



SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES



Coimbatore -641035

COURSE NAME : PHARMACOLOGY(ER20-21 T)

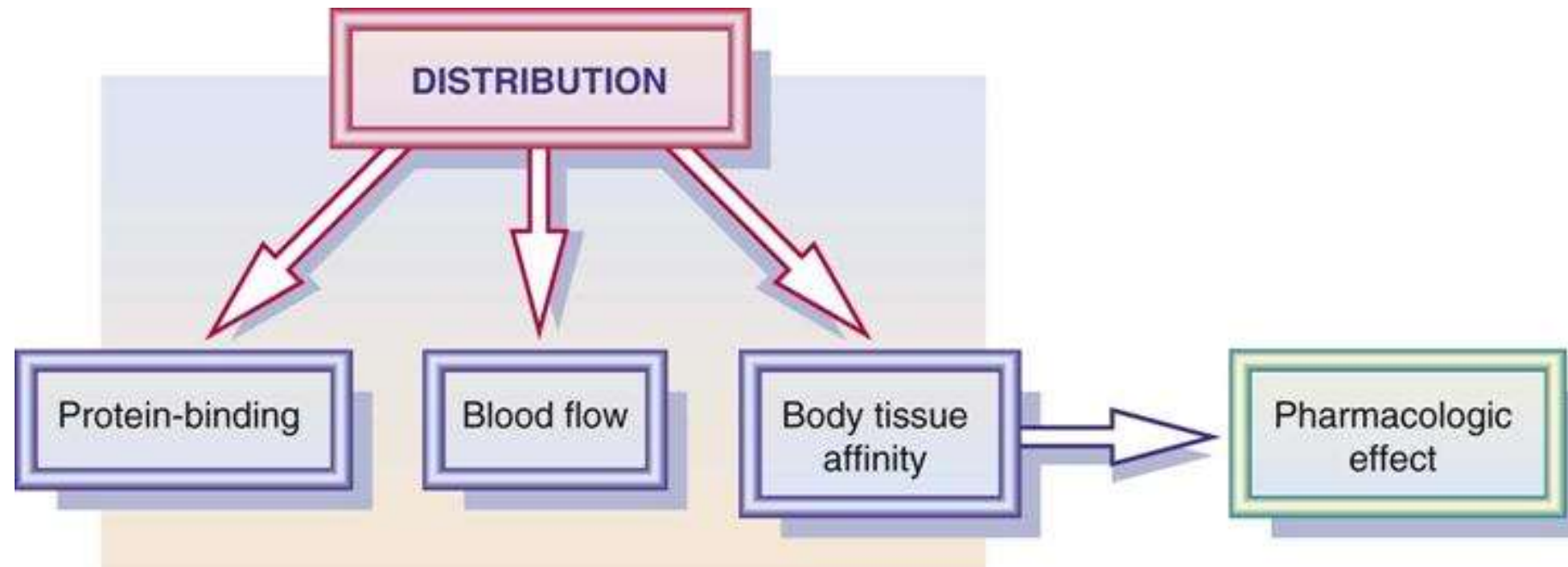
YEAR : DPHARM-II YEAR

TOPIC 4 : PHARMACOKINETICS (DISTRIBUTION)

