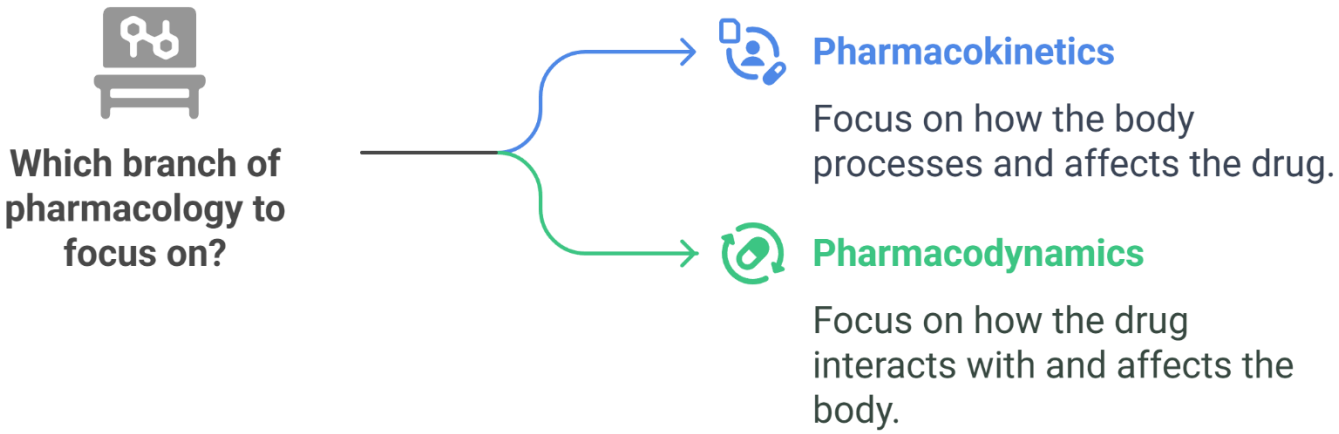
General Pharmacology

Introduction and Scope of Pharmacology

What is Pharmacology?

- Pharmacology is the **branch of science** that deals with the **study of drugs** and their **interactions with living organisms**.
- It involves understanding how drugs:
  - **Act** on the body (**pharmacodynamics**)
  - **Are processed** by the body (**pharmacokinetics**)
- **Origin of the Term:**
  - "Pharmakon" (Greek) = Drug or poison
  - "Logos" (Greek) = Study or discourse
  - So, Pharmacology = Study of drugs

Two Main Branches:



1. **Pharmacokinetics**
   - ➢ *What the body does to the drug.*
     1. **Absorption**: Entry of drug into the bloodstream.
     2. **Distribution**: Dispersion throughout the body.
     3. **Metabolism**: Biotransformation, often in the liver.
     4. **Excretion**: Removal of drug via kidneys, bile, etc.
2. **Pharmacodynamics**
   - ➢ *What the drug does to the body.*

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- Mechanism of action.
- Drug-receptor interactions.
- Dose-response relationships.
- Therapeutic and toxic effects.

Other Subfields of Pharmacology:

- **Clinical Pharmacology** – Application of pharmacological principles in the clinic.
- **Toxicology** – Study of harmful effects of chemicals/drugs.
- **Pharmacognosy** – Study of drugs from natural sources (plants, animals).
- **Pharmaceutical Chemistry** – Chemical aspects and synthesis of drugs.
- **Pharmacovigilance** – Monitoring and evaluating adverse drug reactions (ADRs).
- **Neuropharmacology**, **Cardiopharmacology**, etc. – Specialized branches.

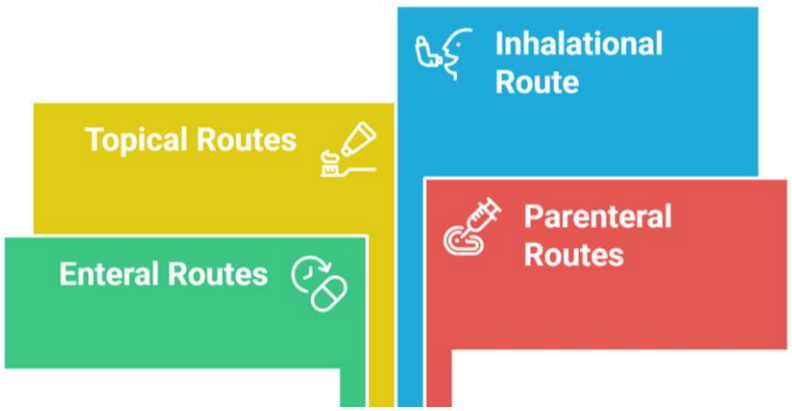
Scope of Pharmacology:

1. **Drug Development** – Understanding drug action leads to creation of new medications.
2. **Therapeutics** – Choosing correct drugs and dosages for diseases.
3. **Rational Use of Medicines** – Avoiding overuse/misuse.
4. **Personalized Medicine** – Tailoring drug treatment to individual genetic profiles.
5. **Education and Research** – Key component in medical, dental, and pharmacy education.
6. **Regulatory Affairs** – Approving and monitoring drugs (FDA, CDSCO).

