Department of Pharmacy GP (Uttawar)

POSOLOGY

(Pharmaceutics II)
Unit 3

Posology and Dose:

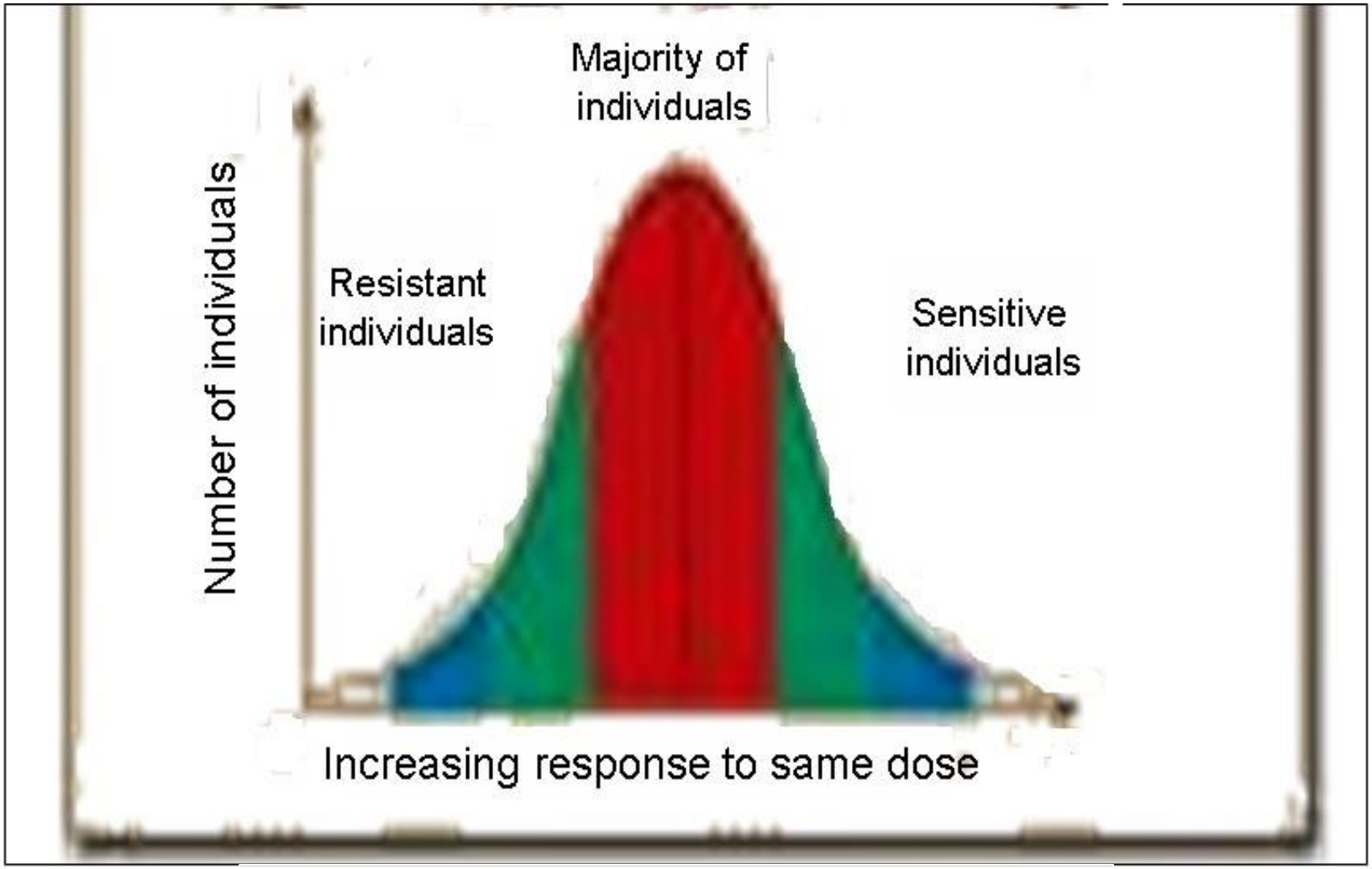
- Posology:

  (Derived from the greek◊ Posos-how much, and logos-science) is the branch of pharmacology dealing with doses.

