Sources and active principles of Drugs

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Objectives

At the end of the lecture the students should be able to know about the

- Main categories of sources of drugs
- Chemical, Biochemical and biotechnologically based methods of obtaining drugs
- Define the active principle
- List active principles
- Differentiate between the active principles
- Describe the properties of active principles

Main Categories of Drugs

- Two main categories

1. Natural sources (Plant, animal, microbial, mineral sources)

2. Synthetic sources (chemical, biochemical and biotechnology based products)

1. Natural Sources

- Plant source – Most of the drugs are of plant origin. Active principle is localized either in one or more of the plant body such as leaves, flowers, bark, root and seeds etc.

  E.g bella dona leaves, belladona roots, cinchona bark, digitalis leaves, senna leaves etc. Belladona contains atropine as its active principle. Cinchona bark contains quinine and digitalis contains digoxin.

  a) Alkaloids e.g morphine, atropine, quinine, reserpine,ephedrine.

  b) Glycosides e.g digoxin, digitoxin

- Animal Sources – Their production capacity is low but these are sources of important drugs like:
  - Hormones, enzymes, vitamins, minerals, antitoxins, vaccines, heparin, insulin etc.

1. Natural Sources…contd.

- Microbial Sources – With the discovery of penicillin by Flemming in 1929, the microbial sources were established.
  - Antibiotics are the major examples of this source e.g streptomycin from actinomyces, griseofulvin from penecelium grisofulvin, penicillin from penecelium crysogenum.
  - Enzyme like streptokinase is secured from bacteria streptococci and various hormones are also obtained like insulin from E.Coli.
- Mineral Sources – Inorganic drugs obtained from these sources include:
  - Sodium, Potassium, Calcium, Magnesium, Iron, Copper.
  - Ferrous sulphate, magnesium sulphate.

2. Synthetic Drugs

- Most of the drugs used today are synthetic, e.g aspirin, paracetamol

2. Synthetic Drugs…contd.

- Chemical Products: These are synthesized;
  - From a simple reagent to a complete product.
  - The product is either a structural copy of the natural drug like many antibiotics, alkaloids, steroids etc. or a totally new drug (very economical with high yields)
- Biochemical Drugs –

-These drugs are obtained from natural resources

-these are modified synthetically to have desired properties

e.g in protamine-zinc insulin, zinc is chemically combined with natural product insulin to increase the duration of effect.

2. Synthetic Drugs…contd.

- Biotechnologically based – The genetic engineering has provided a means of producing the animal originated drugs of desired properties with high productivity profile and minimal adverse effects

e.g large scale production of human insulin by recombinant DNA technology in large fermentation tanks.

Active Principle of a Drug

- The constituents of drugs which are biologically active and responsible for the therapeutic action of the drugs are called active principles. These include:
- Alkaloids (Atropine, Quinine)
- Glycosides (Simple resins, ions exchange resins)
- Minerals (iodine in cod fish liver and sodium, potassium, calcium, Mg)
- Hormones (Insulin, Glucogon, growth hormone
- Steroids (cardiotonics Vit D precursors, oral contraceptives, anabolic steroids, anti-inflammatory agents – corticosteroids)
- Carbohydrates (Lactose, starch, cellulose, aldehyde)

Active Principle of a Drug…contd

- Amino Acids (tartaric acid, citric acid, anti-septic and anti flatulent)
- Gums…are non absorbable resins used by the dentists.
- Waxes.. these are esters of fatty acids with monohydric alcohol, are used in ointments and other complex mixtures.
- Enzymes are obtained from
- Animals (Papain, diastase)
- Plants (pepsin, trypsin, lipase) and
- Microorganisms
- Vitamins
- Animal origin (Fat soluble vitamins e.g Vit A,D,E,K
- Plant origin (Vit B and C series)

Thank You!!!