Various Routes of Drug Administration

- Drugs can be administered in multiple ways, depending on their **form**, **site of action**, and **desired speed of action**.

Main Categories:



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1. Enteral Routes:

A. Oral:

- Swallowed and absorbed via GI tract
- **Advantages:**
  - Convenient, safe, economical
  - Self-administration possible
  - Suitable for long-term therapy
- **Disadvantages:**
  - Slower onset
  - Can be affected by food, pH, motility
  - First-pass metabolism in the liver may reduce bioavailability
  - Not suitable in vomiting, unconsciousness

B. Sublingual:

- Placed under the tongue
- **Advantages:**
  - Rapid absorption via mucosa
  - Bypasses first-pass metabolism
- **Disadvantages:**
  - Only suitable for small doses
  - Not all drugs can be absorbed sublingually

C. Rectal (PR):

- Inserted into the rectum
- **Advantages:**
  - Useful in vomiting, unconscious patients
  - Partial avoidance of first-pass metabolism
- **Disadvantages:**
  - Inconvenient
  - Absorption can be erratic and incomplete

2. Parenteral Routes:

A. Intravenous (IV):

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- Directly into bloodstream
- **Advantages:**
  - Immediate effect
  - 100% bioavailability
  - Suitable for emergency, large volume, irritating drugs
- **Disadvantages:**
  - Invasive, painful
  - Risk of infection, embolism
  - Requires skill and sterility

B. Intramuscular (IM):

- Into the muscle
- **Advantages:**
  - Faster than oral
  - Depot preparations for slow release
- **Disadvantages:**
  - Pain at injection site
  - Can damage nerves or blood vessels

C. Subcutaneous (SC):

- Into the tissue under the skin
- **Advantages:**
  - Can be self-administered (e.g., insulin)
  - Slower but more sustained absorption
- **Disadvantages:**
  - Limited to small volume
  - Irritating drugs cannot be given

D. Intradermal:

- Into the skin (e.g., tuberculin test)
- **Advantage:** For allergy testing, local reactions
- **Disadvantage:** Tiny volume, technical skill needed

3. Topical Routes:

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- **Skin (creams, ointments):** For local effects
- **Eye, ear, nasal drops**
- **Advantages:**
  - Localized effect, minimal systemic side effects
- **Disadvantages:**
  - Not suitable for deep or systemic effects
  - Can be messy or cause irritation

4. Inhalation Route:

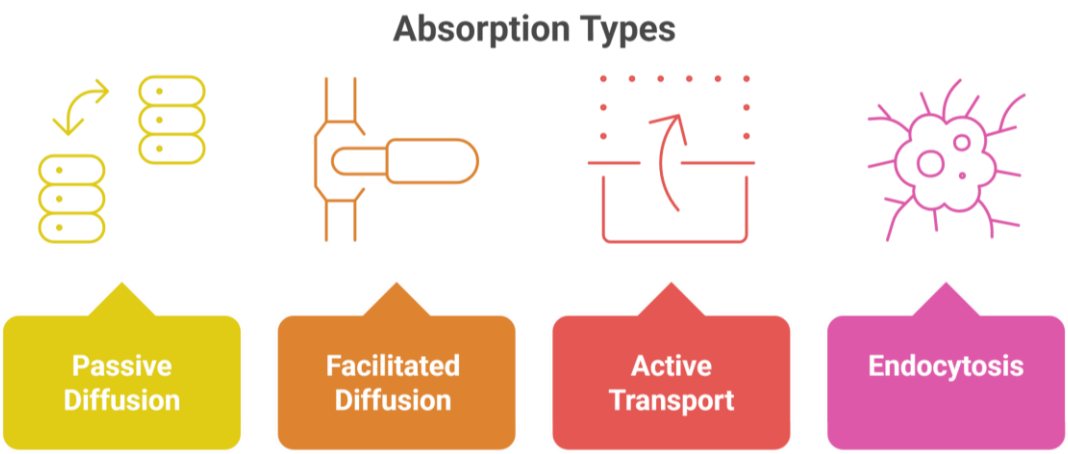
- **Gaseous drugs or aerosols** inhaled into lungs (e.g., asthma meds)
- **Advantages:**
  - Rapid absorption due to large surface area
  - Local action in respiratory tract
- **Disadvantages:**
  - Difficult to control dose
  - Requires coordination (inhaler use)

Drug Absorption

Definition:

- Drug absorption is the **process by which a drug moves from its site of administration into the bloodstream**.
- It's a key part of **pharmacokinetics** and determines the **onset**, **intensity**, and **duration** of drug action.

Types of Absorption Mechanisms:



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