



NOVA

Charting New Horizons in Education

Definition of Pharmacology

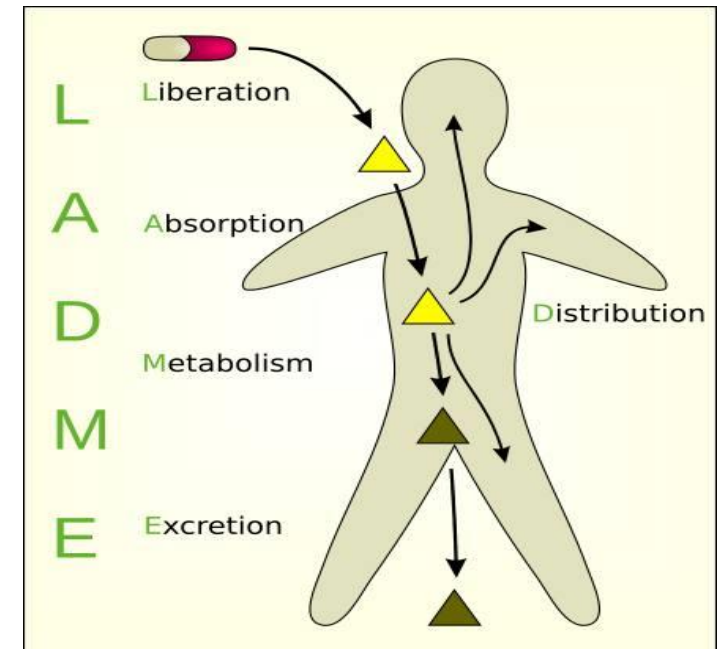
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Pharmacology

~ Definitions and divisions



- **Pharmacology**: It is the science that deals with interaction of drugs with living systems.
- **Drugs**: These are chemical substances that shows biological activity (treatment or sometimes diagnosis).
- **Divisions of Pharmacology:**
 1. **Pharmacodynamics: (What the drug does to the body)**
 - This deals with the action of drugs on living tissues , namely the type or quality of action, its quantitative aspect, as well as the mechanism of action.



~ Definitions and divisions



- Adverse effects and safety of drugs on body tissues or systems are also included
- The main organ or tissue on which the drug acts, and for which it is used therapeutically, is called the target organ or tissue of drug action

2. Pharmacokinetics: (What the body does to drug)

- This includes administration and absorption of drugs, their distribution inside body, and their elimination by metabolism or excretion

Other topics linked with pharmacology



1. **Pharmacotherapeutics**: It is concerned with the proper use of drugs in treatment of disease in man

2. **Clinical Pharmacology, this includes:**
 - I. Drug pharmacology
 - II. Clinical evaluation of drugs in treating disease in man, this is done by:
 - a. Clinical trials.
 - b. Surveillance studies

3. **Chemotherapy**:
 - It is used to imply the use of drugs to inhibit growth or kill either:
 - A. Microbes (i.e. anti-microbial agents)
 - B. Cancer cells (Cyto-toxic anti-cancer drugs)

Other topics linked with pharmacology



4. **Pharmacy**: It is the science and profession that is concerned with the preparation, storage, dispensing, and proper utilization of drug products
5. **Toxicology**: It is the science that deals with the harmful effects of chemicals (including drugs).

~ Drug sources



- These may be either:
 - I. **Synthetic sources**: common at present these drugs are prepared by the labs or factories of the pharmaceutical industry. Nowadays, computers greatly assist in discovery of new drugs
 - II. **Semi-synthetic drugs**: these are obtained from natural sources, but are modified by pharmaceutical industry in order to improve their physical or chemical properties or pharmacological activity.

~ Drug sources



III. Natural sources, these are less used now and they may be either:

A. **Organic:**

- ✓ **Plants:** Any part of the plant (stem, leaves, flowers, seeds, roots) may be used to extract active ingredients for drugs; same plant may contain more than one active principle. All of this is dealt with in PHARMACOGNOSY
- **PHARMACOGNOSY:** is the science that deals with drugs derived from natural sources
- **Examples of drugs from plants are: alkaloids, steroids, some vitamins, tannins, volatile oils, gums**
- **Note:** Alkaloids are small organic molecules containing nitrogen . e.g. atropine, morphine, caffeine, theophylline, quinine

Drug sources



- ✓ **Animals**: these may include either proteins , oils, enzymes from exocrine glands, hormones, vaccines and anti-sera, and some vitamins
- ✓ **Microbes**: like fungi, and sometimes bacteria which are sources of antibiotics

B. **Non-Organic sources** :

- **Metals**: Platinum, Zinc
- **Non-metals**: Sodium chloride, magnesium sulfate

Rational drug design



- This implies the ability to predict the chemical structure of drug molecule on basis of 3-dimensional structure of its receptor, employing at present suitable computer programs.
- Only few drugs in clinical use at present were developed in this rational way.
- Most drugs were in the past developed through random testing of chemicals, or modified molecules of known drugs that are known to have some pharmacological effect.
- However, as more becomes known about detailed structure of receptors, rational drug design with the aid of computers would become more feasible

~ Drug classification



- There is no fixed rule; classification is usually done according to their:
 1. Therapeutic use: e.g. anti-hypertensive drugs ; anti-microbial drugs ; anaesthetics; hypoglycemic drugs; anticoagulants;
 2. Type of pharmacological action: This should be precise. e.g. local or general anesthetics; vasodilators; anticoagulants
- ✓ OR according to molecular or cellular site of action in target cells, e.g. enzyme inhibitors, receptor blockers, ion channel blockers, inhibitors of transporters, antimicrobials acting on cell wall, DNA, or ribosomes

~ Drug classification



3. **Physiological systems on which they act:** Drugs acting on cardio-vascular system; drugs acting on GIT or CNS or respiratory system

4. **Chemical nature or Source :**
 - Common chemical groups or structures can be used to classify drugs that have similarity in their pharmacological profile e.g. benzodiazepines, steroids.

