Routes of administration:

* Depends on drug & patient related factors

Division:

1) Local action 2) Systemic action

factors:

1. physical & chemical properties of drug.
   solid / liquid / gas - solubility, stability, PH, pKa
2. Rate & extent of absorption ≈ bioavailability.
3. site of desired action { localized / systemic/generalized.
4. Effect of digestive juice & 1st pass metabolism.
5. Rapidity of action needed.
6. Accuracy of dosage required
7. Condition of patient

Local Routes: → Topical / Deeper / Arterial

1. Topical: external application, localized lesions on skin, oral mucosa, ear canal, eye, nasal mucosa, anal canal, vagina in the form lotion, cream, oint, paint, drops, sprays, lozenges, suppos, pessaries, non absorbable drugs for GI mucosa - sucralfate, vancomycin.
   Inhal'n: bronchi: salbutamol, cromoglycate sodium.
2. Deeper tissues: syringe & needle.
   a. Intraarticular inj - knee joint
   b. Intrathecal inj - lidocaine
   c. retrobulbar inj - behind eye ball.
3. Arterial supply:
   . angiography
   . Anti cancer drugs - femoral & brachial artery, limb malignancies

Systemic Routes:

1. Oral : Adv: 1. Safe, 2. Convenient, self administr. non invasive (painless) economical, good abs all the length of git

Disadv: • Not emergencies ∵ slow abs.
• Irritable & unpalatable drug – No.
• Uncooperative & unconscious vomiting – No
• Some drug destroyed.
• First pass metabolism. • food-drug & Drug drug int.

Dosage form: Tab, cap, elixirs, soln, susp, emul. granules

2. Sub lingual; or (Buccal)
Drug is placed under the tongue or crushed.
Adv: • Drug abs quick & directly venous.
• No 1st pass.
• Self admin & economical.
Disad: unpalatable – No.
Irritation of buccal mucosa
Not large quantity
only fewer drugs

GTN, Buprenorphine, Des amino oxytocin

3. Rectal : suppository, retention enema.
Adv: • used in children.
• little or no 1st pass effect.
• Used in vomiting & unc.
• High conc rapidly achieved.
Disadv: Inconvenient.
• Abs'n slow & erratic
• Irritation or infl'n of rectal mucosa

Diazepam, paracetamol, indomethacin, ergotamine.

4. Cutaneous:
– applied over skin for slow & prolonged actn/abs'n.
– Liver is bypassed.

TTS: through stratum corneum

chest, abdomen, upper arm, lower back, buttock, mastoid.
→ GTN, fentanyl, Nicotine, estradiol.

5. Inhalation: Volatile liquids & gases. abs'n from alveoli, rapid. eg: general anest. Disadv: Irritation of Respiratory tract & secretions

6. Nasal: mucous mem of nose. → spray.
eg: GnRH analogues, desmopressin, Insulin
Adv: By passes liver & drug...

7. Parenteral:
Adv: • faster & surer; emergencies
• No gastric irritation; vomiting
• unconscious, uncooperative or vomiting
• liver bypass: No interaction.

Disadv: • sterilised; costlier.
• invasive & painful; assistance of other person.
• chances of local tissue injury.

i) SC: → into subcutan. richly ē nerves,

Disadv: • irritant drugs can't be.
• less vascular • only small volumes.

1. Dermojet 2. pellet implantation, 3. sialistic implant.
↳ solid pellet into cannula.
4 drugs is packed in tubes or capsules implanted under
Norplant (Hormones & contraceptive)

ii) Intra muscular (I.M).
deltoid, ~~triceps~~ gluteus ~~max~~ maximus (hip muscle)
(humerus) rectus femoris.
→ less richly supplied ē nerves ∴ so irritants can be.
→ less painful, but ~~is~~ not self injected.
eg: Depot prep^n.

iii) IV. : i.v. bolus & infusion.
Disadv: thrombophlebitis of injected vein.
Necrosis of adjacent tissues
only aqueous sol^n are taken (no particles).
Adv: 100% bioavailability.
Response is accurately measurable.

iv ID: skin raising a bleb.
eg: vaccine, sensitivity testing.

