Al-Mustaqbal University
College of Pharmacy
4th stage
Practical Pharmacology II
Lab: 1

ROUTES OF DRUG ADMINISTRATION

Dr Qassim A zigam

Definition

- The route of administration is the **way** through which the **dosage form** is administered into the **body** for treatment of various diseases and disorders.
- **Various** routes of administrations play a marked role in the **bioavailability** of the active drug in the body.

Classification

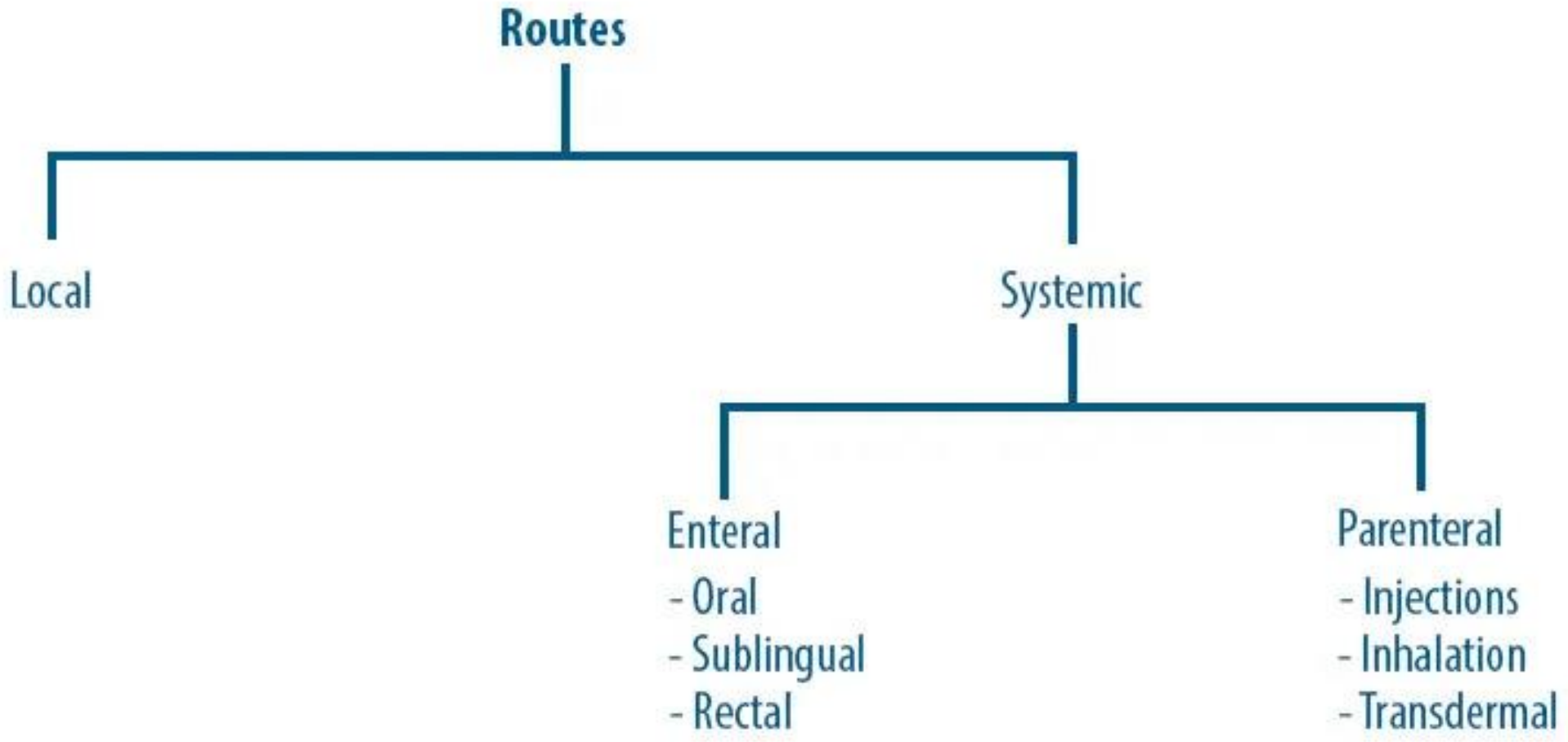
- The various routes of administration are classified into the following categories:-

1. Systemic Route

A) Enteral route	(b) Parenteral route
1. Oral	1. Intravascular
2. Sublingual	2. Intramuscular
3. Rectum	3. Subcutaneous
	4. Inhalation

2. Local Route

Systemic Route



Oral Route

Oral Route: -

- In this route the drug is placed in the mouth and Swallowed.
- It is also called per oral (p.o.)

