Routes of drug administration

Pharmacology lab 1/ 4th stage

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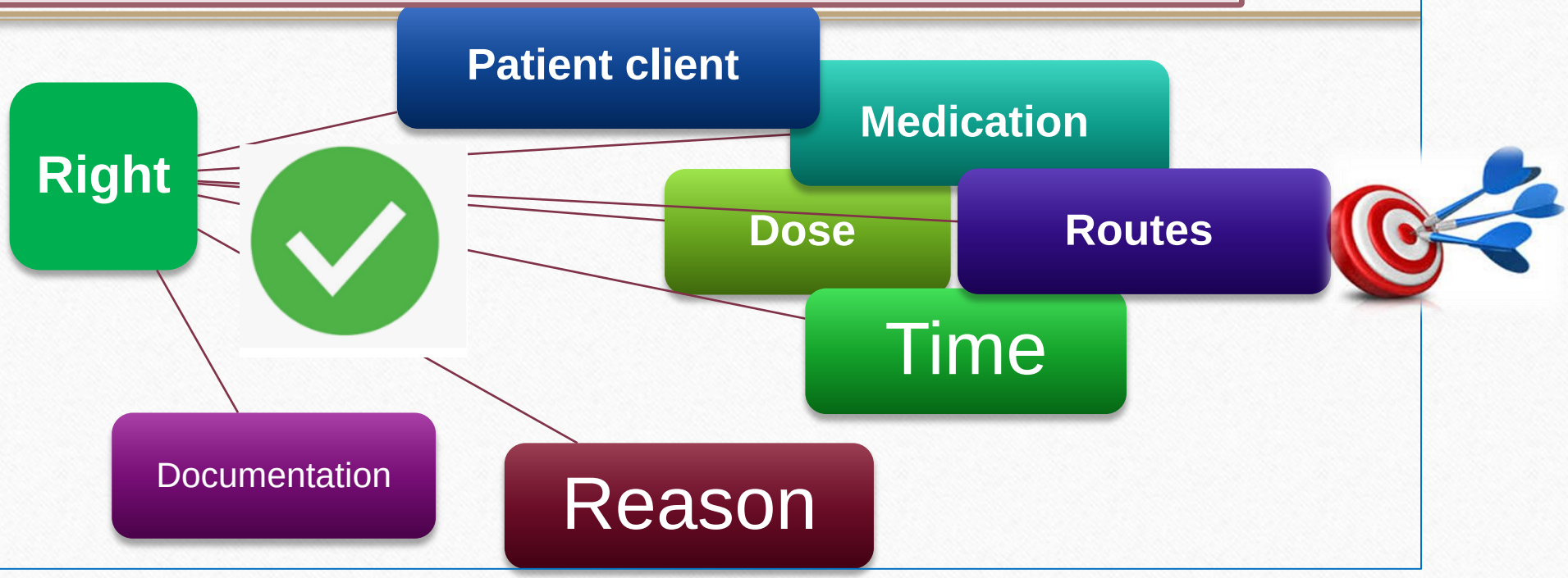
The route of drug administration

