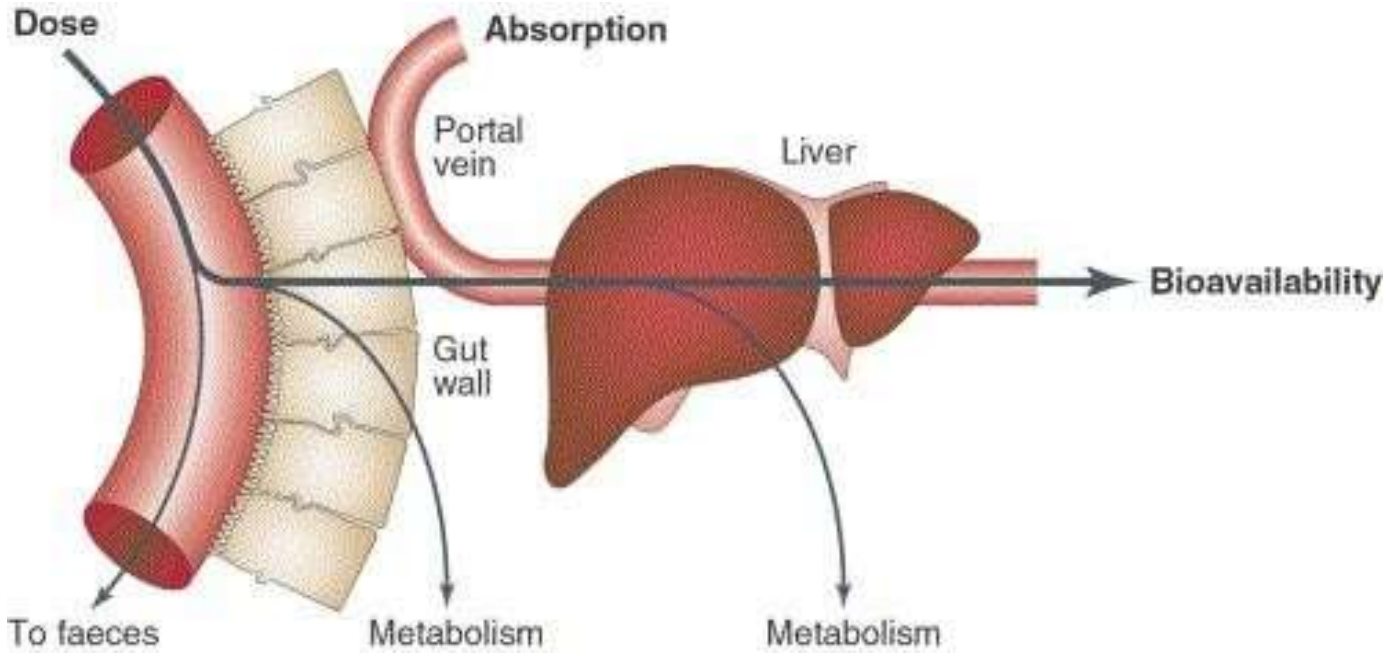
Absortion & Distribution

Absorption and Bioavailability

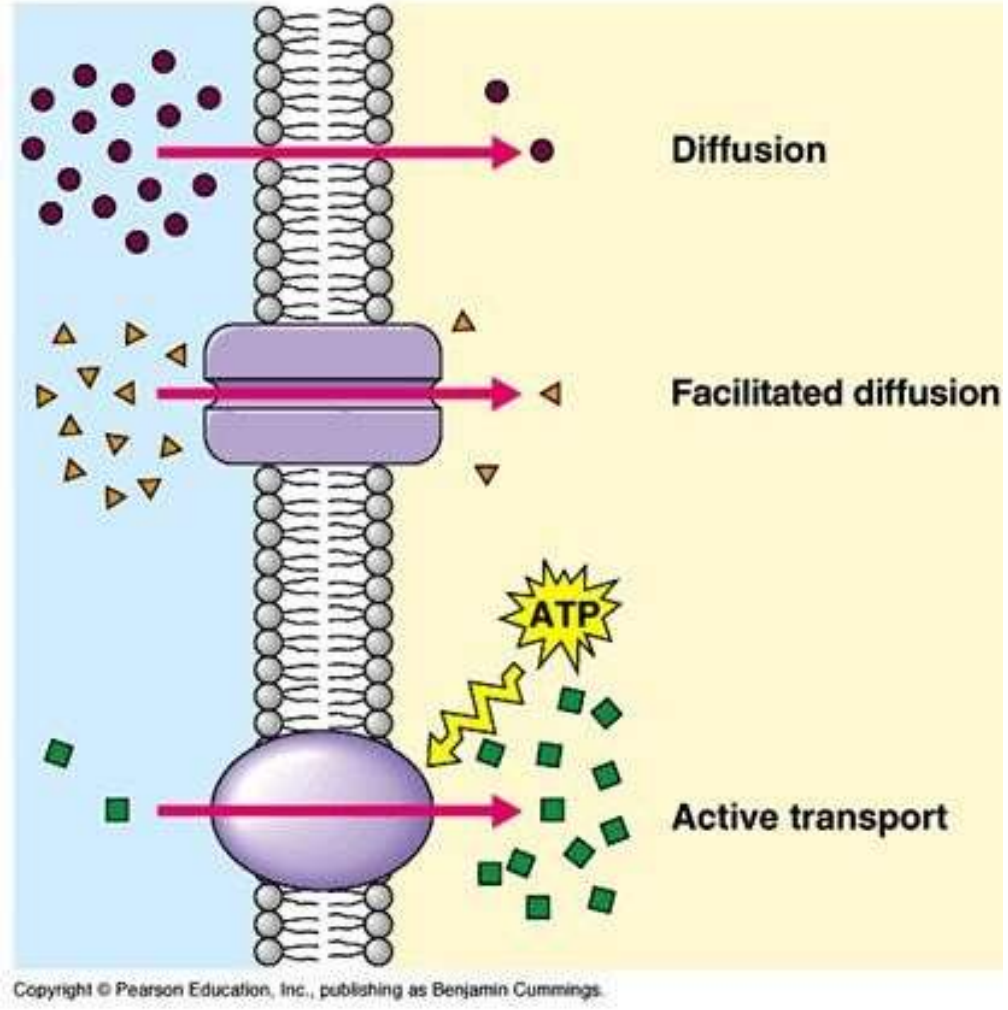
- Drugs – systemic circulation
- Drugs divided into 3 groups:
  - Non ionised, non-polar, lipid soluble
  - Ionised polar, water soluble
  - Partly ionised and non ionised