Examples:-

- The example of dosage forms which are used by oral route include

1. Tablet
2. Capsules
3. Syrups etc.

Oral Route

Advantages of Oral Route

1. **Convenient**

- Can be self-administered, pain-free, & easy to take

1. **Absorption**

- Takes place along the whole length of GIT

1. **Cheap**

- Compared to most other parenteral routes

Oral Route

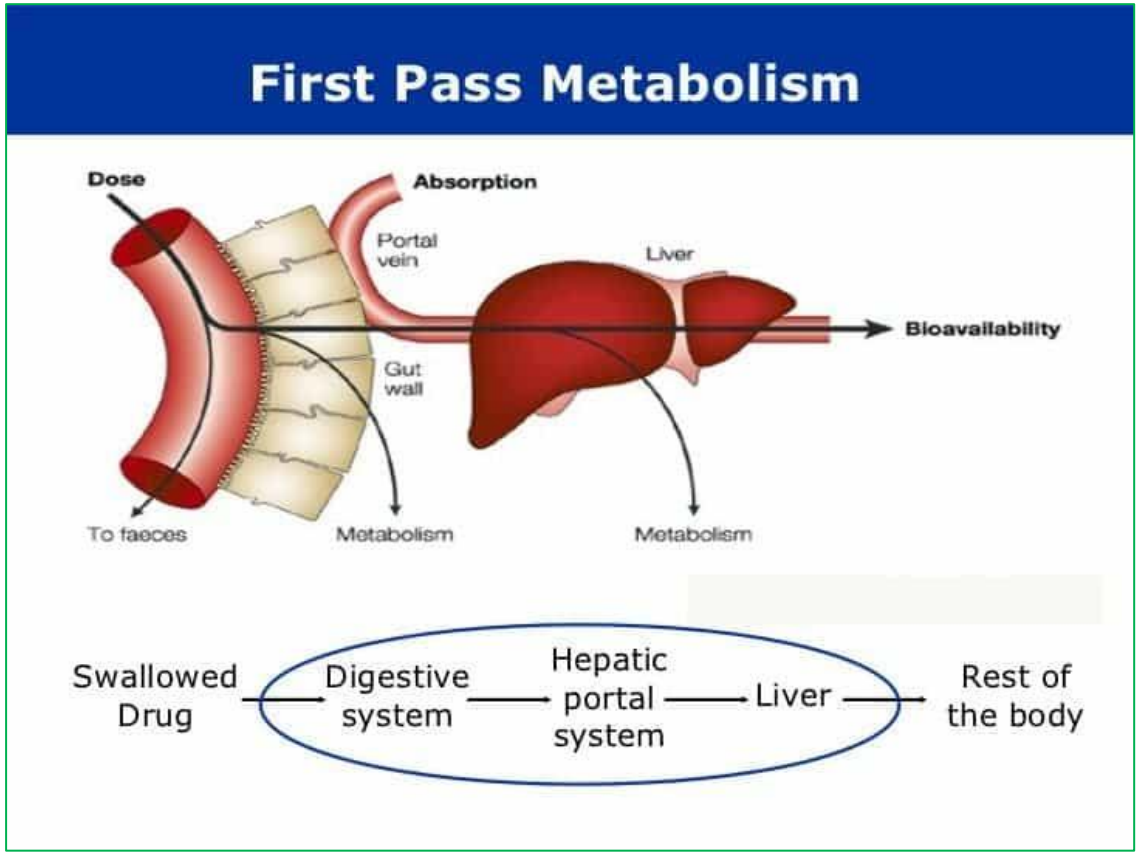
Disadvantages of Oral Route

1. **Sometimes inefficient -** only part of the drug may be absorbed
2. **First-pass effect -** drugs absorbed orally are initially transported to the liver via the portal vein
3. **Irritation to gastric mucosa –** nausea and vomiting
4. **Destruction of drugs** by gastric acid and digestive juices
5. **Effect too slow** for emergencies
6. **Unpleasant taste** of some drugs
7. **Unable to use in** unconscious patient

Oral Route

First-pass effect:-

- This is an effect which occurs with the **oral route** of administration.
- The first-pass effect is the term used for the **hepatic metabolism** of a **drug.**
- When the drug is **absorbed** from the gut and **delivered** to the liver via **portal circulation**.
- The **greater** the first-pass effect, the **less** the agent will **reach the systemic circulation**.



