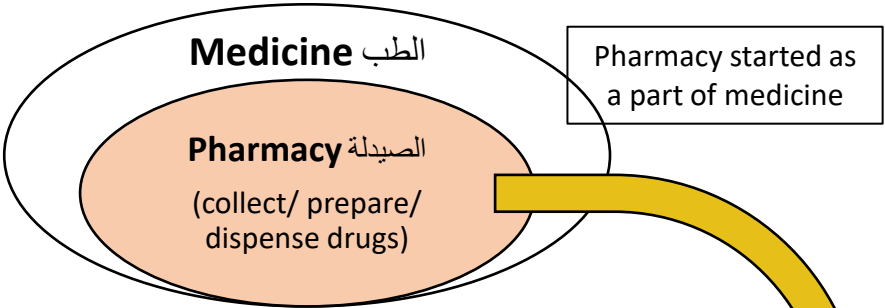


U9: Pharmacy

L1: History of pharmacy

Ancient Greece: the 1st to use drugs (**Asclepios + Hygeia** “the masters of health/ health & hygiene”)

Egypt + India + China: used plants & herbs



Islamic Golden age
(8th – 14th century):

- #Separate between pharmacy and medicine
- #Great knowledge in chemistry & botany “study of plants”
- #Lots of books were written
- #Al Razi (the first to write books based on home treatments)
- #First pharmacies were built in Baghdad

Pharmacists صيدلاني
(types of pharmacy)

- Community** مجتمع
(pharmacy in public places where you can buy medicine)
- Home care** رعاية منزلية
(send medication to old/ sick ppl at home)
- Research** أبحاث
(develop new drugs)
- Clinical** عيادي
(work at hospital with doctors & nurses)
- Hospital** مستشفى



In the 16th century a law was created: “only **pharmacists** are allowed to prepare medicines”

بداية عمر الإنسان
Pediatric (children/ infants) أطفال

عندما يجري العمر
Geriatric (old ppl) كبار السن

أمراض نفسية (mental disorders) Psychiatry

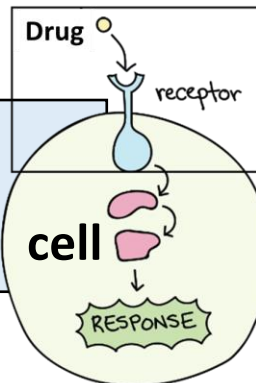
السرطان (cancer) Oncology

Pharmacology علم الدواء (the study of drug)

Cell receptors:
مستقبلات الخلية

Surface
سطحية

Intra-cellular
داخل الخلية



Enter
خروج
exit
Pharmacokinetics حركة الدواء

(The study of what the body does to the drug)
What happens to the drug once it enters the body?

ADME

Pharmacokinetics
The principles of ADME

عكس
بعض

≠

Pharmacodynamics تفاعل الدواء

(The study of what the drug does to the body)

دواء مستقبل استجابة
Drug + receptor = response

3 levels of response

1,2,3 go!

