

The background of the cover is a collage of scientific and medical imagery. On the left, a glowing blue DNA double helix is visible. In the center, there is a blurred image of laboratory glassware, including a beaker with orange liquid and a white bottle. On the right, a molecular structure diagram with blue and white nodes is shown. At the bottom, several white and blue capsules are scattered on a dark surface. The title 'Bio Pharma' is prominently displayed in the center in a large, bold, white font with a blue outline.

Bio Pharma

Saeef Dawwas

علم الكميات

POSODOLOGY AND DOSAGE REGIMEN



Factors affecting drug dosage:

تنبيه لمشاكل محتملة يمكن تصير

A- Precaution: Is used to advise the prescriber of some possible problems attendant with the use of the drug. It is less restrictive than warning.

e.g. The use of tetracycline antibiotic may result in overgrowth of fungi.

In such a case, the physician may prescribe an alternate drug.

تحذير

B- Warning: It is used when the potential for patient harm is greater than in instances in which the precaution is used.

بتوخذ الدوا عادي بس

بتعمل فحوصات

Factors affecting drug dosage:

e.g. If tetracycline is used in the presence of renal impairment, it may lead to accumulation of the drug and possible liver toxicity.

- Lower than usual doses are indicated.
 - if therapy is prolonged, blood serum levels of the drug should be taken and the patient monitored at regular intervals to assure the maintenance of non-toxic levels of the drug.

في حال اخذ الدواء لفترة طويلة بتعمل

فحوصات لكمية الدواء بالدم بتكون على نحو مستمر عشان

ممنوع يتأخذ الدواء اصلا

ما نوصل للسمية

C- Contraindication: A term that used to indicate an absolute prohibition to the use of a drug in the presence of certain stated conditions. It is the most restrictive of the warnings which limits the use of drugs.

Factors affecting drug dosage:

القدرة على تحمل تأثير الدواء

لما يـأخذ الدواء لمدة مستمرة الجسم يـبلش
يتعود على تأثير الدواء

6- Tolerance:

Drug tolerance: The ability to endure the influence of a drug, particularly when acquired by a continued use of the substance.

❑ Tolerance occurs commonly in such drugs e.g. antihistaminics, narcotic analgesics. مضاد مخدر حساسية

❑ Normal sensitivity may be regained by suspending the drug administration for a period of time.

❑ The development of tolerance can be minimized by:

تبدأ بجرعة قليلة وبترفعها بالتدريج

- I. Initiating therapy with the lowest effective dose.
- II. Avoiding prolonged administration.

Factors affecting drug dosage:

7- Drug-drug interactions:

□ The effects of a drug may be modified by the concurrent administration of another drug.

□ These drug-drug interactions are due to:

A- chemical or physical interaction between drugs.

B- alteration of the absorption, distribution, metabolism or excretion patterns of one of the drugs.

→ Pharmacodynamic

Factors affecting drug dosage:

مش دايما اشي سيء

The effects of drug-drug interactions may be:

I. Beneficial:

e.g. probenecid causes prolongation of penicillin serum levels (as it decreases its renal excretion). **So:**

- Reduction in penicillin dose is required. **بقلل وجود الدوا بال nephron**
- Decrease the frequency of its administration. **فبزيد وجودوا بالدم والخلايا**
كمية الاعطاء **فلهيك بنقل الجرعة**

II. Detrimental:

□ Many antacids drugs are rich in these metals should be:

- Avoided during tetracycline administration.
- Given alternately according to strict schedule. **بعطي بديل اذا كان لازم اخذ هذول**
الدوايين مع بعض

e.g. diabetic patients who smoke heavily may require insulin dosage one-third higher than normal. **اذا كانت الجرعة مثلا ٦٠ بصير يوخذ ٨٠**

- Smoking – induced peripheral vasoconstriction reduces the rate of insulin absorption following subcutaneous absorption. **تضييق شرايين**
بزيد

Factors affecting drug dosage:

زي ما اخذنا بال absorption

8- Time of administration:

- The time at which a drug is administered sometimes influences dosage. This is specially true for oral therapy in relation to meals.
- Absorption proceeds more rapidly if the stomach and upper portions of the intestinal tract are free of food, and an amount of a drug that is effective when taken before a meal may be ineffective if administered during or after eating.