is the path by which a drug is taken into the body



Factors interfering with Choosing particular route of drug administration

DRUG RELATED FACTORS

1-Physical and Chemical properties

2- Compared bioavailability for different routes

PATIENT RELATED FACTORS

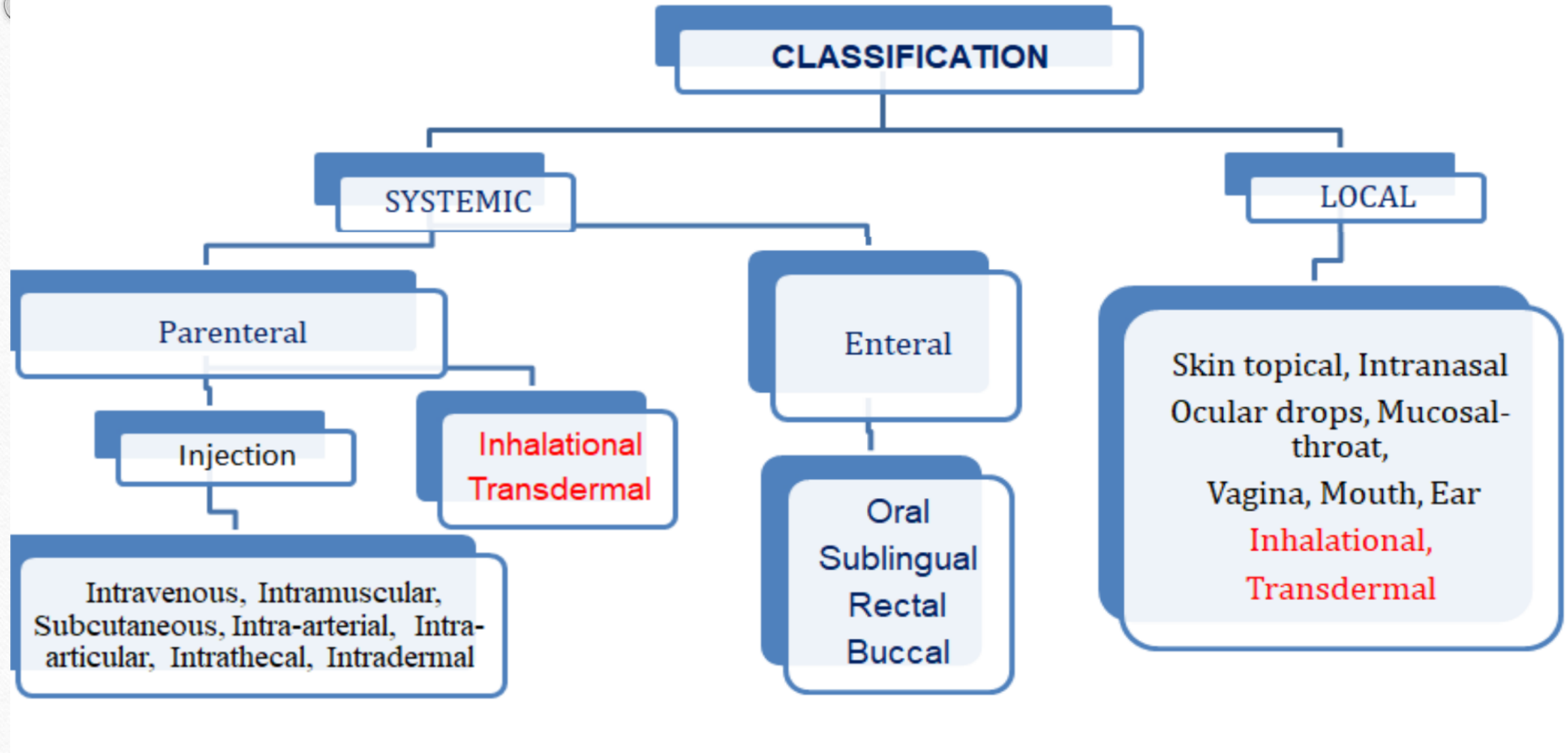
1-Condition of patient

2- urgency for response

3- site of desired action

4-Accuracy of dosing

5-First pass effect


CLASSIFICATION
SYSTEMIC
LOCAL
Parenteral
Enteral
Injection
Inhalational
Transdermal
Intravenous, Intramuscular, Subcutaneous, Intra-arterial, Intra-articular, Intrathecal, Intradermal
Oral
Sublingual
Rectal
Buccal
Skin topical, Intranasal
Ocular drops, Mucosal-throat,
Vagina, Mouth, Ear
Inhalational,
Transdermal

Enteral -Oral route

❖ **Advantage**

Simple use , safe ,economic **abbreviated by** (PO)

❖ **Disadvantages**

Delayed onset

First pass effect, Interactions

Not used with some patients eg children ,emergency ,coma ,…

Not used with some drugs eg insulin ,aminoglycoside …

Common Oral dosage form

- Tablets
- Capsules
- Powder
- Syrups
- solutions
- Suspensions
- Elixir

Sublingual routes

- Administration of Dosage form by placed under the tongue.

