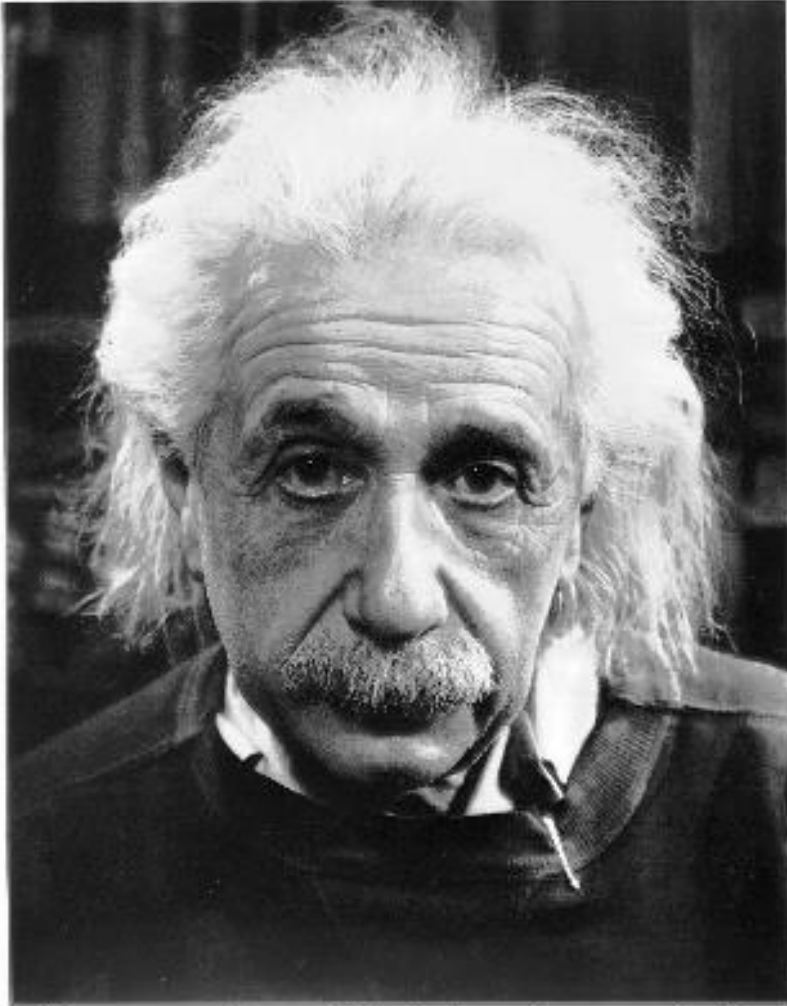


Introduction to Pharmacology

Dr Abdelrahim Alqudah



"If you can't explain it simply, you don't understand it well enough"

