



***Department of Pharmacology
College of Medicine
University of Al-Anbar
Lab: (1)***

Dosage Forms

The goal of drug therapy is to:-

- To cure disease (anti biotic to treat bacterial infection).
- To suppress control disease state e.g. diabetes mellitus, epilepsy and hypertension.
- To prevent disease (prophylaxis): primary and secondary (vaccination).
- replace deficiencies (hormones, vitamins).

SOURCES OF DRUGS:

- 1) NATURAL
- 2) SEMISYNTHETIC
- 3) Synthetic

NATURAL

DRUGS FROM PANTS:

**- Active principles are found in roots, leaves and seeds in
2 forms:**

1) Glycoside

2) Alkaloid (e.g. Morphine, curare, atropine)

DRUGS FROM ANIMALS:

-Hormones like heparin, insulin

-Plasma or serum from blood

-Gonadotrophines from urine of pregnant women

DRUGS FROM MICROORGANISMS:

-Antibiotics

-Streptokinase, streptodorinase.

INORGANIC METALS:

-Iodine

-Lithium

SEMISYNTHETIC DRUGS

- Semisynthetic penicillins from 6-aminopenicillanic acid
- Semisynthetic cephalosporins from 7-amino cephalosporinic acid.

Drug name

- ❖ **Chemical name:** represents the exact description of the drug's **chemical composition**
- ❖ **Generic name (non-proprietary):**
 - simpler than the chemical name and derived from the chemical name itself
 - easier to remember
 - Example 1: the chemical name 2-methyl-5-nitroimidazole-1-ethanol is metronidazole. The word methyl-nitro is condensed to metro and ni-dazole is due to its imidazole ring

❖ **Brand or trade name (proprietary)** → is developed by the company requesting approval for the drug and identifies it as the exclusive property of that company.

- Example 1: Metrogyl[®] is the trade name for metronidazole.
- Example 3: Amoxil[®] is the trade name for amoxicillin.
- Example 4: Celebrex[®] is the trade name for Celecoxib.

Mechanisms of drug actions:-

A- on the cell membrane:

1. action on specific receptors e.g. agonist and antagonist on adrenoceptors, **histamine** receptor.
2. interference with passage of ion across cell membrane e.g. Ca⁺²channel blockers.
3. inhibition of membrane – bound enzymes e.g. digoxin inhibit membrane ATP-ase enzyme in cardiac muscle.

B- on metabolic process within the cell:

1. Enzymatic inhibition e.g. aspirin inhibits cyclooxygenase enzyme.
2. inhibition transport process across the cells e.g. probencid blocks anion transport in renal tubular cells lead to decrease excretion of penicillin, increase excretion urate.
3. Altering metabolic processes unique to microorganisms e.g. penicillin inhibit bacterial cell wall synthesis.

C- outside the cell:

1. direct chemical interaction e.g. antacids.
2. osmosis e.g. purgatives (MgSO_4), diuretics (mannitol).

Why we take drug history from patient?

- 1- Drugs are cause of disease and withdrawal of drugs can cause disease e.g. adrenal steroid, antiepileptic drug and others. [propranolol withdrawal syndrome].
- 2- Drugs can hide disease e.g. adrenal steroid. [infection].
- 3- Drugs interactions can potentiate or suppress adverse effects. [gentamicin plus frusemide – ototoxicity; NSAIDs plus antacids].
- 4- Drugs can cause false results in clinical chemistry e.g. plasma cortisol and urinary glucose.
- 5- Assist choice of drug in future.

Compliance.

Factors that cause poor patient compliance:-

1. Poor patient-doctor relationship.
2. Lack of motivation.
3. Forgetfulness.
4. Lack of information.
5. Frequency and complexity of drug regimen.
6. Side effects.
7. Psychiatric condition. [chlorpromazine (oral), fluphenazine (modecate®), deep IM, depot preparation]

What every patient needs to know?

1. Disease and the reason for prescribing.
2. The name of the medicine.
3. The objective is to treat the disease and/or to relieve symptoms.
4. How and when to take the medicine.
5. How long the medicine is likely to be needed.
6. How to recognize side effects.