Advantages

- rapidly absorbed by mucosa
- Convenience of administration
- Avoidance the GIT irritation and first pass effect

Sublingual routes

- **Disadvantages**
- **Unpalatable and bitter taste drugs**
- **Irritation of oral mucosa**
- **Large quantity not given**

Buccal routes

Buccal administration is where the dosage form is placed between the gums and inner lining of cheek

- **absorbed by buccal mucosa**

Buccal routes

Advantages

Rapid absorption

Avoid first pass effect

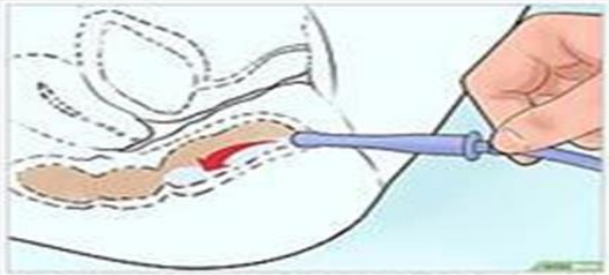
Disadvantages

Inconveneince

Small dose limit

Rectal route

Administering medication rectally



Insertion of an enema nozzle as it breeches the anal sphincter.

Enema equipment for introducing a large amount of fluid into the colon via the rectum.

Glycerin (laxative) suppositories for insertion into the rectum.

A rectal "bulb" syringe for introducing a small amount of fluid into the rectum.

Rectal Administration of Drugs

ADVANTAGES

- Used in children
- Little or no first pass effect
- Used in vomiting or unconscious
- Higher concentrations rapidly achieved

DISADVANTAGES

- Inconvenient
- Absorption is slow and erratic
- Irritation or inflammation of rectal mucosa can occur

systemic- Parenteral

- Parenteral administration is injection or infusion by mean a needle or catheter inserted into body
- The term parenteral comes from Greek words
- Para, = outside
- Enteron = intestine

PARENTERAL ROUTES

Direct delivery of drug into systemic circulation without intestinal mucosa

Intravenous (I.V.) (into veins)
Intramuscular (I.M.) (into skeletal muscle)
Subcutaneous (S.C.) (into subcutaneous tissue)

Intra-arterial (I.A.) (into arteries)

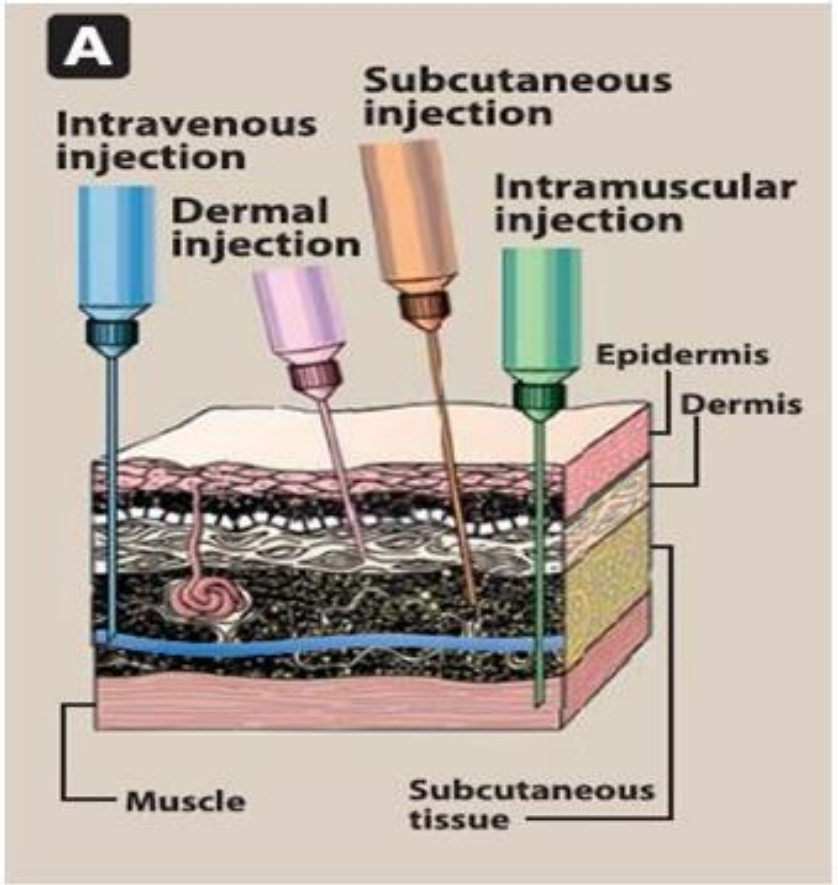
Intradermal (I.D.) (into skin)

