Al-Mustaqbal University College
Department of Pharmacy
4th stage
Practical Pharmacology II
Lab: 4

Study of Absorption, Excretion and Bioavailability of Drugs in Human

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PHARMACOKINETICS

Pharmacokinetics is currently defined as:

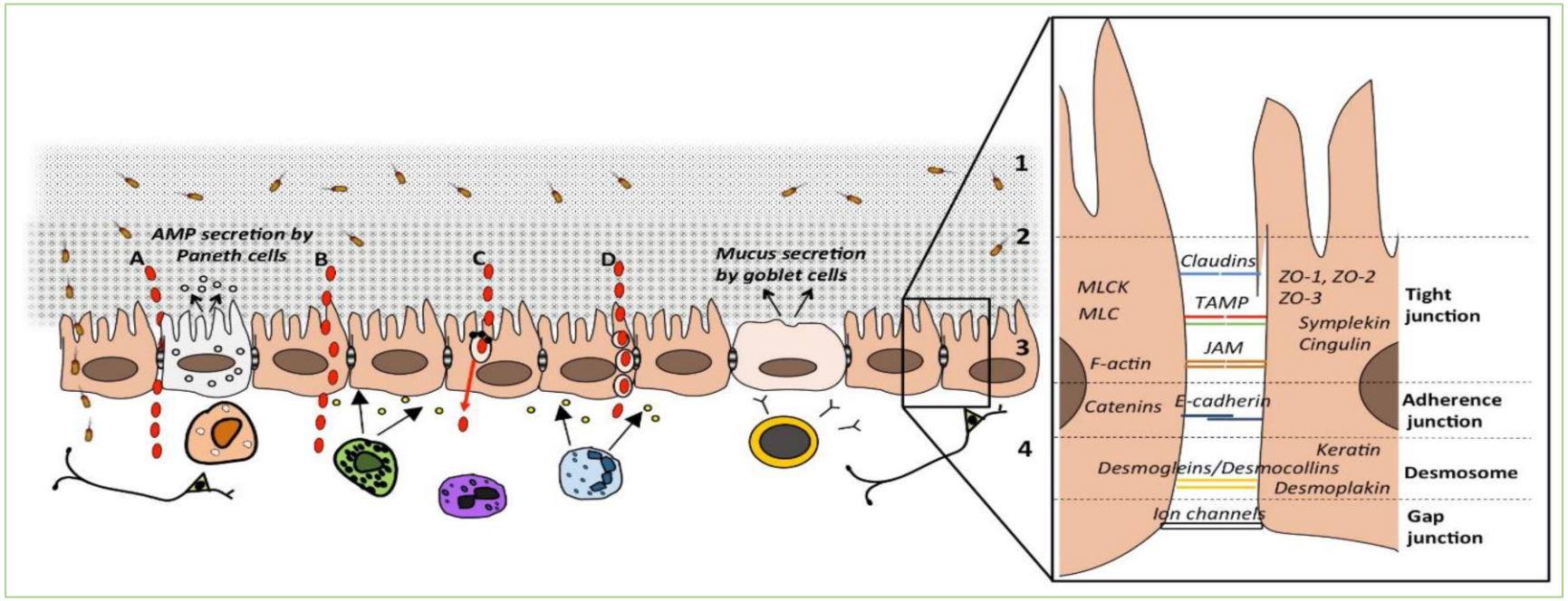
The study of the time course of drug absorption, distribution, metabolism, and excretion.

Clinical pharmacokinetics is:

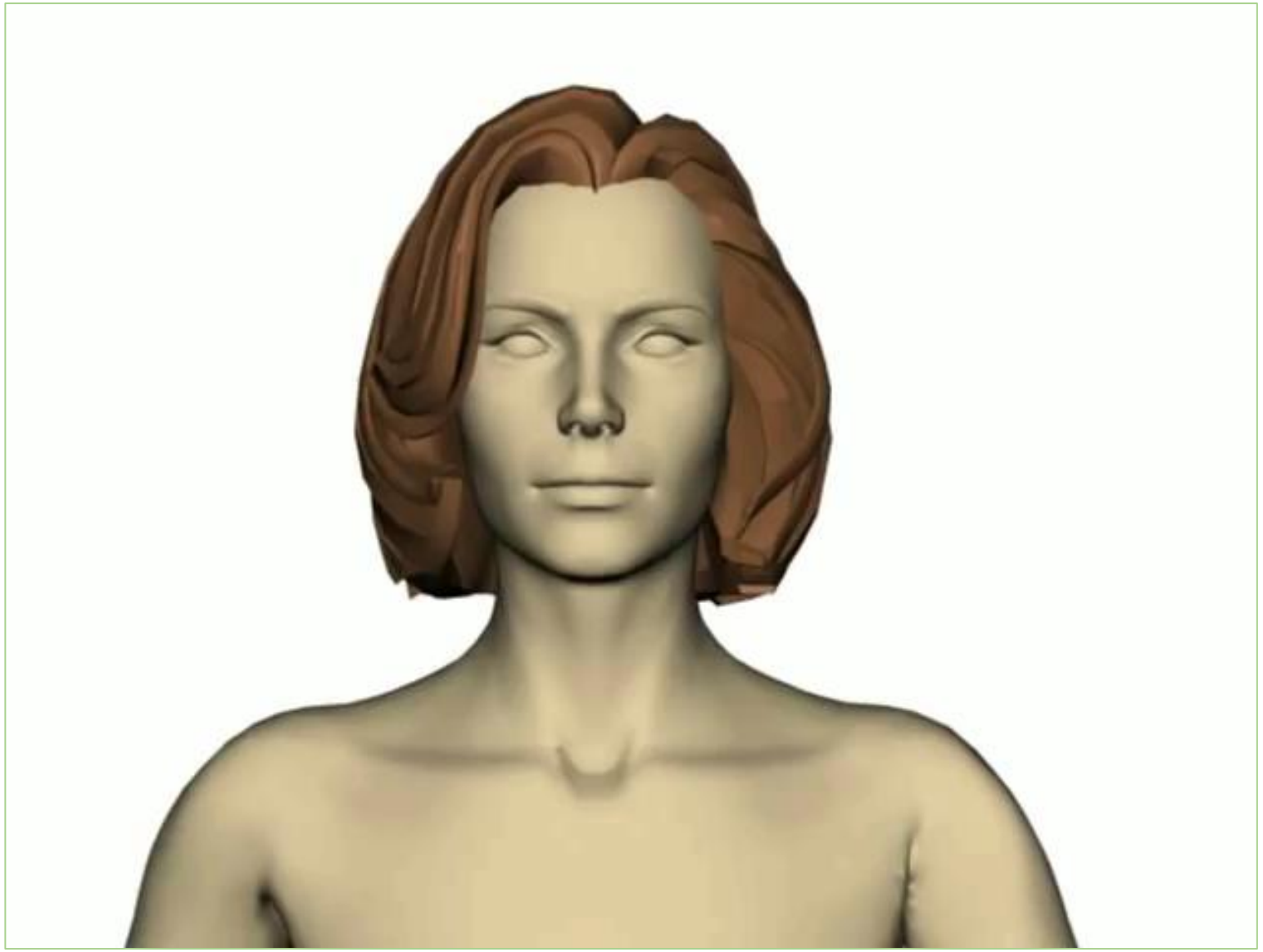
The application of pharmacokinetic principles to the safe and effective therapeutic management of drugs in an individual patient.

ABSORPTION

- Defined as the **passage** of a drug from its site of administration into the plasma, Therefore, it is important for all routes of administration, **except** intravenous injection
- Cell membranes form the **barriers** between aqueous compartments in the body.
- An **epithelial barrier**, such as the gastrointestinal mucosa or renal tubule, consists of a **layer of cells** tightly connected to each other so that molecules must traverse at least **two cell membranes** (inner and outer) to pass from one side to the other