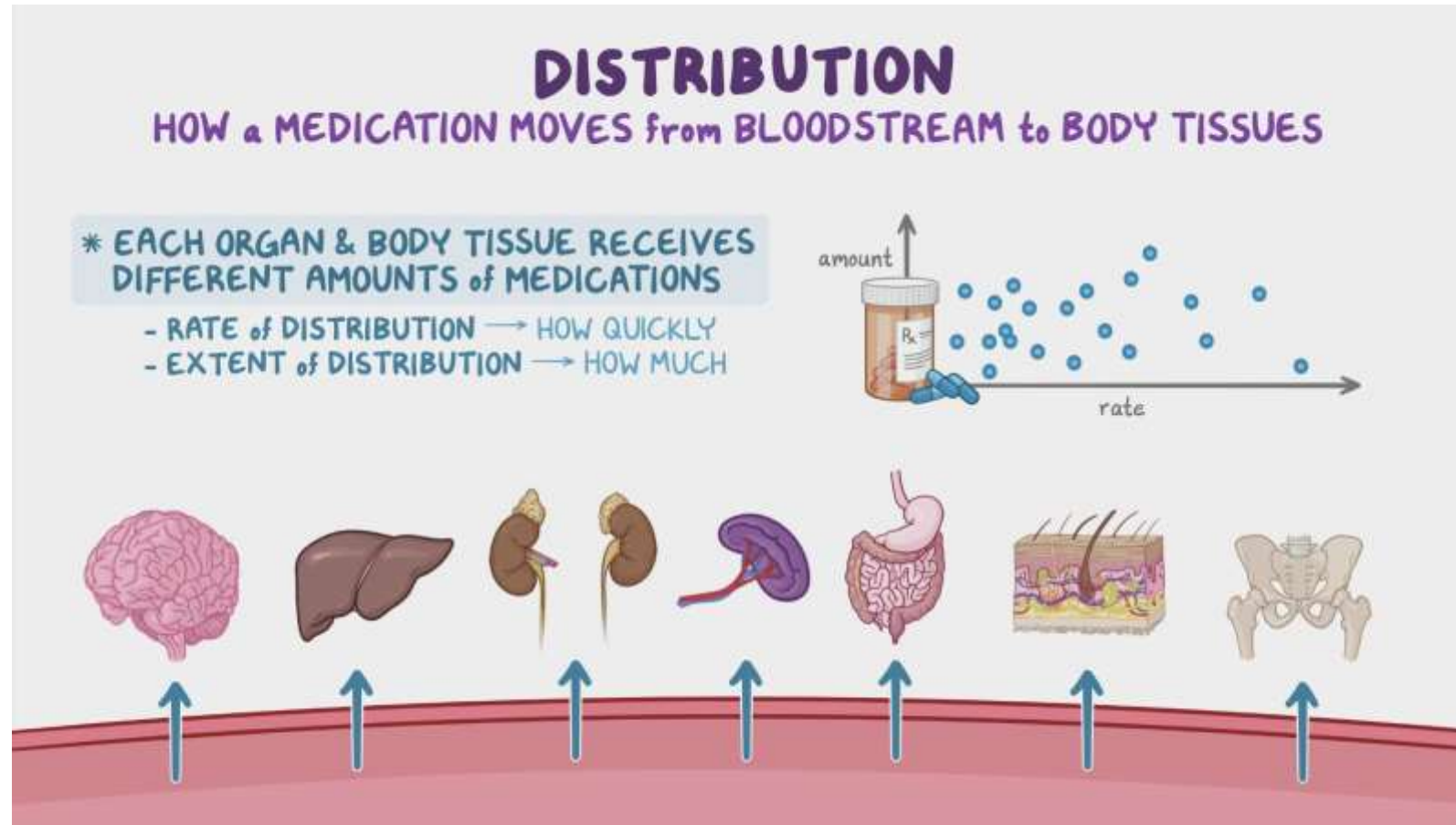
DESIGN THINKING IN DRUG DISTRIBUTION

- **Empathize:** Deeply understand the user or patient's challenges, needs, and experiences related to drug distribution in the body.
- **Define:** Reframe the problem based on insights from the empathize phase and establish clear context.
- **Ideate:** Brainstorm and explore a wide range of ideas and potential solutions, including innovative formulations or carriers that enhance selective distribution.
- **Prototype:** Simulate and build drug delivery prototypes to improve tissue-specific distribution and patient outcomes.

