramide
Laxatives	Promote bowel movement	Lactulose
Antidiarrheals	Reduce diarrhea	Loperamide
Digestive enzymes	Aid digestion	Pancreatin

E. ENDOCRINE SYSTEM

Functions:

Replace or regulate hormones.

Drug Type	**Action/Function**	**Example**
Insulin	Controls blood glucose	Insulin injections
Thyroid hormones	Correct hypothyroidism	Levothyroxine
Corticosteroids	Reduce inflammation	Prednisolone
Oral hypoglycemics	Lower blood sugar	Metformin

F. RENAL (URINARY) SYSTEM

Functions:

Regulate fluid and electrolyte balance.

Drug Type	Action/Function	Example
Diuretics	Increase urine output	Furosemide
Urinary antiseptics	Treat urinary infections	Nitrofurantoin
Antispasmodics	Relieve bladder spasms	Oxybutynin

G. REPRODUCTIVE SYSTEM

Functions:

Control fertility and reproductive hormone balance.

Drug Type	Action/Function	Example
Oral contraceptives	Prevent pregnancy	Ethinylestradiol + Levonorgestrel
Fertility drugs	Stimulate ovulation	Clomiphene
Hormone replacement	Treat menopause symptoms	Estrogen therapy

H. MUSCULOSKELETAL SYSTEM

Functions:

Relieve inflammation, pain, and muscle spasms.

Drug Type	Action/Function	Example
NSAIDs	Reduce pain/inflammation	Ibuprofen

Muscle relaxants	Relieve spasm	Baclofen
Gout medications	Lower uric acid	Allopurinol

I. SKIN (INTEGUMENTARY) SYSTEM

Functions:

Treat infections, inflammation, or allergic skin reactions.

Drug Type	Action/Function	Example
Antifungal creams	Treat fungal infections	Clotrimazole
Corticosteroid creams	Reduce inflammation	Hydrocortisone
Antibacterial ointments	Treat bacterial infection	Neomycin ointment

J. IMMUNE SYSTEM

Functions:

Enhance or suppress immune responses.

Drug Type	**Action/Function**	**Example**
Vaccines	Stimulate immunity	Hepatitis B vaccine

Immunosuppressants	Prevent organ rejection	Cyclosporine
Immunostimulants	Boost defense	Interferons

4. SUMMARY

General Drug Action	Example	Purpose
Stimulation	Adrenaline	Increases heart rate
Depression	Diazepam	Reduces anxiety
Replacement	Insulin	Replaces deficient hormone
Cytotoxic	Penicillin, Cisplatin	Kills pathogens/cancer cells
Immunomodulation	Vaccines, Cyclosporine	Regulate immune response

In summary:

Drugs act by modifying the functions of body systems — either enhancing, suppressing, or replacing natural physiological activities — to restore or maintain health.

ROUTES OF DRUG ADMINISTRATION

1. INTRODUCTION

The route of drug administration refers to the pathway through which a drug is introduced into the body to produce its desired effect.

The route chosen depends on:

- Nature of the drug (solid, liquid, gas)
- Desired speed of action
- Site of action
- Condition of the patient
- Convenience and safety

MAIN CATEGORIES OF DRUG ADMINISTRATION

Drugs can be administered by two main routes:

A. ENTERAL ROUTES

→ Drugs are given through the alimentary (gastrointestinal) tract.

Includes oral, sublingual, and rectal routes.

B. PARENTERAL ROUTES

→ Drugs are administered by injection or other routes bypassing the gastrointestinal tract.

Includes intravenous, intramuscular, subcutaneous, etc.

TYPES OF ROUTES OF ADMINISTRATION

A. ORAL ROUTE (Per Os / PO)

Definition:

Drug is swallowed and absorbed through the gastrointestinal tract.

Advantages:

Convenient, safe, and economical

Suitable for self-administration

Painless and non-invasive

Disadvantages:

Slow onset of action

Not suitable for unconscious or vomiting patients

Affected by food and gastric acid

Undergoes first-pass metabolism in the liver

Examples:

Paracetamol, Amoxicillin, Ibuprofen, Metformin

B. SUBLINGUAL ROUTE

Definition:

Drug is placed under the tongue and absorbed through the oral mucosa.

Advantages:

Rapid absorption

Avoids first-pass metabolism

Easy to use

Disadvantages:

Only suitable for small doses and lipid-soluble drugs

Examples:

Nitroglycerin, Loratadine, Buprenorphine

C. BUCCAL ROUTE

Definition:

Drug is placed between the cheek and gum for absorption through the buccal mucosa.