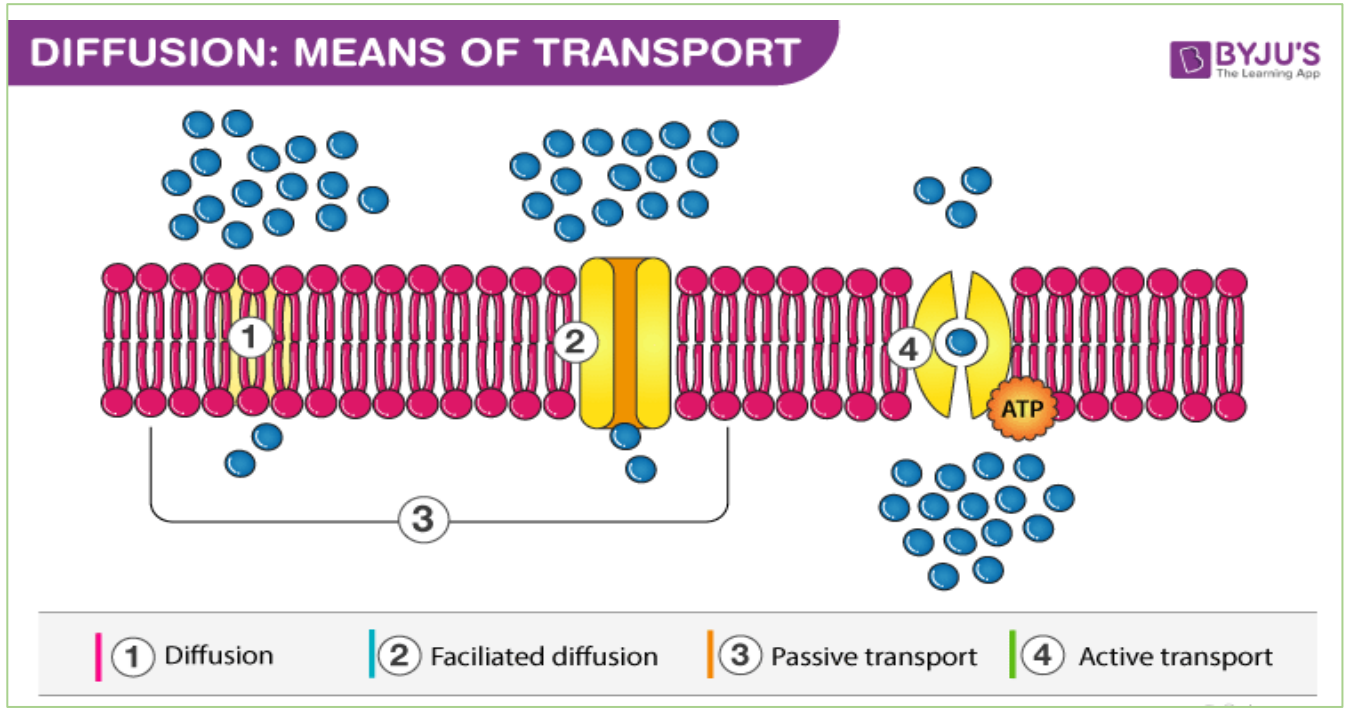


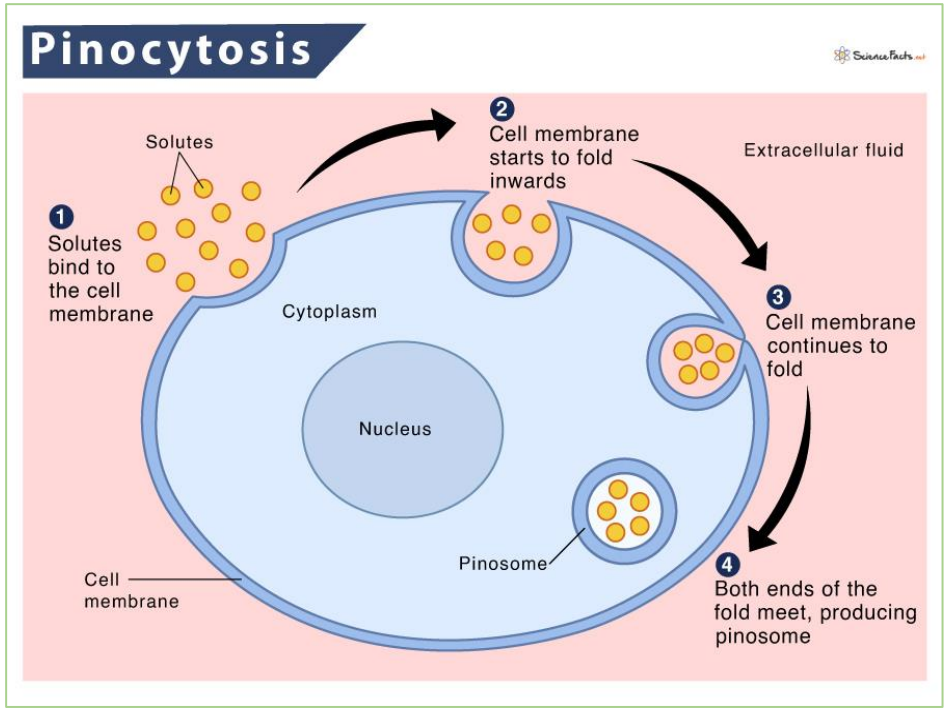
ABSORPTION



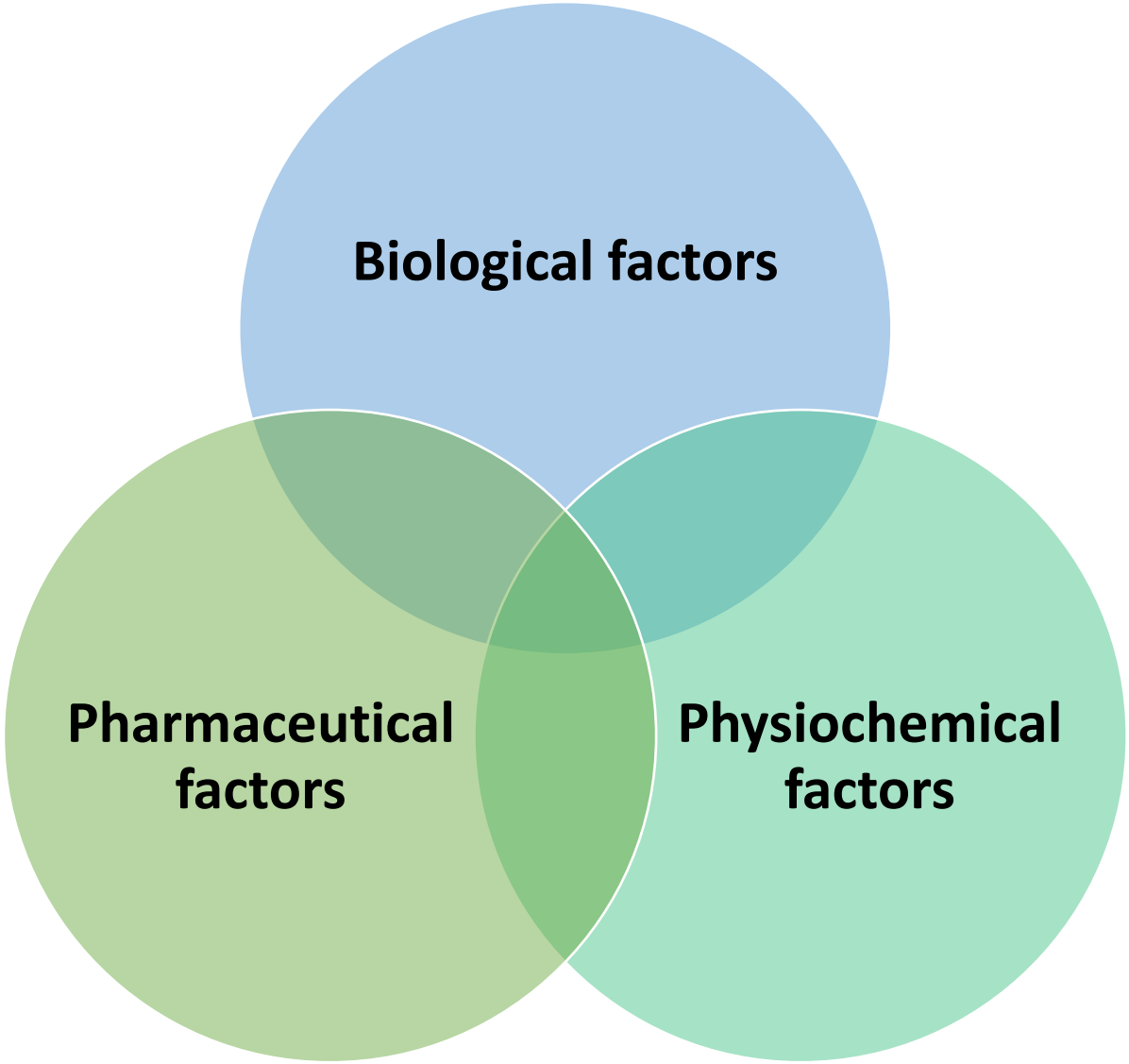
TYPES OF TRANSPORT ACROSS CELL MEMBRANE

1. **Diffusion** through lipid layers
2. **Transfer** through aqueous pores
3. Transport by **carrier proteins**: **Passive** transport & **Active** transport
4. **Pinocytosis**