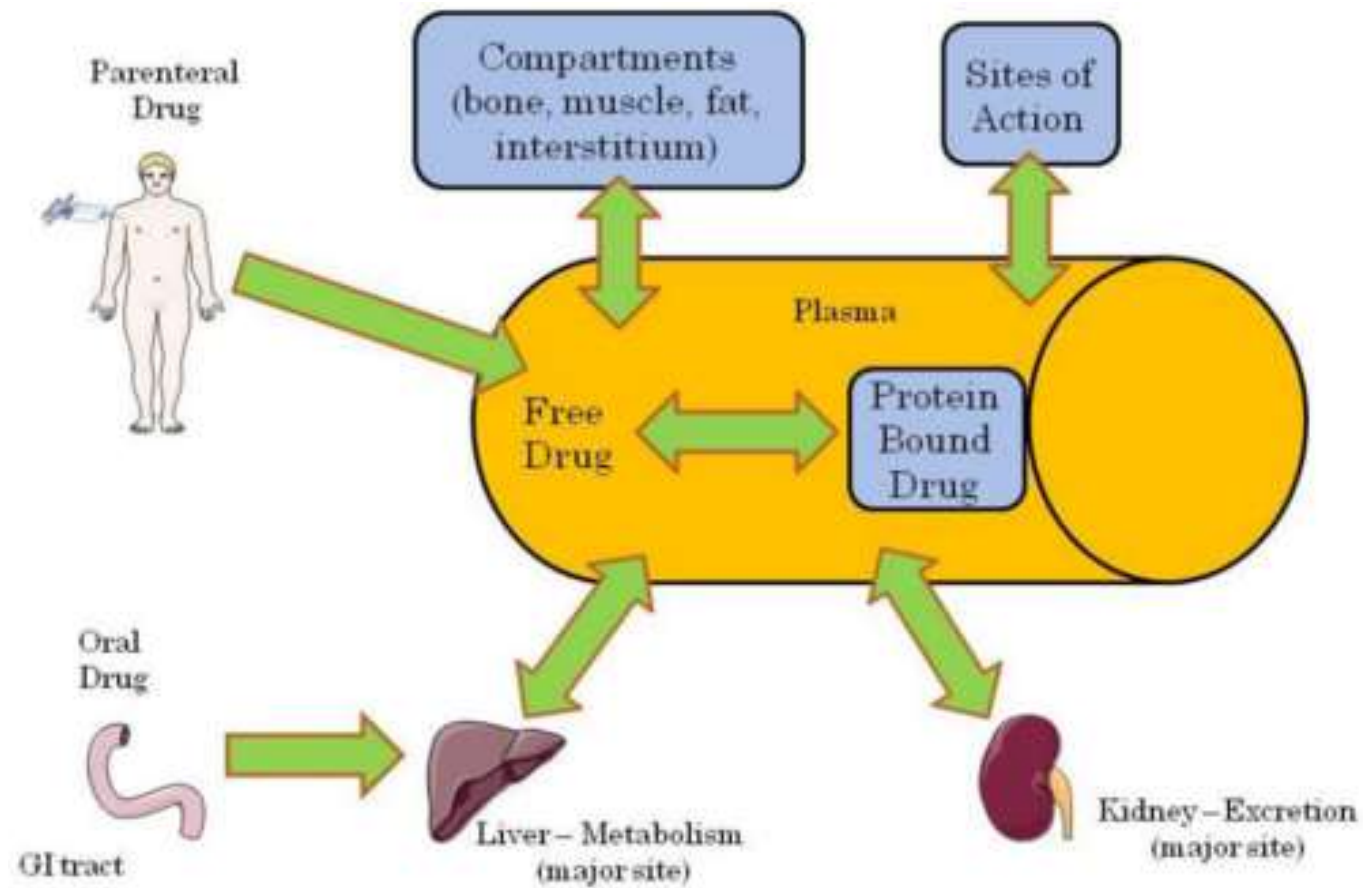
MINDMAP



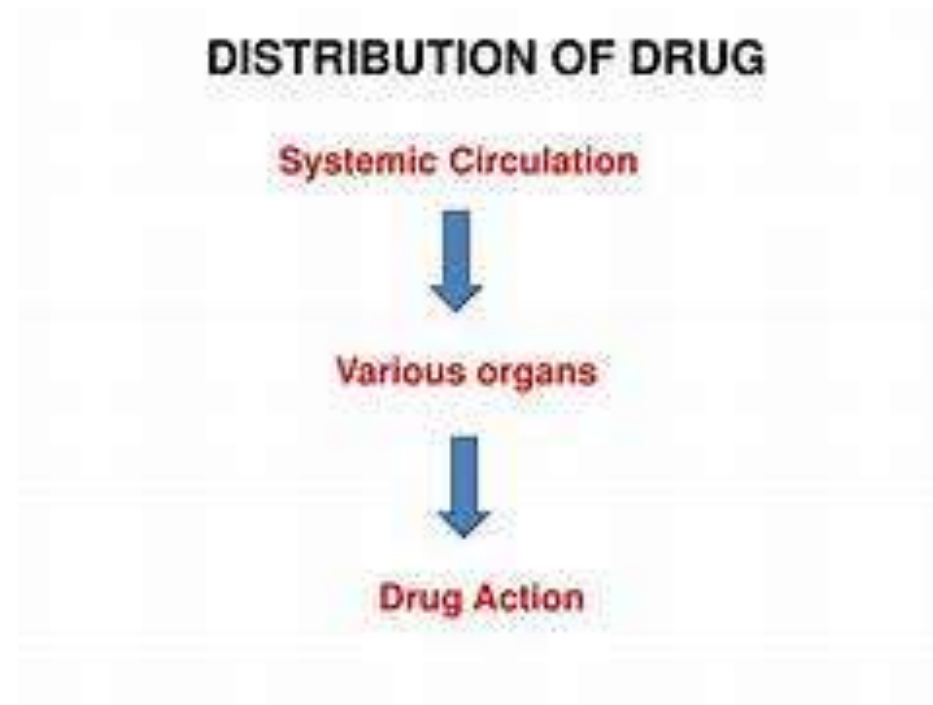
DISTRIBUTION



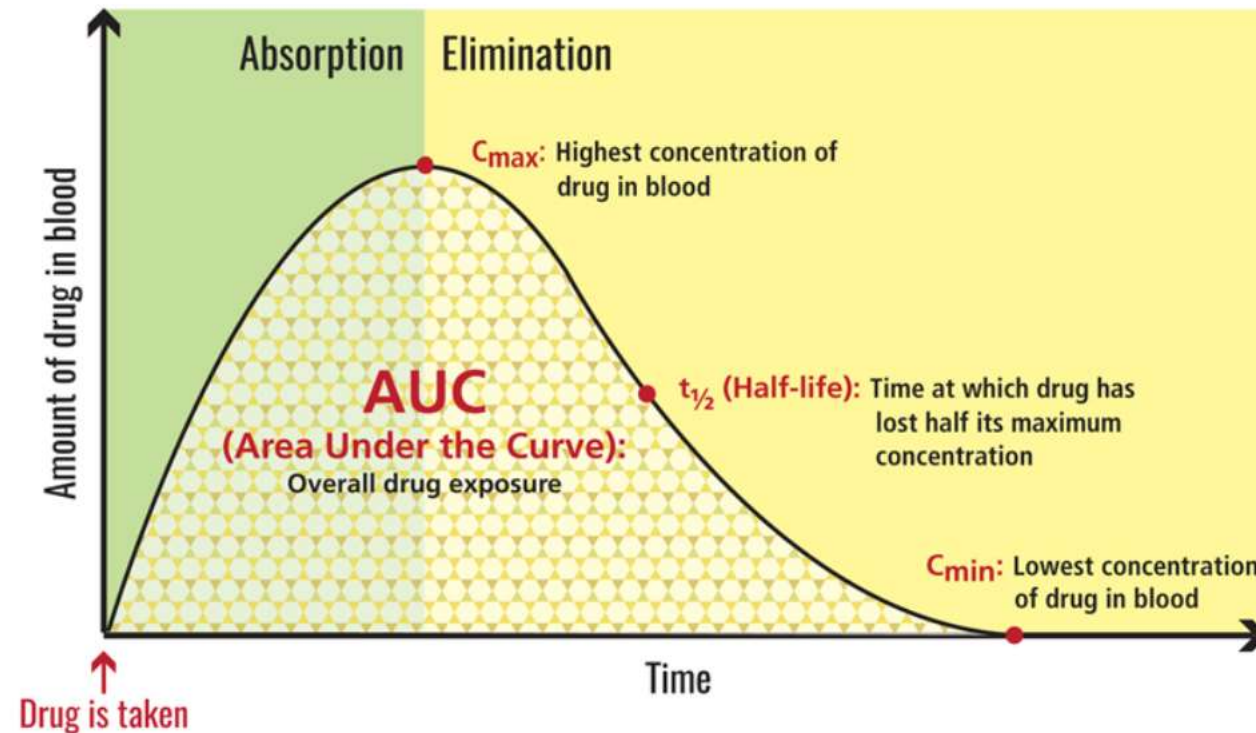
IMPORTANCE OF DRUG DISTRIBUTION