Intrathecal (I.T.) (cerebrospinal fluids)

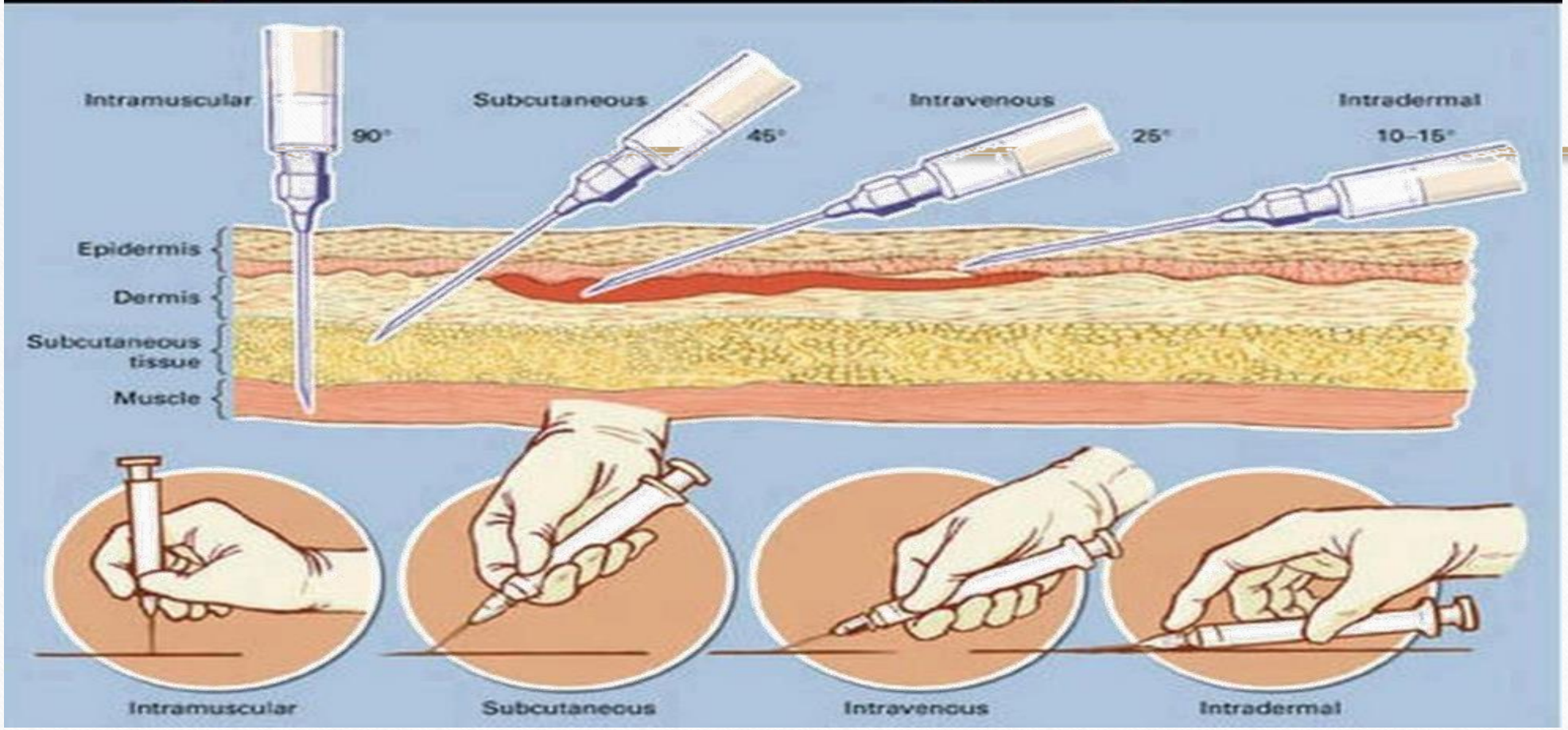
Intraperitoneal (I.P.) (peritoneal cavity)