Discomfort and upper portion of the stomach لما يكون ال
- Irritating drugs are better tolerated by the patient if food is present in the stomach to dilute the drug's concentration.

intestine فاضيين ما فيهم اكل يكون ال
لأهم وبوصل الدوا emptying فاسرع فزيد ال
time more يكون absorption لجدارهم اسرع فال
rapidly

وبالمقابل وجود الاكل بقل ال emptying لأهم فبقل
الامتصاص

الادوية الي زي الاسبرين بتزيد حموضة المعدة وبتعمل
irriation فعشان هيك بنأخذ بعد الاكل خصوصا
bulky الوجبات ال

Factors affecting drug dosage:

9- Route of administration:

- ❑ Drugs administered intravenously enter the blood stream directly and thus the full amount administered is present in the blood.
- ❑ In contrast, drugs administered orally are rarely fully absorbed due to the various physical, chemical and biologic barriers to their absorption, including interactions with the gastric and intestinal contents.
الدوا الي بناخذ oral يكون كميتوا الي بتوصل للدم قليلة لانو بمر بال first pase metabolism
- Thus, a lesser parental dose of a drug is required than the oral dose to achieve the same blood levels of drug.

Factors affecting drug dosage:

10- Pharmaceutical dosage form and drug physical state:

لما تقلل حجم الجزيئات يزيد ال surface area ويزداد الامتصاص

e.g. Increasing the surface area of a drug by the reduction of its particle size has a significant effect on the rate of absorption, therefore, the dose can be minimized by reducing the particle size.

- Thus, crystalline and amorphous forms of a drug shows a significant difference in the rate of absorption.