First-pass effect:-

- **Examples** of drugs which undergo marked First Pass Effect:-

1. Nitrate
2. Imipramine
3. Lidocaine
4. Beta blocker (Propranolol)
5. Morphine

NIL By Mouth

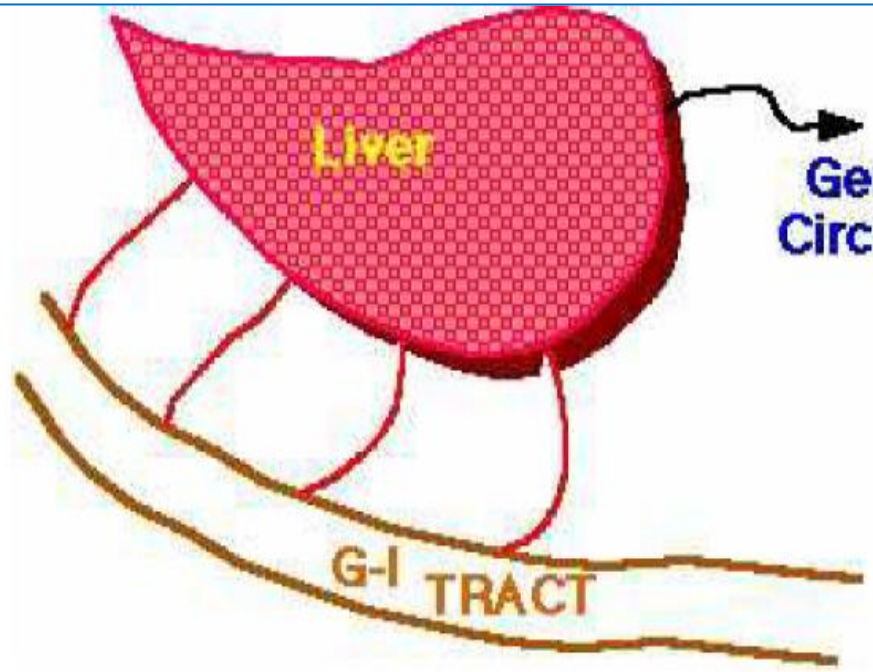


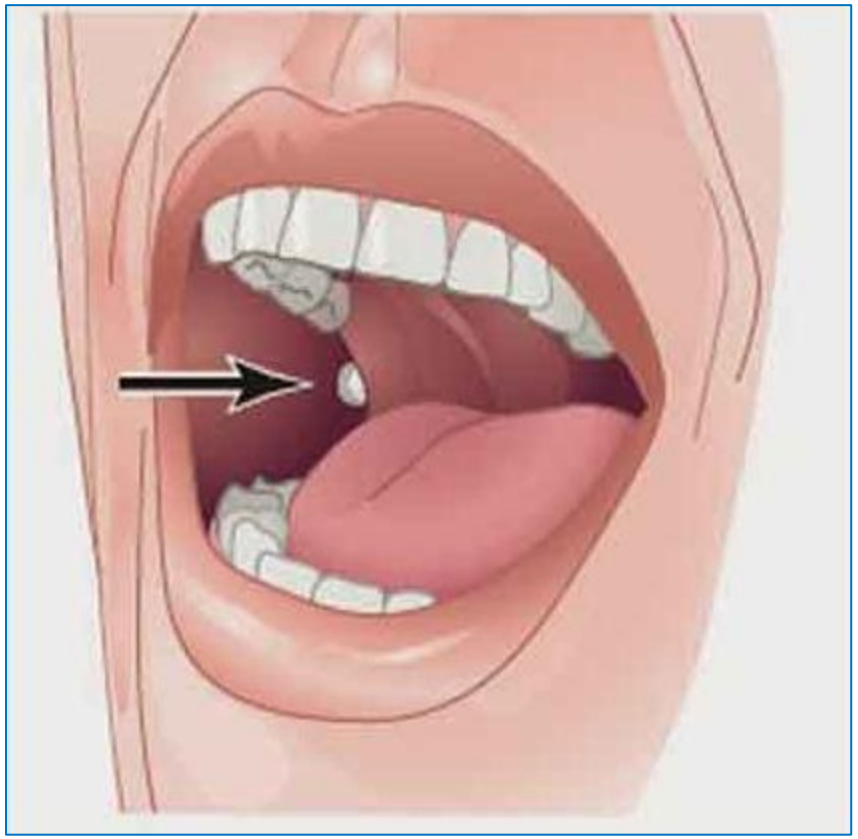
Figure 2 First Pass Effect

Sublingual Route

- In this route the drug is placed **under the tongue** without the use of **water**.
- When it is placed under the tongue it **disintegrates** there and then **absorption** occurs in the **mouth**.
- The tablets are **small in size** and is to be used through the sublingual route.
- Example of Sublingual tablet is **Nitroglycerine** tablets

Buccal Route

- In this route the drug is kept in the **buccal cavity**.
- where it **disintegrates** and **absorption** occurs in the **mouth**.