Missed dose may lead to:-

1. Loss of efficacy (acute disease).
2. Reappearance (chronic disease).
3. Rebound or Withdrawal syndrome. (Hyperacidity, insomnia, hypertension)

Placebo medicine: is any component of therapy that is without specific biological activity for the condition being treated.

It is used for two purposes:

1. As control in scientific evaluation of drugs.
2. To benefit or please patient, not by any pharmacological actions, but by **psychological means.**

1. Solid Dosage Form



- **a. Tablet:** containing drug substances with or without diluent.
- **Advantages:** 1. Popular, 2. Convenience to use, 3. Accuracy of dose, 4. Portability, 5. Ease of administration 5. scoring of tablet (Inderal 40)
- **Disadvantages:** 1. Bitter tasting, 2. Unpleasant odour, 3. Sensitive to light & moisture

Tablet coating:

- 1. Sugar coated tablet: the tablet coated by sugar sells (e.g. ibuprofen).
- 2. Film coated tablet: the tablet coated by thin film (e.g. diclofenac, metronidazole).
- 3. Enteric coated tablet: the tablet coated by special coating to remain intact in the stomach & with the release of the tablet content once the tablet reaches the small intestine (e.g. sulphasalazine, Aspirin e/c).
- **Advantages:** 1. Mask the taste of medicines, odour, colour, 2. Chemical & physical protection for the drug, 3. Control the release, 4. Protection from gastric environment, 5. To incorporate another drug adjuvant in the coating to avoid chemical interaction, 6. To prevent gastric distress or nausea due to irritation, 7. Pharmaceutical elegance



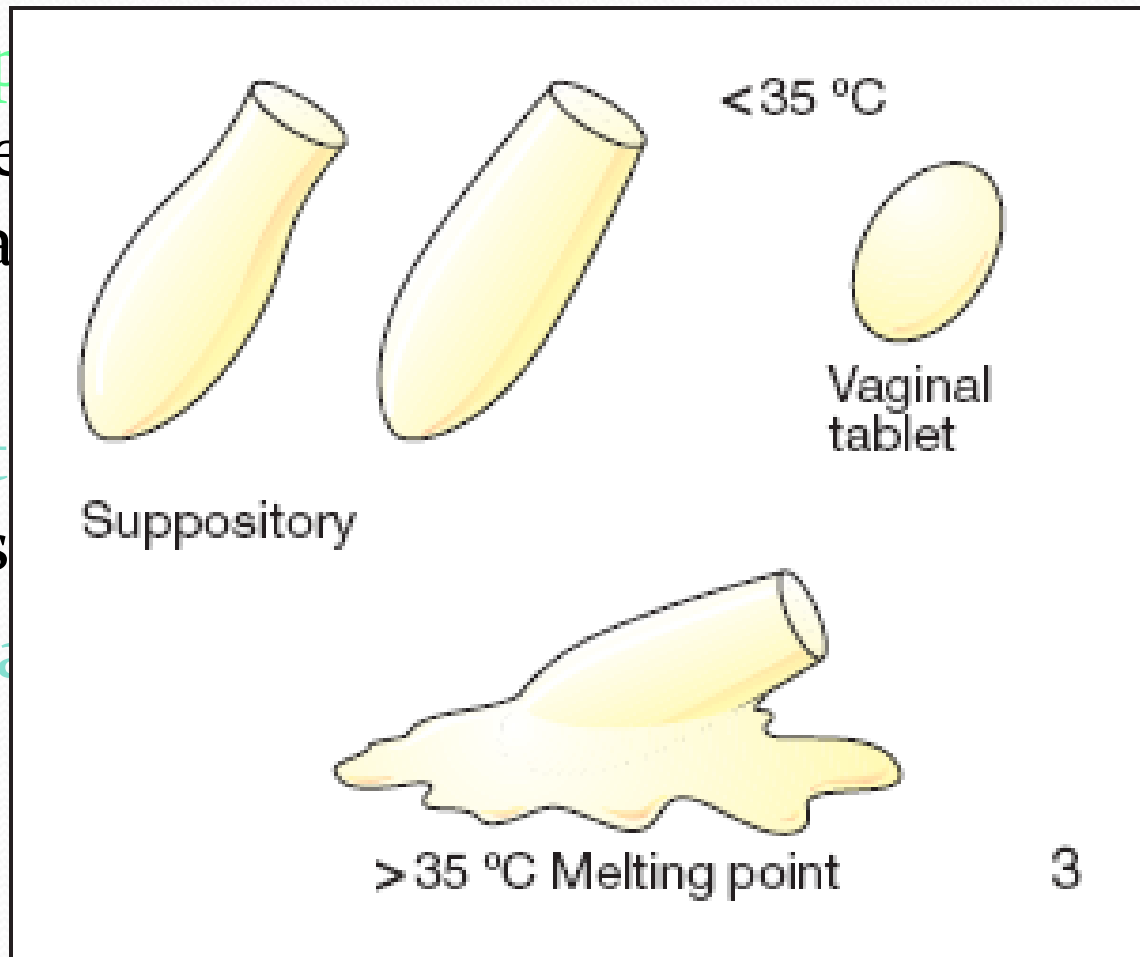
- **b. Capsule:** single solid dosage form in which the drug substance is enclosed in a hard or soft-shell.
- **Advantages:** 1. Protection from light, 2. Mask the taste or odour of their components, 3. Attractive appearance, 4. Ease to identify 5. Controlled release.