Agonist منشط

حذفنا الـ زعشان م ينفع
يجمع حرفين علة

Anti = against

3) Antagonist مثبط

1) Full كامل: when a drug connects to a receptor & produces a **maximum** effect

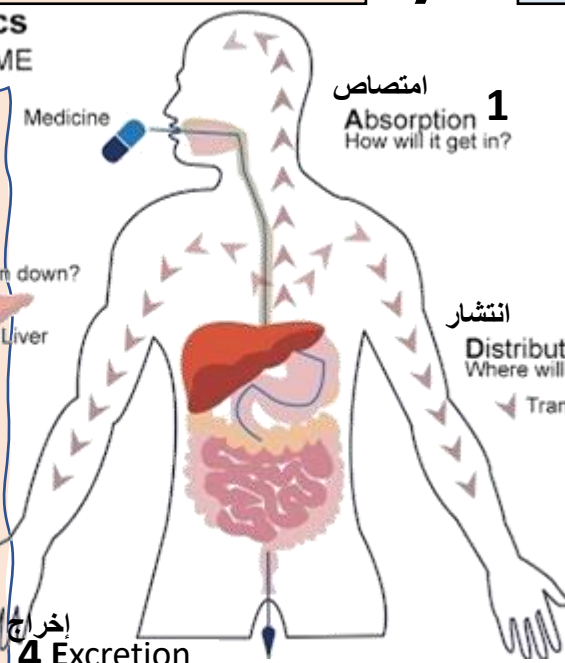
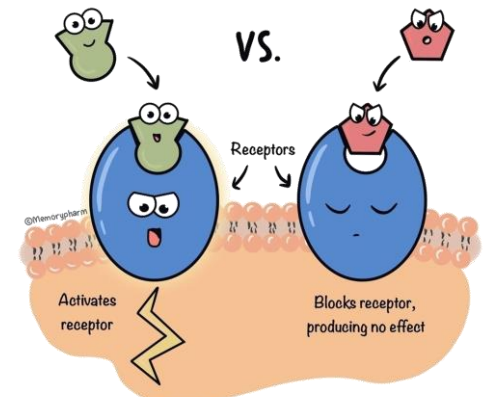
2) Partial جزئي: when a drug connects to a receptor & produces **less than a maximum** effect

When a drug connects to a receptor, but there is no effect

AGONIST

ANTAGONIST

VS.



Factors عوامل affecting pharmacodynamic:

- 1) Patient age.
- 2) Disease type.
- 3) Pregnancy.
- 4) Other drugs in the body.

MTG



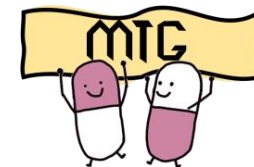
1) **Absorption:** how the medicine gets into the body (enter blood stream)

2) **Distribution:** where the medicine goes in the body (move with blood stream)

3) **Metabolism:** what the body does to the medicine (breaks down in liver)

4) **Excretion:** how the body gets rid/ remove of the medicine (eliminated in urine through kidneys)

يُوصف المراحل التي يمر بها الدواء من لحظة دخوله للجسم لحظة خروجه منها



PHARMACY

1) Collect drugs

2) Prepare
(making medicine)

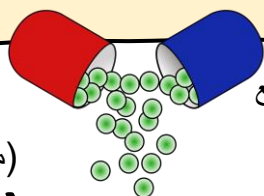
3) dispense medicine

drugs = ingredients

- ✓ Drugs are chemical substances taken from:
 - Plants (herbs)
 - Animals
 - Microorganisms
 - Minerals
- ✓ They are not used directly as a treatment.

- ✓ Excipients are used to prepare medicines.
- ✓ Helps to:
 - Formulate
 - Protect
 - Support
 - Make medicines safe to use
- ✓ Most medicines have excipients added to them.

- ✓ Medicines are directly used as a treatment.
- ✓ They are the result of mixing a drug or drugs, sometimes with or without excipient.



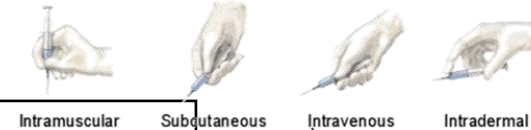
المادة الفعالة في الدواء
(مثال: البودرة اللي في الكبسولة)

المادة غير الفعالة في الدواء ويتم خلطها مع
المادة الفعالة لجعل الدواء سهل وآمن في
الاستخدام (مثال: الكبسولة الخارجية)

الدواء جاهز للعلاج والاستخدام المباشر

drug(s) + excipient(sometimes) = medicine

L3: Routes of administration



Parenteral بالحقن (injection/ infusion)

- Intra-dermal:** في الجلد
Into skin
e.g., allergy test
- Intra-venous:** في الوريد lv
Into vein
e.g., saline infusion
(takes from 30-60 seconds)
- Sub-cutaneous:** تحت الجلد SC
Into **fat** under skin
e.g., insulin infusion
(take from 15-30 mins)
- Intra-muscular:** IM في العضل
Into muscle
e.g., vaccine
(take from 10-20 mins)

- Advantage:**
- ✓ Faster drug action
 - ✓ Useful for unconscious patients
- Disadvantage:**
- X Require aseptic conditions
 - X Can be painful
 - X Most injections are not self-administered
 - X Dangerous if administered incorrectly

