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Medication administration routes: An overview

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ABSTRACT

The route of administration for a drug should be particular to attain a useful concentration at the site of action as suitably as possible. Important subsidiary objectives may be rapidity of onset and duration of drug effect and, in some instances, the selectivity of action. The route of administration is the method through which the dosage form is administered into the body for the treatment of various diseases and disorders. Various routes of administrations play a clear role in the bioavailability of the active drug in the body. In the current review, these routes are integrated with their advantages and limitations. This is an attempt for the initials of the field to bring into the light with the routes of administrations with their significances. Many drugs will elicit effects of similar magnitudes when the same dose is given by a number of different routes. However, there are so many instances when this is not true that these can be important traps for the unwary pharmacologist, toxicologist, or clinician. Several drugs with effects that vary according to the route of administration.

Keywords— *Bioavailability, Concentration, Drug, Route*

1. INTRODUCTION

A route of administration in and is the pathway by which, fluid, poison, or other substance is taken into the body. A route of administration in pharmacy is the path by which a drug is taken into the body. [(1)]
Drug administration. 6 Rights: P-D-D-R-T-D
"Patients Do Drugs Round the Day"

- Right Patient
- Right Drug
- Right Dose
- Right Route
- Right Time
- Right Documentation

2. RESEARCH

Neural drug delivery is the next step beyond the basic addition of to allow the rate of growth factor release to be regulated over time, which is critical for creating an environment more closely representative of in vivo development environments[2].

2.1 Classification

The various routes of administrations are classified into following categories

Table 1: Abbreviations of Routes of Drug Administration

Routes of Administration	
Abbreviation	**Meaning**
P.O	Per OS-By-Mouth
N.G	Nasogastric

S.L	Sub-Lingual
I.V	Intravenous
I.M	Intramuscular
Sub Cut.	Subcutaneous
P.R	Per Rectum
P.V	Per Vagina
gutt	Eye Drops
OCC	Eye Cream
E/C	Enteric Coated
M/r	Modified Release[2]

Table 2: Routes of Drug Administration

Route	Description	Examples of drugs
I. Oral or Enteral	This most commonly employed route for drug administration.	Tablets, Capsules, Liquid orals[3].
II. Parenteral	Route of administration other than the alimentary tract are called parenteral.	
A) Inhalation	Drugs may be administered as dry powders, as nebulized particles from solutions or in the form of vapours.	Beclamthazone, Sodium cromoglycate, Salbutamol Isoprenaline
B) Injections 1) Intradermal	Given into layers of the skin (Employed for testing drug sensitivity)	B.C.G. Vaccine
2) Sub-Cutaneous	Given beneath the skin into the fatty connective tissue lying below the dermis only non –irritant substances can be injected by this route.	Insulin(Commonest drug used by this route) Adrenaline4
3)Intramuscular	Soluble substances, Mild Irritants, suspensions, Colloids can be injected by this route the volume of injection should not exceed 10ml.	Penicillin, Streptomycin, Benzathine Pencillin, Paraldehyde. Sodium, Diazepam.
4)Intra-venous	Drugs given directly into a vein to produce rapid action and desired blood concentration.	Frusemide, Digoxin, Pethidine, IV Fluids, Aminophyllline.
5)Intra-Arterial	Drug given directly into artery used in diagnostic studies (Angiogram)	Meglumine-Diatrizoate5.
6)Intra-Thecal	Drug administered into the sub-archnoid space and drugs act directly on CNS.	Spinal anaesthetics, Antimalignancy drugs.
7)Intra-peritoneal	This route is used in infants for giving fluids like glucose saline into the peritoneum. It is also used for peritoneal dialysis.	Glucose saline in infants.
8)Intra-Medullary	Introduction of a drug into the bone marrow	
9)Intra-Articular (Or) Intra-lesional	Drugs are administered directly into a joint for the treatment of local conditions.	Hydrocortisone acetate, Fludroccartisone6.
10) Intraocular	Drugs are administered into the eye,	Some medications for glaucoma or eye neoplasm
11)Intra-cavernous injection,	Injection into the base of the penis. This injection site is often used to administer medications to check for or treat erectile dysfunction in adult men	Caverject, Trimix, Bimix, Quadmix, prostaglandin, papaverine, phentolamine, and either atropine or forskolin[7]
12)Intracardiac	Injections that are given directly into the heart muscles or ventricles. They are used in emergencies	Adrenaline
13)Intravaginal administration	Route of administration where the substance is applied inside the vagina	Vaginal tablets, vaginal cream, vaginal suppository and vaginal ring.[8]
14) Extra-Amniotic administration	Route of administration to the space between the fetal membranes and endometrium inside the uterus of a pregnant woman.	Oxytocin, prostaglandins.
III Trans-Cutaneous 1)Iontophoresis	Galvanic current is used for bringing about the penetration of drugs into the deeper tissues (Anode Iontophoresis is used for compounds bearing positive charges and cathode Iontophoresis for the negatively charged compounds)	Salicylates
2)In unction	Drugs rubbed into the skin can get absorbed and produce their systemic effect.	Nitro-glycerine ointment, iodex ointment, chaulmoogra oil.[9]
3)Jut injection	This method involves transcutaneous introduction of a drug by means of a high velocity jut produced through micro filed orifice.	Jet injection for insulin.
4)Adhesive units	A Transdermal therapeutic system in the form of an adhesive unit is available to deliver slowly, producing prolonged systemic effect	Scopolamine for prevention of motion –sickness.[10]