- **Spansule:** special preparation that disintegrates and releases the drug over a prolonged period of time.



granules with a special coating that allows the drug to be released at different times for

- c. Supp
intende
urethra
- Advant
uncons
- Disadv
release



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ssaries.
trolled

2. Semisolid Dosage Form

Preparation intended for external application to the skin or mucous membrane.

a. Ointment: (little powder in a lot of grease) drug in fatty base-soften & protect, for scaly & cracked skin, more occlusive than cream.

Advantages: for dry skin as waterproof.

b. Cream: drug in water removable base (soften, moisten & cool, relieve itching associated with dry skin, continuous treatment requires a second application).

Advantages: for moist skin.

c. Paste: (a lot of powder in little grease) ointment with high percentage of insoluble solids, used on weeping or oozing surfaces.

Lotion: liquid cream with water or alcohol vehicle (is an independent dosage form, or with the semisolid)

Advantages: for hairy skin.

3. Liquid Dosage Form

- Drug in liquid form for oral administration
- Advantages: rapid absorption, ease of administration, and avoidance of swallowing difficulties (e.g., for elderly or children)



for
to swallow

Types of liquid dosage form:

- **a. Solution:** syrup & elixir (bronqium)
- **b. Suspension:** powder dispersed in liquid (Metronidazole)
- **c. Emulsion:** mixture of two immiscible liquids (liquid paraffin).

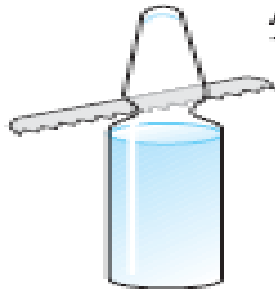
4. Sterile Dosage Form

- **a. Injection:** highly purified & sterile dosage form either in ampoules or vials (for multidose)
- **Advantages:** 1. Complete bioavailability, 2. Avoid GIT, 3. Ready for immediate action.
- **b. Intravenous Admixture:** (i.v. fluid) large volume injection intended to be administered by i.v. infusion, for fluid replacement; electrolytes balance restoration; supplementary nutrition; & as vehicle for other drug substance (Albumin, Dopamine).
- **Advantages:** 1. Decrease irritation (vesicant drugs, injurious to tissue), 2. Desirability for continuous or intermittent drug therapy.