Intra - articular (Synovial fluids)

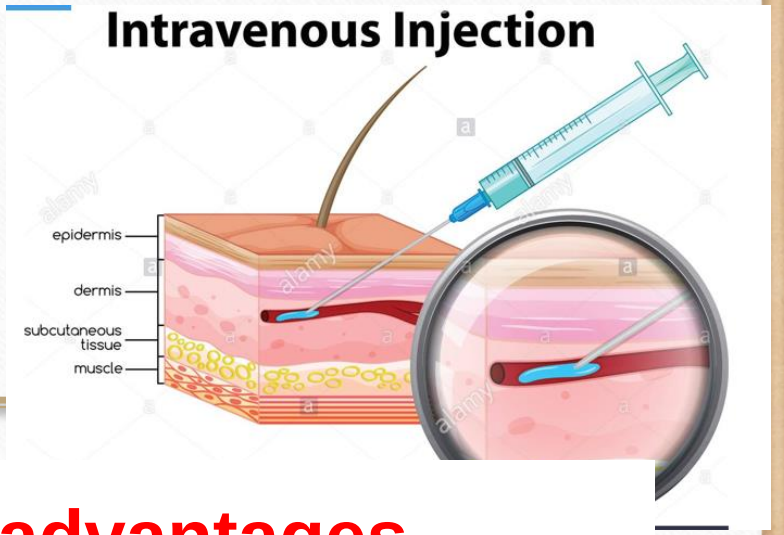
Intraosseous Infusion (I.O.) (into bone marrow).



Angles for inserting injections



Intravenous (IV)



Advantages

Bioavailability 100%

Large dose

Emergency

Vomiting, diahria, coma…

Disadvantages

Expensive and Less convenient

Need technical assistance

Less safety

Thrombophlebitis

Intramuscular (IM)

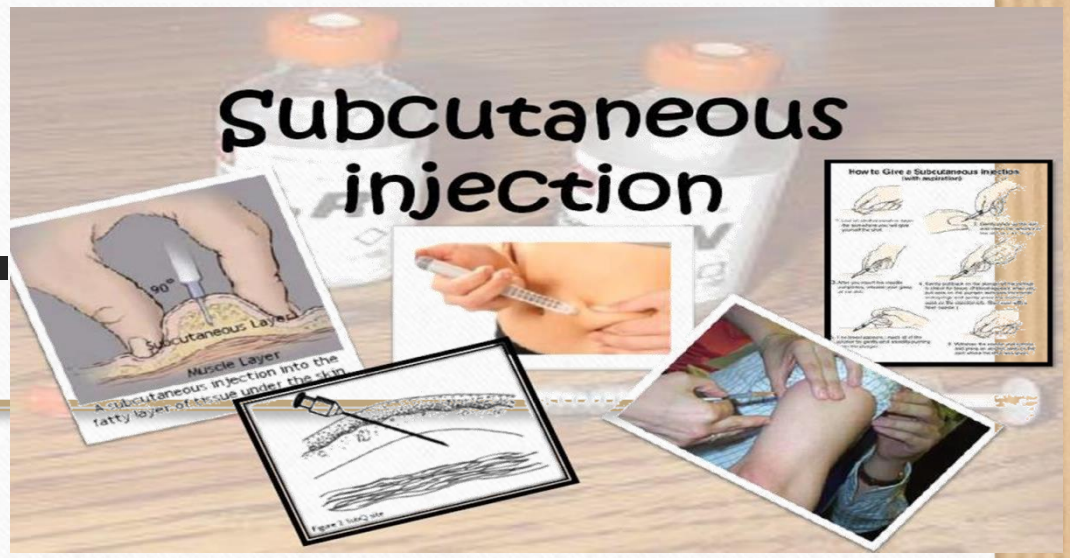
Advantages

- Rapid absorption
- Rapid onset of action compared to oral and subcutaneous
- Avoid first pass effect
- Avoid gastric factors