Absorption Process

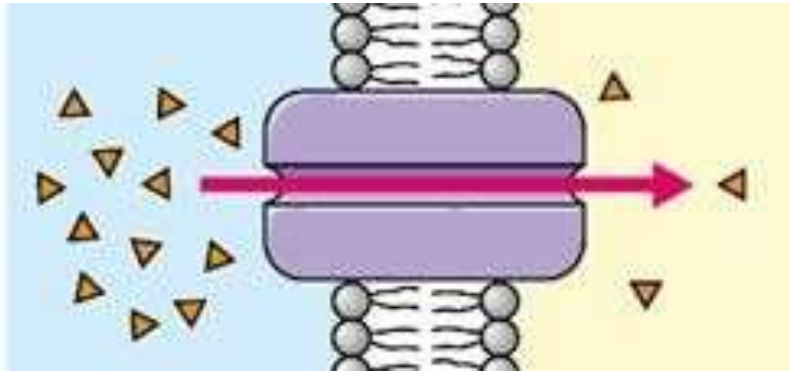
Molecules cross biological membrane by:

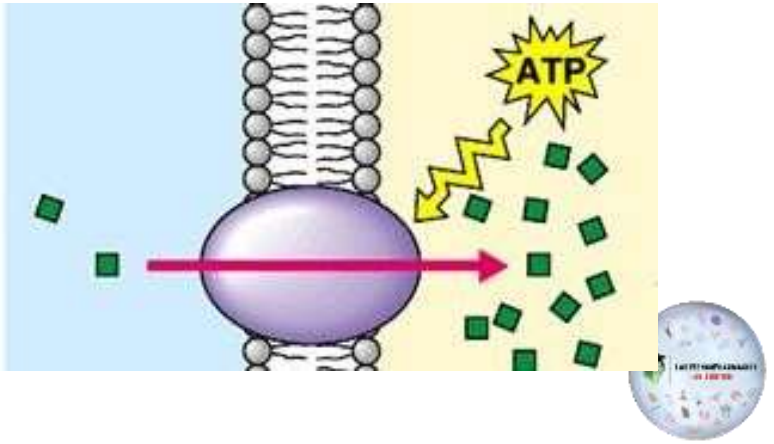
- Simple or passive diffusion
  - Lipid diffusion
  - Aqueous diffusion
- Transport using transmembrane transporters
  - Uptake transpoters
  - Efflux transporters



Transport using transmembrane transporters

- **Facilitated diffusion**
  - SLC moves down the chemical or electrical gradient
- **By active transport**
  - Carrier protein against electrical or chemical gradient
  - Via ion channels
  - By endocytosis