■ Sterile, iso-osmolar

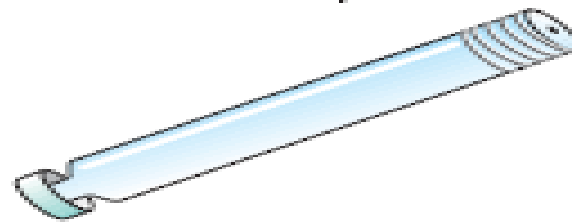


With and without fracture ring

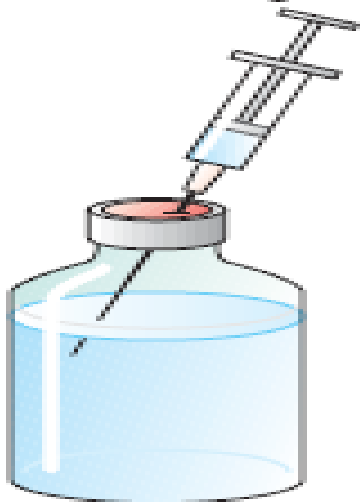


Ampule
1 – 20 ml

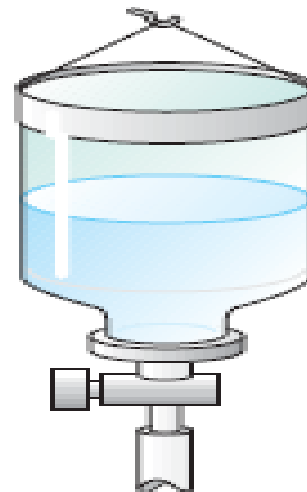
Cartridge
ampule 2 ml



Often with
preservative



Multiple-dose
vial 50 – 100 ml,
always with
preservative



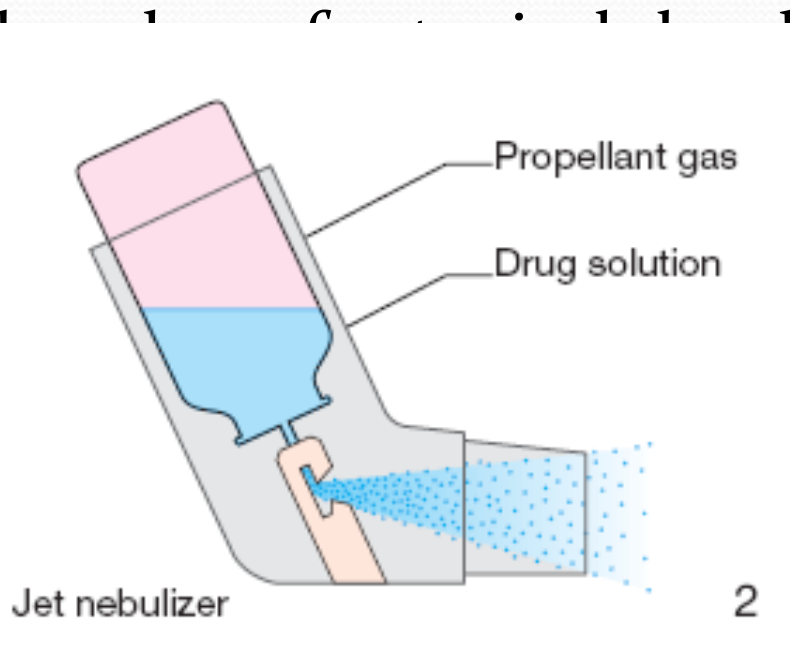
Infusion
solution
500 – 1000 ml

- **c. Ophthalmic Products:** sterile product, free from foreign particles, either solution, suspension, or ointment



5. Aerosol

- Pressurized (e.g. respiratory tract) application
- Advantages: 1. Wide range of acceptances. 2. The medication is ready to use, 3. The medication is delivered directly to the affected area.



