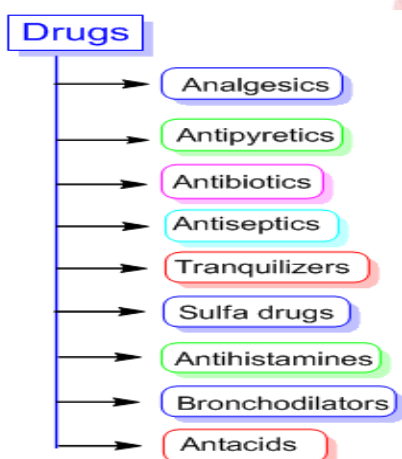


## DRUGS AND MEDICINES

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Drugs are chemicals of low **molecular masses (~100 – 500u)**. These interact with macromolecular targets and produce a biological response. When the biological response is therapeutic and useful, these chemicals are called medicines and are used in diagnosis, prevention and treatment of diseases.

Drugs are classified as:



### CLASSIFICATION OF MEDICINES

The number of medicines is very large therefore medicines are classified according to their action or use. Table 30.1 provides a list of some important classes of medicines.

**Table 30.1: Some Important Classes of Medicines and their Action**

S.No.	Class	Action or Usage
1.	Antipyretics	Reduce body temperature
2.	Anti histamines	Reduce allergy
3.	Analgesics	Reduce pain
4.	Antimalarials	Used for treatment of malaria
5.	Germicides	Kill germs
6.	Antiseptics	Kill germs (can be safely used on living tissue)
7.	Disinfectant	Kill germs (cannot be used on living tissue)
8.	Antacids	Reduce acidity in stomach
9.	Anaesthetics	Loss of sensation
10.	Antimicrobials, Sulpha drugs and Antibiotics	Kill microorganisms
11.	Tranquilizers and hypnotics	Reduce anxiety and bring calmness
12.	Birth Control Medicines (Contraceptives)	Birth control

(i) **On the basis of pharmacological effect:** Drugs for a particular type of problem as analgesics for pain relieving.

(ii) **On the basis of drug action:** Action of drug on a particular biochemical process.

(iii) **On the basis of chemical action:** Drugs having similar structure, *e.g.*, **sulpha drugs**.

(iv) **On the basis of molecular targets:** Drugs interacting with biomolecules as **lipids, proteins**.

#### Enzymes as Drug Targets:

(i) **Catalytic action of enzymes:**

(a) Enzymes have active sites which hold the substrate molecule. It can be attracted by reacting molecules.

(b) Substrate is bonded to active sites through hydrogen bonds, ionic bonds, van der Waal or dipole-dipole interactions.

(ii) **Drug-enzyme interactions:**

(a) Drug complete with natural substrate for their attachments on the active sites of enzymes. They are called competitive inhibitors.

(b) Some drugs binds to a different site of the enzyme called allosteric sites which changes the shape of active sites.

✚ **Antagonists:** The drugs that bind to the receptor site and inhibit its natural function.

✚ **Agonists:** Drugs mimic the natural messenger by switching on the receptor.

✚ **Antacids:** These are compounds which neutralize excess acid of stomach. *E.g.*, Aluminium hydroxide, magnesium hydroxide.

✚ **Anti Histamines:** The drugs which interfere with the natural action of histamines and prevent the allergic reaction. *E.g.*, Rantidine, tegarnet, avil.

✚ **Tranquilizers:** The class of chemical compounds used for the treatment of stress, mild or even severe mental diseases. *E.g.*, Idardil, iproniagid, luminal, seconil equanil.

✚ **Analgesics:** They reduce pain without causing impairment of consciousness, mental confusion or some other disturbance of the nervous system. E.g., Aspirin, seridon, phenacetin.

✚ **Antimicrobials:** They tend to prevent/destroy or inhibit the pathogenic action of microbes as bacteria, virus, fungi etc. They are classified as :

✚ **Antibiotics:** Those are the chemical substances which are produced by micro-organisms. E.g., Penicillin, Ofloxacin.

✚ **Narrow spectrum antibiotics:** These are effective mainly against gram positive or gram negative bacteria. E.g., Penicillin, streptomycin.

✚ **Broad spectrum antibiotics:** They kill or inhibit a wide range of micro-organisms. E.g., Chloramphenicol, tetracycline.

✚ **Antiseptics or Disinfectant:** These are which either kill/inhibit the growth of micro-organisms. Antiseptics are applied to the living tissues such as wounds, cuts, ulcers etc. E.g., Furacine, chloroxylenol and terpinol (dettol). Disinfectant are applied to inanimate objects such as doors, drainage system. E.g., 0.2% solution of phenol is an antiseptic while 1% solution is an disinfectant.