Advantages:

Avoids first-pass effect

Rapid action

Examples:

Buccal tablets of Prochlorperazine, Fentanyl

D. RECTAL ROUTE

Definition:

Drug is inserted into the rectum and absorbed through the rectal mucosa.

Advantages:

Useful for unconscious or vomiting patients

Partial avoidance of first-pass metabolism

Disadvantages:

Absorption may be irregular

Some patients find it uncomfortable

Examples:

Suppositories (Paracetamol, Diazepam), Enemas

E. INTRAVENOUS (IV) ROUTE

Definition:

Drug is injected directly into the vein.

Advantages:

Most rapid and complete absorption

Immediate effect (useful in emergencies)

Suitable for large volumes

Disadvantages:

Requires skillful administration

Risk of infection, phlebitis, or overdose

Examples:

IV fluids, Antibiotics, Morphine, Diazepam

F. INTRAMUSCULAR (IM) ROUTE

Definition:

Drug is injected into the muscle tissue (commonly deltoid, gluteal, or thigh muscles).

Advantages:

Rapid absorption than oral route

Suitable for oily or slow-release preparations

Disadvantages:

Painful injection site

Risk of nerve injury or abscess

Examples:

Vaccines, Penicillin G, Diclofenac injection

G. SUBCUTANEOUS (SC) ROUTE

Definition:

Drug is injected into the subcutaneous tissue beneath the skin.

Advantages:

Slower and more sustained absorption

Suitable for self-administration

Disadvantages:

Limited volume can be injected

Pain or irritation at site

Examples:

Insulin, Heparin

H. INHALATION ROUTE

Definition:

Drug is inhaled into the lungs as gases, vapors, or aerosols.

Advantages:

Rapid absorption through lung surface

Direct effect on respiratory tract

Bypasses first-pass metabolism

Disadvantages:

Requires special equipment and technique

Examples:

Salbutamol inhaler, Oxygen gas, Anaesthetic gases

I. TOPICAL ROUTE

Definition:

Drug is applied directly to the skin or mucous membrane for local effect.

Advantages:

Localized action with minimal systemic effects

Easy to apply

Disadvantages:

May cause skin irritation

Limited absorption through thick skin

Examples:

Antifungal creams, Hydrocortisone ointment, Eye/ear drops

J. TRANSDERMAL ROUTE

Definition:

Drug is applied to the skin using patches for systemic absorption.

Advantages:

Provides sustained release

Avoids first-pass metabolism

Convenient and non-invasive

Disadvantages:

Slow onset of action

Only suitable for lipid-soluble drugs

Examples:

Nicotine patch, Fentanyl patch, Hormonal patches

L. NASAL ROUTE

Definition:

Drug is administered through the nose and absorbed via nasal mucosa.

Advantages:

Rapid absorption

Avoids first-pass effect

Examples:

Nasal sprays (Oxymetazoline, Desmopressin)

L. VAGINAL ROUTE

Definition:

Drug is inserted into the vagina as creams, tablets, or suppositories.

Advantages:

Local treatment, Good absorption

Examples:

Antifungal pessaries (Clotrimazole), Estrogen creams

FACTORS AFFECTING CHOICE OF ROUTE

1. Nature and properties of the drug (solid, liquid, stability, solubility)

2. Desired speed of action (emergency vs long-term)

3. Site of action (local vs systemic)

4. Condition of the patient (consciousness, vomiting, age)

5. Convenience and safety

5. SUMMARY TABLE

Route	Site of Administration	Onset of Action	Examples
Oral	Mouth → GIT	Slow	Paracetamol, Amoxicillin
Sublingual	Under tongue	Very rapid	Nitroglycerin
Rectal	Rectum	Moderate	Diazepam suppository
IV	Vein	Immediate	Saline, Antibiotics
IM	Muscle	Rapid	Vaccines, Diclofenac
SC	Beneath skin	Slow	Insulin
Inhalation	Lungs	Rapid	Salbutamol
Topical	Skin	Local	Antifungal creams
Transdermal	Skin patch	Slow, sustained	Nicotine patch
Nasal	Nose	Rapid	Oxymetazoline spray
Vaginal	Vagina	Moderate	Clotrimazole pessary

DRUGS FOR PROPHYLAXIS AND CONTROL OF PARASITIC, BACTERIAL, AND VIRAL INFECTIONS

1. INTRODUCTION

Infectious diseases are caused by microorganisms such as parasites, bacteria, and viruses.