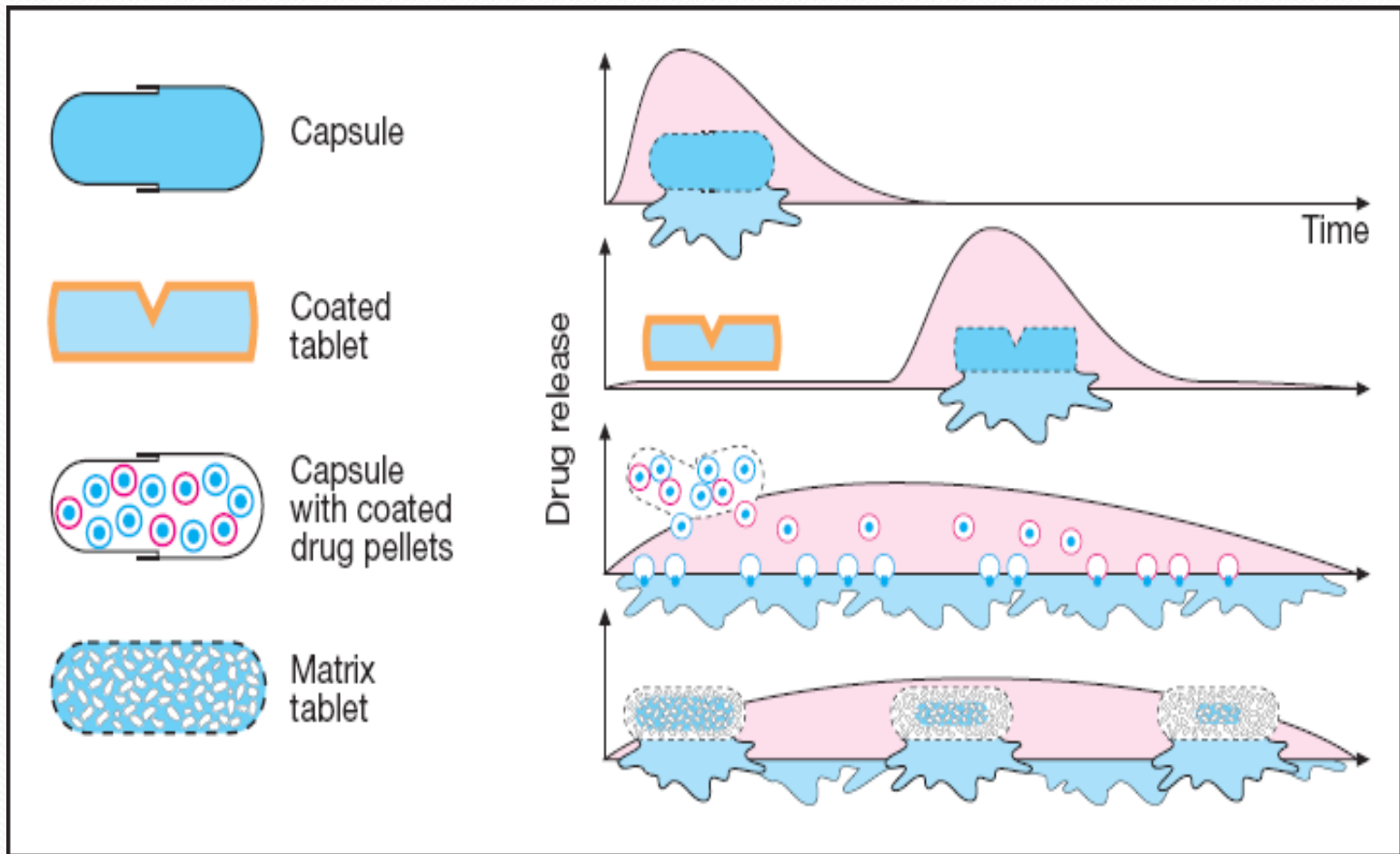
(e.g. respiratory tract), 2. Wide range of acceptances, 3. The medication is ready to use, 4. The medication is delivered directly to the affected area.

6. Sustained Release Dosage Forms

- (Sustained action, prolonged action, controlled release, extended action,)
- **Advantages:** to eliminate the need for multiple dosage regimens, drugs which need to be given in high doses, but too rapid release is likely to cause undesirable side effect (e.g. potassium chloride tablets).

Types of sustained release dosage forms:

- **a. Injection:** drug complex, e.g. iron preparation; drug depot, e.g. methylprednisolone, fluphenazine decanoate (Modecate®), flupenthixol (Depixol®) and haloperidol.
- **b. Spansule:** e.g. theophylline, & trifluoperazine.
- **c. Tablet:** coated tablet for sustained release.

