

## INTRODUCTION TO PHARMACOLOGY

**Pharmacology** is the study of the effects of chemicals (drugs) on the function of living systems.

**The term pharmacology** is derived from two Greek words: pharmakon, the Greek word for drug, and logos, the Greek word for science.

**Clinical pharmacology:** is the scientific study of drugs in man.

**Medical pharmacology** is the branch of pharmacology concerned with the use of chemicals in the prevention, diagnosis, and treatment of diseases, especially in human.

**Toxicology** is the branch of pharmacology concerned with the undesirable effects of the chemicals on biological systems.

**Drug:** A drug may be defined as any substance that brings about a change in biologic function through its chemical actions, or any substance that used for the diagnosis, prophylaxis and treatment of disease.

**Chemotherapy:** It is the treatment of systemic infection/malignancy with specific drugs that have selective toxicity for the infecting organism/malignant cell with no/minimal effects on the host cells.

**Pharmacogenetics** is the study of genetic influences on responses to drugs. Originally, pharmacogenetics focused on familial idiosyncratic drug reactions, where affected individuals show an abnormal usually adverse–response to a class of drug.

**Pharmacogenomics.** This recent term overlaps with pharmacogenetics, describing the use of genetic information to guide the choice of drug therapy on an individual basis. The underlying principle is that differences between individuals in their response to therapeutic drugs can be predicted from their genetic make-up.

**Pharmacotherapeutics:** It's the proper selection of drugs in the management (treatment, prevention) of various diseases.

**Dose:** It is the amount of drug used to produce biological effect on living systems.

**Indication of drug:** it is the disease, symptom or condition that may be treated by using the drug. Example insulin for diabetes.

**contraindication of drug:** it is the disease, symptom or condition for which the drug is not indicated and will cause harm.

**Adverse effects of drug (side effects):** Undesirable effects of the drug on the body.

**Pharmacokinetics:** The actions of the body on the drug, including absorption, distribution, metabolism, and elimination.

**Pharmacodynamics:** The actions of a drug on the body, including receptor interactions, dose-response phenomena, and mechanisms of therapeutic and toxic actions.

### **THE SOURCE OF DRUGS:**

The drugs can be obtained from the following sources:

**Plants** (Atropine from atropa belladonna), **Animals** (Insulin), **Minerals** (Iron, iodine), **Microorganism**

(Penicillin), **Synthetic/chemical derivatives** (Sulfonamides),  
Biotechnology.

### **NOMENCLATURE (NAMING OF DRUGS):**

- **Chemical name:** N-acetyl-p-aminophenol is chemical name for acetaminophen.

- **Generic name:** it is the official name for the drug. Example: acetaminophen.

- **Brand/trade name** (company name): A brand name for acetaminophen is Panadol, Amol.

## PHARMACODYNAMICS

Pharmacodynamics is the study of the biological and therapeutic effects of drugs and their mechanisms of action. (What drug does to the body?).

### **Drug effects may be local or systemic.**

Therapeutic and toxic effects of drugs result from their interactions with molecules in the patient.

### **The targets of the drugs**

The targets of the drugs can be divided into two types: non-specific and specific.

**A- Non-specific:** A few drugs act by virtue of their physicochemical properties, and this is called non-specific drug action.

### **Non-specific medicinal drug actions include:**

#### **Physical:**

- **Osmosis:** osmotic diuretics (Mannitol), osmotic laxatives (magnesium sulphate).

- **Adsorption:** kaolin adsorbs toxins in case of diarrhea, activated charcoal adsorbs other drugs in treatment of acute toxicity.

- **Others:** demulcent, astringent.

#### **Chemical:**

- **Neutralization:** Antacids as  $\text{HCO}_3^-$  neutralises acid in the stomach in case of hyperacidity.

- **Chelation:** Heavy-metal chelators; desferrioxamine, used to treat iron poisoning; it chelates iron.

**B- Specific (Biological targets):** Specific targets for drug action are usually macromolecules.

They are all protein in nature (gene production).

May be:

1- Enzymes : catalytic proteins

2- Carrier molecules : carrier protein transporters

3- Ion channels : channel that allow pump of ions “ anionic or cationic

4- Receptors : macromolecules