Concentration = amount in the plasma or blood divided by the concentration of the drug.

Clearance = rate of elimination of a drug divided by the concentration of the drug in the plasma or blood.

Volume of distribution (apparent) = volume of fluid in the body divided by the concentration of the drug in the plasma or blood.

Volume = amount (dose) divided by concentration.

Clearance = rate of elimination divided by concentration.

The AUC is also used as a measure of bioavailability. It is defined as the fraction of unchanged drug reaching the systemic circulation by any route. This is 100% for IV drugs.

For drug administration orally, the bioavailability is less than 100% for two main reasons:

1. Incomplete extent of absorption: drugs are hydrophilic (eg atenolol) or lipophilic (aciclovir).
2. First pass elimination: drugs are absorbed in the gut and metabolized in the liver (first pass metabolism).

Subcutaneous injection is typically used for systemic clearance of almost all IV drugs in anesthesia. There are two types of biotransformation reactions:

Phase I Reactions: the drug undergoes conjugation, typically by glucuronic acid (via UDP-glucuronosyltransferases (UGT)), acetate (N-acetyltransferases (NAT)), glutathione (Glutathione-S-transferases (GST)), sulfate (Sulfotransferases (SULT)) or an amino group. The main purpose of this reaction is to transform hydrophobic molecules into hydrophilic molecules by dealklation or N-dealkylation, altering an existing oxygen to increase reactivity (deamination) or by adding an OH group (hydroxylation).

Phase II Reactions: the drug undergoes dealklation or N-dealkylation, altering an existing oxygen to increase reactivity (deamination) or by adding an OH group (hydroxylation).