

Lec.1

Pharmacology

Routes of drug administration

A) Enteral routes

B) Parenteral administration

C) Others

A) Enteral routes

1) Oral

2) Sublingual & buccal

A) Enteral routes (administering the drug by mouth):

1) Oral route: most commonly used for drug administration.

Advantage:

1- Most convenient to the patient.

2- Acceptable.

3- Painless.

4- Safe

Disadvantage:

1- Drug action is slow, thus not suitable for emergency.

2- Irritant drugs cannot be administered.

3- May not be useful in the presence of vomiting.

4- Cannot be used for unconscious patient.

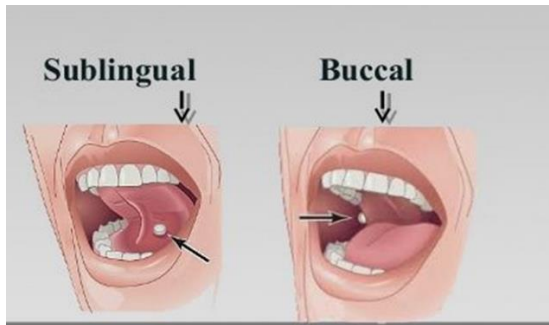
5- Digestive juices destroy some drugs (Penicillin G).

6- The drug must pass to the liver on its way to the general circulation (first pass metabolism).

2) Sublingual & buccal

The highly lipid soluble and non-irritating drugs (e.g.: nitroglycerine) in the form of tablets or pellets is placed under the tongue (sublingual). Or (buccal route) placement of

drug between the cheek and gum. The drug rapidly dissolves and is absorbed quickly in the general circulation



Advantage:

- 1- Rapid onset of action.
- 2- Easy to be used.
- 3- The effect can be terminated by spitting out the tablet.
- 4- Avoiding degradation of certain drugs by gastric acid & first pass metabolism in the liver.

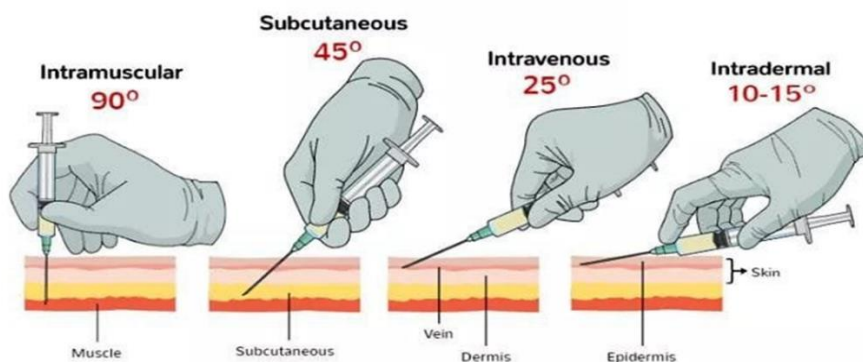
Disadvantage:

- 1- Irritation of mucus membrane.
- 2- Short duration of action.
- 3- Inconvenient for frequent use.

B) Parenteral administration

- 1) Intravenous (IV)
- 2) Intramuscular (IM)
- 3) Subcutaneous
- 4) Intradermal

Injection technique



1) Intravenous (IV): Drug introduces directly to systemic circulation.

Advantage:

- 1- Rapid effect and desired blood concentration can be obtained with a definite dose but it is at the same time the most dangerous route.
- 2- It is suitable for administration of drugs that are not absorbed from the gut or irritant to be given by other routes.
- 3- Suitable for unconscious patients and in case of vomiting.
- 4- Used in emergencies when rapid action is required.
- 5- Allow rapid modification of dose (i.e. immediate cessation of administration is possible if unwanted effects occur).

Disadvantage:

- 1- If given too rapid may cause severe toxicity or adverse effect.
- 2- Infection of intravenous catheter.
- 3- Less safe, more expensive.
- 4- Inconvenient (painful) for patient.
- 5- Can cause local venous thrombosis especially with prolonged infusion & with bolus doses of irritant formulation.
6. Chances of local injury at the site of injection

2) Intramuscular (IM):

The soluble substances, mild irritants & suspensions can be injected by this route in large skeletal muscles (deltoid, triceps, gluteus maximus, rectus femoris).

