

Introduction to Pharmacology

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Definitions

it's a chemical compound that can modify physiological or biochemical processes, facilitating, increasing or reducing them.

Drug:

It is any chemical that affect living processes.

It **modifies an already existing function, and **does not create** a new function.!!**

Definitions

Pharmacology (science of drugs):

It is the knowledge of history, source, physical and chemical properties, absorption, distribution, excretion, biotransformation, actions and therapeutic uses of drugs. (or toxic effects on microbes and cancer cells).

Handwritten notes:
Natural
synthetic
how it reaches the circulation and the site of action from intestines
(how to get rid of drugs?)

pharmacy Vs. pharmacology

- الدواء قبل دخول الجسم
(هناك وتصفيره ...)

- تأييد الدواء بعد ما يدخل الجسم

Definitions

→ when related to human

Medical (or Clinical) Pharmacology:

Is the science that deals with the use of drugs for diagnosis^{*}, prevention^{*} and treatment^{*} of human disease.

Definitions

-Toxins are drugs since they affect physiological and Biochemical processes in the body

Toxicology: علم السموم A Branch of pharmacology deals with toxins and overdosed drugs

Is that aspect of pharmacology which deals with **toxic effects** of drugs and the toxic effects produced by household, environmental and industrial chemicals. (poisons are also drugs, why?)

Definitions

Clinical Toxicology:

Deals with the toxic or adverse effects of toxins on the human body, including the diagnosis and treatment of human poisoning.

Definitions

Pharmacotherapeutics:

Is the use of drugs in the **prevention** and **treatment** of disease (or the medical uses of drugs).

Chemotherapeutics:

Is the use of drugs to **stop the growth** or **kill** microorganisms or cancer cells.

Definitions

-The genomic effect on the action of the drug

Pharmacogenomics: *(multiple genes)*

The relation between the individual's genetic makeup to his/her response to specific drugs (**entire genome**).

Pharmacogenetics: *(single gene)*

Interindividual variation in drug response that is due to genetic influences (**specific gene**).

Definitions

↳ happens over time slowly

Tolerance: *results from adaptation of the body*

Is a decrease in the responsiveness to the drug with continued drug administration.

Tachyphylaxis: *[Rapid tolerance to the drug]*

Similar to tolerance but more rapid.

Definitions

الوصفة الطبية
Prescription:

توجيهات
The written directions for the preparation, dispensing and administration of the drug.

The therapeutic effect: Required action

Two types of effects

It is the primary effect that the drug is prescribed (such as morphine for pain).

غير المرغوب فيه
Adverse effects:

Are the undesirable harmful effects of the drug during therapy (at therapeutic doses).

every drug has adverse effect but differ in severity

During treatment
↳ if large doses it's now called toxic effect
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Definitions

Drug toxicity:

Harmful effect of the drug on the body as a result of **drug overdose**.

Drug-Drug interaction:

increasing or decreasing

When administration of one drug affect the action of another drug, or when co-administered drugs affect the action of each other.

Definitions

Drug misuse:

Is the improper use of medications concerning dose*, frequency*, and duration* of administration; or Invalid indication. All may lead to acute and chronic toxicity.

Drug abuse: *related to addiction*

It is an inappropriate and **habitual intake** of drugs either continually or periodically **for recreational** but NOT medical reasons. It is related to **addiction** to drugs.

Areas of Pharmacology

mechanism of action
toxic effect ↓ *therapeutic effect*
reverse effect

Pharmacodynamics: *Related to the effect of the drug*

Is what the drug does to the body, which includes the biochemical and physiological effects of the drug, including the mechanism of action, interaction with receptors as well as the adverse effects.

Areas of Pharmacology

حركية الدواء

Pharmacokinetics:

- Is what the body does to the drug.
How does the drug move?
 - Deals with absorption*, distribution*, biotransformation* and excretion* of drugs:
1. Absorption: Is the movement of drug molecules from the site of administration into the circulation.

Areas of Pharmacology

→ (to site of actions and organs of elimination)

- 2. Distribution:** Is the movement of drug molecules from the circulation to tissues and between different parts of the body.
- 3. Biotransformation:** Is conversion of the drug from one chemical structure into another by the action of metabolic enzymes (metabolism).
- 4. Excretion:** Is the movement of drug molecules out of the body.