IV Trans-Mucosal 1)Sublingual	Drug is placed under the tongue and allowed to dissolve in the mouth.	Isoprenaline, Nitrooglycerine, Nifedipine, isosorbide dinitrate, Buprenorphine.
2)Trans-Nasal	Administered through nose	DADVP, a synthetic analogue of vasopressin, the hormone of the posterior pituitary gland.
3)Trans-Rectal	Administered into rectum	Indomethacin in rheumatoid arthritis [11]
4)Bronchial		Asthma
V)New drug delivery System	Drug in a programmed dosage form that administers the medication at a predetermined way, automatically over an extended period of time from a single application.	
	1)Ocusert	Pilocarpine in the form of ocusert placed directly under the eyelid .[12]
	2)Progestasert	An intrauteral contraceptive
	3)Prodrug	Propoxyphene napsylate, Chloroamphenicol palmitate, levodopa.[13]
	4)IVDS	Hormones: Progestin,levonorgetrel Non-Hormones: Contraception.[14]

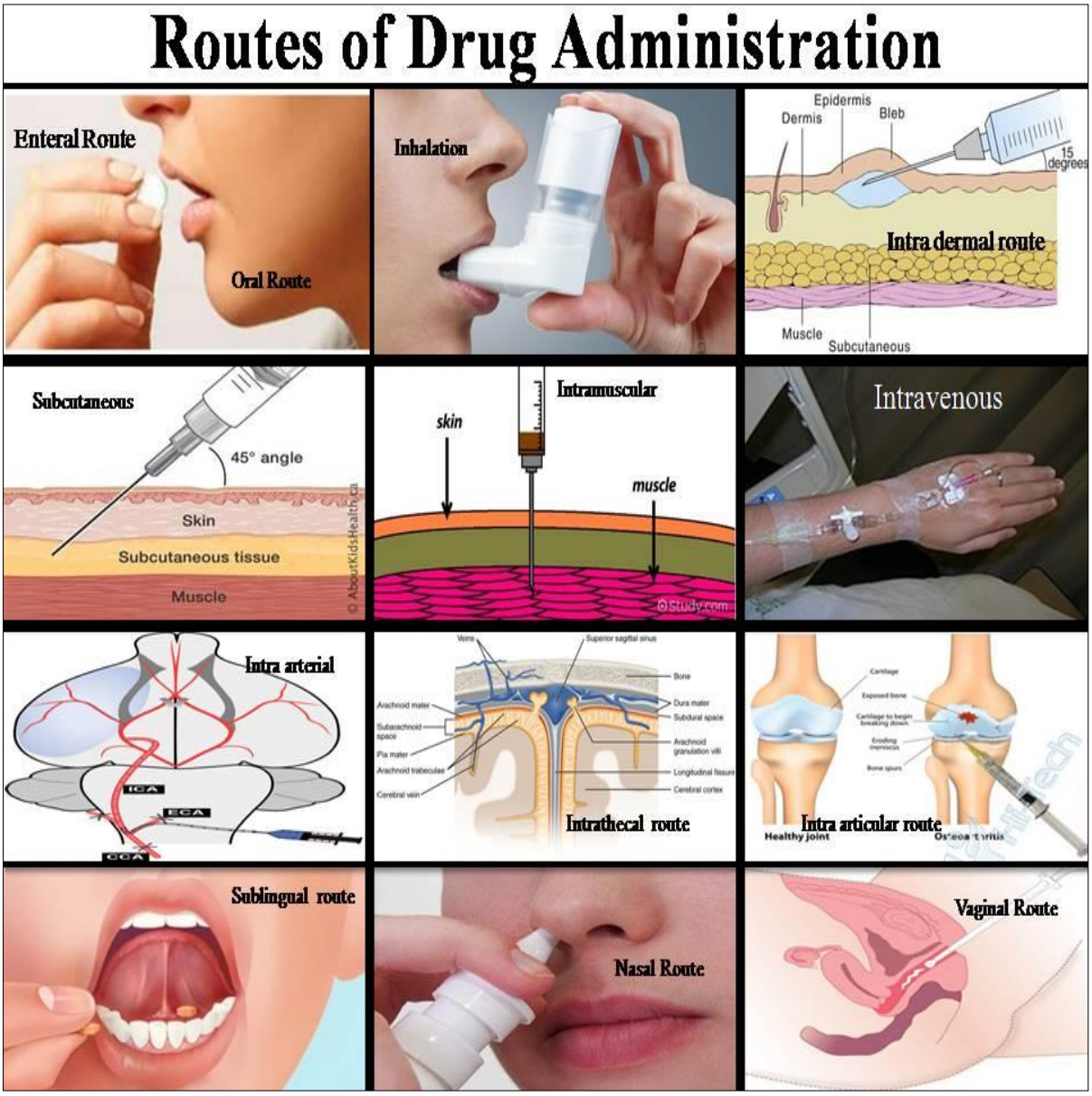

Fig. 1: Different Routes of drug administration [15-16]

3. CONCLUSION

Many drugs will elicit effects of similar magnitudes when the same dose is given by a number of different routes. However, there are so many instances when this is not true that these can be important traps for the unwary pharmacologist, toxicologist, or clinician. Several drugs with effects that vary according to the route of administration.

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