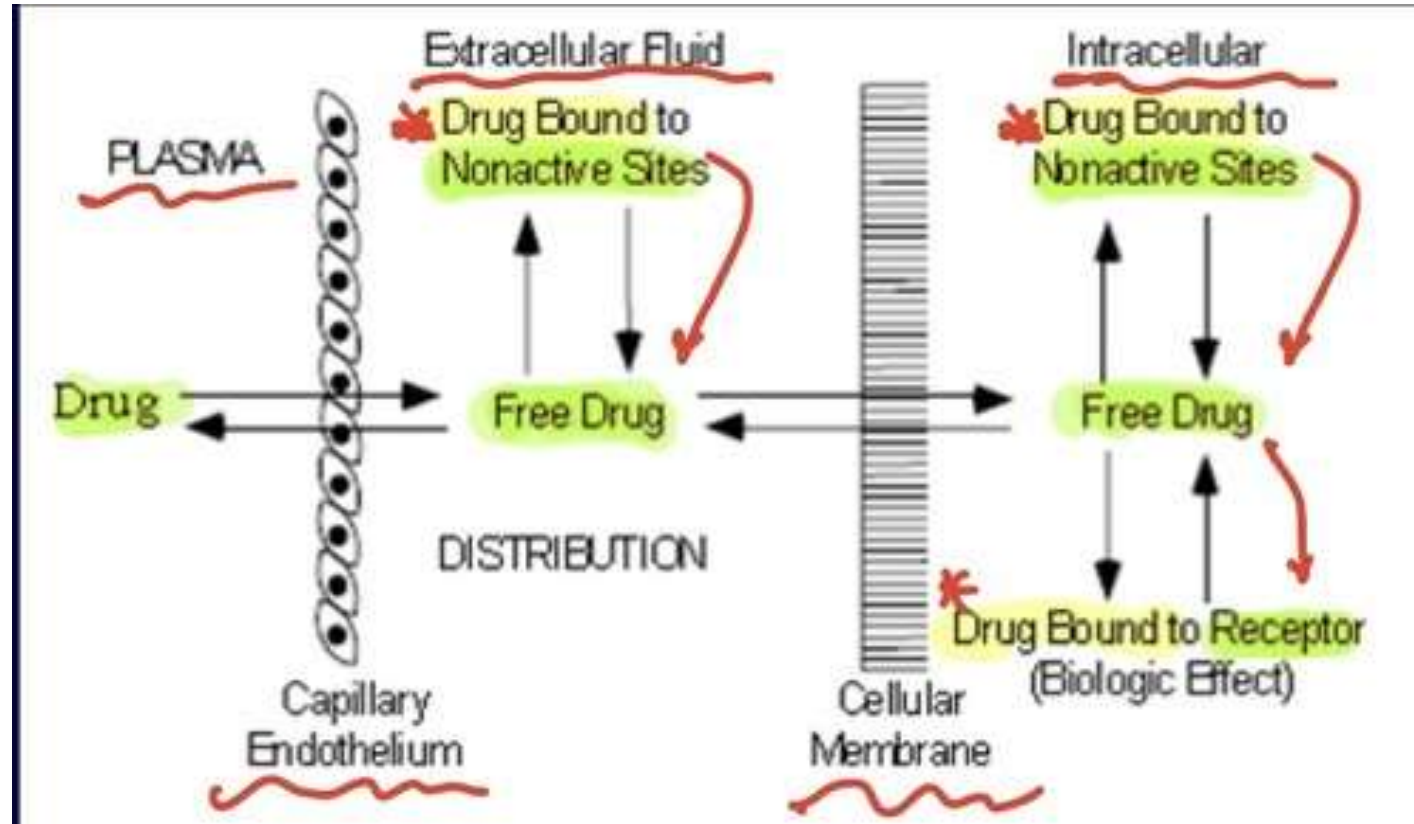


PROCESS OF DRUG DISTRIBUTION



TERMINOLOGY USED IN DRUG DISTRIBUTION





VOLUME OF DISTRIBUTION

Volume of distribution (Vd)

