

Introduction & Scope of Pharmacology

**Mr. Sangale G.P.
Lecturer**

Mula Education Society College of Pharmacy, Sonai.

Introduction & Definition

- Pharmacology
 - Pharmacon - Drug
 - Logos - Study
- It is defined as the study of the substances which interact with living system by activating or inhibiting normal body processes.
 - (In simple terms, it is study of all the aspects of drug.)

- Drug : A chemical substance that is used for diagnosis, prevention & treatment of disease.

(French: Drogue -Dry herb)

- **Contraceptives**
- **General Anaesthetics**
- **Vaccines**

**Alter
Physiological
State**

- WHO : “Any substance or product that is used or intended to be used to modify or explore the **physiological system** or **pathological state** for the **benefit of the recipient**”

Classification of Drugs

- Based on site of action
- Based on Chemical Structure
- Based on Mechanism of Action
- Based on Ionization of Drugs
- Based on Therapeutic Uses
- Based on Anatomical Therapeutics Classification (ATC)

Sources of Drugs

- A) Plant Sources
- B) Animal Sources
- C) Microorganism
- D) Chemicals
- E) Recombinant DNA Technology

• A) Plant Sources-

- 1) **Alkaloids** – Atropine (*Atropa belladonna*)
Morphine (*Papaver somniferum*)
- 2) **Glycosides-** Digoxin (*Digitalis purpurea*)
- 3) **Oils-** Essential oil (Volatile oil)-leaves & Flower
eg- clove oil, piperment, eucalyptus
Fixed oil- seeds
eg- ground nut, coconut, castor, olive oil
Mineral oil- liquid paraffin
- 4) **Gum** - excretory products (gum acacia)
- 5) **Resins** - Tolu balsam (cough mix)
- 6) **Tannins** - catechu

• **B) Animal Sources**

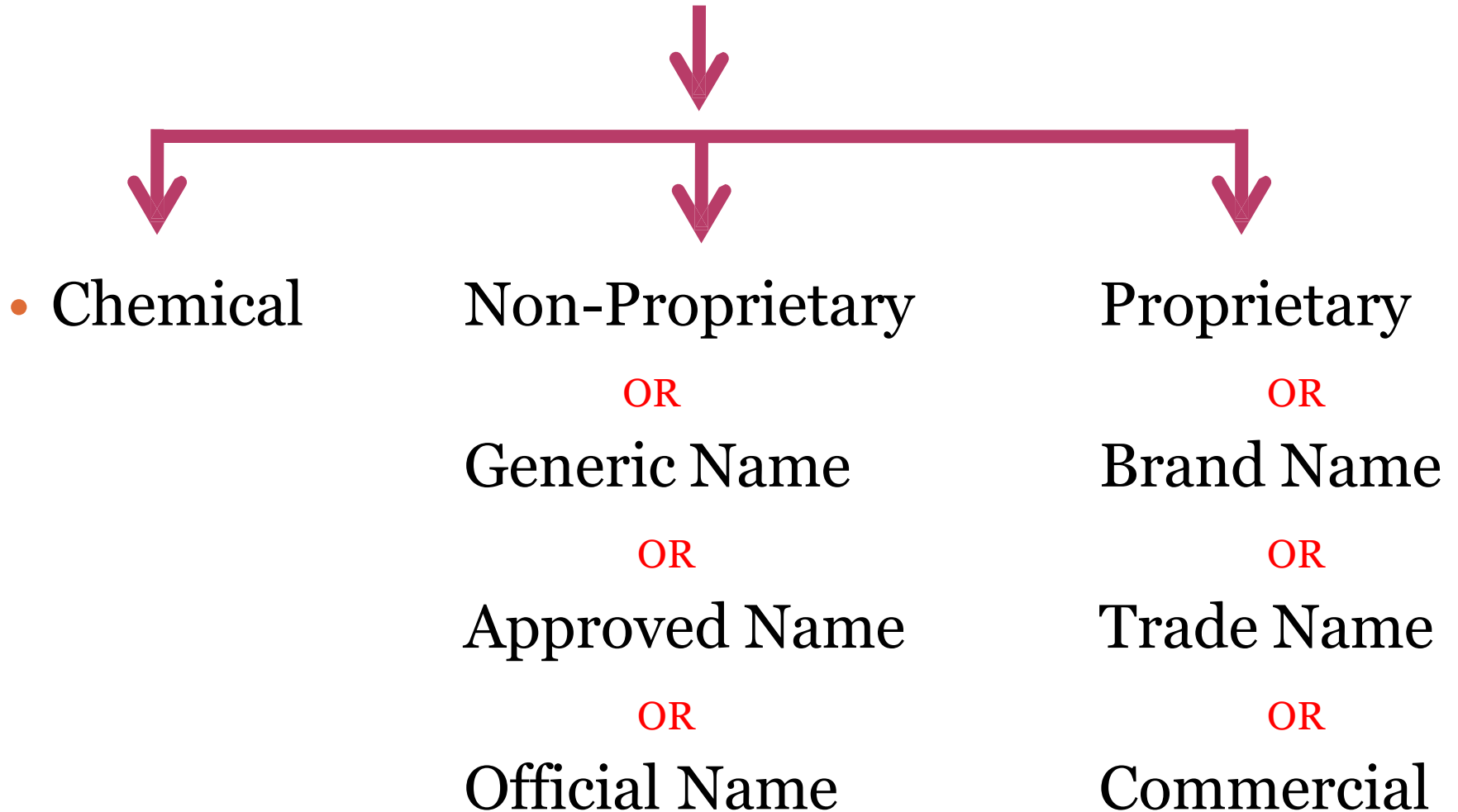
- 1) **Hormones** - Insulin (Pork-Procine), (Beef-Bovine)
 - 2) **Vaccines** - Polio, Antirabies
 - 3) **Sera** - ATS (Antitetanus Serum)
 - 4) **Vitamins** - Vit B12 from Liver extract
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• **C) Microorganism-** Antibiotics