Agonists

1) Agonists
Affinity + IA ⇒ 1
eg: Dop, hist, morphine.
2) Partial agonist
eg: Buprenorphine
affinity & IA → 0-1
~~agonist~~ sub maximal response
antagonises action of full agonist.
3) Inverse agonist
affinity & IA → 0-(-1)
→ chlorpheniramine → H₁
DMCM → BZP

Antagonists

Reversible | Irreversible Atom...
competitive | Noncompetitive
affinity | on other site
IA = 0 | Ketamine
compete with agonist | for NMDA glutamate receptor.
eg: Atropine
Naloxone.
BZP - flumazenil

Receptor: Macromolecule, or binding site located on the surface or inside the effector cell, that serves to recognise the signal molecule or drug. to initiate the response to it but itself has no function

Spare receptors : Those receptors where the maximal response is elicited by an agonist at a conc that does not produce full occupancy of available receptors.

Definitions:

Addiction : it is a pattern of compulsive drug use characterised by overwhelming involvement with the drug.
physical dependence
eg: Amphetamine, LSD, cocaine, cannabis

Drug abuse:
use of drug by self medication to a manner and amounts that deviates for approved medical & social patterns in a given culture at a given time.
two pattern
a. continued : alcohol, opioid, sedatives
b. occasional : cocaine, amphetamine,

Drug habituation: → less intensive involvement
coffee, tea, tobacco.

Drug dependence:
It is a state in which use of drugs for personal satisfaction is accorded a higher priority than other basic needs, often in the face of known risks to the health.
a. physical dependence → Neuroadaptation
→ withdrawal syndrome
b. physcological dep

Idiosyncrasy:
genetically determined abnormal reactivity to a chemical
→ drug interacts & some unique feature of human not found in majority of subject.

eg: Barbiturates cause excitement & mental confu.
chloramphenicol → aplastic anemias.

Drug allergy:
immunologically mediated rxn produce stereotype symptoms which are unrelated pharmacodynamics profile of drug. even in smaller dose. with different time course of onset & duration.

→ Prior sensitization is requi
→ unrelated to PD
→ manifestn of to food, pollen & other allergic diseases.
→ Severity of is correlated to dose.
→ Occur in few of subjects.

Tachyphylaxis:
Refers to rapid development of tolerance when dose of drug is repeated in quick succession results in marked ↓ in response.
eg: (catecholamines) ephedrine, tyramine, nicotine.

Biological membrane:
lipid bilayer contains cholesterol,
hydrophilic
hydrophobic
contains integral prn → forming pore
surface prn → act as carrier enzymes, receptor & signal transduction properties
— there are paracellular spaces.
— glycoprn & glycolipids are also present

Transport: a. Passive diffusion
b. special transport.

a. Passive diffusion: ⇒ unionised drug.
most of drugs are weak electrolyte
their ionn is pH dependent.
ionsn: $pH = pKa + \log \frac{[A^-]}{[HA]}$
if conc of ionis = unionised

when $\frac{[A^-]}{[HA]} = 1$ log 1 = 0.

then PH = PKa when ionised & unionised is 50%. ionised

If PH is ↑ed by 1

$1 = \log \frac{[A^-]}{[HA]}$ if PH is ↑ed by 1 then ionisation ↑ses by 10 folds.

Antilog 1 = 10

If PH is ↓ed by 1

$-1 = \log \frac{[A^-]}{[HA]}$

Antilog [-1] = 1/10.

- weak acids are ionised in basic PH
- acidic drugs are absorbed in acidic m
- Basic " " " in basic medi
- ex Acidic drugs are ionise in basic medium and are excreted.

2) Filtration:
passage of drugs through aqu pores in mem. or paracellular spaces.
majority cells have pores 4 A° only > 100-200 (except RBC & iste). only small can pass
- capillaries have large paracellular spaces (except brain). (40°A)

3) specialised transport:
① facilitated diffusion → SCC solute carrier trans
② Active transport → 1° → ABC ATP binding cassette transporters
→ P-gp.
→ 2° = symport & antiport
1. organic anion transports pro
2. organic cation transport

4) Pinocytosis,
process of transport across the cell. ex particulate form.