Pharmacokinetics & Pharmacodynamics

الشكل الموجود في الدواء
Dosage form (fluid, solid)



Disintegration (Result in the active form of the drug)



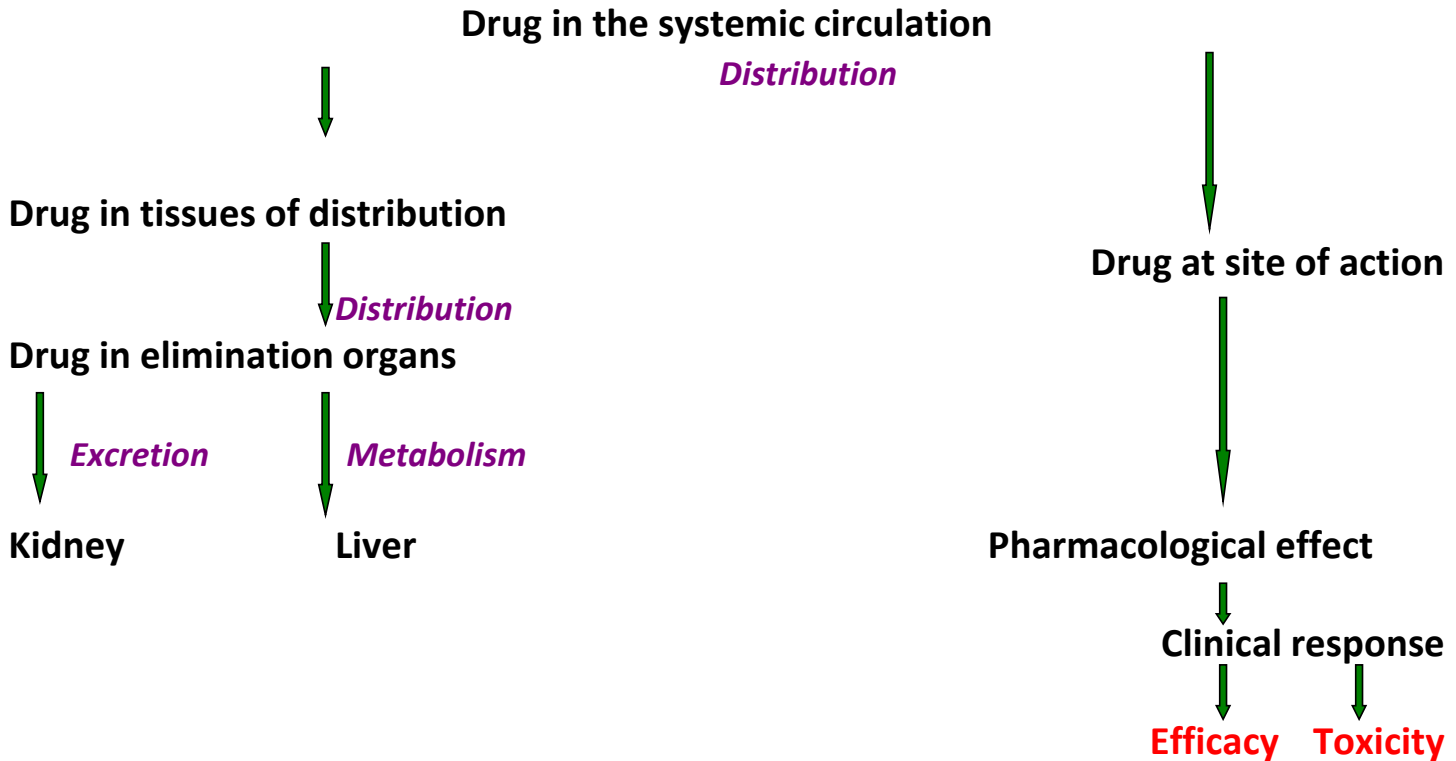
Dissolution



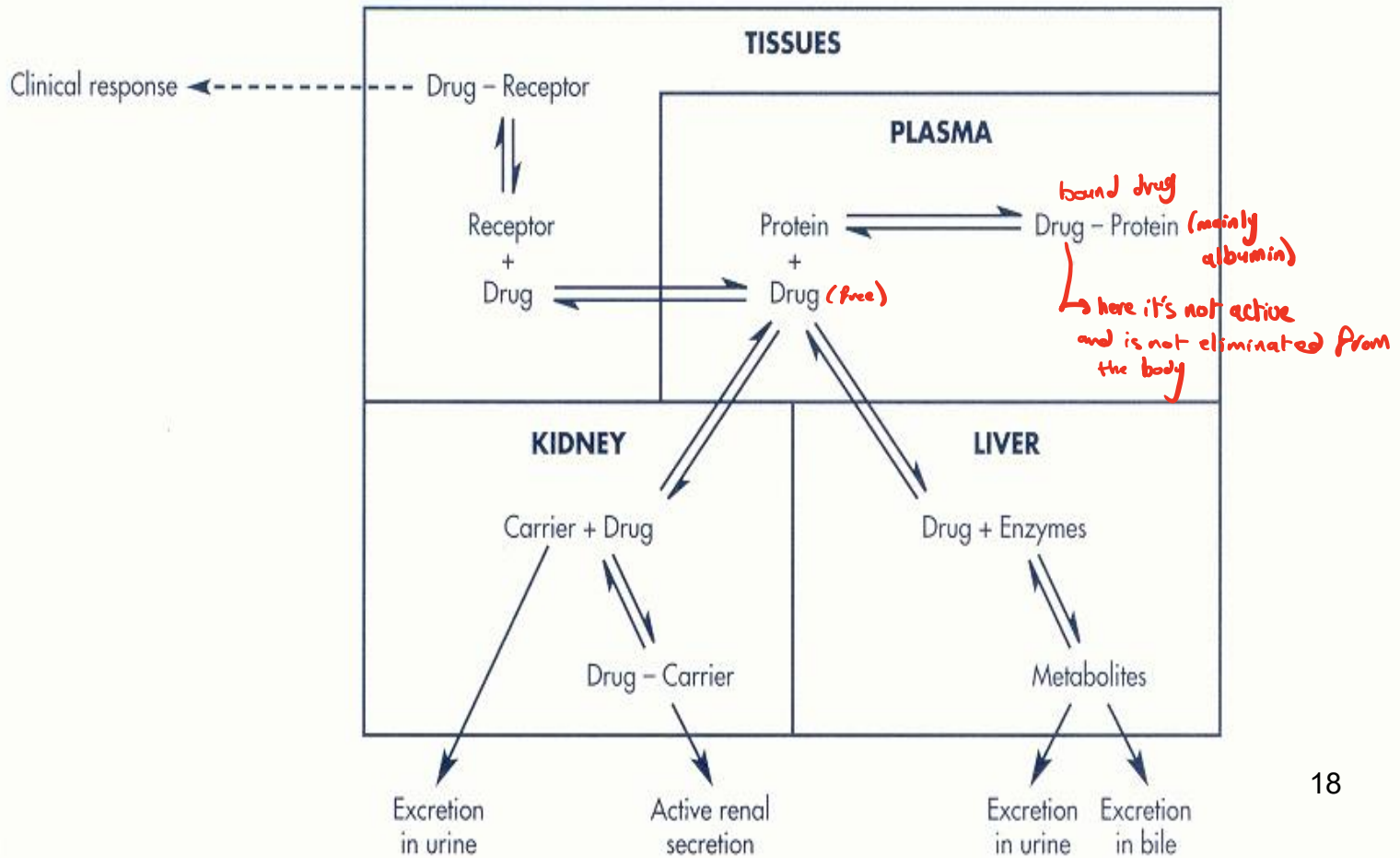
absorption

Drug in the systemic circulation

Pharmacokinetics & Pharmacodynamics



Drug Disposition



Drug Sources

1. Natural Sources:

- **Plants:** include alkaloids, which are substances containing nitrogen groups and give an alkaline reaction in aqueous solution. Including morphine, cocaine, atropine, and quinine. *(contain nitrogen)*
- **Microbes:** include antibiotics which are isolated from microorganisms, such as *Penicillium* and *Streptomyces* species. *specially from fungi* * + anticancer drugs

Drug Sources

(hormones)

- **Animal tissues:** The most important are hormones used for replacement therapy (Insulin, growth hormone, thyroid hormones). These days, peptide hormones may be synthesized by recombinant DNA technology.

Drug Sources

② Synthetic Drugs:

- **Synthesized new compounds:** *exist in small amount* include aspirin, barbiturates, and local anesthetics which were among the first drugs to be synthesized in the laboratory.
- **Modified naturally occurring drugs:** *by altering the structure of drugs* include **Semisynthetic derivatives** of naturally occurring compounds, such as the morphine derivative oxycodone.