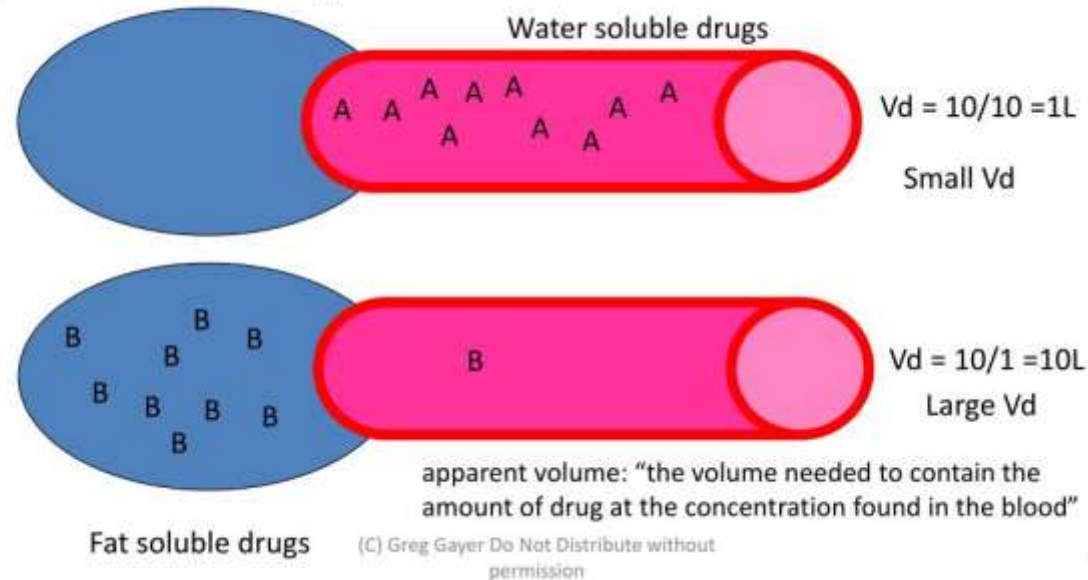
$$V_d = \frac{\text{Amount of drug in body}}{C_{\text{plasma}}}$$

(Units=volume)

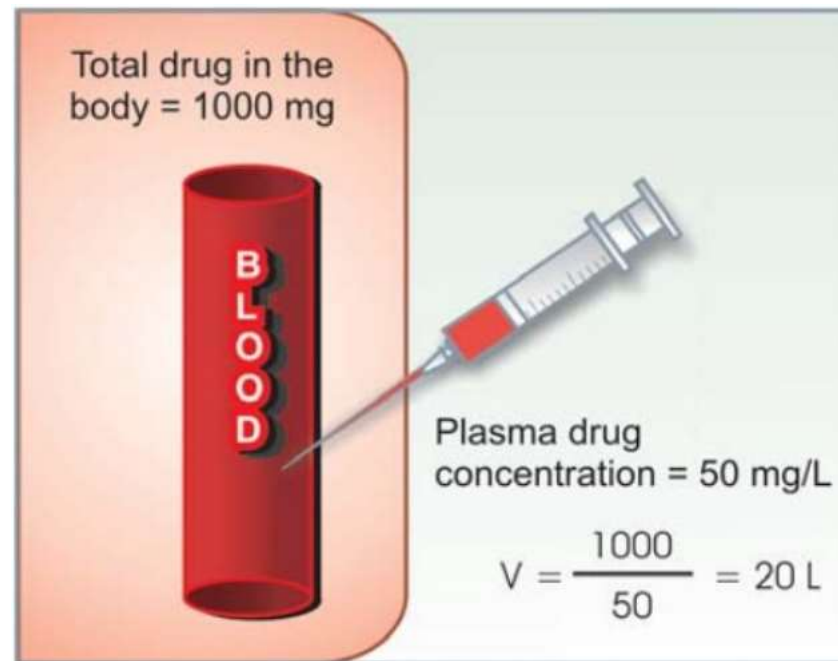
Used to
calculate
Loading
dose and
t_{1/2}

