Route of drug administration

Subject: Pharmacology and Toxicology
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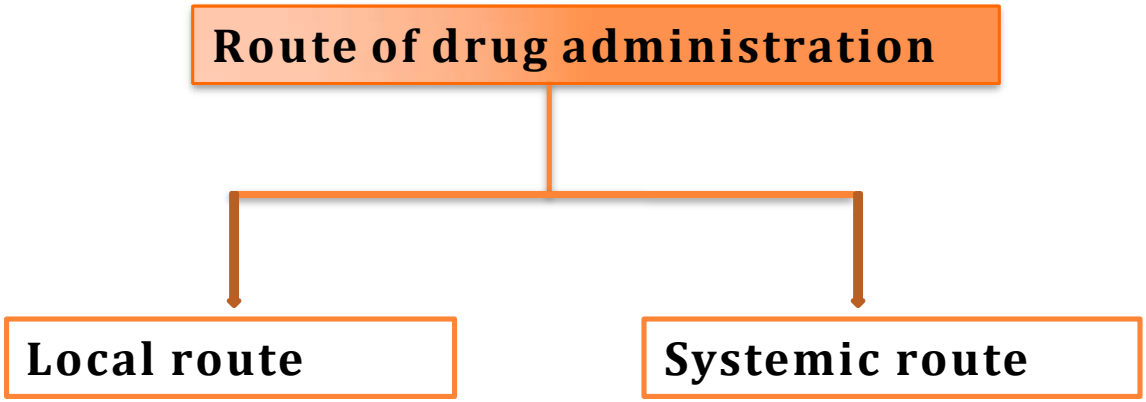
For any drug to exert its pharmacological effects, it must reach its site of action. Drug can be administered by a variety of routes. The choice of appropriate route in a given situation depends both on drug as well as patient.

- **Factor governing choice of route**

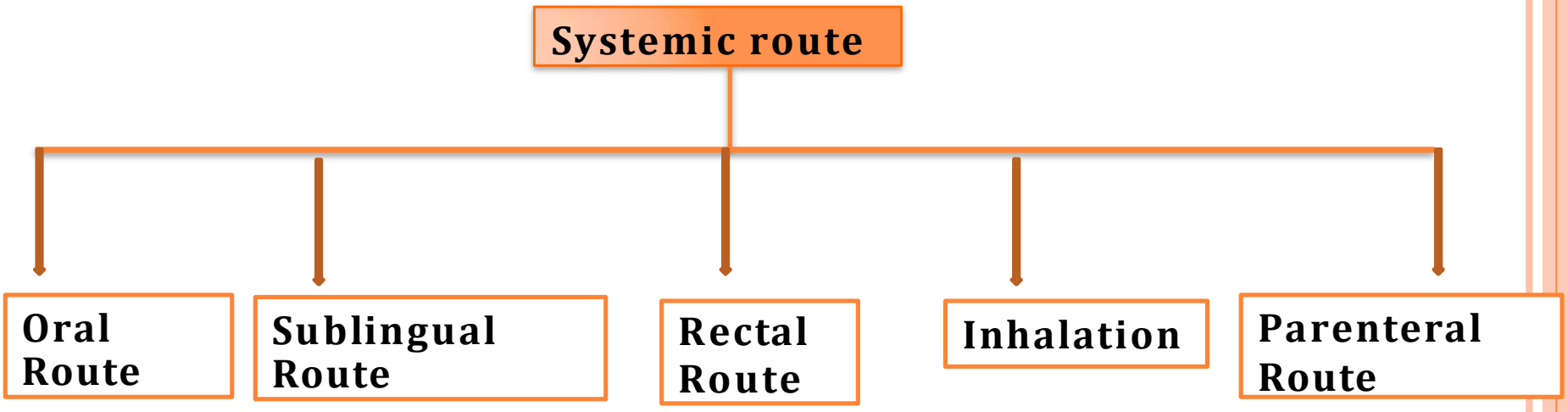
- ✓ Physical and chemical properties of drug.
- ✓ Site of action of the drug—local or systemic.
- ✓ Condition of the patient (unconscious, vomiting).
- ✓ Rapidity with which the response is desired.
- ✓ Effect of digestive juices and first pass metabolism.

- **Routes can be divided into-**



Systemic Routes

Drugs administered by this route enterblood and produce systemic effects.



1. Oral Route

It is the most common and acceptable route for drug administration. Dosage forms are tablet, capsule, syrup, mixture, etc.

Site: swallowing through mouth.

Advantages

- Safe
- Cheaper
- Painless
- Convenient
- Sterilization is not essential.
- Self-administered.

Disadvantages

- Not suitable for emergency as onset of action of orally administered drugs is slow.

It is not suitable for-

- ✓ Unconscious/unco-operative/ vomiting patient.
- ✓ Unabsorbable drugs (e.g. aminoglycosides).

- ✓ Drugs that are destroyed by digestive juices Drugs with extensive first-pass metabolism(e.g. lignocaine).

E.g. paracetamol tablet for fever, omeprazolecapsule for peptic ulcer are given orally.

Sublingual Route

- Site: The preparation is kept under the tongue. The drug is absorbed through the buccal mucous membrane and enters thesystemic circulation directly.