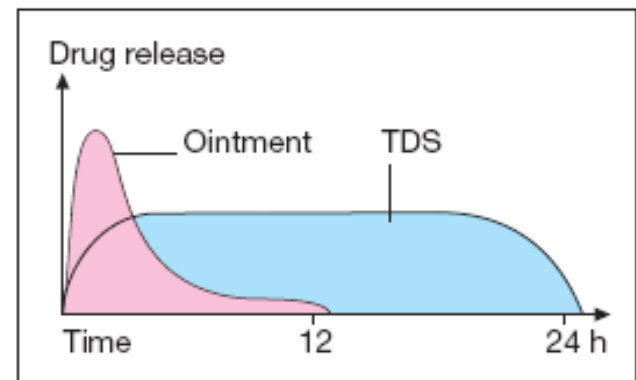
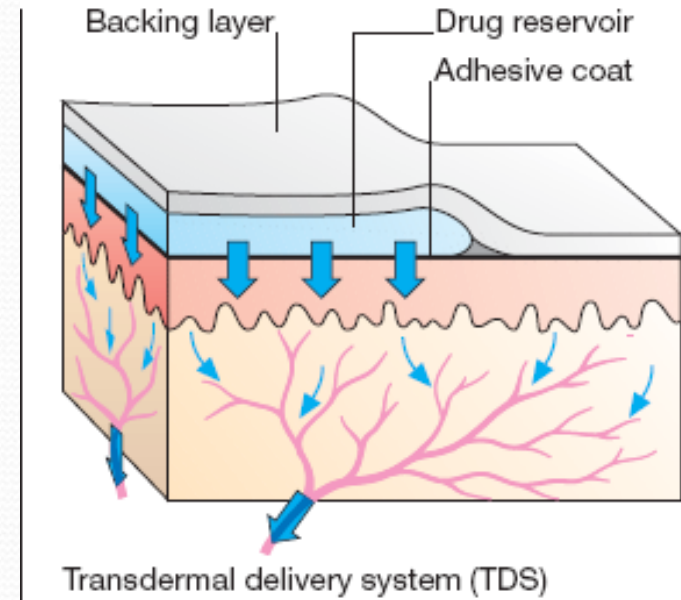


C. Dosage forms controlling rate of drug dissolution

Other

- **Enema:** a clyster or injection; a liquid injected or to be injected into the rectum (e.g. hydrocortisone enema), & barium enema (barium meal).

Transdermal delivery system (TDS):







Chewable Tablets



Effervescent Tablets



Capsules







Pills



Drug

~0.5 – 500 mg



Filler

30 – 250 mg



Disintegrating agent

20 – 200 mg

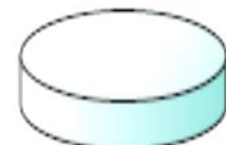
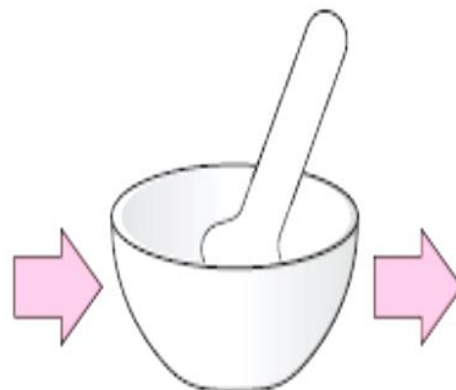


Other excipients

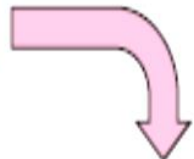
30 – 15 mg

min 100 – 1000 mg max possible tablet size

Mixing and forming by compression



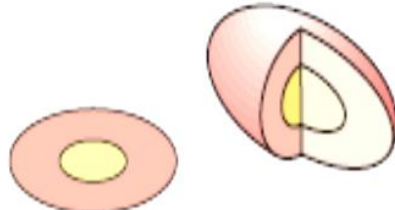
Effervescent tablet



Tablet

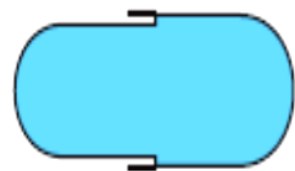


Capsule



Coated tablet

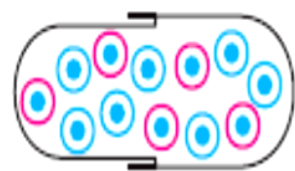
B. Solid preparations for oral application