Disadvantages

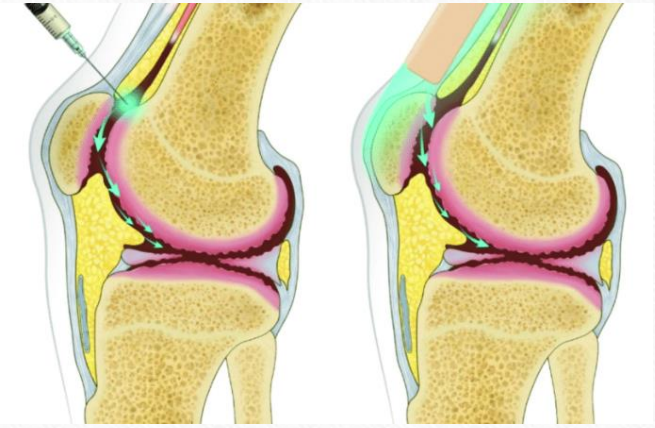
- Expensive
- local pain and abscess
- nerve damage
- Up to 10 ml drug given

Subcutaneous inj.



- Injected under the skin
- Absorption is slow so prolong duration of action
- Liquid such as heparin ,insulin
- Solid dosage form such as implantation tablet

Intra-articular inj .



- Injected materials **directly into a joint**.
- Corticosteroids (steroids), local anesthetics, hyaluronic acid, and Botox are the most common substances injected into joints

Intradermal inj .

- Injections are delivered into the **dermis**

or (the skin layer underneath

the epidermis layer.)

- Vaccines ,allergy test ,

Inhalation route

- Used for volatile gases (anaesthetic)
- also liquid such as in aerosol, nebulizer/ inhaler
- **Advantage**

Large surface area , high blood flow and rapid action

Represent a local route in lung diseases.

Small dose, so less toxicity

- **Disadvantages**

Difficulty used inhaler in some patient.

Only few drugs can be used.

Topical administration

- Is application of drug directly to the surface of skin
- Also includes administration to other mucous membrane such as eye ,nose ,ear, vagina
- Examples for Topical dosage form:-
- Cream, ointment, gel, lotion, transdermal patch, drop, solution, spray
- Advantages and disadvantage
  - ❖ Local therapeutic effect
  - ❖ Lower side effects ?
  - ❖ Sprays through nose may be for local or systemic effect eg , desmopressin (systemic ,xylometazoline local)

