

Lecture 2

Pharmacology



Noor Hammouri

Second Year

Passion Batch

- **Pharmacology**: is a science dealing with the study of drug
- **Drug** is a chemical or biological compound that is introduced to the body to induce an effect
- Difference between **drug** and **medicine** :

Drug is the active ingredient of the medicine . but the medicine is the final compound of the drug and as a doctor you deal with a medicine not drug.

for example :

Revanin (paracetamol) → the active ingredient is paracetamol but the medicine not only paracetamol we add :

- 1- Preservatives(to prevent bacterial and fungus effect)
- 2- 2- excipient 3- adhesive 4- disintegrate 5- flavoring agent

يعني لما بدنا نعمل دوا بكون عبارة عن بودرة

مشان أعملها على شكل (tablet)

بنحتاج مادة تعمل (adhesive)

ولما تدخل على المعدة لازم تتفكك

لهيك بنضيف مادة بتعمل (disintegration)

*all medicine are drug but not vice versa

Medicine is a drug used for treatment or prevention from disease :

- treatment : for example if you have a hyper tension you will get a treat hypertension and in the same time you need to prevent this disease
- prevention: like taking supplement (iron) to prevent anemia but if you have anemia you will take iron to treat it .
- difference between capsule and tablet : capsule has a gelatinous cover but tablet is a compressed powder

• *Sources of drugs :*

1. Plants: such as digitalis, vincristine

- At the beginning the source was natural (from herbs) but these natural substances don't have the exact amount that we need in the dose .
- After that drugs became semisynthetic

مثال : المورفين هي نبتة تستخدم لحالات التخدير ولكن لاحظوا انها بتسبب الإدمان لهيك عدلوا على ال (formula) تبعثها بإضافة :

CH₃ , OH or other groups

2. Human and animals: such as epinphrine, insulin and adrenocoticotrpoic hormone

- This source of drugs is purely synthetic
- في أشياء غير موجودة بالنباتات وما قدرنا نعمل عليها تعديل لنحصل على ال drug الي بنحتاجه مثل البروتين (الهرمون)

So we have to take them from animals or human for **example** :
insulin (the only drug used for diabetes type 1) → they take them
from pigs .

After that they used Recombinant DNA Technology : this
technique includes cutting the DNA that's includes the gene used
to express insulin hormone from pancreas and then put it in
plasmid e coli (bacteria) → e coli started making insulin

3. Synthetic and chemical substance: as sodium bicarbonate

4. Minerals: as iron, iodine and zinc

*note : what we mean by chemical or biological drug? Chemical means
synthetic compound , biological means from bacteria like streptokinase a drug
that is taken from bacteria called streptococcus used for blood clot analysis .

The two main area of pharmacology are:

Pharmacodynamics

Pharmacokinetics

Pharmacokinetics: effect of body on drugs

بنلخص ال kinetic steps بكلمة (ADME)

A = absorption

D= distribution

M= metabolism

E= excretion

1- Absorption: mostly from stomach and intestine to the blood
stream

- 2- Distribution : the blood distribute drug to all over the body then the drug reaches to the target tissue
- 3- Metabolism and excretion : the drug shouldn't be in your body for a long time and the toxic effect should be elevated .
- There are two ways for detoxification :
- liver : converts active form to non active
 - directly to urine
- This depends on : if the drug is polar or nonpolar . **How ?**
- If it is polar it melts in plasma and goes directly to urine
- If it is nonpolar it goes to liver → the liver converts it from nonpolar to polar → then it goes to urine


Pharmacodynamics: effect of drugs on body

It needs receptors , enzymes and messengers to work

Example 1 → receptors : Beta 1 blocker is a drug used to block Beta 1 receptor (a receptor located in the heart used for increasing heart rate)

Example 2 → enzymes : angiotensin 2 (angiotensin converting enzyme) converts angiotensin 1 to angiotensin 2 → causing vasoconstriction and increase blood pressure . the drug used to inhibit it is ACE inhibitor .

Names of drugs :

- **Chemical Name** : Specifies the chemical makeup of a drug which is often long and complicated
- **Generic name**: Identifies the drug legally and scientifically. Becomes public property after 17 years of use by the original manufacturer . Shorter and less complicated
-
- **Brand name** : Trademark name is the private property of the individual drug manufacturer and no competitor may use it Often has the super script ® after or before the name . Example: Aspirin is a registered trademark owned by Bayer  Bayer® Aspirin
EXAMPLE : Rivanin and panadol are brands name but the generic name is paracetamol for each of them

*الأطباء بيتعاملوا بالدواء على أساس ال generic name

Some terms used in pharmacology:

- Onset of action is the duration of time it takes for a drug to make its effects upon administration.

The time frame within it the drug will be act .

يعني عندي صداع وبدي الدواء يشتغل خلال نصف ساعة بس أخذنا الدواء اشتغل بعد

ساعتين معناته في عندنا delay in onset of action

ملاحظات :

- The onset of action for tablets and capsule is longer than injection because in injection you exclude absorption (has a rapid onset of action) .
- The onset of action depends on the drug structure like adhesive and disintegration .

يعني ممكن اذا كان ال adhesive عالي يحتاج وقت أطول ليتفكك بالمعدة

- Duration of action: the length of time that drug still effective
It's important to determine how many time frequency you must take the drug .

مثلا اذا بيستمر مفعوله 12 ساعة بيتأخذ مرتين اذا 24 ساعة مرة باليوم وهكذا

- Dose :Amount of drug administered usually measured in milligrams or grams.

في بالفارما شي بنسميه (5R)

We mean by 5R : right drug for the right patient with the right dose , right duration and right frequency .

- Therapeutic dose
- Toxic dose
- Subtherapeutic dose

*It's very important to give the therapeutic dose

- Therapeutic dose : the exact dose that can treat this condition
- Subtherapeutic dose : a dose that less than therapeutic dose
- Toxic dose :

ممکن تصیر بعدة حالات مثلاً :
حدا أخذ جرعة أكبر من ال therapeutic dose
أو أخذ two drugs وصار عندنا
toxicity Drug drug interaction سبيلنا

**هلاً هاد كله بيعتمد على شغلة اسمها:

(therapeutic index or therapeutic window)

Therapeutic index : the range between therapeutic dose and toxic dose for example : the therapeutic dose is 10 mg and the toxic dose is 20 mg between 10 – 20 is the therapeutic index and you are free to give this drug .

ولكن الأدوية تصنف صنفين:

- 1- Narrow therapeutic index
- 2- Wide therapeutic index (**safer**)

- Dose interval (frequency)
- Indication : the therapeutic use

يعني متى بصير نستخدم هاد الدوا ...

في مصطلح تاني اسمه contraindication

معناه لا يعطى الى مثلاً

حدا معه أزمة ما بصير ياخذ voltaren

- Side effect / adverse effect :

رح نشرح الفرق بيناتهم من خلال هدول الأمثلة :

Side effect: a drug given for hyper tension → causes decreasing in the pressure → after that causes a hypotension .

Glucophage → decrease in blood glucose → hypoglycemia

It's expected !! يعني متوقع حصولها

Adverse effect : when the drug is distributed to all over the body it causes another unexpected action or unwanted action in another part of the body

مثلا اليرفين يستخدم لعلاج الحساسية ولكن يسبب النعاس

DONE