- Albert Einstein

History of Pharmacology

Ancient Times

Scattered data of the
Healing effect of plants

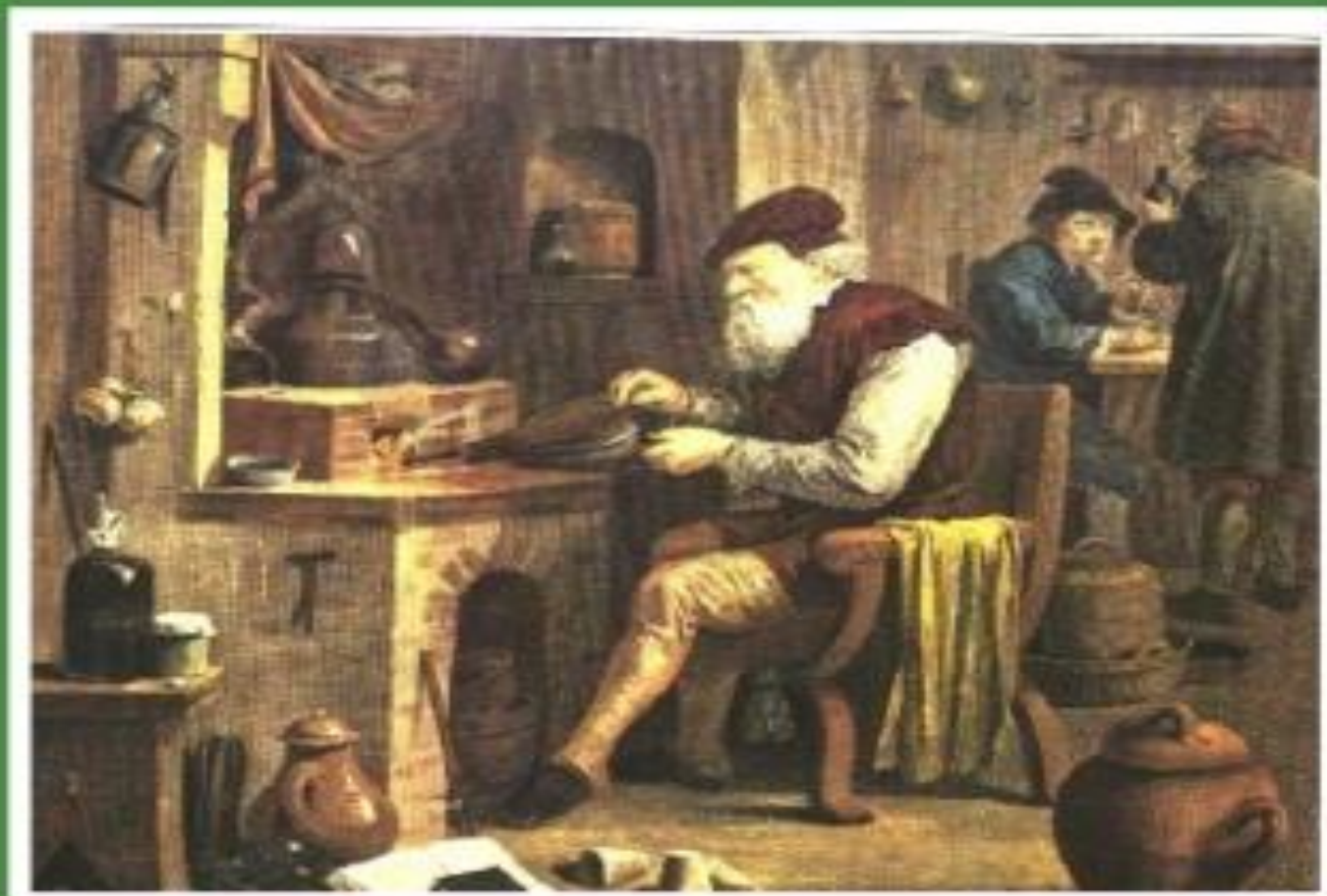
Extensive use of
Natural Products

Trial & Error

History of Pharmacology

With time, the thoughts returned to the appreciation that the natural products themselves held the power to cure.

Although, traditional remedies still generally consisted of complex mixtures of distinct herbs and minerals, perhaps only one of which possessed any activity. Many poisonous mixtures were made.



Dropsy



History of Pharmacology

Over time, as a more sophisticated view of illness evolved, an increasingly scientific approach to the isolation of drugs from natural products was taken. In the early 19th century,



morphine was isolated from the opium poppy (*Papaver somniferum*) and the anti-malarial compound quinine from the bark of the cinchona tree (*Cinchona officinalis*).

ONE NIGHT

TRADE MARK

COUGH SYRUP

EACH OUNCE CONTAINS

ALCOHOL, (less than 1%)	4 1/4 m.
CANNABIS INDICA, F.E.,	4 1/2 m.
CHLOROFORM,	2 1/5 m.
MORPHIA, SULPH,	1/8 gr.