Topical administration transdermal route

Achieved systemic effect

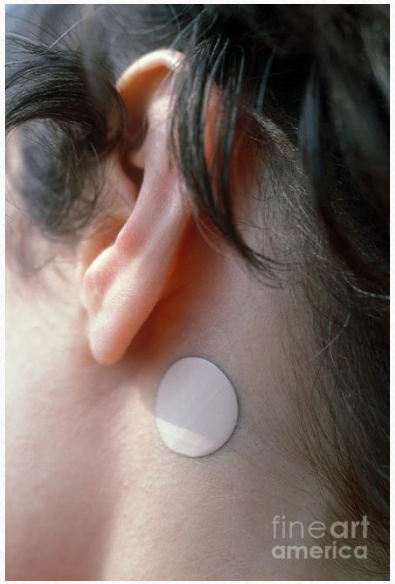
Prolong drug action

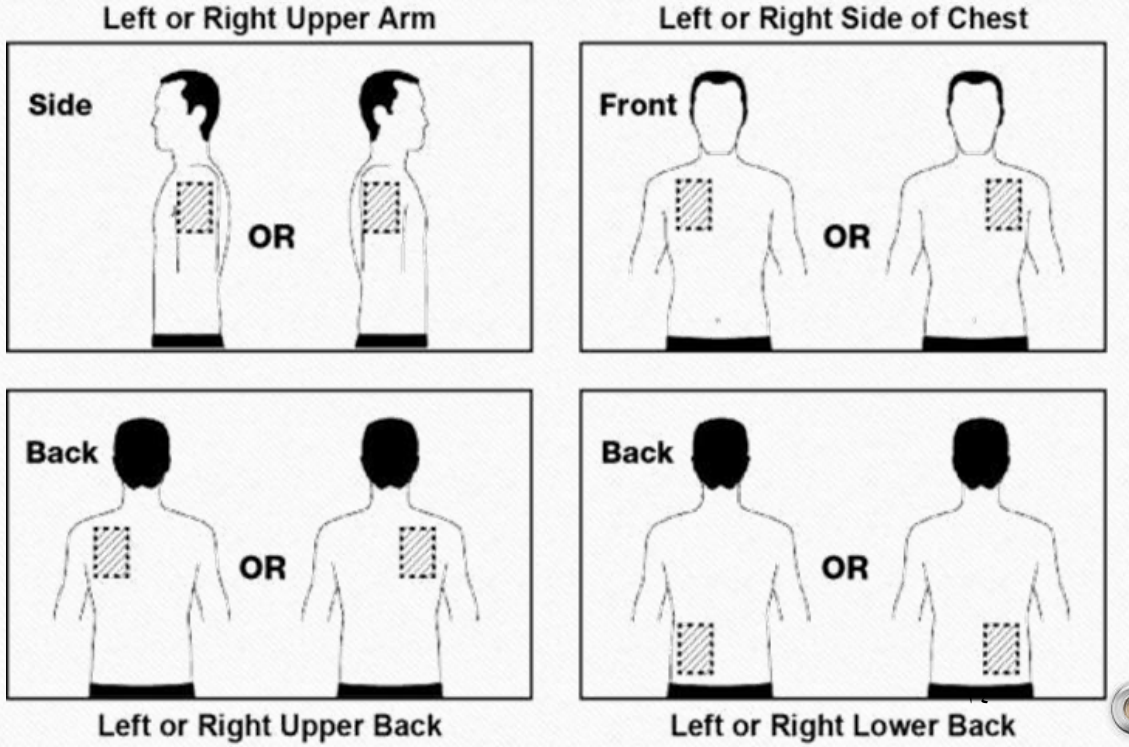
No first pass effect

Rate of absorption determined by drug properties and site of action

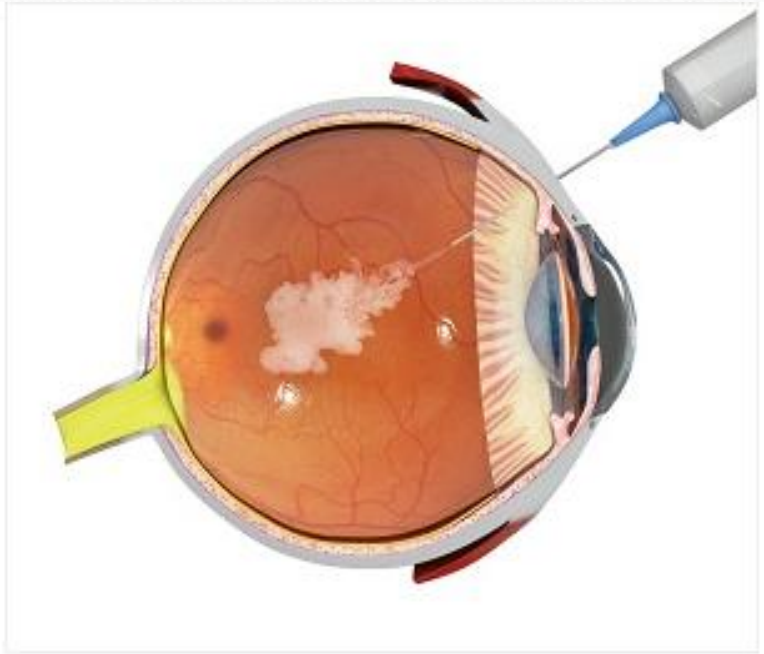
Best site for transdermal patchs

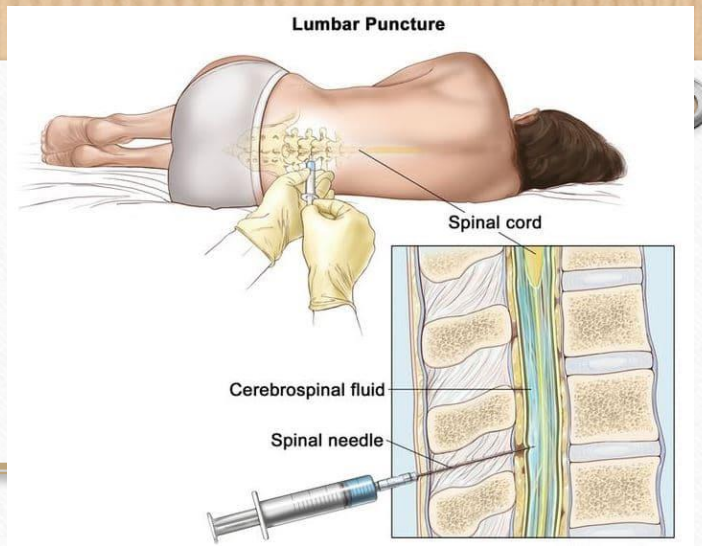