✚ **Antifertility drugs:** These are the chemical substances used to control the pregnancy. They are also called oral contraceptives or birth control pills. E.g., **Mifepristone, norethindrone.**

✚ **Artificial Sweetening Agents:** These are the chemical compounds which give sweetening effect to the food without adding calorie. They are good for diabetic people. E.g., **Aspartame, saccharin, alitame, sucrolose.**

✚ **Food Preservatives:** They prevent spoilage of food to microbial growth. E.g., **Salt, sugar and sodium benzoate.**

✚ **Cleansing Agents:**

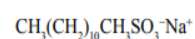
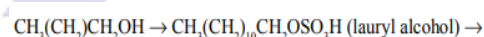
(i) **Soaps:** They are sodium or potassium salts of long chain fatty acids. They are obtained by the soapni cation reaction, when fatty acids are heated with aqueous sodium hydroxide. They do not work well in hard water.

(ii) **Toilet soaps:** That are prepared by using better grade of fatty acids and excess of alkali needs to be removed. Colour and perfumes are added to make them attractive.

(iii) **Medicated soaps:** Substances or medicinal value are added. E.g., **Buthional, dettol.**

• **Synthetic Detergents:** They are cleaning agents having properties of soaps, but actually contain no soap. They can be used in both soft and hard water. They are :

(i) **Anionic detergents:** They are sodium salts of sulphonated long chain alcohols or hydrocarbons. E.g., **Sodium lauryl sulphonate.** They are effective in acidic solution.



(sodium lauryl sulphonate)

(ii) **Cationic detergents:** They are quarternary ammonium salts of amines with acetates, chlorides or bromides. They are expensive used to limited extent. E.g., **Cetyltrimethylammonium bromide.**

(iii) **Non-ionic detergents:** They do not contain any ions. Some liquid dishwashing detergents are of non-ionic type.

✚ **Biodegradable Detergents:** The detergents which are linear and can be attacked by micro-organisms are biodegradable. E.g., **Sodium 4-(1-**

**dodecyl) benzene/sulphonate.**

✚ **Non-biodegradable Detergents:** The detergents which are branched and cannot be decomposed by microorganisms are called non-biodegradable.

**E.g., Sodium 4-(1, 3, 5, 7 tetramethyloctyl)-benzene sulphonate.** It creates water pollution.

### HAZARDS OF SELF MEDICATION

✚ When medicines are taken by a patient without the advice of a qualified doctor, it is called self-mediation. Self-medication is very harmful and a dangerous practice. One should never try self-medication. Some of the harmful effects are:

1. A medicine, which has worked well for someone, may not be good for you and can even cause some serious harm.
2. You may take a medicine in quantity more than necessary. It may be harmful for you.
3. You may take quantity less than necessary. The disease-causing microorganisms may gain resistance to the medicine and the medicine may become ineffective.

#### Is Phenol Antiseptic or Disinfectant?

✚ It is interesting to note that 0.2 percent aqueous solution of phenol is used as antiseptic by making. It is safe to be used on living tissues in low concentrations (less than 0.2 percent). If concentration of phenol is high then it can damage tissues. Therefore, at higher concentration (1 percent or more) phenol is used as disinfectant.

✚ Most antiseptics and disinfectants are powerful poisons. They are able to kill microorganisms as they interfere with their metabolism.

### Check Yourself

1. The use of chemicals for therapeutic effect is called

- (A) Chemotherapy (B) Physiotherapy  
(C) Angiotherapy (D) Polytherapy

2. Drugs that bind to the receptor site and inhibit its natural function are called

- (A) Agonistic drugs  
(B) Antagonists drugs  
(C) Antimicrobial drugs  
(D) Allosteric drugs

3. Barbituric acid and its derivatives are well known as

- (A) Tranquilizers (B) Antiseptics  
(C) Analgesics (D) Antipyretics

4. A drug which acts as antipyretic as analgesic is

- (A) Chloroquin  
(B) Penicillin  
(C) Chlorodiazeposide  
(D) 4-acetamidophenol

5. Which of the following can be used as an analgesic without causing addiction?

- (A) Morphine  
(B) Aspirin  
(C) Heroin  
(D) Codeine

### Test Yourself

1. Sleeping pills are recommended by doctors to the patients suffering from sleeplessness but it is not advisable to take its doses without consultation with the doctor. Why?
2. "Ranitidine is an antacid" With reference to which classification, has this statement been given?
3. Why do we require artificial sweetening agents?
4. Why do we need to classify drugs in different ways?
5. Explain the following as used in medicinal chemistry
  - (a) Lead compounds
  - (b) Target molecules or drug targets.

### Stretch Yourself

**Question:** Name the macro molecules that are chosen as drug targets.

**Answer:** Proteins, carbohydrates, lipids and nucleic acids are chosen as drug targets.



### Answers

#### Check Yourself

**Answer:** 1(A); 2(B); 3(A); 4(D); 5(B)

#### Stretch Yourself

1. Most of drugs taken in doses higher than recommended may produce harmful effects and act as poison and cause even death. Therefore, a doctor must always be consulted before taking the drug.
2. Ranitidine is labelled as antacid since it is quite effective in neutralising the excess of acidity in the stomach. It is sold in the market under the trade name Zintac.
3. To reduce calorie intake and to protect teeth from decaying, we need artificial sweeteners.
4. Do it by yourself.
5. Do it by yourself.