الجزيئات مرتبة بطريقة منظمة : Crystal

ما الهم ترتيب محدد فمساحة السطح الهم اعلى: amorphous

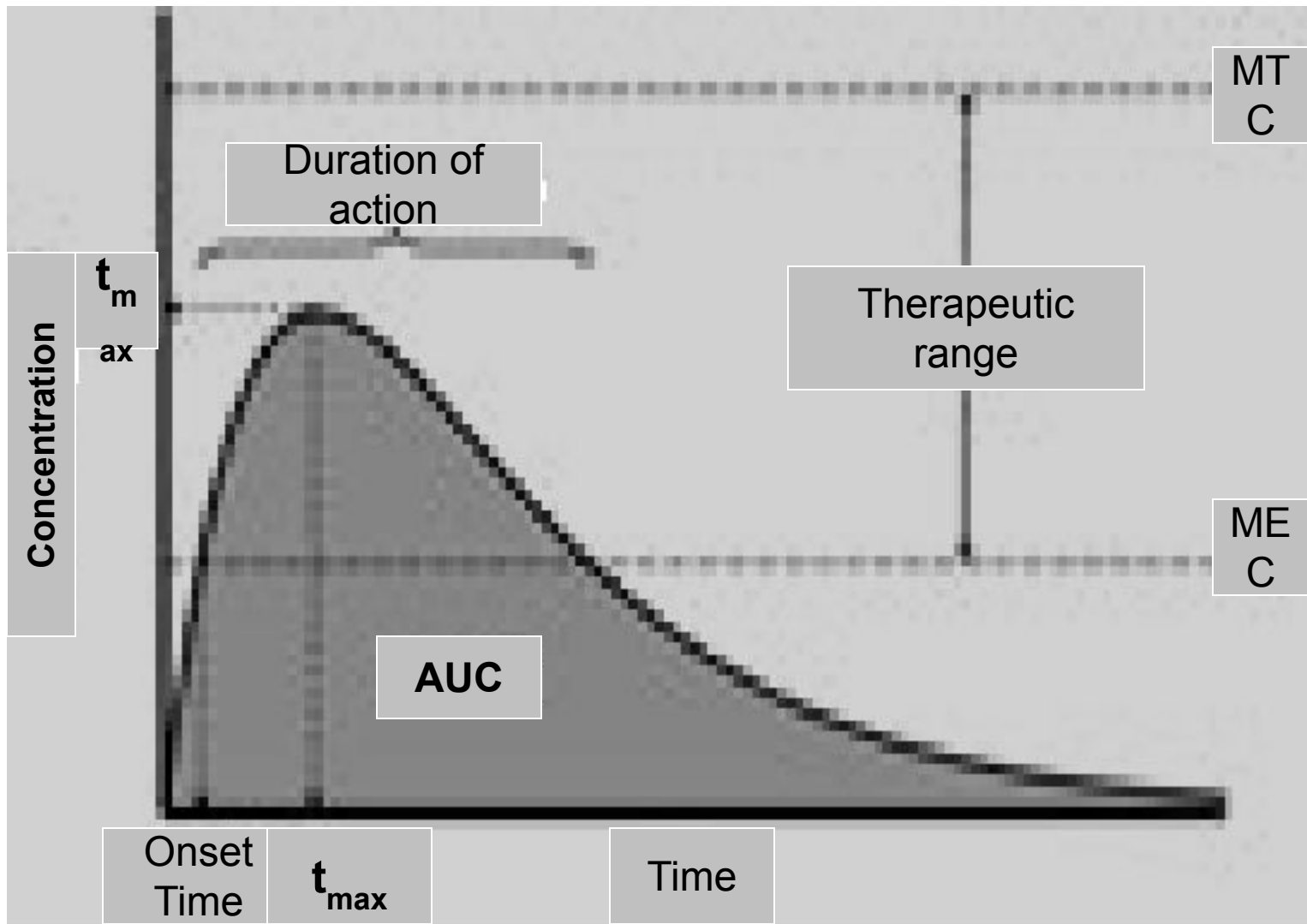
Dosage regimen:

جدولة الجرعات والوقت الي لازم يـأخذ فيه الدوا بتتحكم بال frequency وال duration لأخذ الدوا

- The schedule of dosing (e.g., four times a day for 10 days) is referred to as the **dosage regimen**.

- The proper selection of both the dose size and the frequency of administration is an important factor that influences whether a satisfactory therapeutic plasma concentration is achieved and maintained over the prescribed course of treatment.

الي هي كمية افراز الدوا اذا بنفرز بكمية ثابتة ولا لاء
فعأساس هيك بنعرف اذا الدوا اعطى تأثير مطلوب
بالكورس الي نأخذ فيه الدوا



A blood curve for a drug as a function of the time following oral administration.

Dosage regimen:

Definitions:

Minimum effective concentration (MEC): The minimum concentration that can be expected to produce the drug's desired effects in 50% of the individuals tested.
 الـي هـيـة الـ average

Minimum toxic concentration (MTC): The minimum concentration which produces toxic effects in 50% of the individuals tested.

Therapeutic index:

It is the ratio between a drug's minimum toxic dose and minimum effective dose ($TD_{50\%} / ED_{50\%}$).

□ ↑↑ therapeutic index is more favorable as it means that the drug is safe. والعكس

- Some drugs have low therapeutic index e.g. digoxin (TI = 2).

الـ calculatiins لازم تكون دقيقة

Dosage regimen:

How to design a satisfactory dosage regimen.....???

- The aim of drug therapy is to achieve a plasma concentration of drug which lies within the therapeutic range of that drug.
- 1- If the interval between each dose is longer than the time required for complete elimination of the previous dose, the plasma concentration-time profile of a drug will exhibit a series of isolated single-dose profiles. The design of this dosage regimen is unsatisfactory as the plasma concentration lies below the drug therapeutic range for long periods and so the patient will be under medicated (reduced or no therapeutic effect).