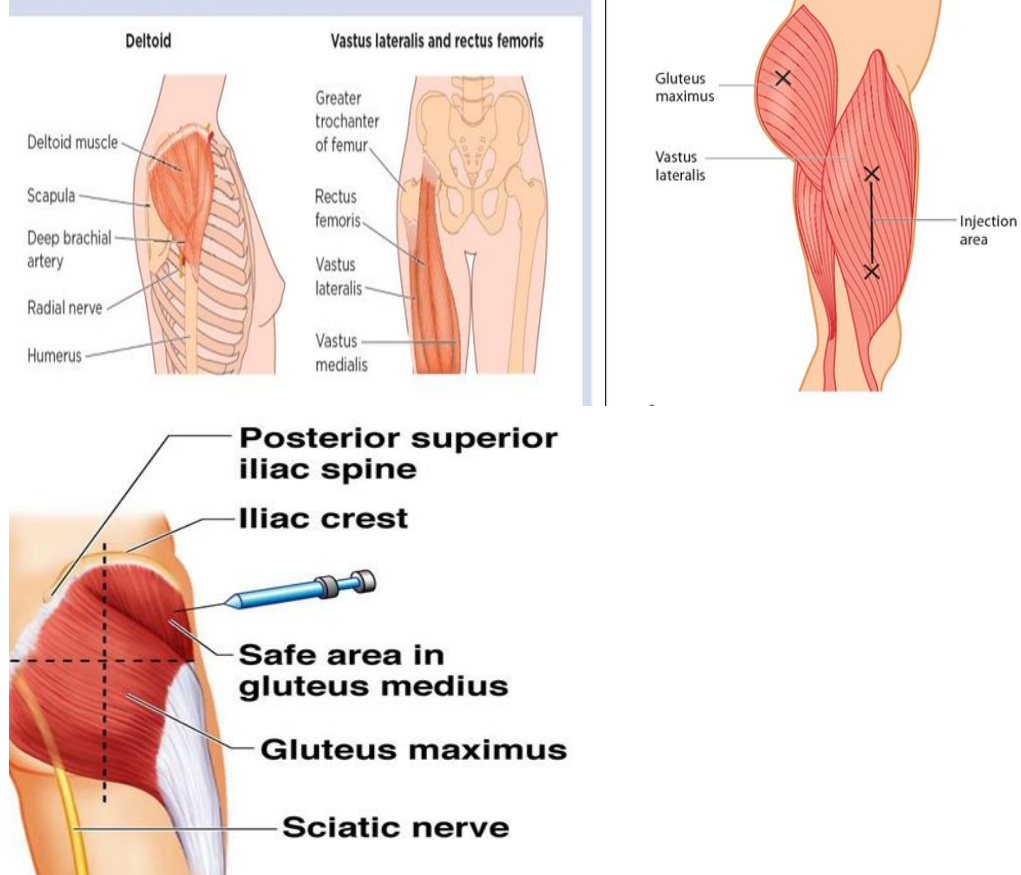
Advantage:

- 1- Reliable route.
- 2- Depot preparation (as benzathine penicillin) can be used at monthly or longer intervals.
- 3- Suitable for drugs not absorbed by gut.
- 4- Absorbed more rapidly than subcutaneous injection.

Disadvantage:

- 1- Painful.
- 2-Adverse effect to depot cannot be removed.
- 3- Unacceptable for self-administration

Fig 1. Sites for intramuscular injection



3) Subcutaneous:

Non-irritant substances can be injected by this route in the outer surface of arm or front of thigh (e.g. insulin, heparin).

Advantage:

- 1- Self-medication is possible.
- 2- Reliable.