 - For drugs derived from nature, both the plant species or genus and drug chemistry are included e.g. belladonna alkaloids from atropa belladonna, digitalis glycosides from Digitalis leaves.

~ DRUG NAMES



1. **Chemical name:** Because of its complexity , the chemical structure is not usually used to name drugs.
 - However, sometimes a shorthand name based on a simple chemical structure is employed e.g. acetylsalicylic acid (aspirin) , acetaminophen (paracetamol)





2. Generic (non-proprietary) name:

- This is a unique name that is given by official pharmaceutical bodies; It is present in pharmacopeias (BP or USP).
- It is the approved scientific name, and must be used in scientific publications as well as in prescriptions esp. in hospitals .
- Its use makes it easier for pharmacist to choose from many available brands of same drug.
- Only few drugs show more than one generic name :
- ✓ Noradrenaline & adrenaline in UK but are named Nor-epinephrine and epinephrine, respectively, in USA & WHO; salbutamol in UK while albuterol in USA
- Generic names of drugs in a classified group may have common endings → e.g. -olol for beta-adrenoceptor blockers; -caine for local anesthetic drugs, These endings may give a hint about the drug pharmacotherapeutic action

3. Commercial or trade or brand or proprietary name:

- This name is given by the specific pharmaceutical company synthesizing and marketing the drug.
- Examples: Diclofenac Na (Voltaren, Inflanban, Diclogesic)
- A single drug can have many brand names (this may be confusing) due to its manufacture and marketing by many pharmaceutical companies.



DOSE FORMS OF DRUGS



- It is the physical form of drug product that is suitable for administration to man. It contains specified dose or amount of drug in a specified quantity or unit of the formulation.
- **Types of drug dose forms:**
 1. Oral
 2. Inhalational
 3. Parenteral
 4. Topical
 5. Suppository

~ DOSE FORMS OF DRUGS



1. Oral dose forms: It includes the following

- A. Pill: Tablets and capsules
- B. Liquid: Syrup or suspension
- C. Powder
- D. Herbal plants: seeds, leaves etc..
- E. Pastes



2. Inhalational:

- A. Aerosol
- B. Inhaler
- C. Vaporizer (Solutions)

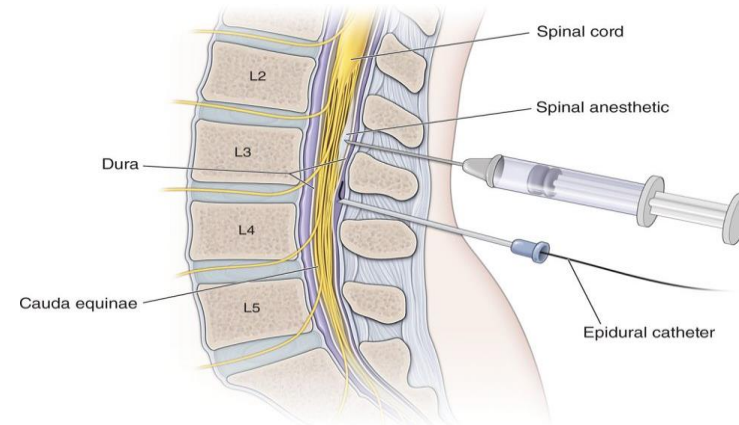
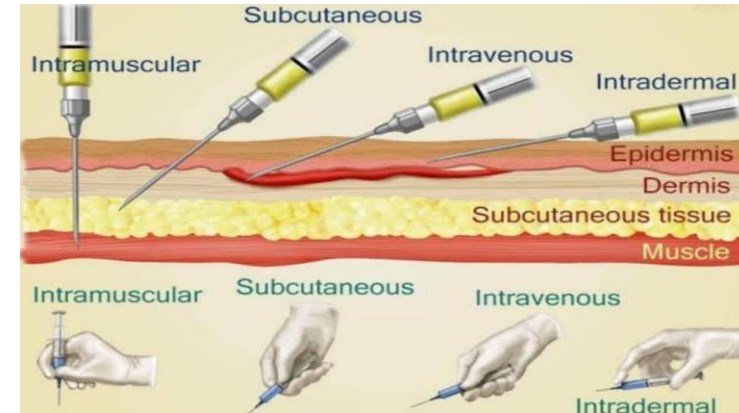


DOSE FORMS OF DRUGS



3. Parenteral:

- A. Intradermal (ID)
- B. Intramuscular (IM)
- C. Intraperitoneal (IP)
- D. Intravenous (IV)
- E. Subcutaneous (SC)
- F. Intrathecal (IT)



~ DOSE FORMS OF DRUGS



4. Topical:

- A. Cream, gel, ointment, lotion
- B. Eye drops (ophthalmic)
- C. Ear drops (otic)
- D. Skin patch (transdermal)

5. Suppository:

- A. Vaginal
- B. Rectal



«Education is the passport to the future, for tomorrow
belongs to those who prepare for it today»

- Maclom X-