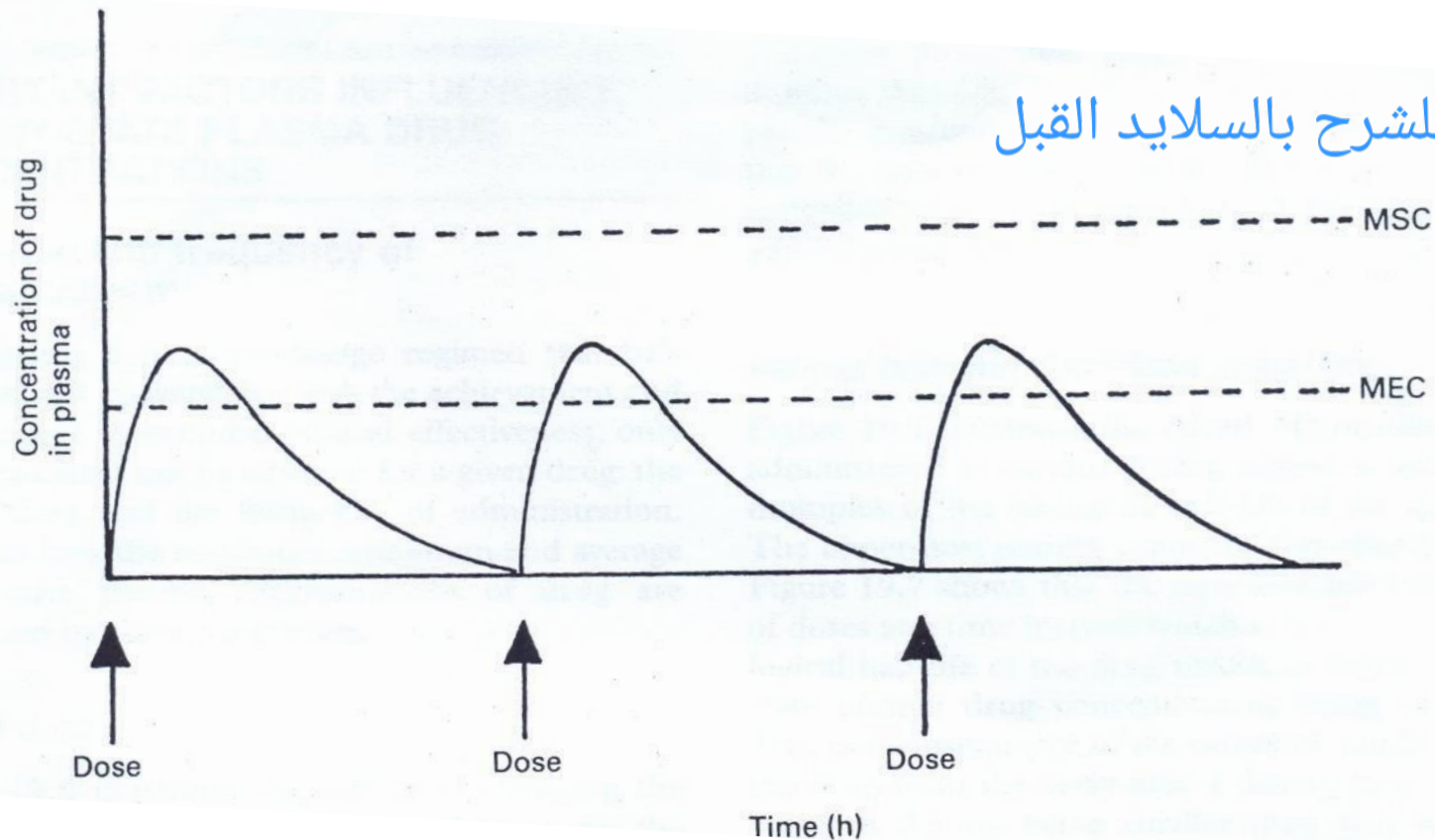
إذا كانت الفترات بين إعطاء الدواء طويلة (الها)
complete (أطول من ال) frequency

plasma فهذا يؤدي الى ال
elimination
فبتكون تحت ال MEC اقل من
concentration
فبتكون تأثيرها كأنها اول جرعة
theraptic rang
فتسمى subtheraptic effect او
non effective
dose