طرق إعطاء الدواء Routes of administration: Provide/give

TOP موضعي Topical (applied directly on affected area) Easy reached areas: skin/ eyes/ ears/ nose

Time to take effect:
Variable (minutes to hours)

Forms of medication:
Creams
Lotions
Gels
Ointments
Sprays
Liquids

Advantages:

- ✓ Easy to apply
- ✓ Low risk of side effect

Disadvantages:

- X Not well absorbed into deep layers of skin
- X Absorption can be slow
- X Stain cloths

SL تحت اللسان Sublingual (under the tongue) & buccal (between gum & check)



Time until effect:
3-5 mins

Forms of medication:
Small tablets
Films
Wafers
Sprays

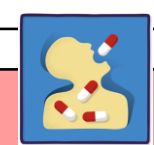
Advantages:

- ✓ Very fast (during a heart attack)
- ✓ Lower doses
- ✓ If the patient cannot swallow or nauseatic

Disadvantages:

- X Uncomfortable to hold small tablets for a long time
- X Eating/ drinking while holding the tablet can affect the absorption

Oral-B فموي PO Oral (through the mouth)



Time until effect:
20 mins – 1 hour

Forms of medication:
Capsules
Liquid
Pastilles
Powder

Advantages:

- ✓ Easy/ safe/ cost-effective (cheap)
- ✓ **Slow-release** (need only to be taken once/ twice a day)

Disadvantages:

- X Unpredictable absorption rate
- X It take time to show any effect (go through digestive system)

Sub- = under = تحت
مثال: sub-title الذي هو العنوان الذي يكون تحت العنوان الرئيس

اشتقينا كلمة lingual من كلمة language وطبعاً م نقدر نتكلم أي لغة من غير اللسان فكلما lingual لها علاقة باللسان.
Sub-lingual = تحت اللسان

تذكر:
inter ≠ intra
Inter = between مثل "الشبكة البينية"
Intra = inside = داخل

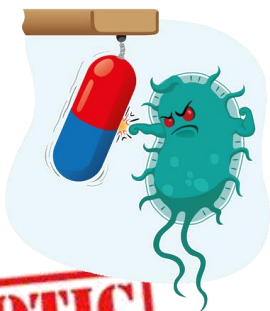


تذكر:
 Anti- = against مضاد
 Ante- = before قبل

When should a patient be given antibiotics?

- 1) If the infection is unlikely to clear up without antibiotic.
- 2) If the infection could spread if not treated.
- 3) If antibiotic can speed up recovery significantly.
- 4) If there is a risk of more dangerous complications.

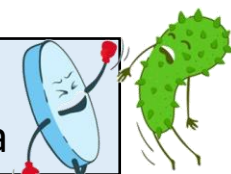
الحالات التي تتطلب استخدام المضاد الحيوي:



مقاومة المضاد الحيوي
 بسبب الاستخدام غير المسؤول

Routes of administration?
 Usually oral/
 injection/ topical

Treatment:
 Kill bacteria



Anti-biotic (e.g., penicillin)
 المضاد الحيوي

Antibiotics **DO NOT**
 work on viruses!

Side effects: آثار جانبية
 Harmful & unwanted effects

Irresponsible use:



Over-use:
 Use antibiotic even if you do not need it (e.g., viral infection)

Happens when the patient do not complete antibiotic course

It is very important to complete the whole course of medication even after symptoms of infection have improved to prevent "antibiotic resistance".

Completing the course is important to make sure that all bacteria are destroyed.

ANTIBIOTIC RESISTANCE

The **overuse** of antibiotics develop super bacteria!

Meaning the antibiotic becomes useless against bacteria & no longer effective!