SKILLFULLY COMBINED WITH A NUMBER
OF OTHER INGREDIENTS

DIRECTIONS

DOSE - One half teaspoonful three

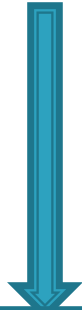
Prepared by

How much time was needed to discover MOA of Aspirin?

1897 Synthesis of Acetylsalicylic Acid



1899 Registered as Aspirin®



1971 Identification of Aspirin MOA

History of Pharmacology

The 20th century has witnessed the discovery of a steady stream of important new drugs that have immeasurably improved the human condition.

Not very long ago, vast numbers of humans perished prematurely or suffered an existence filled with pain due to the effects of infection or disorders that are now successfully treated.

- chemotherapy of cancer

- microbial infections

- diabetes

- hypertension

- depression

- AIDS

Pharmacology is the unique combination of several Biomedical Sciences!



What is pharmacology?

- ▶ *Pharmacon* (drug)..... *Logos* (discourse) or is derived from the Greek words pharmakon (**drug**) and logia (**the study of**).
- ▶ **Pharmacology** can be defined as the study of substances that interact with living systems through chemical processes, especially by binding to regulatory molecules and activating or inhibiting normal body processes.
- ▶ Also, how chemical agents affect the activity of living systems.

These Agents could be :

- ✓ Hormones
 - ✓ Neurotransmitters
 - ✓ Growth Factors
 - ✓ Drugs (Pharmaceuticals)
 - ✓ Toxins
- 

What is a drug?

- ▶ According to the WHO 1966 :

“ A drug is any substance or product that is used or intended to be used to modify or explore physiological systems or pathological states for the benefit of the recipient”

- Diagnostic drugs such as Evans blue and FITC dextrane.
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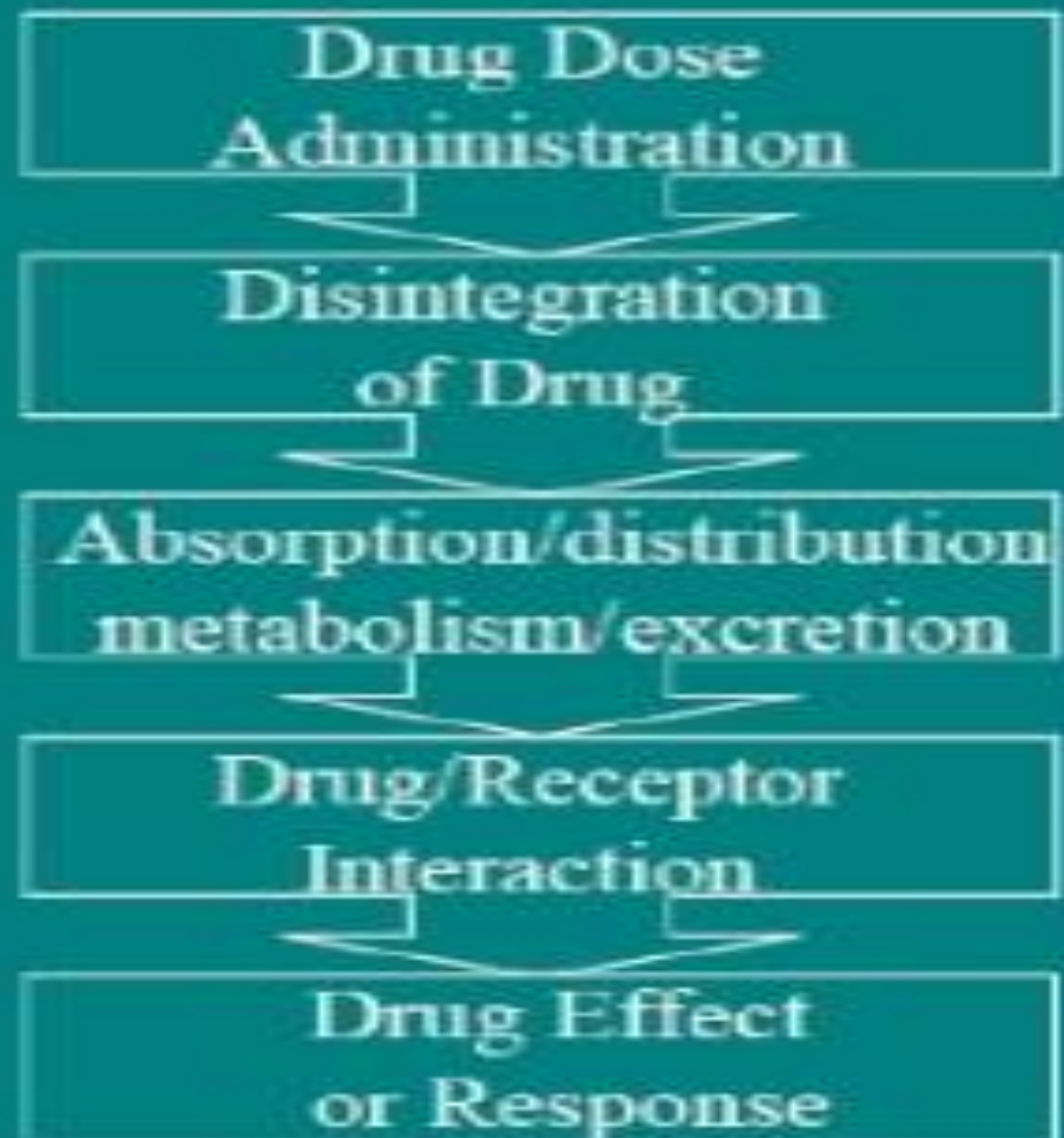
Pharmacology involves :