وشكل المخطط بكون الى
single doseprofile
معناها الى كل جرعة بكون لحال بالمخطط

ال frequency ثابتة بس اشى مش كويس لاني استينا
حتى تم التخلص الكامل من الجرعة

توضيح للشرح بالاسلايد القبل



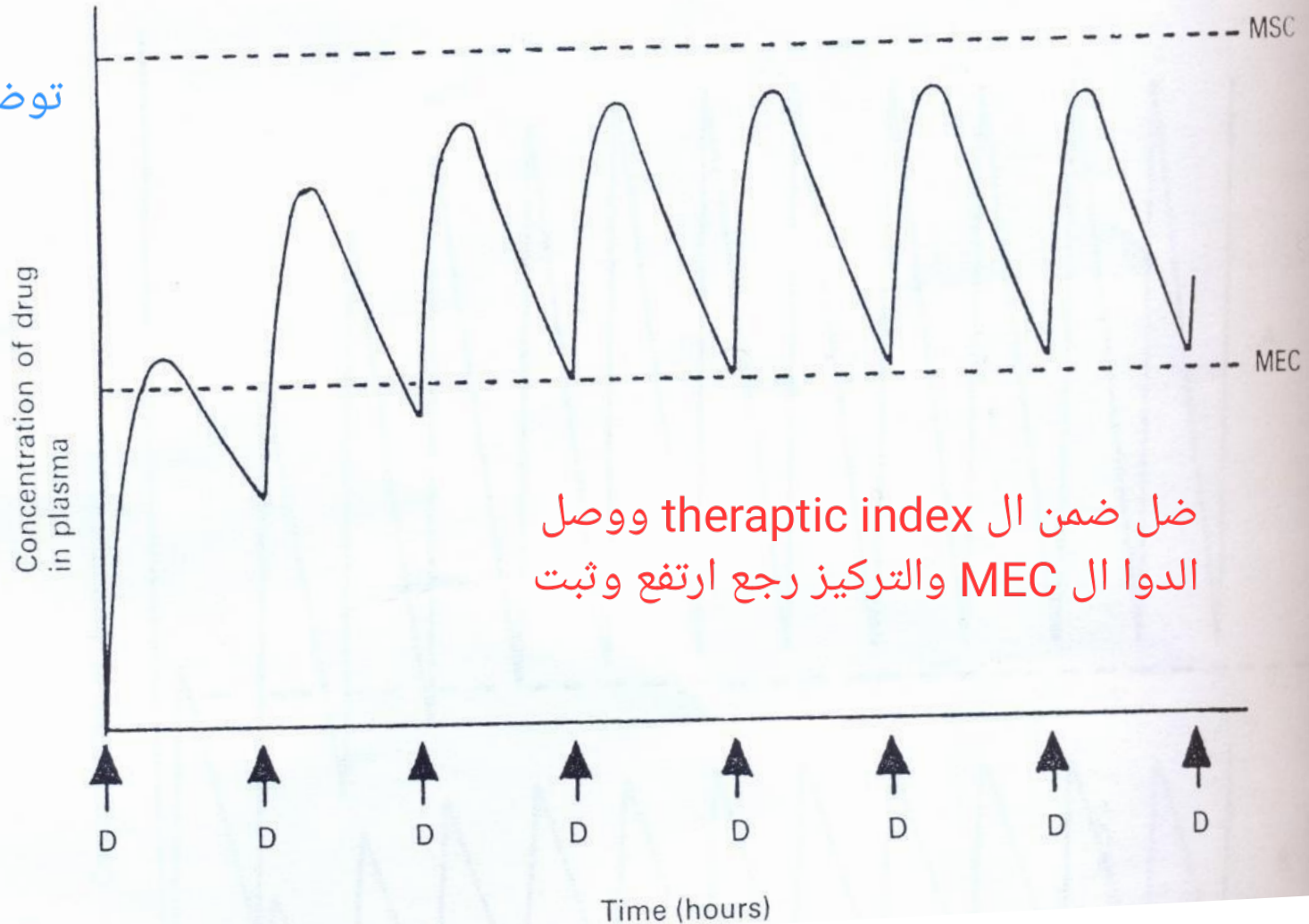
Plasma concentration-time curve following oral administration of equal doses of a drug at time intervals that allow complete elimination of the previous dose.