• **D) Chemicals** – synthetic drugs

• **E) Recombinant DNA Tech** – Human Insulin, Calcitonin, Gonadotropins, erythropoietin etc.

Nomenclature of Drugs



Some examples of Chemical, Generic, Brand Names

Chemical Name	Generic Name/ Non- Proprietary Name	Brand Name/ Proprietary Name
Acetyl Salicylic Acid	Aspirin	Disprin
Acetaminophen	Paracetamol	Crosin, Calpol, Metacin
Aminobenzyl Penicillin	Ampicillin	Roscillin

- **Generic/Non-Proprietary Name-**

- Given by **USAN** Council (United States Adopted Name)

Advantages-

- World-wide acceptance, name remains the same in all countries.
- Usually have similar suffix in a group.
- Economical than Branded/Proprietary Medicines.

Disadvantages-

- Naming of Fixed Dose combinations.

- **Brand Name/Proprietary Name-**

Name given by Pharmaceutical company for commercial purpose.

Advantages-

- The consistency of Pharmacokinetics or efficacy does not change with same brand.
- Single brand name for a Medicine with multiple ingredients.
- Bioavailability remains same where a patient is maintained on a particular brand.

Disadvantages-

- Branded Medicines are costlier.
- Multiple brands for a same Medicine.

Examples of the Drugs with more than one Generic Name-

Acetaminophen	Paracetamol
Adrenaline	Epinephrine
Noradrenaline	Norepinephrine
Frusimide	Furosemide
Oestrogen	Estrogen
Streptozotocin	Streptozocin
Lignocaine	Lidocaine
Methylergometrine	Methylergonovine