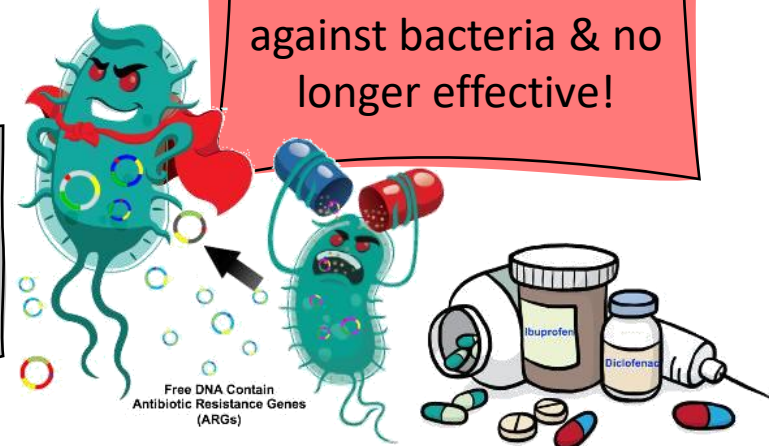
Common side effects:

#Diarrhea إسهال
 #Nausea غثيان
 #Vomiting قيء
 #Rash طفح جلدي
 #Upset stomach مغص

Less common/ rare side effects:

#Kidney stones حصى كلى
 #Blood clotting & disorders اضطرابات دم وتخثر
 #Bowel inflammation التهاب الأمعاء

✓ Side effects range from mild to life-threatening (very rare).
 ✓ Some medications show side effects in 1 out of 10 people, other medications side effects show only in 1 out of 10,000 people.



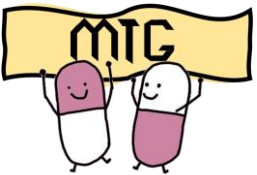
Free DNA Contain Antibiotic Resistance Genes (ARGs)

L5: Latin abbreviations in pharmacy

U9: Pharmacy

جرعة أقل من المطلوب Under-dose	جرعة زائدة Over-dose
Take medication <u>less</u> than recommended or prescribed	#Take medication <u>more</u> than the recommended amount #Overdosing is <u>very toxic</u> & can lead to death

Why is it importance to interpret abbreviations correctly?
Ensure patient's safety & avoid medication errors (underdose or overdose)



Abbreviations:
اختصارات

Measurements:
قياسات

kg = kilogram
g = gram
mg = milligram
mcg = microgram
ml = milliliter
tsp = teaspoon (5ml) ملعقة صغيرة

Routes of administration:
طرق إعطاء الدواء

IM = Intra-muscular
IV = Intra-venous (vein)
PO = By mouth (O = oral)
SC = Sub-cutaneous
SL = Sub-lingual
TOP = Topical

Others:

Dr. = doctor
XR = X-ray
Sx = symptom
Dx = diagnosis
Tx = treatment
FBC = full blood count
BP = blood pressure

Roman numbers:
أرقام رومانية

i	ii	iii
I	II	III
1	2	3

hour تشبه hora
Somni تشبه الكلمة العربية "سنة" بمعنى "نوم"
ساعة النوم
start now!