Dosage regimen:

- 2- If the dosing time interval is shorter than the time required for complete elimination of the previous dose, a steady state (drug concentration remains within therapeutic range) is reached which corresponds to the achievement and maintenance of maximal clinical effectiveness of the drug in the patient.
3. يمكن اعطي الجرعات ورا بعض من غير ما يصير
للدوا فيتزيد السمية لانو بتعدا ال
therapeutic index

عكس الحالة
الاولى
هون بصير
بالمدّة
elimination
n بس مش
كامل

توضيح نقطة ٢



Plasma concentration-time curve following oral administration of equal doses of a drug. (a steady state is reached)



Dosage statements:

The usual dose of a drug:

The amount of the drug which may be expected to produce, in adults, the medicinal effect for which it was officially recognized.

The usual dosage range for a drug:

The quantitative range or amounts of the drug that may be prescribed within the framework of usual medical practice.

Doses falling outside of the usual dosage range may be either underdosage or overdosage.

Dosage statements:

The dosage regimen:

The schedule of dosage. It is indicated for those drugs that are best taken at specific intervals e.g. every 8 hours , e.g. at bedtime, e.g. before meals.

Initial,loading or priming dose: بعض الادوية بدنا اياها توصل لل peak اسرع

It is a large single dose of the drug may be administered initially in order to achieve a peak plasma concentration that lies within the therapeutic range, which may then be maintained through the subsequent administration of regularly scheduled maintenance doses.

الجرعات بتتجمع فبوصل لل steady state

e.g. digoxin (cardiotonic agent)

اسرع بعدين بيلش اقل الجرعات

Initially administered four or more times a day, followed by a single daily dose to maintain the desired blood level of the drug.

Dosage statements:

Maintenance doses: الجرعة اليومية

Smaller, equal doses that administered at suitable fixed intervals to maintain the plasma concentrations of a drug.

Prophylactic doses: الجرعة الوقائية (زي المطاعيم)

doses that may be administered to protect the patient from contracting a specific disease, such as vaccines.

Therapeutic dose: بعد التعرض للمرض

Which is administered to a patient after exposure or contraction of the illness.

Table 4.11. Factors That Determine a Dosage Regimen*

<u>Activity-Toxicity</u>			<u>Pharmacokinetics</u>
Minimum therapeutic dose			Absorption
Toxic dose			Distribution
Therapeutic index			Metabolism
Side effects			Excretion
Dose-response relationships			
<u>Clinical Factors</u>			<u>Other Factors</u>
<u>Clinical State of Patient</u>	<u>Management of Therapy</u>		
Age, weight, urine pH	Multiple drug therapy		Tolerance-dependence
Condition being treated	Convenience of regimen		Pharmacogenetics-idiosyncrasy
Existence of other disease states	Compliance of patient		Drug interactions

*Reprinted with permission from Rowland M, Tozer TN. Clinical Pharmacokinetics. 2nd Ed. Philadelphia: Lea & Febiger, 1989.

آخر سلايد بالمحاضرة

بالتوفيق



Artery Academy