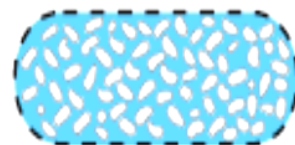
Capsule



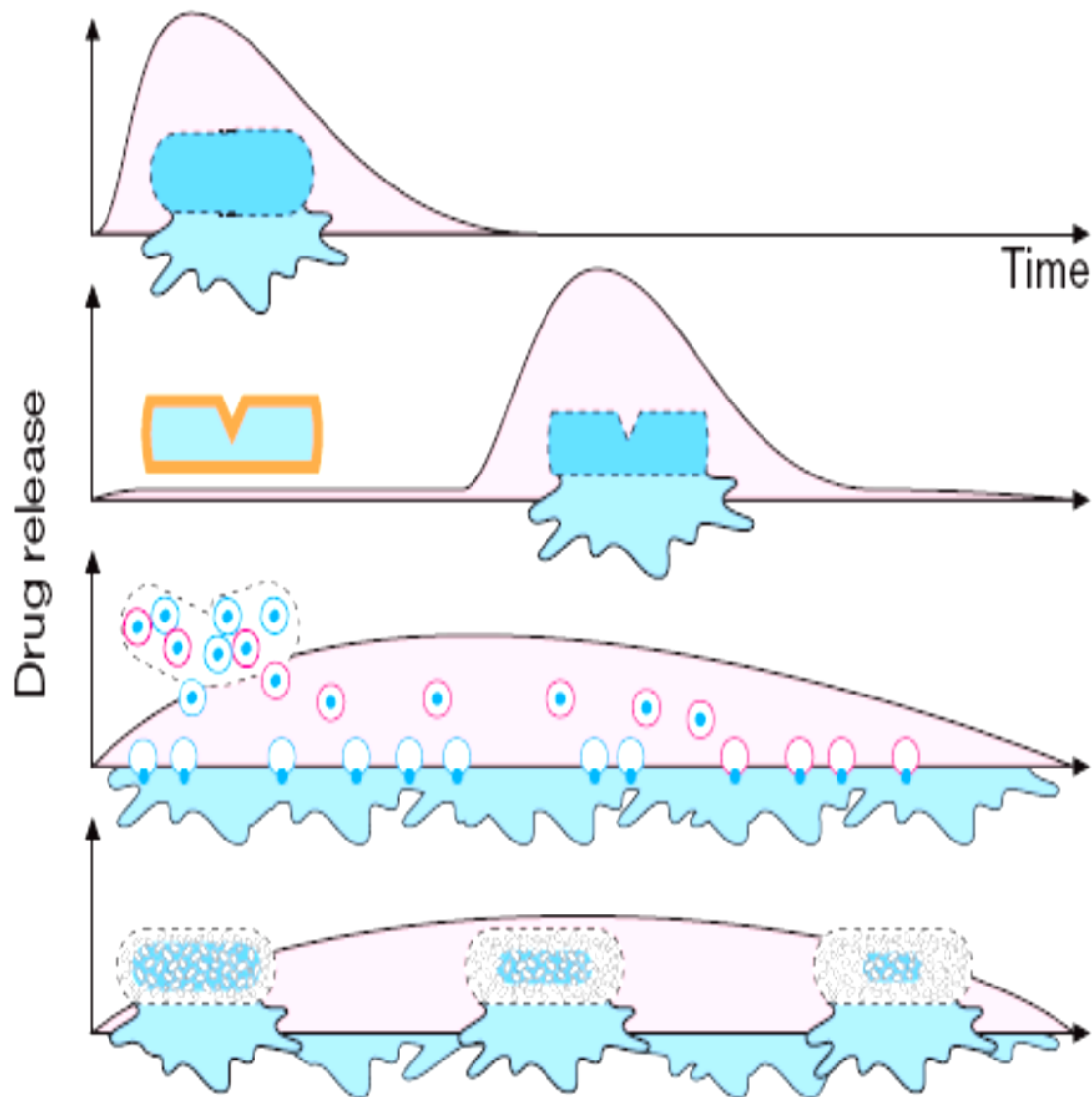
Coated tablet



Capsule with coated drug pellets



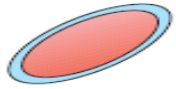
Matrix tablet



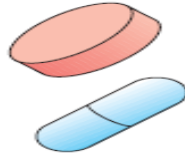
C. Dosage forms controlling rate of drug dissolution