Drugs used to prevent (prophylaxis) and control or treat (therapy) these infections are essential in modern medicine.

Prophylaxis: Prevention of infection before it occurs.

Control/Treatment: Elimination or suppression of existing infection.

2. DRUGS FOR PARASITIC INFECTIONS (ANTIPARASITIC DRUGS)

Parasitic infections are caused by protozoa, helminths (worms), and ectoparasites.

A. ANTIMALARIAL DRUGS

Used for: Prevention and treatment of malaria caused by Plasmodium species.

Category	**Examples**	**Uses / Comments**
Prophylactic drugs	Chloroquine, Doxycycline, Mefloquine	Used for malaria prevention in endemic areas
Treatment drugs	Artemisinin-based combination therapy (ACT): Artemether + Lumefantrine, Artesunate + Amodiaquine	First-line treatment for malaria
Radical cure / Relapse prevention	Primaquine	Eliminates dormant liver forms (hypnozoites) in P. vivax and P. ovale infections

B. ANTIPROTOZOAL DRUGS

Used for: Amoebiasis, Giardiasis, Trichomoniasis, etc.

Infection	**Drug Examples**	**Remarks**
Amoebiasis	Metronidazole, Tinidazole	Kills trophozoites
Giardiasis	Metronidazole, Tinidazole	Treats intestinal infection

Trichomoniasis	Metronidazole	Treats vaginal infection

C. ANTHELMINTIC DRUGS (ANTI-WORM DRUGS)

Used for: Intestinal and tissue helminth infections.

Parasite Type	**Examples of Drugs**	**Remarks**
Roundworms (Ascaris, Enterobius)	Mebendazole, Albendazole	Broad-spectrum activity
Tapeworms (Taenia)	Praziquantel, Niclosamide	Effective against cestodes
Flukes (Schistosoma)	Praziquantel	For schistosomiasis
Filarial worms (Wuchereria bancrofti)	Diethylcarbamazine (DEC), Ivermectin	Used in mass control programs

D. ANTIECTOPARASITIC DRUGS

Used for: Lice, mites, and scabies infections.

Condition	Drug Examples	Route/Use
Scabies	Permethrin cream, Benzyl benzoate	Topical application
Lice (Pediculosis)	Malathion lotion, Permethrin	Topical use

Public Health Use (Mass Prophylaxis Programs):

Ivermectin – Onchocerciasis (river blindness) control

Albendazole + Ivermectin – Lymphatic filariasis elimination

Chloroquine/ACTs – Malaria prevention and treatment campaigns

3. **DRUGS FOR BACTERIAL INFECTIONS (ANTIBACTERIALS / ANTIBIOTICS)**

Bacterial infections are caused by pathogenic bacteria such as Staphylococcus, Streptococcus, E. coli, etc.

Drugs used include antibiotics, synthetic antibacterials, and chemoprophylactic agents.

A. PROPHYLACTIC ANTIBIOTICS

Used to prevent infection in:

Surgery (pre- and post-operative)

Dental procedures

Exposure to contagious diseases (e.g. meningococcal infection)

Situation	Drug Used	Purpose
Surgical prophylaxis	Cefazolin, Amoxicillin-clavulanate	Prevent postoperative infection
Meningococcal exposure	Rifampicin, Ciprofloxacin	Prevent meningitis
Rheumatic fever prevention	Benzathine penicillin	Long-term prophylaxis
Tuberculosis prophylaxis	Isoniazid (INH)	Prevent latent TB activation

B. ANTIBIOTICS FOR CONTROL / TREATMENT

Drug Class	Examples	Mechanism / Target	Common Uses
β-lactams	Penicillin, Amoxicillin, Cephalosporins	Inhibit cell wall synthesis	Pneumonia, UTI
Macrolides	Erythromycin, Azithromycin	Inhibit protein synthesis	Respiratory infections
Tetracyclines	Doxycycline, Tetracycline	Inhibit protein synthesis	Acne, Malaria prophylaxis
Aminoglycosides	Gentamicin, Streptomycin	Bactericidal, inhibit protein synthesis	Severe infections
Fluoroquinolones	Ciprofloxacin, Levofloxacin	Inhibit DNA gyrase	UTI, Typhoid
Sulfonamides	Cotrimoxazole (SMX-TMP)	Inhibit folic acid synthesis	UTI, Pneumocystis
Antitubercular	Isoniazid, Rifampicin,	Multiple	Tuberculosis

drugs	Ethambutol, Pyrazinamide	mechanisms	
Antileprosy drugs	Dapsone, Clofazimine, Rifampicin	Inhibit mycobacteria	Leprosy

4. DRUGS FOR VIRAL INFECTIONS (ANTIVIRAL DRUGS)

Viruses are obligate intracellular parasites, so antivirals inhibit viral replication without damaging host cells.

