- **INTRODUCTION**

DOSE CALCULATION IN PHARMACOLOGICAL EXPERIMENT

Dose calculation is a fundamental aspect of pharmacology that ensures the safe and effective administration of medications. Dosage calculation and stock solution preparation based on dosage rationale formula are prerequisites to drug administration in experimental animals. It involves determining the appropriate amount of a drug required to achieve the desired therapeutic effect while minimizing the risk of adverse effects. Proper dose calculation is crucial in clinical practice, as incorrect dosing can lead to treatment failure, toxicity, or drug resistance.

Pharmacological dose calculations are based on several factors, including the patient's age, weight, body surface area (BSA), renal and hepatic function, and the drug's pharmacokinetics and pharmacodynamics. Different formulas and methods are used for calculating doses, such as weight-based dosing, body surface area dosing, and fixed dosing. Additionally, understanding units of measurement, conversion factors, and routes of administration is essential for accurate dosing.

PRINCIPLE

Dose calculation in pharmacology is guided by several key principles to ensure the safe and effective administration of medications. These principles help healthcare professionals determine the correct drug dosage while minimizing risks associated with underdosing or overdosing.

Individualization of Drug Dosing.

Each patient may respond differently to a drug due to variations in age, weight, metabolism, and organ function. Dose calculations should consider individual patient factors such as:

Age (e.g., pediatric and geriatric patients require special considerations)
Body weight (weight-based dosing is commonly used, especially in pediatrics)
Body Surface Area (BSA) (important for chemotherapy and some other medications)

- **IDEAL OBSERVATION**
  Human equivalent dose (HED) calculation based on body surface area

Species	Ref. body weight (kg)	Working weight range (kg)	Body surface area (m^2)	To convert dose in m/kg to dose in mg/ m^2 Multiply by km	To convert animal dose in mg/kg to HED in mg/kg, either	
					Divide animal dose by	Multiply animal dose by
Human	60	-	1.62	37	-	-
Mouse	0.02	0.011- 0.034	0.07	3	12.3	0.081
Rat	0.15	0.08- 0.27	0.025	6	6.2	0.162
Guinea Pig	0.40	0.208- 0.700	0.05	8	4.6	0.216
Rabbit	1.8	0.9- 3.0	0.15	12	3.1	0.324

CALCULATION & INTERPRETATION:

Q.1) The human equivalent dose of paracetamol is 600mg/kg , calculate the dose for rat?

Solution:- Dose for animal= HED / Animal dose factor
= 600mg/kg / 6.2
= 96.77mg/kg

Q.2) The diazepam dose required for guinea pig is 50mg/kg, calculate the human equivalent dose.

Solution:- HED = dose for animal x animal dose factor
= 50mg/kg x 0.216
= 10.8mg/kg

To calculate the total dose to be administered

Total Dose (mg) = Dose (mg/kg) x Animal Weight (kg)

Q.3) Calculate the dose to be administered to rat with 0.20 kg (200 grams) weight for a dose of 20 mg/kg body weight if the concentration of the given drug solution is 10 mg/mL.

Solution:- Step 1:- Calculate the total dose for the animal

Total Dose (mg)= 20mg/kg x 0.20 kg

= 4mg

Step 2:- Calculate the volume of solution to be administered.

Volume of solution (mL) = Total Dose(mg) / Concentration of solution

= 4mg / 10mg/ml

= 0.4mL

Administer 0.4mL dose of 10mg/ml concentration solution so that the dose will be 20 mg/kg body weight

CONCLUSION:

- Dose estimation always requires careful consideration about the difference in pharmacokinetics and pharmacodynamics among species.
- Different equations described in this review could be used for dose extrapolation among species.
- Allometric scaling assist scientist to exchange doses between species during research, experiments and clinical trials
- Allometric scaling generally used to convert doses among the species and is not preferred within species.

DISCUSSION:

Accurate dose calculation is crucial in pharmacological experiments. Factors like pharmacokinetics, pharmacodynamics, and dose-response curves must be considered. Methods like allometric scaling and body surface area help ensure optimal dosing, especially in special populations like paediatrics and geriatrics. Additionally, factors such as bioavailability, clearance, and experimental conditions must be considered to optimize dosing strategies.

RESULT:

Optimal dose calculation achieved with consideration of pharmacokinetic and pharmacodynamic factors, ensuring efficacy and safety in pharmacological experiments.