# Lecture 6

## Calculation of doses

**Dose:** is the amount of drug to be taken by a patient for the intended medicinal effect.

The dose may be expressed as a:

- **Single dose**: refers to the amount that taken at one time.
- **Daily dose**: refers to the amount taken per day (it may be subdivided and taken in divided doses, two or more times per day).
- **Total dose**: refers to the amount taken during the time-course therapy

Dose regimen: means the schedule of dosing (e.g. three times daily for five days).

The dose of a drug is based on:

- Biochemical and pharmacological activity of the drug.
- Physicochemical property of the drug.
- The dosage form.
- The route of administration.
- The patient.

**Minimum effective concentration (MEC):** is the minimum concentration that can be expected to produce the drug's desired effects.

**Minimum toxic concentration (MTC):** is the base level of blood serum concentration that produces dose-related toxic effect.

**Loading or priming dose:** is the dose that is larger than the usual initial dose and is required to achieve the desired blood drug level.

**TABLE 7.1 SELECTED ROUTES OF ADMINISTRATION AND REPRESENTATIVE DOSAGE FORMS**

| ROUTE OF ADMINISTRATION | REPRESENTATIVE DOSAGE FORMS |
|---|---|
| Oral (mouth, GI tract) | Tablets, capsules, lozenges, solutions, drops, syrups, and suspensions |
| Sublinqual (under the tongue) | Tablets |
| Parenteral (injection) | Solutions and suspensions |
| Epicutaneous/ Transdermal (skin) | Ointments, creams, powders, lotions, aerosols, and patches |
| Conjunctival (eye) | Solutions, suspensions, and ointments |
| Intranasal (nose) | Solutions, sprays, and ointments |
| Intrarespiratory (lungs) | Aerosols and inhalant solutions |
| Rectal (rectum) | Ointments, creams, suppositories, solutions, and suspensions |
| Vaginal (vagina) | Ointments, creams, tablets, suppositories, gels, solutions, and emulsion foams |
| Urethral (urethra) | Solutions and suppositories |

## Calculation the number of doses

$$Number\ of\ doses = \frac{Total\ amount}{Size\ of\ dose}$$

If the dose of a drug is 200 mg, how many doses are contained in 10 g ?

10 g = 10,000 mg

Number of doses = Total Quantity/Size of Dose

Number of doses = 10,000 (mg)/200 (mg)
= 50 doses

## Calculation the size of a dose

$$Size\ of\ dose = \frac{Total\ amount}{Number\ of\ doses}$$

How many teaspoonfuls would be prescribed in each dose of an elixir if 180 mL contained 18 doses?

$$Size\ of\ dose = 10\ mL = 2\ teaspoonfuls$$

- How many grams of a drug will be needed to prepare 72 dosage forms if each is to contain 30 mg?

$$Number\ of\ doses = \frac{Total\ amount}{Size\ of\ dose}$$

$$Total\ amount = 72 \times 30\ mg$$

$$Total\ amount = 2160\ \text{mg} = 2.16\ \text{g}$$

## Determine the quantity of an ingredient in each specified dose.

$$Quantity\ in\ each\ dose = \frac{Quantity\ in\ total\ amount}{Number\ of\ doses}$$

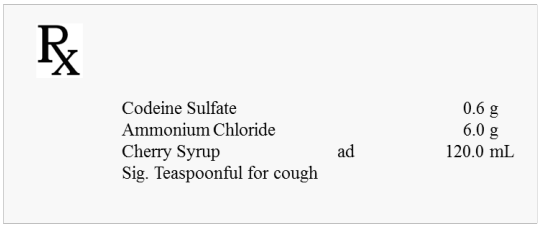
If 0.050 g of a substance is used in preparing 125 tablets, how many micrograms (mcg) are represented in each tablet?

$$Quantity\ in\ each\ dose = \frac{Quantity\ in\ total\ amount}{Number\ of\ doses}$$

0.050 g = 50000 mcg

$$Quantity\ in\ each\ dose = \frac{50000\ (mcg)}{125} = 400\ mcg$$

How many milligrams of codeine sulfate and ammonium chloride will be contained in each dose of the following prescription?



℞

| | | |
|---|---|---|
| Codeine Sulfate | | 0.6 g |
| Ammonium Chloride | | 6.0 g |
| Cherry Syrup | ad | 120.0 mL |
| Sig. Teaspoonful for cough | | |

Teaspoonful = 5 mL

$$Number\ of\ doses = \frac{Total\ amount}{Size\ of\ dose}$$

$Number\ of\ doses$ = 120/5 = 24 doses

Amount of codeine sulfate = 0.6 g / 24 = 0.025 g = 25 mg.

Amount of ammonium chloride = 6.0 g / 24 = 0.25 g = 250 mg.

## Low-dose and high-dose therapies

The above terminologies are different than standard-dose therapy. The most common example for low dose therapy is 81 mg aspirin rather than the standard dose of 325 mg.

High-dose therapy is usually related to chemotherapy where the patient might go under excessive amount of chemo-drug to fight cancer cells.

## Tablet splitting

Different tablets are SCORED or GROOVED to allow breaking into halves.

How many grams of a drug substance are required to make 120 mL of a solution each teaspoonful of which contains 3 mg of the drug substance?

1 teaspoonful = 5 mL

Each 5 mL of the solution contain 3 mg of drug.

| | | |
|---|---|---|
| 3 mg of drug | ⟶ | 5 mL |
| **hence;** | | |
| X mg | ⟶ | 120 mL |

$$X = \frac{120 \times 3}{5} = 72\ mg\ or\ 0.072 g$$

Pediatric Patients:

Neonate (newborn): from birth to 1 month.

Infant: 1 month to 1 year.

Early childhood: 1 year through 5 years.

Late childhood: 6 years through 12 years.

Adolescence:13 years through 17 years.

Proper drug dosing depends on a number of factors

- In the neonate, the biological functions of organs are underdeveloped. For instance, kidney function develops over the period of the first 2 years.
- On the other hand, in geriatrics (elderly people), the function capacity of most organ systems is declined.

Different rules of dosage in which the pediatric dose was a function of the adult dose, based on relative age or weight, were proposed for pediatrics:

**Drug dosage based on Age:**

Before the physiologic differences between adult and pediatric patients were clarified, Pediatric patients were treated with drugs as if they merely miniature adults.