Advantages

- Quick onset of action.
- Bypasses first-pass metabolism.
- Self-administration is possible.

Disadvantages

- It is not suitable for: Irritant and lipid-insoluble drugs.
- Large mol. Weight drug not well absorbedby this route.

E. g. Nitroglycerine for acute anginal attackand buprenorphine for myocardial infarction.

Rectal Route

- Site: rectum

Advantages

- Useful for nausea and vomiting.Useful for gastric irritant drugs.

Disadvantages

- Rectal inflammation
- Inconvenient & embarrassing to patient.

E.g. Suppository

Inhalation

- Volatile liquids and gases are given byinhalation for systemic effects.

Advantages

- Quick onset of action.

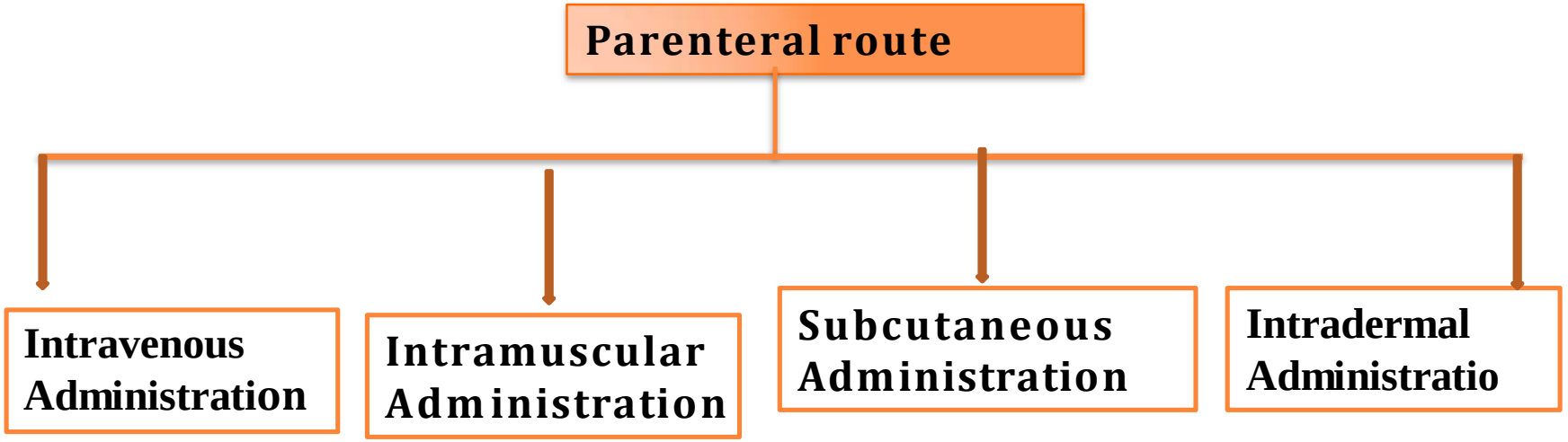
Disadvantages

- Local irritation may cause increased respiratory secretions and bronchospasm.

E. g. General anesthetics.

Parenteral

(*Par*—beyond, *enteral*—intestinal) Conventionally, parenteral refers to administration by injection which takes the drug directly into the tissue fluid or blood without having to cross the enteral mucosa.



Intravenous (i.v.)

Site: lumen of vein, antecubital vein

Merits

- Drug reaches directly into the blood stream and effects are produced immediately.
- Highly irritant drugs can be injected i.v.
- Employed even in Unconscious/unco-operative/ vomiting patient.

Demerits

- Only aqueous solutions (not suspensions, because drug particles can cause embolism) are to be injected i.v. and there are no depot preparations for this route.

- Strict aseptic condition is needed.
- Expertises are needed.
- Painful
- Risky
- Thrombophlebitis of the injected vein and necrosis of Adjoining tissues if extravasation occurs.

E.g -sodium nitroprusside

Intramuscular (i.m.)

Site: large skeletal muscles—deltoid, triceps, gluteusmaximus, rectus femoris, etc.

Merits

Depot preparations (oily solutions, aqueous suspensions) can be injected by this route.

Demerits

- Perfect aseptic condition required
- Nerves damage

Subcutaneous (s.c.) Site:

subcutaneous tissue

Merits

Deport preparation is given

Demerits

Irritant drug cannot administrate

E.g. vaccine

Intradermal injection

- The drug is injected into the skin

E.g. BCG vaccine, sensitivity testing.

LOCAL ROUTES

- These routes can only be used for localized lesions at accessible sites and for drugs whose systemic absorption from these sites are minimalor absent.

- The local routes are:

Topical

Deeper tissues

Topical

This refers to external application of the drug tothe surface for localized action.

It is often more convenient as well as encouragingto the patient.

Drugs can be efficiently delivered to the localizedlesions on skin, or pharyngeal/nasal mucosa, eyes, ear canal, anal canal or vagina in the formof lotion, ointment, cream, powder, rinse, paints, drops, spray.

Deeper tissues

Certain deep areas can be approached by using a syringe and needle, but the drug should be in such a form that systemic absorption is slow,

E.g.

- Intra-thecal injection (lidocaine)
- Retro bulbar injection(Hydrocortisone acetate behind the eyeball)
- Intra-articular injection (Hydrocortisone acetate in knee joint)