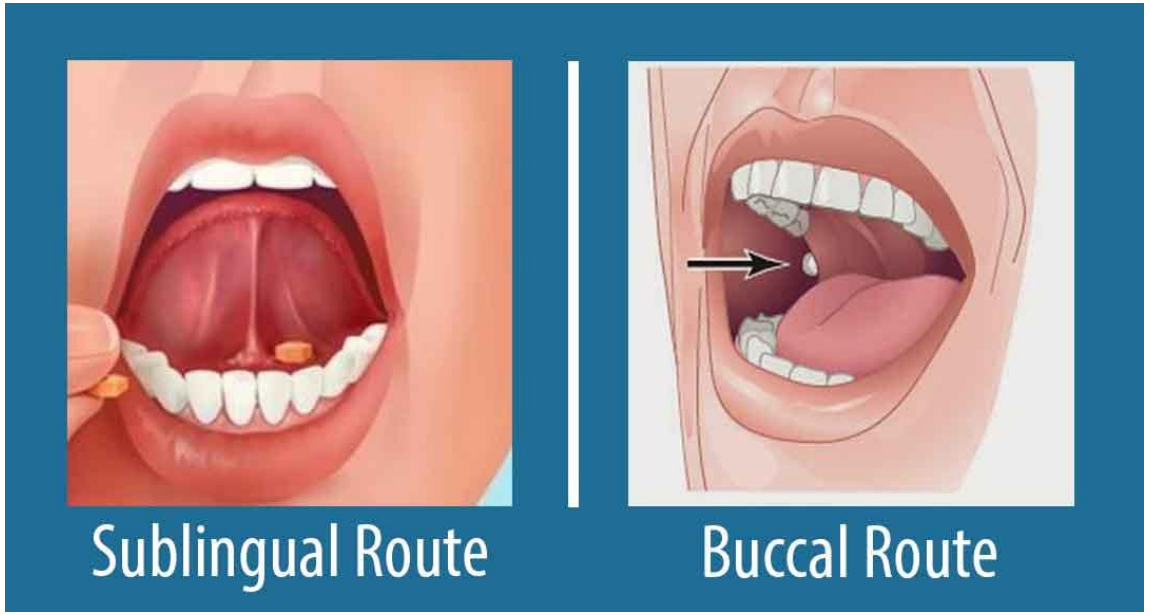
Sublingual & Buccal Route

Advantages

1. **Rapid absorption:**
2. **Drug stability:** -

✓As in this route the drug does **not go** to the **stomach,** so it is **not destroyed** by the <u>enzymes and acids</u>.

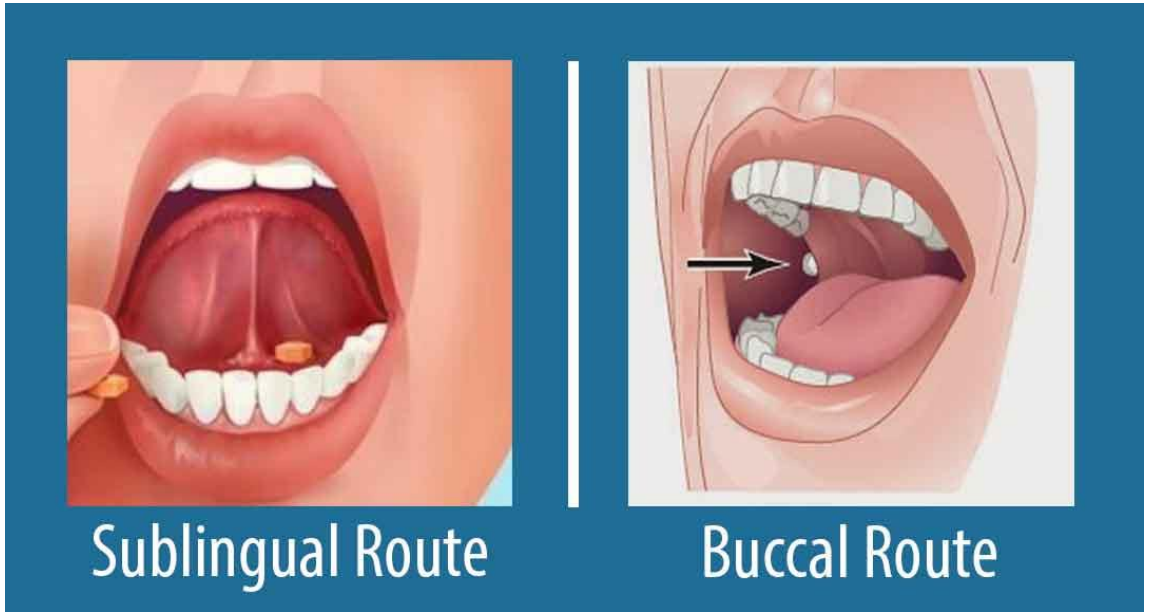
4. Avoid the **first-pass** effect.



