07 - C. Distribution

C. Distribution:

© SPMM Course C. Distribution: Distribution of a drug refers to ‘where’ in the body it can be found. Drugs are not evenly distributed throughout the body. Some drugs are confined to the body fluids only, but others accumulate in particular tissues. Drug distribution is influenced by various factors.

1. Hemodynamic factors like cardiac output, regional blood flow. Organs with the highest blood perfusions such as the brain, kidneys, and liver receive the highest distribution and redistribution is seen in the second distribution phase to tissues such as skeletal muscles, adipose tissues and skin.
2. Plasma protein binding
3. Permeability factors- higher the lipid solubility of the drug, the greater its rate of entry into cells.
4. Blood-brain barrier
5. Blood- CSF barrier Distribution can be viewed as the drug achieving equilibrium between different compartments. An approximation of this property is provided by the two compartment model; body is divided into a central compartment made of the plasma and a peripheral compartment made up of fat and other tissues, which vary with age, sex and weight. Distribution of a drug leads to a fall in the plasma concentration (central to peripheral shift) and is most rapid after intravenous administration. Protein binding: The distribution of a drug depends on how protein bound it is. When in the blood, many drugs are bound to circulating plasma proteins. It is the unbound fraction of the drug (free fraction) that can be active i.e. bind to receptors, pass across blood brain barrier, etc. Generally equilibrium exists between the fraction of bound and unbound molecules. Reduced protein-binding increases the free drug fraction and, therefore, the effect of the drug. Plasma protein binding is usually reversible (not covalent). Therefore, changes in protein binding can have profound effects on the availability of the drugs. Drugs that are highly protein bound (>90%), such as phenytoin, are most prone to interactions mediated by this mechanism. For example, diazepam displaces phenytoin from plasma proteins, resulting in an increased plasma concentration of free phenytoin and an increased risk of adverse effects. The effects of protein displacement are usually not of clinical significance, as the metabolism of the affected drug increases in parallel with the free drug concentration. The result is that, although the plasma level of the free drug rises briefly, the increased metabolism rapidly restores the level to the previous steady state. Therefore, any untoward effects of the interaction are normally short-lived

Revision #1
Created 2026-01-04 20:04:13 UTC by Omar Ayman

Updated 2026-01-04 20:04:13 UTC by Omar Ayman