Disadvantage:

Pain & necrosis if the drug is irritating

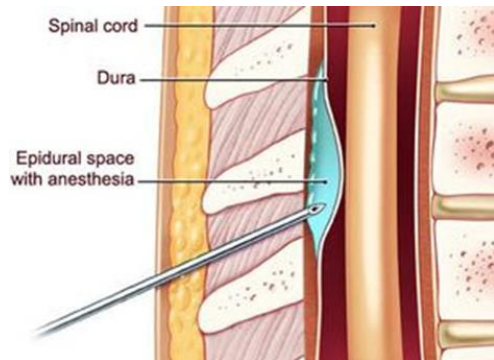
4) Intradermal:

Injection into the dermis, the more vascular layer of skin under the epidermis used for vaccination e.g. BCG vaccine, or for drug sensitivity e.g. penicillin injection.

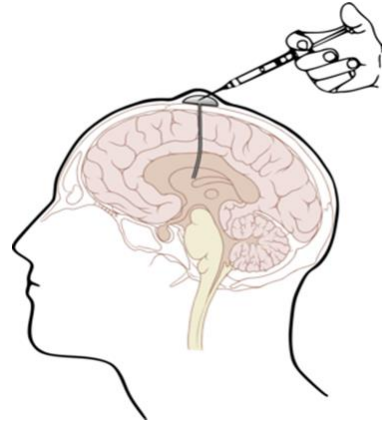
C. Others

1) Intrathecal / intraventricular:

The blood brain barrier typically delays or prevents the absorption of drugs in the central nervous system. When local, rapid effects are needed (meningitis, spinal anesthesia), it is necessary to introduce drugs directly into the cerebrospinal fluid.



1. Intrathecal injection



2. Intracerebroventricular injection

2) Intracardiac:

In sudden cardiac arrest and other cardiac emergencies, the adrenalin is injected into the heart by bug needle. To stimulate the heart

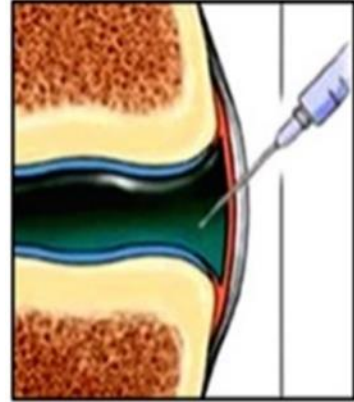
3) Intraperitoneal:

Intraperitoneal injection or IP injection is the injection of a substance into the peritoneum (body cavity). It is more often applied to animals than to humans. In general, it is preferred when large amounts of blood replacement fluids are needed or when low blood pressure or other problems prevent the use of a suitable blood vessel for intravenous injection.

In humans, the method is widely used to administer chemotherapy drugs to treat some cancers, particularly ovarian cancer. Fluids are injected intraperitoneally in infants, also used for peritoneal dialysis.

4) Intra-articular:

Certain drugs (glucocorticoids) can be administered directly into a joint space for the treatment of local condition e.g. osteoarthritis.



Intra-articular

5) Inhalation:

provide rapid delivery of drug across the large surface area of respiratory tract epithelium

Advantage:

- 1- Rapid effect.
- 2- Convenient for patient with respiratory disorders and give local effect with minimal systemic side effect.
- 3- Ideal for gases e.g. salbutamol and sodium cromoglycate inhaler.

Disadvantage:

- 1- The drug must not be irritant.
- 2- Obstructed bronchi cause the therapy to fail.



6) Rectal: (suppositories)

Advantage:

- 1- Used with drugs that are irritant to the stomach.
- 2- Suitable in case of vomiting or unconsciousness.
- 3- When lacking of cooperation (pediatrics).

Disadvantage:

- 1- May cause rectal inflammation.
- 2- Absorption incomplete.



7) Topical route:

When local effect of drug is desired (as ointments, creams, lotions) may be used for skin, eye, intranasal, minimize systemic absorption, easy for patient, e.g. hydrocortisone cream



8) Transdermal: As in cases of unstable angina. Application of drug to the skin and achieves systemic effect use transdermal patch, rate of absorption varies markedly depending on the physical characteristics of skin at site of application as well as lipid solubility of drug.