Disadvantages

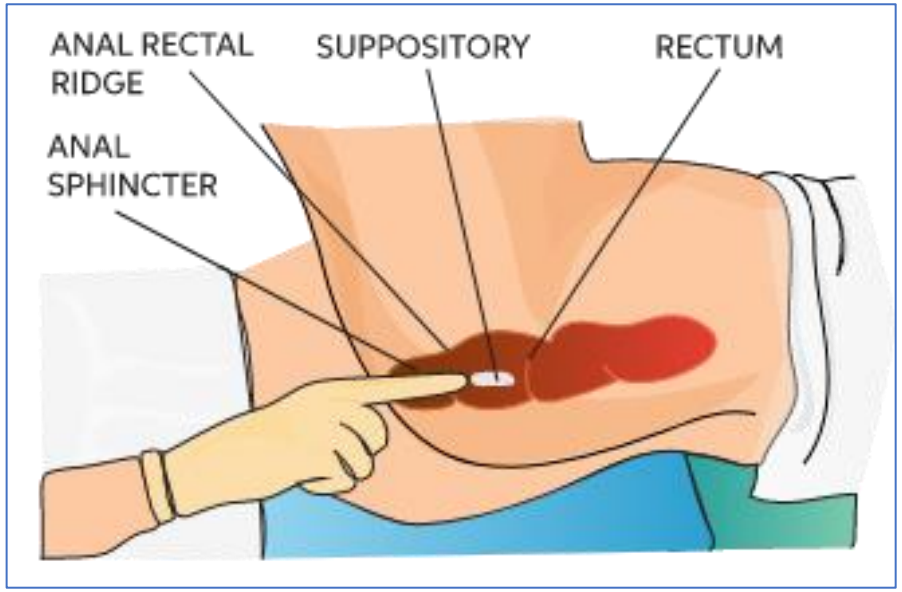
1. May be **Inconvenient**
2. Only **small Doses**
3. **Unpleasant taste** of some drugs:

✓The drugs having unpleasant taste can cause problem because the drug is kept in the mouth.