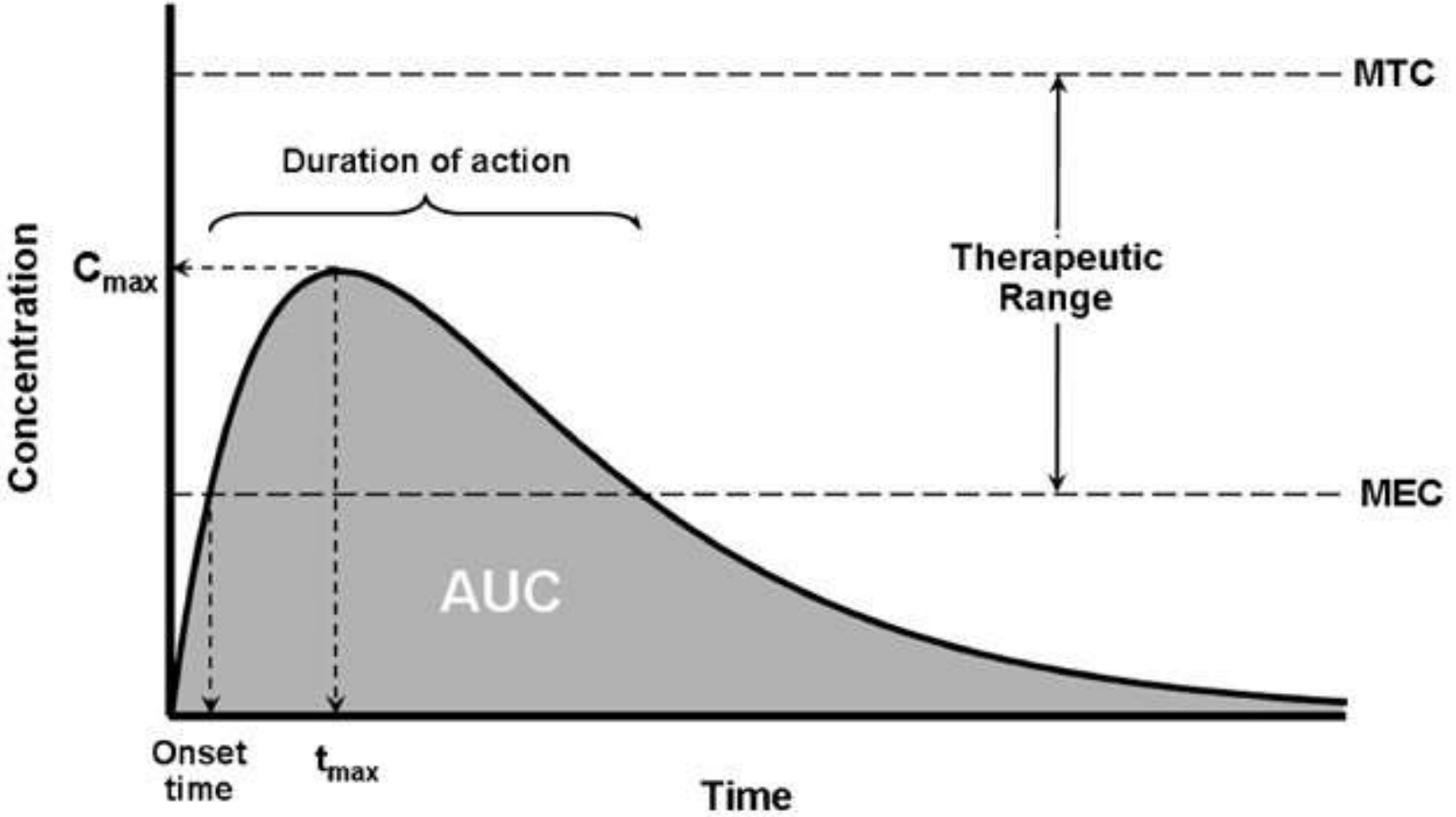


Bioavailability

- Amount or % of drug absorbed from given dosage
- Following non vascular administration
- Available at the desired site of action
- IV bioavailability – 100%
- Valid test for F: level of drug in biological fluid
- Measurable parameter of therapeutic efficacy

$$F = \frac{\text{AUC after oral dose}}{\text{AUC after IV dose}} \times 100$$

AUC


MTC
Duration of action
Concentration
C_{max}
Therapeutic Range
MEC
AUC
Onset time
t_{max}
Time

Drug

- **Pharmaceutically equivalent:**
  - Same active ingredients
  - Identical in strength, conc., dosage forms

- **Bioequivalent:**
  - Rate and extent of **F**
  - Active ingredients in 2 formulations
  - Do not differ significantly
  - Likely to be therapeutically equivalent

Factors affecting drug absorption and bioavailability

Drug related

- Physical properties of the drug
- Nature of the dosage form

Patient related

- Physiological factors
- Pharmacogenetic factors
- Disease states

- **Physical properties**
  - Physical state
  - Lipid/ water soubility

- **Nature of Dosage forms**
  - Particle size: Reduction – dosage can be reduced
  - Disintegration time: Break up into drug granules
  - Dissolution rate: Drug goes to solution
  - Formulation: Diluents, fillers

Physiological Factors

- Ionisation
- pH of the GI fluid and blood
- GI transit time
- Enterohepatic cycling
- Area of the absorbing surface and local circulation
- First pass elimination
- Presence of other agents