- Dose:

  Is the quantitative amount administered or taken by a patient for the intended medicinal effect.

- The idea being to produce the optimum therapeutic effect in a particular patient with the lowest possible dose.



Drug effect in a population sample (Dose – response curve)

Factors affecting drug dosage:

The familiar bell-shaped curve shows that:

1 In a normal distribution of patients, a drug's usual dose will provide an average effect in the majority of individuals.
2 In a portion of the patients, the drug will produce little effect (resistant individuals).
3 In another group of similar size, the drug will produce an effect greater than the average effect (Sensitive individuals).

So, the drug's usual dose would be the starter dose for an individual taking the drug for the first time, then the physician may increase or decrease subsequent doses to meet the requirements of his patient.

Factors affecting drug dosage:

1. Age
2. Body Weight
3. Body Surface Area
4. Sex
5. Pathological State
6. Tolerance
7. Drug-Drug Interactions
8. Time Of administration
9. Route Of Administration
10. Pharmaceutical dosage form and drug physical state

Age

- Newborn infants (pediatric) are abnormally sensitive to certain drugs because of the immature state of their hepatic and renal function by which drugs are inactivated and eliminated from the body. Failure to detoxify and eliminate drugs results in their accumulation in the tissues to a toxic level.
- The decline in renal and hepatic function in the elderly (geriatric) may slow drug clearance and increases the possibility of drug accumulation in the body and subsequent toxicity.
- Elderly individuals may also respond abnormally to the usual amount of a drug because of changes in drug-receptor sensitivity or because of age-related alterations in target tissues and organs.

Various rules of dosage in which the paediatric dose was a fraction of the adult dose

Rule	Age	Formula
Young's Rule	<2 Yrs	Adult Dose x (Age/Age+12)
Cowling's Rule	>2 Yrs	Adult dose x [Age at next birthday (in years)/24]
Fried's Rule for infants	Infants < 1yr	Adult dose x (Age in monts/150)

Body weight

- The official usual doses for drugs are considered suitable for 70 kg (150 pounds) individuals.

- The ratio between the amount of drug administered and the size of the body influences the drug concentration at the site of action. Therefore, drug dosage may require adjustment from the usual adult dose for abnormally lean or obese patients.

To calculate the dose of a drug for children based on body weight

- The determination of drug dosage for children on the basis of body weight is more dependable than that based on age.

Clark's Rule:

$$\text{Dose for child} = \text{Adult dose} \times \frac{\text{Weight (in lb)}}{\text{150 (average weight of adult in lb)}}$$

Body surface area

- A close relation exists between a large number of physiological processes and body surface area (BSA).
- The surface area of individuals may be determined from a nomogram composed of scales of height, weight and surface area.
- Two such nomograms are presented, one for adults and one for children.
- Surface area is indicated where a straight line drawn to connect the height and weight of an individual intersects the surface area column.

To calculate the dose of a drug for children based on body surface area as related to weight

- Many physicians believe that doses for children should be based upon body surface area, since the correct dosage of drugs seems more proportional to the surface area.

$$\text{Approximate dose for child} = \text{Adult dose} \times \frac{\text{BSA of child (in } m^2\text{)}}{1.73\ m^2 \text{ (average adult BSA)}}$$

- **If the dose per m^2 is given,**

$$\text{Approximate dose for child} = \text{Dose per } m^2 \times \text{BSA of child (in } m^2\text{)}$$

Sex

- Women are more susceptible to the effects of certain drugs than are men.
- Pregnant women and nursing mothers should use medications only with the advise and under the guidance of their physician.
- Examples of drugs that are transported from the maternal to the fetal circulation e.g. alcohol, anesthetic gases, barbiturates, anticoagulants, etc.
- Because of the undeveloped drug detoxification and excretion mechanisms present in the fetus, concentrations of drugs may reach a higher level in the fetus than in the maternal circulation.
- The transfer of drugs from the mother to the nursing infant through human milk may occur with various drugs with the drug effects becoming manifest in the infant.