ANTIVIRALS FOR COMMON VIRAL INFECTIONS

Virus / Disease	**Drug Examples**	**Mechanism / Action**
Herpes simplex, Varicella-zoster	Acyclovir, Valacyclovir	Inhibit viral DNA synthesis
Influenza A & B	Oseltamivir (Tamiflu), Zanamivir	Inhibit neuraminidase enzyme
Hepatitis B virus (HBV)	Tenofovir, Lamivudine, Entecavir	Inhibit reverse transcriptase
Hepatitis C virus (HCV)	Sofosbuvir, Ledipasvir	Inhibit viral RNA polymerase
HIV/AIDS	Zidovudine (AZT), Efavirenz, Lopinavir, Tenofovir	Block viral replication at different stages

COVID-19 (SARS-CoV-2)	Remdesivir, Nirmatrelvir + Ritonavir	Inhibit viral replication

B. VACCINES FOR VIRAL PROPHYLAXIS

Vaccines are biological preparations that stimulate immunity to prevent viral infections.

Disease	**Vaccine Used**
Measles, Mumps, Rubella	MMR vaccine
Polio	Oral polio vaccine (OPV), IPV
Hepatitis B	Hepatitis B vaccine
HPV infection	HPV vaccine
Influenza	Seasonal flu vaccine
COVID-19	mRNA or vector-based vaccine

5. SUMMARY TABLE

Infection Type	Examples of Drugs	Used For
Parasitic	Artemether-Lumefantrine, Albendazole,	Malaria, Worms,

infections	Ivermectin	Filariasis
Bacterial infections	Penicillin, Amoxicillin, Ciprofloxacin	Pneumonia, UTI, Typhoid
Viral infections	Acyclovir, Tenofovir, Oseltamivir	Herpes, HIV, Influenza
Prophylaxis	Vaccines, Isoniazid, Doxycycline	Disease prevention

Summary:

Prophylactic drugs prevent infection (e.g. vaccines, chemoprophylactics).

Control drugs treat or suppress infections once established.

Rational use of these drugs helps combat resistance, reinfection, and outbreaks.

CHEMOTHERAPY FOR PARASITIC INFECTIONS

1. INTRODUCTION

Chemotherapy in parasitic infections refers to the use of chemical agents (drugs) to kill or inhibit the growth of parasites within the host without causing harm to host tissues.

Parasites include:

Protozoa (e.g. Plasmodium, Entamoeba, Giardia)

Helminths (worms such as Ascaris, Taenia, Schistosoma)

Ectoparasites (e.g. lice, mites)

The goal of chemotherapy is:

- To eradicate the parasite
- To relieve symptoms
- To prevent transmission or recurrence

2. PRINCIPLES OF CHEMOTHERAPY FOR PARASITIC INFECTIONS

1. Selective Toxicity:

The drug should be toxic to the parasite but safe for the host.

2. Specificity:

Each parasite species responds to specific drugs.

3. Stage-specific action:

Some drugs act on particular life stages (e.g., blood schizonts, tissue stages).

4. Combination Therapy:

Used to enhance efficacy and reduce drug resistance (e.g., ACT for malaria).

5. Chemoprophylaxis:

Drugs can also be used to prevent infection (e.g., chloroquine, doxycycline).

3. MAJOR GROUPS OF ANTIPARASITIC DRUGS

A. ANTIMALARIAL DRUGS

Used for the treatment and prevention of malaria caused by Plasmodium species.

Drug Class	Examples	Mechanism / Site of Action	Clinical Use
Blood schizonticides	Chloroquine, Quinine, Mefloquine, Artemisinin, Lumefantrine	Act on erythrocytic stage	Treatment of acute malaria
Tissue schizonticides	Primaquine	Acts on liver stages	Prevent relapse (P. vivax, P. ovale)
Sporonticides	Primaquine	Prevent transmission by killing gametocytes	Malaria eradication programs
Prophylactic drugs	Chloroquine, Doxycycline, Mefloquine	Prevent infection	For travelers in endemic areas

Combination Therapy (ACTs):

Artemether + Lumefantrine

Artesunate + Amodiaquine

These are the first-line treatments in most endemic regions.

B. ANTIAMOEBIC DRUGS

Used for amoebiasis caused by Entamoeba histolytica.