$$\text{Loading dose} = \frac{C_p \times V_d}{F}$$

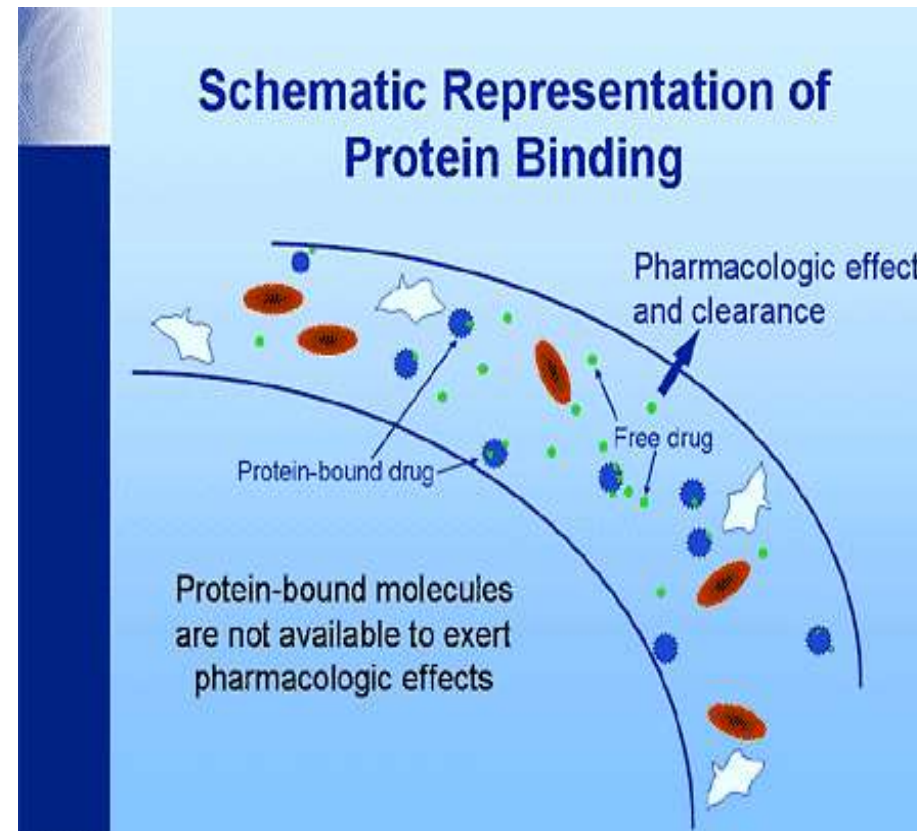
$$t_{1/2} = \frac{C_p \times V_d}{F}$$



APPARENT VOLUME OF DISTRIBUTION



PLASMA PROTEIN BINDING



REDISTRIBUTION

Redistribution of drug

Highly Lipid soluble drugs: Thiopentone sodium