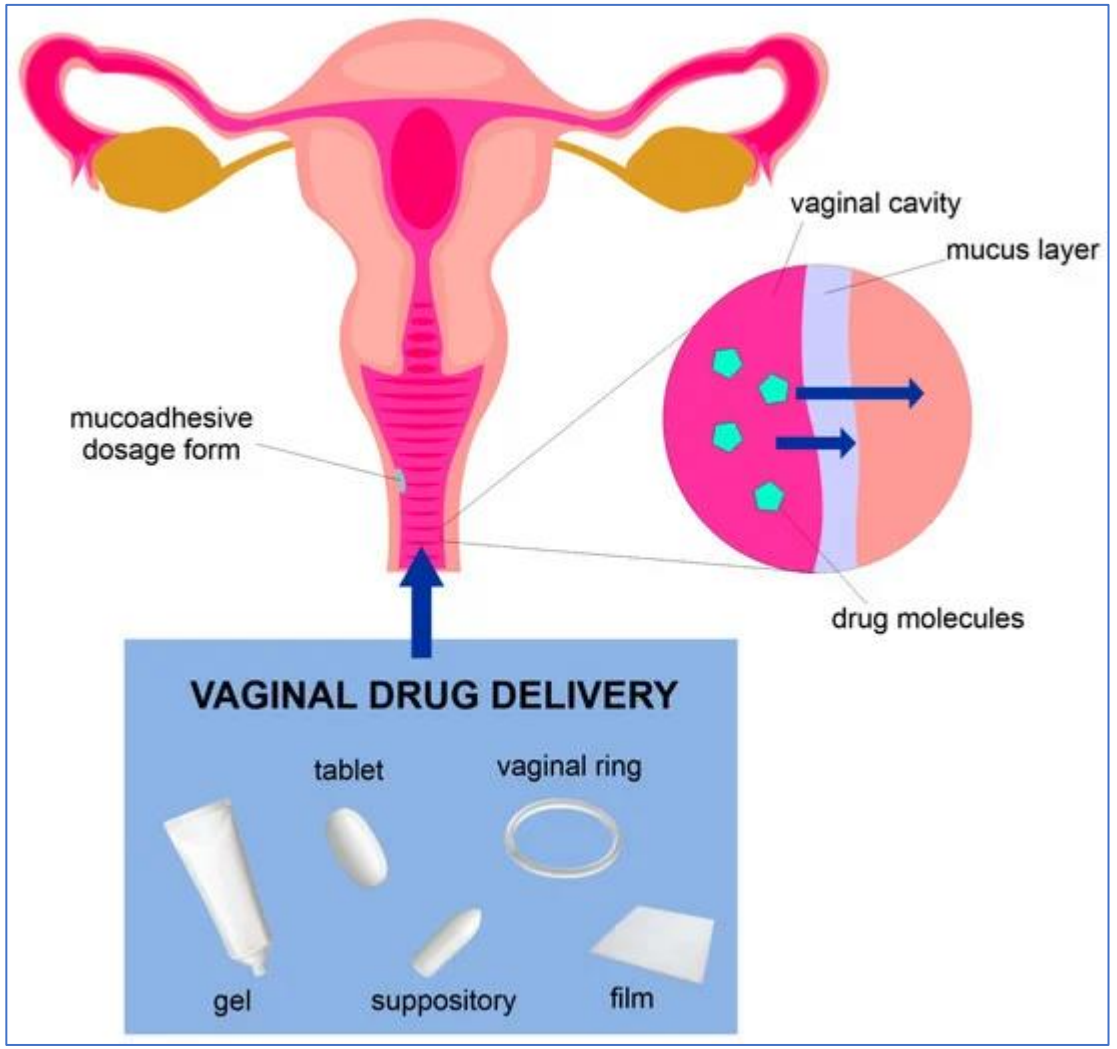
Rectal Route

- In this form, a drug is **mixed with a waxy substance** that dissolves or liquefies after it is **inserted** into the **rectum**.
- Because the **blood supply** is **rich**, the drug is readily absorbed.
- It is prescribed for people who **cannot** take a drug **orally** because they have nausea, cannot swallow, or have restrictions on eating.



Vaginal Route

- Some drugs may be administered **vaginally** to women as a solution, tablet, cream, gel, suppository, or ring.
- The drug is **slowly** absorbed through the vaginal wall.



Advantages of rectal/vaginal route

- **Advantages**:

1. **Unconscious** patient and children
2. If the patient is **nauseous** or **vomiting**

Disadvantages:

1. May cause **irritation**
2. **Absorption** may be variable

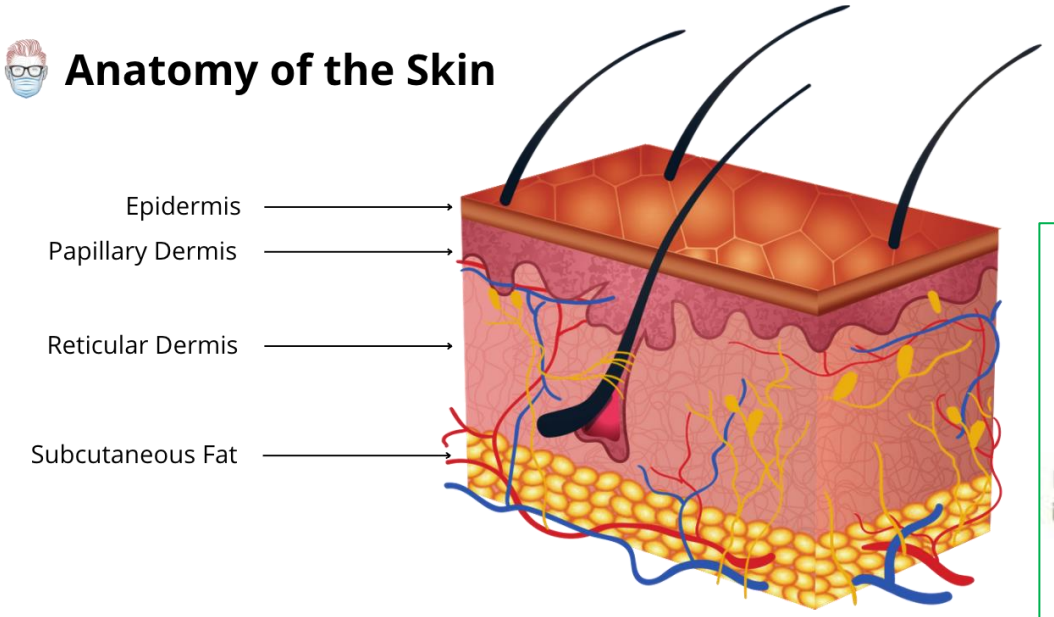
Parenteral Routes

- The drug does **not pass** through the **GIT, &** It **directly** reaches the **blood**.
- It can further be classified into two classes:-

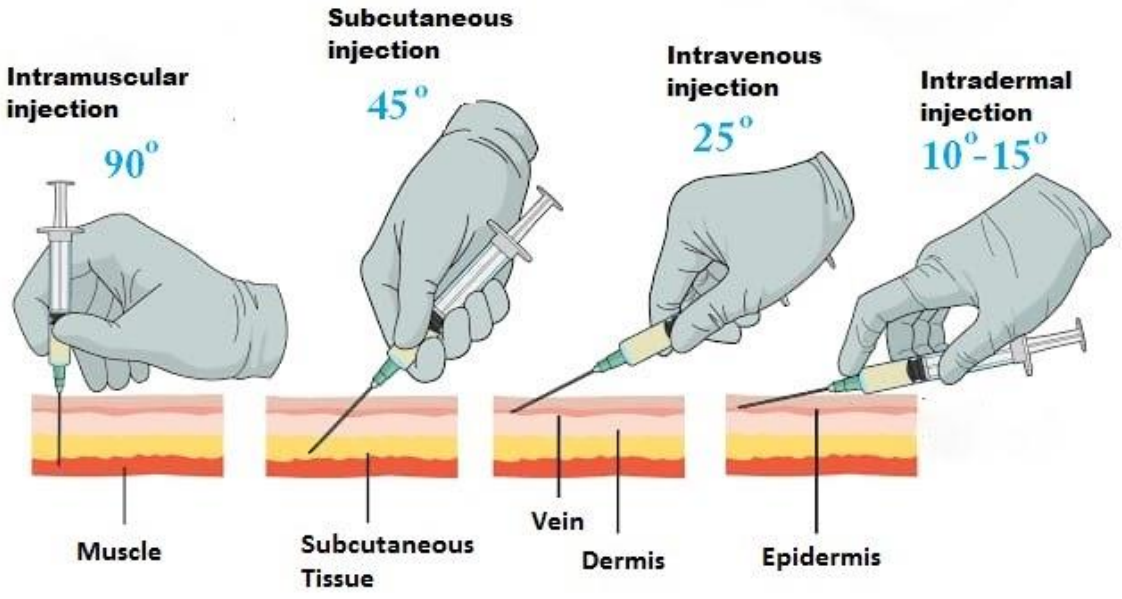
1. **With injections:-** such as:
   - ✓Intravascular
   - ✓Intramuscular
   - ✓Subcutaneous
2. **Without injections:** - such as:
   - ✓Inhalations

Parenteral Routes

Anatomy of the Skin



Angle for Administration of Injection



Intravascular Route

- The drug is **directly taken into the blood** with the help of injection, **absorption** phase is **bypassed**.
- **Advantages:-**
  1. Precise, accurate and almost immediate onset of action
  2. Large quantities can be given, fairly pain-free
  3. Can be given to unconscious patients
  4. Quick action
  5. Drugs having unpleasant taste can be given
- **Disadvantages:-**
  1. Pain at the site of injection
  2. Greater risk of adverse effects