FACTORS AFFECTING THE ABSORPTION OF DRUG FROM GIT



FACTORS AFFECTING THE ABSORPTION OF DRUG FROM GIT

Biological factors

- Surface area of GI absorption sites
- pH of gastrointestinal fluids
- Gastrointestinal motility
- Influence of food in GIT
- Hepatic metabolism (first pass effect)
- Gastrointestinal disorders

FACTORS AFFECTING THE ABSORPTION OF DRUG FROM GIT

Physiochemical factors

- Drug dissociation constant
- Lipid solubility
- Dissolution rate of drugs
- Drug stability and degradation condition in GIT
- Drug interaction properties with other constituents

FACTORS AFFECTING THE ABSORPTION OF DRUG FROM GIT

Pharmaceutical factors

- Types of dosage forms
- Influence of excipients
- Polymorphisms

SALIVA AND TDM

In recent years, saliva has been utilized for therapeutic drug monitoring

The advantage is that collection is:

- **Noninvasive**
- **Painless**
- **It has been used as a specimen of choice in pediatric TDM**

SALIVA AND TDM

Due to the **low protein** content of saliva, it is considered to represent the unbound or free fraction of the drug in plasma.

Since this is the fraction considered **available for transfer** across membranes and therefore responsible for the **pharmacological activity**, its usefulness is easy to understand.

Drugs **excreted** in saliva enter the **mouth** and may be **reabsorbed** and **swallowed**

POTASSIUM IODIDE

KI It's a **salt of iodine** added to Iodized table salt to keep most people **healthy** under normal conditions

KI is a **safe** and medically **effective** drug.

Short-term use of KI at the **proper dosage** is safe for most people KI is available **without a prescription**.

The **thyroid gland** needs iodine to carry out its hormone production and iodine deficiency can cause **hypothyroidism**.

KI drops used **topically** in the treatment of acne, sebaceous Cysts, nasal polyps, local anti-septic, and nail fungus.

THE AIMS OF EXPERIMENT

The aim of this experiment is

to illustrate the **considerable variation** that exists in the **rate of absorption and excretion** of potassium iodide

in **two different** dosage forms (capsule & solution)

when administered **orally**

MATERIALS

- Drugs and solutions:

1. Potassium iodide 300mg capsules
2. Potassium iodide 300mg/5ml solution
3. Sulphuric acid 10% solution
4. Hydrogen peroxide 5%
5. Starch solution 1% in distilled water.

- Apparatus: Droppers, containers, and test tubes.

PROCEDURE

- Assigned students into 2 groups:

1. A random sample of students was allocated to receive potassium iodide 300 mg in capsules and another receives potassium iodide 300 mg in solution

2. Two samples of saliva are collected every 10 minutes for 1 hour

- These samples are tested as follows.

PROCEDURE

- Testing the samples of saliva

1. 4 drops (Saliva), 5 drops (H_2O_2), 4 drops (H_2SO_4), 1 ml starch solution.
2. Shaking for 3 seconds
3. Blue color indicates a positive test (presence of iodide), the intensity of which indicates the concentration of KI.
4. The approximate values are obtained by color intensity (+ve, ++ ve, +++ ve, etc).
5. Tabulate the results and plot on graph paper (X-axis time & Y-axis conc.) to show the rate of excretion consequent to absorption as below

Results

Time	KI (capsule)	KI (solution)
	Presence of iodide in Saliva	Presence of iodide in Saliva
10 min		
20 min		
30 min		
40 min		
50 min		
60 min		

Results

Plot the graph (X axis time, Y axis concentration (intensity of the color) to show the rate of excretion consequent to absorption of capsules vs. solution dosage forms

DISCUSSION

- Advantages of TDM by using Saliva for estimating drug levels
- Compare the rate of excretion consequent to absorption of KI capsules vs KI solution dosage forms.

THANK YOU FOR YOUR ATTENTION