Organs with High blood flow: Brain, Kidney, Liver

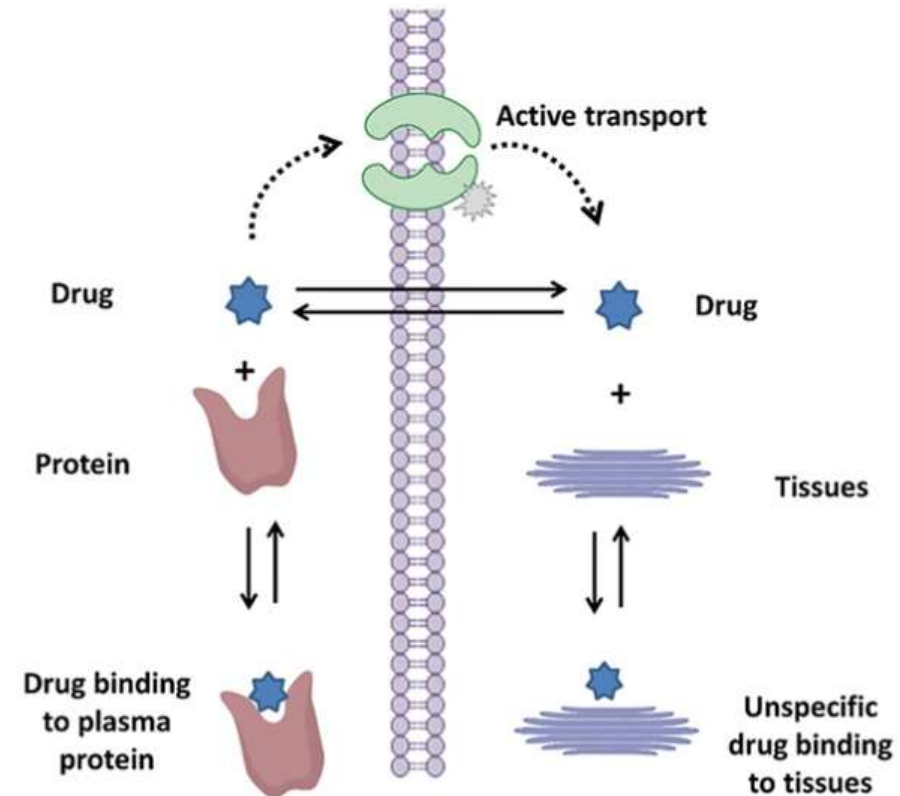


Less vascular & Bulky Tissue: Fat, Muscle

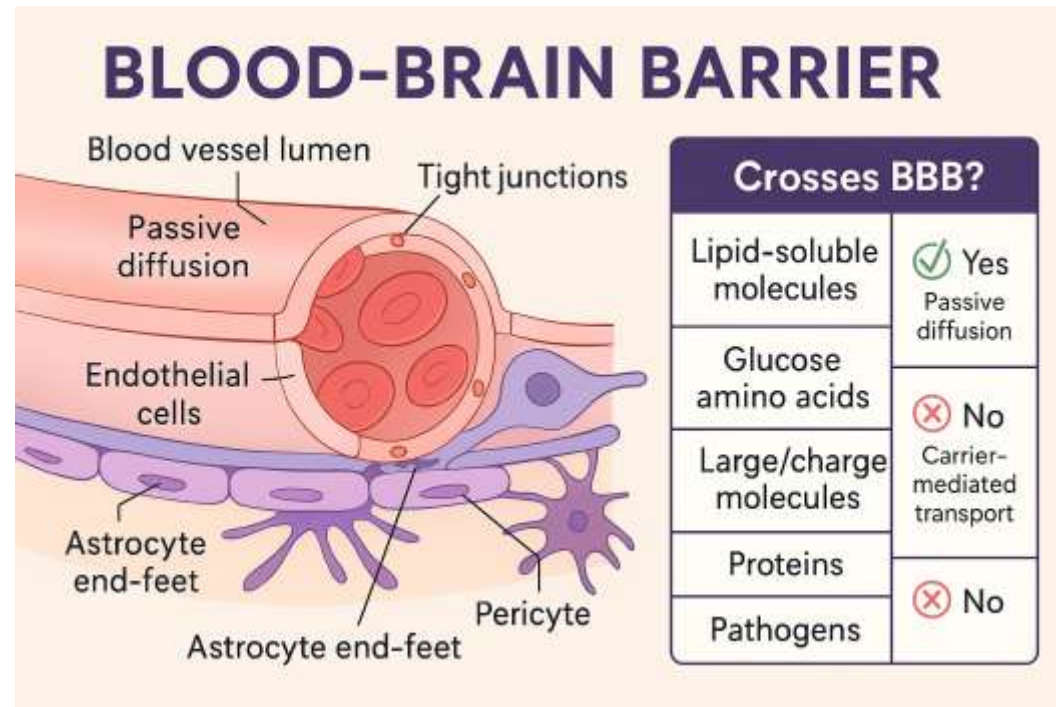


Termination of Drug Action

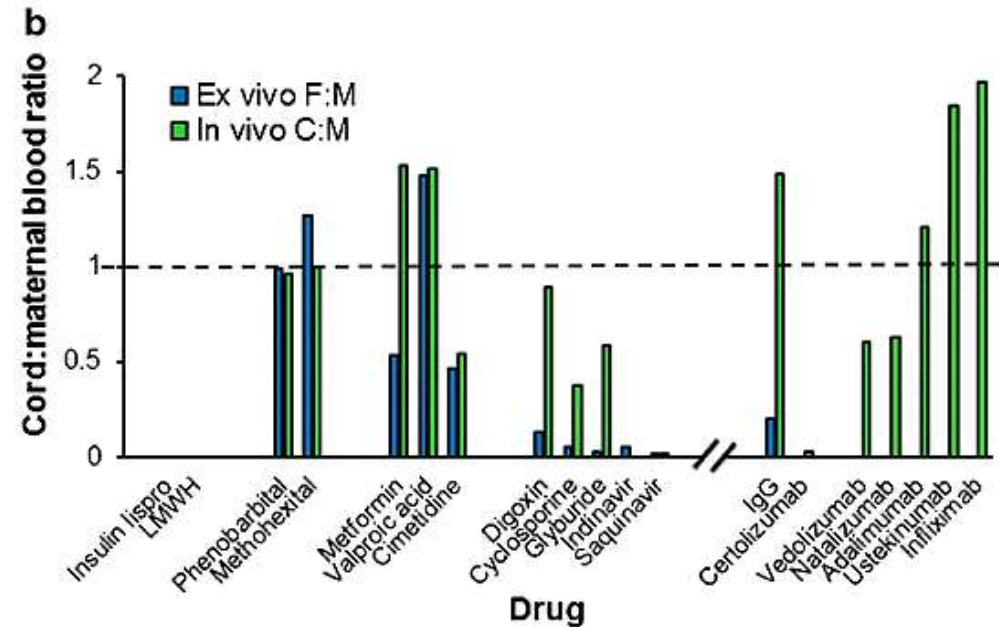
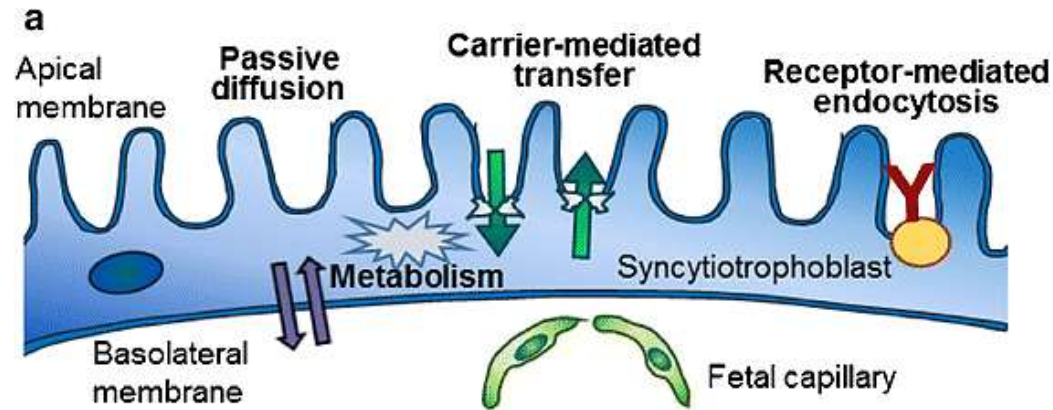
TISSUE BINDING