  A. High concentration attained rapidly

  b. Risk of embolism

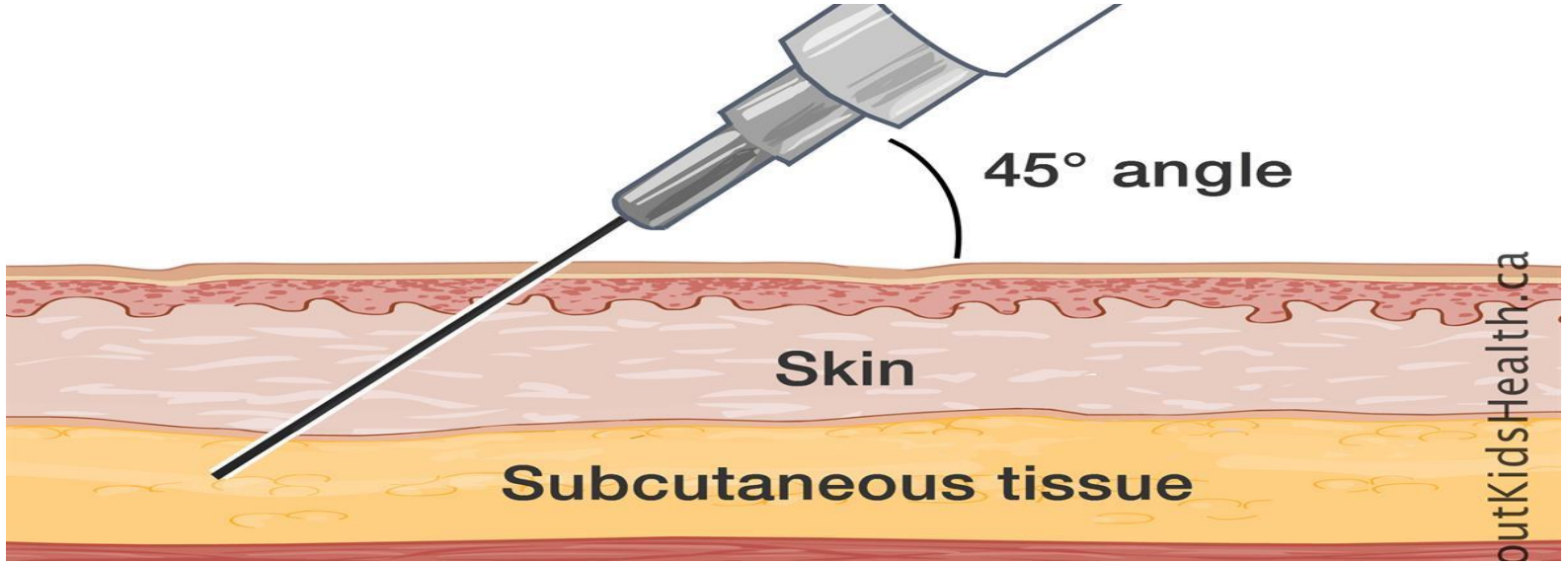
Intramuscular Route

- The drug is given into the **muscles** with the help an of injection.
- Drug once reaches the muscles, **absorbs** into the blood.

  1. Very **rapid** absorption of drugs in an aqueous solution
  2. **Depot** and slow-releasee preparations
  3. **Pain** at injection sites for certain drugs

Subcutaneous Routes

- The drug is given into the **subcutaneous** layer with the help of an injection.
- Drug once reaches the subcutaneous layer crosses the membrane and **absorbs** into the blood.



Inhalation Routes

- **Without** going to the **GIT**
- **Not** administered with the help of **injections**
- The drug is administered in the **gaseous** form.
- **Rapid** onset of action due to rapid access to the circulation
- **Pain not occurs** because the injection is not used
- Examples:- Inhalers & Aerosols

Local/Topical Routes

- The drug is applied to **the skin** and **mucous** membrane for **local action**.
- **Mucosal membranes** (eye drops, antiseptic, sunscreen, callous removal, nasal, etc.)
- **Skin**

✓Dermal: Oil or ointment (local action).

✓Transdermal: Absorption of the drug through the skin (<u>systemic action</u>)

- ❖ Stable blood levels
- ❖ No first-pass metabolism
- ❖ Drug must be potent

Onset of Action

Routes	Onset of Action
Intravenous	30-60 seconds
Intraosseous	30-60 seconds
Inhalation	2-3 minutes
Sublingual	3-5 minutes
Intramuscular	10-20 minutes
Subcutaneous	15-30 minutes
Rectal	5-30 minutes
Oral	30-90 minutes
Topical/transdermal (topical)	variable (minutes to hours)

THANK YOU FOR YOUR ATTENTION