Type	Examples	Action Site	Remarks
Tissue	Metronidazole,	Act on	Used for intestinal

amoebicides	Tinidazole	trophozoites in tissues	and extra-intestinal amoebiasis
Luminal amoebicides	Diloxanide furoate, Paromomycin, Iodoquinol	Act on cysts in intestine	Used to prevent relapse
Mixed amoebicides	Metronidazole + Diloxanide furoate	Both tissue and lumen	Most effective combined regimen

C. ANTIGIARDIAL DRUGS

Used for Giardiasis caused by Giardia lamblia.

Drugs	Mechanism / Use
Metronidazole	First-line agent; damages parasite DNA
Tinidazole	Single-dose treatment
Nitazoxanide	Alternative drug, especially in resistant cases

D. **ANTIPROTOZOAL DRUGS (OTHERS)**

Disease	Causative Agent	Drug of Choice
Trichomoniasis	Trichomonas	Metronidazole

	vaginalis	
Trypanosomiasis (Sleeping sickness)	Trypanosoma brucei	Suramin, Melarsoprol, Eflornithine
Leishmaniasis	Leishmania donovani	Sodium stibogluconate, Amphotericin B, Miltefosine
Toxoplasmosis	Toxoplasma gondii	Pyrimethamine + Sulfadiazine

E. **ANTHELMINTIC DRUGS (ANTI-WORM DRUGS)**

Used to treat infections by helminths (worms).

Group / Infection	Examples of Drugs	Mechanism / Action
Roundworms (Nematodes)	Albendazole, Mebendazole	Inhibit glucose uptake in worms
Hookworms / Pinworms	Pyrantel pamoate, Levamisole	Cause paralysis of worms
Tapeworms (Cestodes)	Praziquantel, Niclosamide	Damage worm tegument
Flukes (Trematodes)	Praziquantel	Increase calcium permeability leading to worm death
Filarial worms	Diethylcarbamazine (DEC), Ivermectin	Kills microfilariae and inhibits reproduction

F. ANTI-ECTOPARASITIC DRUGS

Used for lice and scabies.

Condition	Drugs	Mode of Use
Scabies	Permethrin cream, Benzyl benzoate	Topical application
Pediculosis (lice)	Malathion lotion, Lindane (limited use)	Apply to scalp/hair
Resistance control	Ivermectin (oral or topical)	For resistant cases

COMBINATION CHEMOTHERAPY

Purpose: To improve efficacy, reduce resistance, and attack multiple stages of parasite life cycle.

Examples:

ACT (Artemisinin + partner drug) for malaria

Metronidazole + Diloxanide furoate for amoebiasis

Pyrimethamine + Sulfadoxine for malaria prophylaxis

Ivermectin + Albendazole for filariasis

5. CHEMOPROPHYLAXIS IN PARASITIC INFECTIONS

Used to prevent infection or relapse in high-risk individuals.

Condition	Drug Used	Target
Malaria	Chloroquine, Doxycycline, Mefloquine	Travelers, soldiers
Filariasis	Ivermectin, DEC, Albendazole	Community-wide prevention
Amoebiasis	Diloxanide furoate (after treatment)	Prevent relapse

6. SIDE EFFECTS AND TOXICITY CONSIDERATIONS

Metronidazole: Metallic taste, nausea, disulfiram-like reaction with alcohol

Chloroquine: Retinopathy with long-term use

Mefloquine: Neuropsychiatric effects

Praziquantel: Dizziness, abdominal pain

Albendazole/Mebendazole: GI upset, liver enzyme elevation

Amphotericin B: Nephrotoxicity (in Leishmaniasis treatment)

7. NURSING RESPONSIBILITIES / CLINICAL PRECAUTIONS

1. Assess for type and severity of parasitic infection.

2. Observe for allergic reactions and drug toxicity.

3. Encourage adherence to full treatment course.

4. Advise avoidance of alcohol with drugs like metronidazole.

5. Ensure hygiene and sanitation to prevent reinfection.

6. Support mass deworming and vector control programs.

7. Educate on preventive measures (bed nets, clean water, handwashing).

8. SUMMARY

Category	**Example Drugs**	**Major Uses**
Antimalarials	Chloroquine, ACTs, Primaquine	Malaria
Antiamoebics	Metronidazole, Diloxanide	Amoebiasis
Antigiardials	Metronidazole	Giardiasis
Anthelmintics	Albendazole, Praziquantel, Ivermectin	Worm infestations
Antileishmanials	Sodium stibogluconate, Miltefosine	Leishmaniasis
Anti-trypanosomals	Suramin, Melarsoprol	Trypanosomiasis

Summary

Chemotherapy for parasitic infections involves targeted drug therapy aimed at destroying or inhibiting parasites at different life cycle stages. Rational selection, combination use, and adherence are crucial to achieve cure, control, and prevention of reinfection and drug resistance.