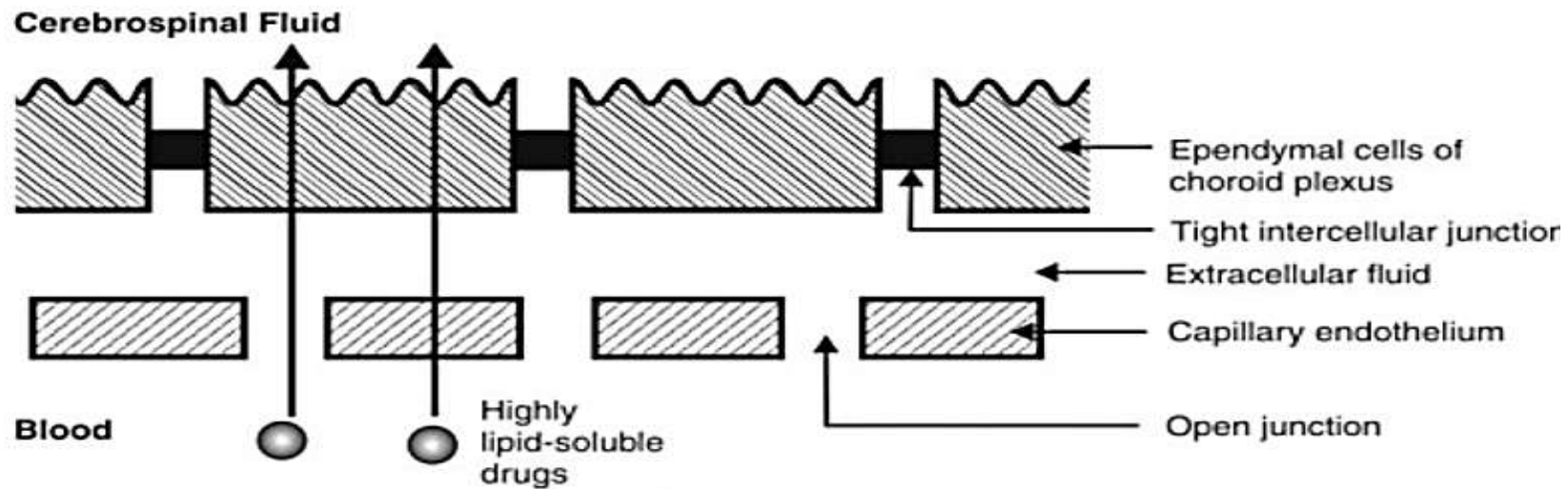
BLOOD BRAIN BARRIER



PLACENTAL BARRIER

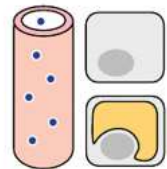
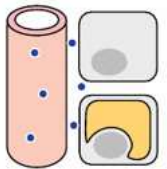
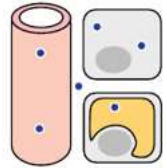


CSF BARRIER



CLASS ASSESSMENTS

How drugs distribute in the body?



Intravascular volume (5%)



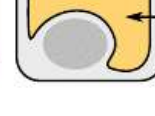
Intracellular volume (40%)



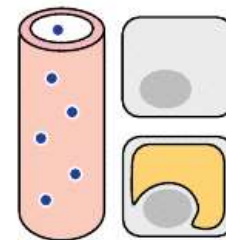
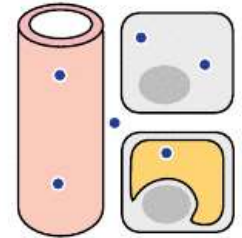
Interstitial volume (15%)



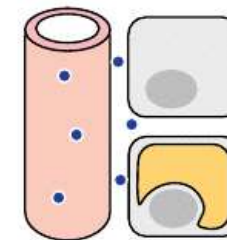
Fat (several %)



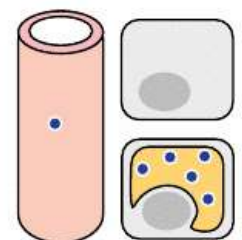
Drug evenly distributed (uncommon)



Drug confined to circulation (very large drug molecules)



Drug excluded by cell membranes (very polar drug molecules)



Drug enriched in fat (lipophilic drugs)

SUMMARY

- Drug distribution is key to pharmacokinetics, influenced by solubility, binding, and barriers.
- Understanding it optimizes therapy, minimizes risks. Key concepts:
Vd, protein binding, redistribution, special barriers.

REFERENCE

- Rang & Dale's Pharmacology, 9th Edition, Elsevier, 2019.
- Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 13th Edition, McGraw-Hill, 2018.
- Text book of Pharmacology by KD Tripathi.