Drug Categories



**Prescription
Drugs**

**OTC
(Over The Counter)
Non-Prescription
Drugs**

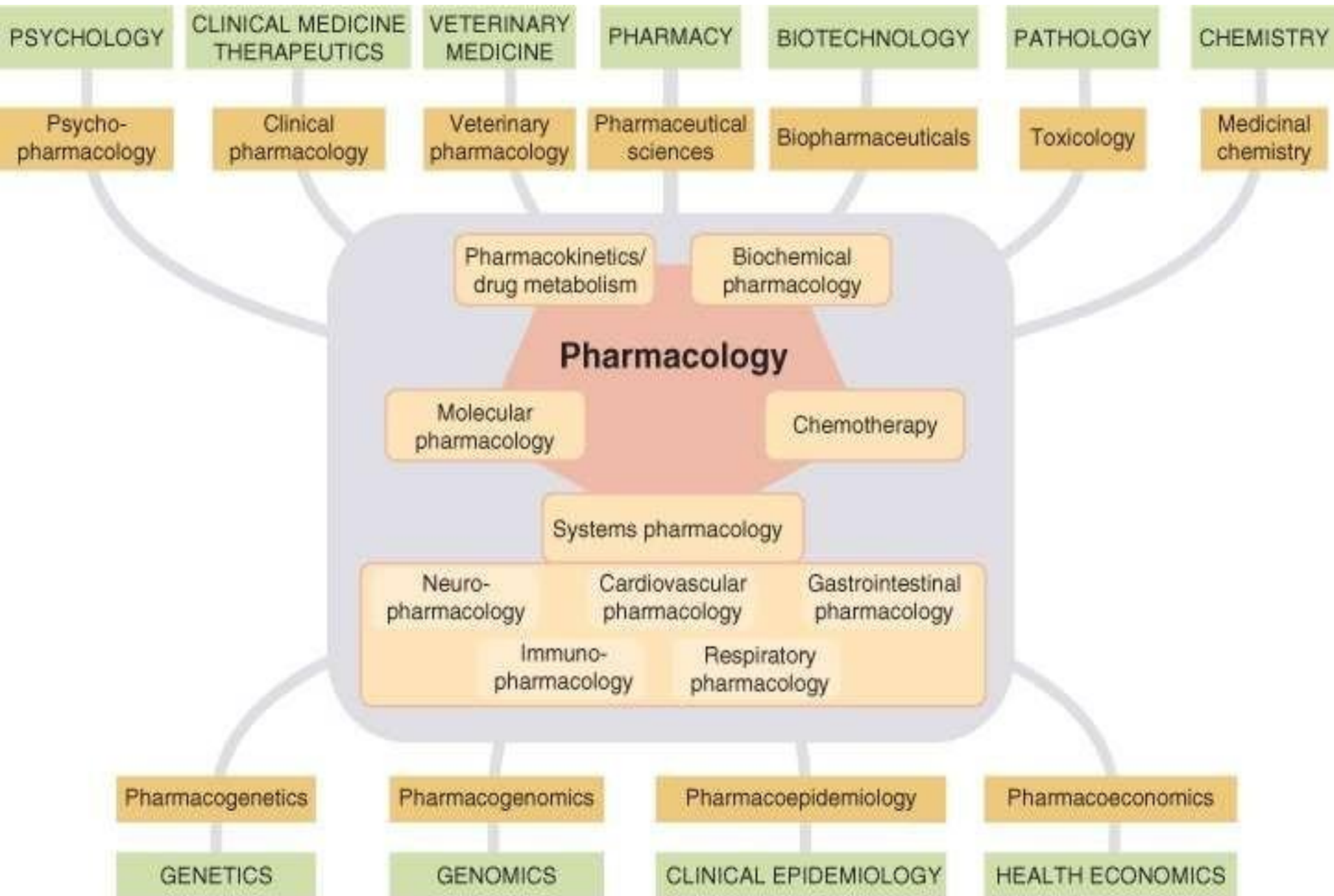
Sources of Drug Information

- Official Compendia
- Pharmacopoeia (IP, BP, USP)
- Formulary (NFI)
- Non-Official Compendia
- Physician's Drug References(PDR)- USA
- Martindale Pharmacopoeia – Great Britain
- Other Sources of Drug Information
- Drug indices (*CIMS, IDR, MIMS, Drug Index*)
- Drug advertisement
- Internet, Medical Rep.

Essential Drugs

- WHO in 1977 published a list of drug as “Model list of Essential drugs”.
- *“List of drugs that satisfy the health care needs of majority of the population; they should therefore, be available at all times in adequate amount & in appropriate dosage form.”*
- The current WHO list is revised in 2011 as 17th edition for adults with 23 FDC & 3rd edition for children.
- India produced its National Essential Drug List in 1996, presently it is revised in 2011 with title “*NLEM (National List of Essential Medicines)*” which includes 348 medicines.

PHARMACOLOGY DIVISIONS



Subdivisions of Pharmacology:

- These are followings
- **Pharmacy:** It deals with study of collection, compounding, and dispensing of drugs so as to make them fit for administration to patient.
- **Immuno pharmacology:** It deals with the immunological actions of drugs in immune system and development of antibodies in response to a drug.
- **Pharmacoeconomics:** It is the branch which deals with economics of drug, which aims to quantify drug in economic terms, the cost and benefit of drugs used therapeutically.
- **Pharmacokinetics:** It deals with Absorption, Distribution, Metabolism and Excretion (ADME) of drugs.

Subdivisions of Pharmacology

- **Pharmacodynamics:** It deals with study of biochemical and physiological effects of drugs and their mechanism of actions.
- **Pharmacotherapeutics:** it deals with the use of drugs in prevention and treatment of diseases.
- **Clinical Pharmacology:** It deals with the study of drugs in human/animals when given in diseased condition.
- **Pharmacognosy:** It deals with the sources of drugs.
- **Pharmacogenetics:** It deals with the study of genetically determined variations in response to drugs.
- **Pharmacometrics:** It deals with the study of qualitative and quantitative evaluation of drugs activity.