THERAPEUTIC DRUGS AND THEIR ACTIONS ON CELLS

1. INTRODUCTION

Therapeutic drugs are chemical substances used in the treatment, prevention, or diagnosis of diseases.

Their actions on cells determine their pharmacological effects, which may include stimulating, depressing, replacing, or destroying cellular functions.

2. BASIC CONCEPTS

Target Cell: The specific cell or tissue on which a drug acts.

Drug Action: The biochemical or physiological mechanism by which a drug produces its effects on the body.

Drug Effect: The observable result of the drug action (e.g., pain relief, reduced fever).

Drugs act mainly by interacting with cellular components, such as:

Receptors

Enzymes

Ion channels

Transport systems

Cell membranes

Nucleic acids (DNA/RNA)

3. MECHANISMS OF DRUG ACTION ON CELLS

A. ACTION THROUGH CELL RECEPTORS

Receptors are protein molecules located on cell membranes or inside cells.

Drugs that bind to receptors are classified as:

Type of Drug	Action on Receptor	Effect on Cell	Example
Agonists	Activate receptor	Stimulate cellular activity	Adrenaline on β-receptors → ↑ heart rate

Antagonists	Block receptor	Inhibit normal cell response	Propranolol blocks β-receptors → ↓ heart rate
Partial agonists	Produce weaker response	Moderate activity	Buprenorphine (opioid partial agonist)

Summary:

Receptor interaction is the most common mechanism of drug action, forming the basis for many therapeutic effects.

B. ACTION ON ENZYMES

Some drugs act by inhibiting or enhancing enzyme activity, altering cellular metabolism.

Mechanism	Example Drug	Action / Effect

Enzyme inhibition	Aspirin	Inhibits COX enzyme → ↓ prostaglandin synthesis → ↓ pain/inflammation
Competitive inhibition	Neostigmine	Inhibits acetylcholinesterase → ↑ acetylcholine at neuromuscular junction
Enzyme activation	Streptokinase	Activates plasminogen → dissolves blood clots
Enzyme replacement	Pancreatic enzymes	Aid digestion in pancreatic insufficiency

C. ACTION ON ION CHANNELS

Drugs can open or block ion channels, affecting the flow of ions such as Na^+, K^+, Ca^{2+}, or Cl^- across membranes.

Drug Type	Example	Effect
Sodium channel blockers	Lidocaine	Blocks nerve conduction → local anesthesia
Calcium channel blockers	Amlodipine, Verapamil	↓ Ca^{2+} influx → relax smooth muscle → ↓ blood pressure
Potassium channel openers	Minoxidil	Vasodilation → ↓ blood pressure
Chloride channel modulators	Diazepam (via GABA receptor)	↑ Cl^- influx → sedation, anxiolysis

D. ACTION ON TRANSPORT SYSTEMS

Some drugs interfere with cellular transport mechanisms that move molecules across membranes.

Drug	Mechanism	Effect
Furosemide	Inhibits $Na^+/K^+/2Cl^-$ transport in renal tubules	Diuretic (↑ urine output)
Digoxin	Inhibits Na^+/K^+ ATPase pump	↑ intracellular Ca^{2+} → stronger heart contractions
Omeprazole	Inhibits H^+/K^+ ATPase in stomach	↓ gastric acid secretion

E. ACTION ON CELL MEMBRANES

Drugs can alter cell membrane permeability or disrupt structural integrity.

Drug	Mechanism	Result
Amphotericin B	Binds to ergosterol in fungal membranes	Creates pores → cell death
Local anesthetics	Block Na^+ channels in nerve membranes	Prevent nerve impulse transmission
Detergent antiseptics	Destroy microbial cell walls	Cell lysis and death

F. ACTION ON NUCLEIC ACIDS (DNA/RNA)

Some drugs act directly on genetic material, affecting cell division and protein synthesis.

Drug Class	Examples	Mechanism / Effect
Anticancer drugs	Cyclophosphamide, Methotrexate	Inhibit DNA replication → stop tumor growth
Antiviral drugs	Acyclovir, Remdesivir	Inhibit viral DNA/RNA synthesis
Antibacterial drugs	Rifampicin, Ciprofloxacin	Inhibit bacterial RNA/DNA polymerase → bactericidal

G. METABOLIC ANTAGONISM

Some drugs act as false substrates, blocking metabolic pathways.