Pharmaceutical

Pharmacokinetics

Pharmacodynamics

Pharmacotherapeutics

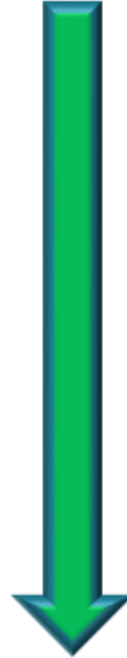


Sources of Drugs



- **Plant sources** – Morphine, digoxin, quinine, atropine, reserpine, vinca alkaloids and paclitaxel.
- **Animal sources** – Insulin, Thyroid extract, heparin, gonadotrophins and antitoxic sera.
- **Minerals** – Liquid paraffin, magnesium sulfate, magnesium trisilicate, ferrous sulfate and kaolin.
- **Micro – organisms** – Bacteria and fungi – Penicillin, Streptomycin
- **Synthetic** – Analgesics, hypnotics, anticancer drugs and antimicrobials
- **Genetic Engineering** – Human insulin, growth hormone genes
- **Hybridoma technique** – monoclonal antibodies

Drug discovery



On the Pharmacy Shelf !

General Phases of Drug development

1. Preclinical stage:

- ▶ Animal models are used to study pharmacology and toxicology
- ▶ Determine efficacy & safety

2. Phase 1 :

- ▶ Clinical testing on healthy volunteers to determine tolerance and toxicity

3. Phase II

- ▶ Limited number of diseased patients
 - ▶ Dose –response studies
 - ▶ Determination of pharmacokinetic parameters
 - ▶ Safety studies
 - ▶ Drug formulation aspects
- 

4. Phase III :

- ▶ Large scale : (multi center studies)
- ▶ Mainly to determine drug EFFICACY
- ▶ Determine side effects on large population sample

5. Phase IV :

- ▶ Manufacturing scale up activity to produce large batches of the drug

6. Phase V :

- The Product is FDA approved for being marketed
 - Additional studies may be performed in special populations : elderly, pediatrics ,etc.
 - Additional studies for new possible indications
 - Additional studies for dose response based on ethnicity.
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