Subdivisions of Pharmacology

- **Experimental Pharmacology:** It deals with the study of drugs action in animals under laboratory conditions.
- **Pharmacoepidemiology:** It deals with the study of both beneficial and adverse effects of drug on human/animal population.
- **Chemotherapy:** It deals with study of drugs that inhibits specific agents of diseases such as bacteria, virus and fungi
- **Toxicology:** It deals with the study of adverse effects of drugs or chemicals on living system.
- **Materia Medica:** It is a book containing information about pharmacy, pharmacognosy, posology and uses of drugs. Now a days it is replaced by modern science of pharmacology

HISTORY OF PHARMACOLOGY

- Knowledge of drugs and their uses in diseases are as old as history of mankind.
- Primitive men gather the knowledge of healing and medicines by observing the nature, noticing the animals while ill and personal experience after consuming plants and herbs as remedies.
- Ancient civilizations discovered that extracts from plants, animals, and minerals had medicinal effects on body tissue. These discoveries became the foundation of pharmacology.
- Pharmacology in the present form is relatively recent branch about hundred years old.

Historical developments in Pharmacology

- **PEN PSAO (2700 BC)** It was the great herbal materia medica written in china.
- **Kahun Papyrus (2000 BC)** is an oldest Egyptian document containing information about veterinary medicines and uterine diseases of women.
- **Ebers papyrus (1550 BC)** also an Egyptian document containing information about number of diseases and 829 prescription where castor oil, opium like drug are being used.
- **Hippocrates (460-375 BC)** A greek physician consider **“father of Medicine”**. He was the first person who recognize disease as abnormal reaction of body. He introduce use of metallic salts for the treatment of disease.

Historical developments in Pharmacology

- **Theophrastus (380-287 BC)** a great philosopher called father of Pharmacognosy. He classified medicinal plants on the base of medicinal characteristics.
- **Dioscorides (AD 57)** a greek, produced one of the first materia medica of approximately 500 plants and remedies.
- **Claudius Galen (AD 129-200)** first attempted to consider the theoretical background of pharmacology.
- **Paracelsus (1493-1541)** a Swiss scholar and alchemist, often considered the “**grandfather of pharmacology**”. He introduces the use of chemicals for treatment of disease.
- **Valerius Cordus (1514-1544)** He compiled the first pharmacopeia where he described techniques for the preparation of drugs.

MODERN PHARMACOLOGY

- Conversion of old medicines into the modern pharmacology start taking shape following the introduction of animal experimentation and isolation of active ingredients from plants.
- **Francois Megendie (1783-1855)** a first pharmacologist established the foundation of modern pharmacology. He developed experiment to elucidate the physiological processes and action of drugs on the body.
- **Frederich Sertürner**, German pharmacist's assistant, isolated morphine—the first pure drug—in 1805
- **Claude Bernard (1813-1878)** considered Father of experimental Medicine. He identifies the site of action of curare (arrow Poisoning).

MODERN PHARMACOLOGY

- **Rudolph Buchheim (1820-1879)** German pharmacologist a key figure in the development of pharmacology, a who at the University of Dorpat, created the first pharmacological institute.
- **Oswald Schmiedeberg (1838-1921)** “**Father of Pharmacology**” established pharmacology as an independent discipline. He start teaching Pharmacology in University of Strasbourg (France).
- **John Jacob Abel (1857-1938)** founded first department of pharmacology in USA in the University of Michigan in 1893. In 1897 he established pharmacology department at Johns Hopkins University. Abel also co-founded the Journal of Pharmacology and Experimental Therapeutics in 1909.

MODERN PHARMACOLOGY

- L. mayer Jones (1912-2002) regarded as father of modern veterinary pharmacology. He authored first book of veterinary pharmacology therapeutics in 1954.

SCOPE OF PHARMACOLOGY

- It provides the rational basis for the therapeutic use of the drug. Before the establishment of this discipline, even though many remedies were used, but doctors were reluctant to apply scientific principles to therapeutics.
- In 1920s, many synthetic chemicals were first introduced and the modern pharmaceutical companies began to develop.

SCOPE OF PHARMACOLOGY

- Scientific understanding of drugs enables us to predict the pharmacological effect of a new chemical that will produce a specified therapeutic effect.
- The scope of pharmacology has expanded greatly over the last decade to incorporate many new approaches such as computer-assisted drug design, genetic screens, protein engineering and use of novel drug delivery vehicles including viruses and artificial cells.
- Our society needs pharmacologists who understand the basis of modern therapeutics for careers within academic, pharmaceutical and governmental laboratories to study and develop tomorrow's drugs.



Thank You...