Example	Mechanism	Effect
Sulfonamides	Compete with PABA for folic acid synthesis enzyme	Inhibit bacterial growth
Methotrexate	Inhibits folate reductase enzyme	Inhibits DNA synthesis in cancer cells

4. TYPES OF DRUG ACTIONS ON CELLS

Type of Action	**Description**	**Example**
Stimulation	Increases cell activity	Caffeine → stimulates CNS
Depression	Decreases cell activity	Barbiturates → CNS depression
Irritation	Mild inflammation leading to functional change	Skin rubefacients
Replacement	Supplies deficient substances	Insulin for diabetes, Thyroxine for hypothyroidism
Cytotoxic Action	Kills abnormal or foreign cells	Anticancer drugs, antibiotics

Immune Modulation	Alters immune response	Corticosteroids (suppress), Vaccines (enhance)

5. CELLULAR TARGETS OF DRUG ACTION

Target Structure	**Example Drug Acting on It**	**Effect**
Receptors (membrane-bound)	Adrenaline, Atropine	Change cell signaling
Enzymes (cytoplasmic)	Aspirin, ACE inhibitors	Alter metabolism
Ion Channels (membrane)	Verapamil, Lidocaine	Modify excitability
Transporters (membrane)	Furosemide, Digoxin	Affect ionic balance
Nucleic Acids (nucleus)	Methotrexate, Acyclovir	Inhibit replication

6. FACTORS INFLUENCING DRUG ACTION ON CELLS

1. Drug concentration at target site
2. Receptor sensitivity or density
3. Cell type or tissue specificity
4. Presence of disease (e.g., liver or kidney dysfunction)
5. Age, genetics, and metabolic rate of the individual

7. SUMMARY TABLE

Mechanism of Action	**Examples of Drugs**	**Resulting Effect on Cells**
Receptor activation/blockade	Adrenaline, Propranolol	Stimulate or inhibit responses
Enzyme inhibition	Aspirin, Neostigmine	Alter metabolism
Ion channel modulation	Lidocaine, Amlodipine	Control excitability or contraction
Transport system inhibition	Digoxin, Furosemide	Modify ionic movement
Membrane disruption	Amphotericin B	Cell lysis
Nucleic acid interference	Acyclovir, Methotrexate	Inhibit replication

---

Summary: Therapeutic drugs act on specific cellular targets—receptors, enzymes, ion channels, membranes, or nucleic acids—to modify or control physiological processes.

Understanding these mechanisms helps in rational drug use, minimizing side effects, and improving therapeutic outcomes.

DIFFERENT LOTIONS AND THEIR USES

1. INTRODUCTION

Lotions are liquid or semi-liquid topical preparations meant for application on the skin or mucous membranes.

They usually contain medicinal agents dissolved or suspended in a watery or oily base and are used for cleansing, soothing, protecting, or medicating the skin.

Lotions are non-greasy, easily spread over large areas, and quickly absorbed — making them suitable for hairy, inflamed, or sensitive skin.

2. TYPES OF LOTIONS

Lotions are generally classified according to their composition or therapeutic use.

A. CLASSIFICATION BY COMPOSITION

Type	**Description**	**Examples**	**Uses**
Aqueous lotions	Water-based, light, and quick-drying	Calamine lotion, Potassium permanganate lotion	Cooling, soothing, antiseptic
Oily (emollient) lotions	Contain oil or fat in a water base; soften and protect skin	Olive oil lotion, Glycerin lotion	Moisturizing dry skin
Shaking lotions (suspension)	Contain insoluble powders that must be shaken before use	Calamine lotion, Zinc oxide lotion	Soothing irritation, insect bites
Medicated lotions	Contain active drugs for specific therapeutic effects	Clotrimazole lotion, Hydrocortisone lotion	Antifungal, anti-inflammatory, antiseptic
Cosmetic lotions	Used for cleansing or toning skin	Body lotion, facial toner, cleansing milk	Skin care and hygiene

3. COMMON LOTIONS AND THEIR USES

Below is a list of commonly used therapeutic and cosmetic lotions with their main ingredients and uses.