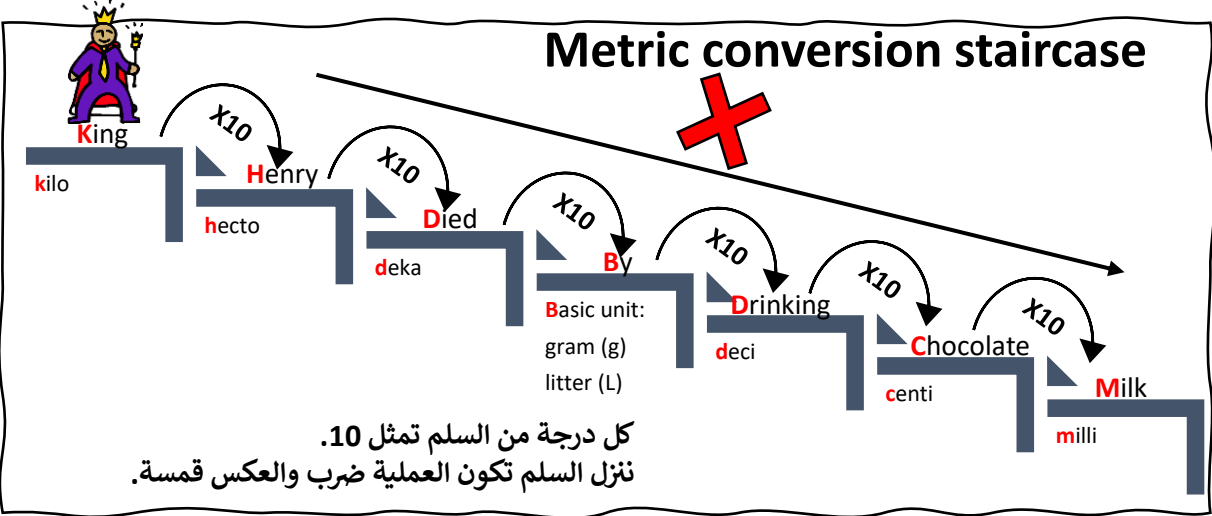
Latin:
مصطلحات واختصارات لاتينية

Prescription: الوصفة		
Abbreviation	Latin	Meaning
Rx	praescriptus	وصفة prescription
ac	ante cibum	before meal
pc	post cibum	after meal
hs	hora somni	at bedtime
stat	statim	give now
bid	bis in die	twice a day
tid	ter in die	three times a day
qid	quarter die sumendus	four times a day
prn	pro re nata	as needed عند الحاجة
ad	ad libitum	as desired/ wanted عند الرغبة

Rx: أيام أول كانوا يستخدموا كلمة "recipe" وبعدين تغيرت لـ prescription بس الاختصار م تغير	كلمة "cibum" تشبه كلمة "سينابون" فكرة الطالبة: غزلان خلفان cibum = meal = وجبة	كلمة "insomnia" بمعنى الأرق وعدم القدرة على النوم. لو حذفنا الـ in أصبحت "somni" بمعنى نوم!
Prefix bi- : bicycle	Prefix tri- : triangle	Prefix quad- : quarter الربع له علاقة بالرقم 4 quad- = 4

Example: "Rx Ondansetron 4mg, IV, qid, PRN, nausea"

Prescription: Ondansetron 4 milligram, intravenous, if needed by patient to treat nausea.



Convert the following units:

15g to mg
 $15 \times 1000 = 15000 \text{ mg}$

نزلنا 3 درجات يعني ضرب في 1000.
نزلنا 3 درجات يعني ضرب في 1000.

7000g to kg
 $7000 \div 1000 = 7 \text{ kg}$

صعود الدرج يعني قسمة.
صعدنا 3 درجات يعني نقسم على 1000.

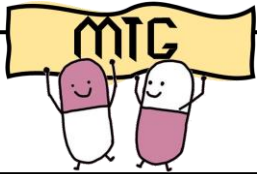
Convert 180 seconds to minutes.

1min $\times$?

60s $\times$ 180s

حركة المقص بتساعدكم في تحويل الوقت وحساب الجرعات

$(1 \times 180) \div 60 = 3 \text{ mins}$



Calculating drug dosages: حساب جرعات الأدوية

Tablets

الحبوب



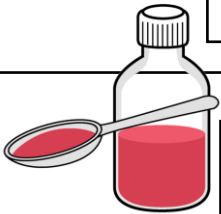
Example: The doctor prescribed 500mg of a drug that is available in a stock strength of 100mg. Calculate how many tablets are needed using the basic formula.

1tablet = 100mg

1tablet $\times$?
100mg $\times$ 500mg
 $(1 \times 500) \div 100 = 5 \text{ tablet}$

Mixtures & solutions

المحاليل والمخاليط



Example: The doctor prescribed a 500mg dose of solution. It is available in a strength of 250mg/5ml. How much solution is needed?

5ml $\times$?
250mg $\times$ 500mg
 $(5 \times 500) \div 250 = 10 \text{ ml}$

IV rate (ml/hr)

المعدل/ السرعة اللي ينزل بها المحلول الوريدي



Example: The doctor prescribed 120ml of IV liquid medicine over a period of 3 hours. How much liquid is administered per hour?

$120 \text{ ml} \div 3 \text{ hrs.} = 40 \text{ ml/hr.}$