Example : Nitroglycerine, nicotine ,scopolamine, fentanyl

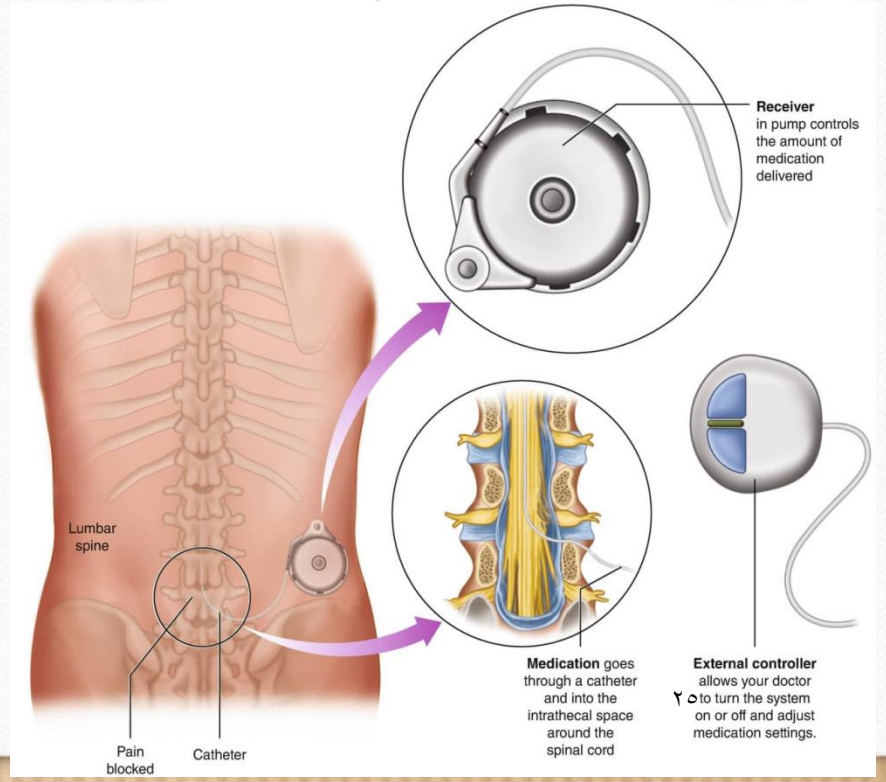




- Intrathecal (injection into sub-arachnoid space)
  - Intravitreal administered by **ophthalmologist**







Intraosseous Infusion

Intraosseous infusion (IO) is the process of injecting directly into the **Bone marrow**.
It is an alternate emergency technique to intravenous infusion.

Thank You For Your Attention