Pathological state

- The effects of certain drugs may be modified by the pathological condition of the patient and must be considered in determining the dose.
- Warning and precautions are used in the drug labeling to alert the physician to certain restrictions in the use of a particular drug.

Precaution

- Is used to advise the prescriber of some possible problems attendant with the use of the drug. It is less restrictive than warning.
- Ex: The use of tetracycline antibiotic may result in overgrowth of fungi.
- In such a case, the physician may prescribe an alternate drug.

Warning

- It is used when the potential for patient harm is greater than in instances in which the precaution is used.
- Ex:If tetracycline is used in the presence of renal impairment, it may lead to accumulation of the drug and possible liver toxicity.
- **So**,Lower than usual doses are indicated.
- If therapy is prolonged, blood serum levels of the drug should be taken and the patient monitored at regular intervals to assure the maintenance of non-toxic levels of the drug.

- **Contraindication:** A term that used to indicate an absolute prohibition to the use of a drug in the presence of certain stated conditions. It is the most restrictive of the warnings which limits the use of drugs.

Tolerance

- The ability to endure the influence of a drug, particularly when acquired by a continued use of the substance.
- Tolerance occurs commonly in such drugs e.g.antihistaminics, narcotic analgesics.
- Normal sensitivity may be regained by suspending the drug administration for a period of time.
- The development of tolerance can be minimized by initiating therapy with the lowest effective dose and avoiding prolonged administration.

Drug-Drug Interactions

- The effects of a drug may be modified by the concurrent administration of another drug.
- These drug-drug interactions are due to Chemical or physical interaction between drugs or alteration of the absorption, distribution, metabolism or excretion patterns of one of the drugs.
- The effects of drug-drug interactions may be beneficial, Detrimental,

Time of Administration

- The time at which a drug is administered sometimes influences dosage. This is specially true for oral therapy in relation to meals.
- Absorption proceeds more rapidly if the stomach and upper portions of the intestinal tract are free of food, and an amount of a drug that is effective when taken before a meal may be ineffective if administered during or after eating.
- Irritating drugs are better tolerated by the patient if food is present in the stomach to dilute the drug's concentration.

Route of administration:

- Drugs administered intravenously enter the blood stream directly and thus the full amount administered is present in the blood.
- In contrast, drugs administered orally are rarely fully absorbed due to the various physical, chemical and biologic barriers to their absorption, including interactions with the gastric and intestinal contents.
- Thus, a lesser parentral dose of a drug is required than the oral dose to achieve the same blood levels of drug.

Pharmaceutical dosage form and drug physical state:

- Increasing the surface area of a drug by the reduction of its particle size has a significant effect on the rate of absorption, therefore, the dose can be minimized by reducing the particle size.

- Thus, crystalline and amorphous forms of a drug shows a significant difference in the rate of absorption.

Measurement Concersions

Liquids

- 1 cc = 1 ml
- 5 ml = 1 tsp
- 15 ml = 1tbsp
- 30 ml = 1 oz
- 480 ml = 1 pt
- 3785 ml = 1 gal

- Pt= pint
- Gal= gallon
- Tsp= Tea Spoon
- Tbsp= Table Spoon

- 3 tsp = 1 tbsp
- 2 tbsp = 1 oz
- 16 oz = 1 pt
- 2 pt = 1 qt
- 4 qt = 1 gal
- 1 L = 1000 ml

- Oz= Ounce
- Qt= quarter

Measurement Concersions

Solids

- 1 kg = 2.2 lbs
- 1 lb = 454 gm
- 1 oz = 30 gm
- 16 oz = 1 lb

- Lb= pound


POSOLOGY