1. Calamine Lotion

Composition: Zinc oxide, Ferric oxide, Bentonite, Glycerin, Water

Uses:

- Relieves itching and irritation from insect bites, sunburn, chickenpox, and rashes
- Has mild antiseptic and cooling effects
- Precaution: Shake well before use; for external use only

2. Zinc Oxide Lotion

Action: Astringent, protective, and mildly antiseptic

Uses:

Diaper rash, minor burns, eczema, or acne

Protects skin from moisture and irritation

3. Potassium Permanganate Lotion

Action: Antiseptic and disinfectant

Uses:

Cleansing ulcers, wounds, and weeping skin lesions

Treatment of fungal infections (athlete’s foot)

Note: Should be diluted before application to avoid burns

4. Sulfur Lotion

Action: Antiseptic, antifungal, and keratolytic

Uses:

Acne, seborrheic dermatitis, scabies

Kills mites and reduces oil on the skin

5. Benzyl Benzoate Lotion (25%)

Action: Antiparasitic (kills mites and lice)

Uses:

Treatment of scabies and pediculosis (lice)

Caution: Avoid in young children; may irritate skin

6. Crotamiton Lotion

Action: Antipruritic (relieves itching) and scabicidal

Uses:

Scabies and itching due to various causes

7. Clotrimazole Lotion

Action: Antifungal

Uses:

Treatment of ringworm, athlete’s foot, and candida infections

8. Hydrocortisone Lotion

Action: Corticosteroid (anti-inflammatory and antipruritic)

Uses:

Eczema, dermatitis, insect bites, allergic rashes

Reduces redness, itching, and swelling

Note: Prolonged use may cause thinning of the skin

9. Salicylic Acid Lotion

Action: Keratolytic (removes dead skin cells)

Uses:

Acne, dandruff, psoriasis, warts

Helps unclog pores and reduce scaling

10. Coal Tar Lotion

Action: Antipruritic and keratoplastic

Uses:

Chronic skin conditions such as psoriasis, eczema, dermatitis

Note: Has a strong odor; may stain clothing

11. Glycerin Lotion

Action: Humectant (retains moisture)

Uses:

Dry, chapped, or rough skin

Soothes and softens skin surfaces

12. Menthol Lotion

Action: Cooling, soothing, antipruritic

Uses:

Relieves itching, sunburn, or heat rashes

Provides refreshing skin sensation

13. Povidone-Iodine Lotion

Action: Broad-spectrum antiseptic

Uses:

Cleansing wounds, burns, and cuts

Pre-surgical skin preparation

14. Clindamycin or Erythromycin Lotion

Action: Topical antibiotic

Uses:

Treatment of acne vulgaris and bacterial skin infections

15. Permethrin Lotion

Action: Antiparasitic (kills lice and mites)

Uses:

Treatment of head lice and scabies

Note: Safe for most ages; applied to entire body then washed off after several hours

4. GENERAL USES OF LOTIONS

Purpose	**Examples of Lotions**
Moisturizing	Glycerin lotion, Aloe vera lotion
Antiseptic	Povidone-iodine lotion, Potassium permanganate lotion
Antipruritic (anti-itch)	Calamine lotion, Menthol lotion
Antifungal / Antibacterial	Clotrimazole, Erythromycin lotion
Anti-inflammatory	Hydrocortisone lotion

Antiparasitic	Benzyl benzoate, Permethrin lotion
Cosmetic / Cleansing	Body lotion, facial toner, cleansing milk

5. PRECAUTIONS IN LOTION USE

1. External use only – avoid contact with eyes or mucous membranes.
2. Shake before use – especially for suspensions like Calamine lotion.
3. Patch test – to check for allergies or irritation.
4. Apply thinly and evenly on affected areas.
5. Avoid broken skin unless indicated by a doctor.
6. Store properly – in a cool, dry place away from direct sunlight.

6. SUMMARY TABLE

Lotion Name	**Main Action**	**Primary Use**
Calamine	Soothing, antipruritic	Rashes, insect bites
Zinc oxide	Protective, astringent	Diaper rash, eczema
Sulfur	Antifungal, keratolytic	Acne, scabies
Benzyl benzoate	Antiparasitic	Scabies, lice
Clotrimazole	Antifungal	Fungal infections

Hydrocortisone	Anti-inflammatory	Eczema, dermatitis
Povidone-iodine	Antiseptic	Wound cleansing
Glycerin	Moisturizing	Dry skin
Menthol	Cooling, soothing	Heat rash, itching
Permethrin	Antiparasitic	Lice, scabies

Summary:

Lotions are liquid topical medications used to treat or protect the skin.

Their effectiveness depends on their composition and active ingredients.

They are commonly used for moisturizing, antiseptic, anti-itch, antifungal, antibacterial, and anti-inflammatory purposes.