Administration in form of

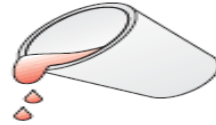
Enteric-coated tablet



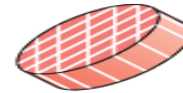
Tablet, capsule



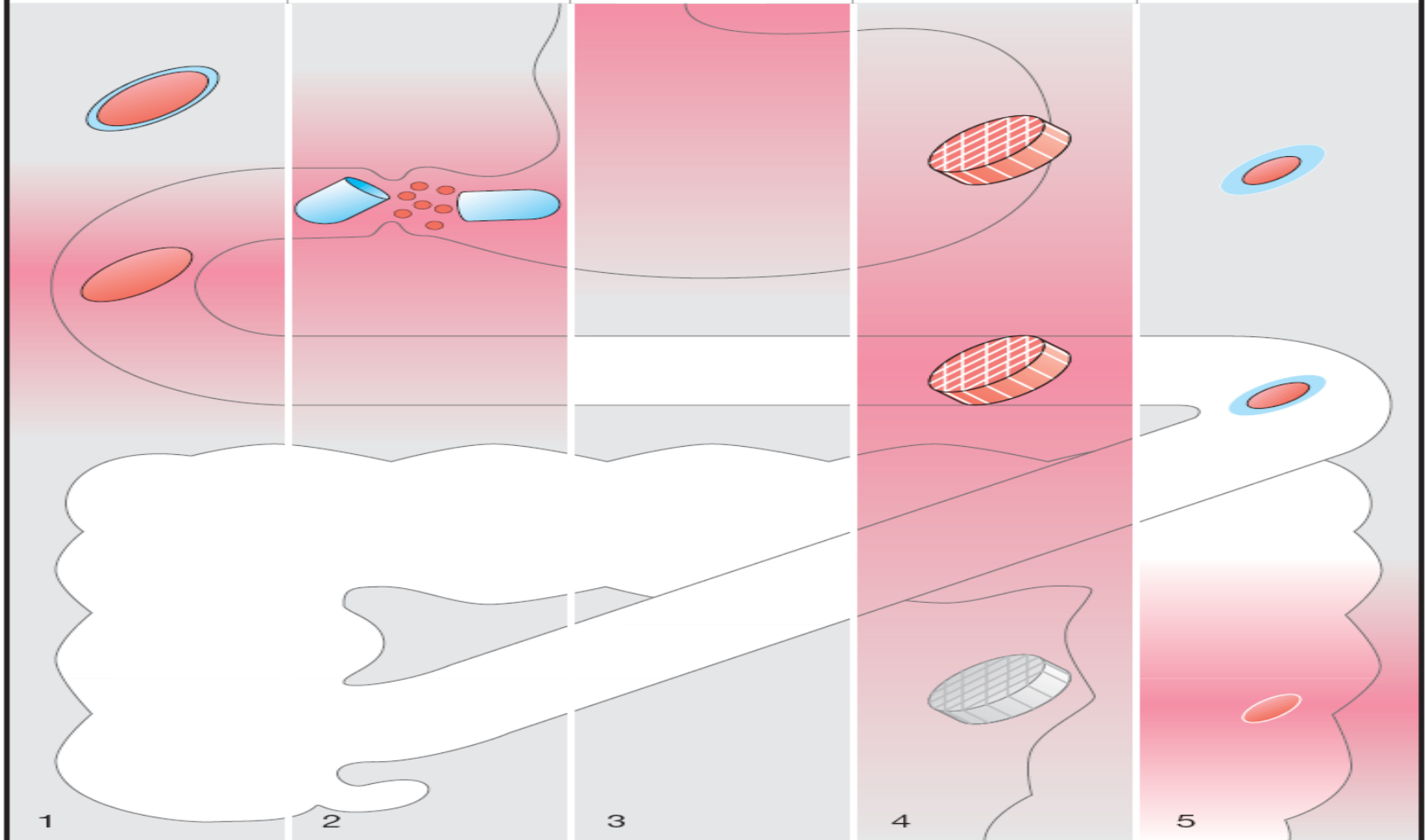
Drops, mixture, effervescent solution



Matrix tablet



Coated tablet with delayed release



1

2

3

4

5

A. Oral administration: drug release and absorption

Solution



Suspension



Ampoule



Vials





Drops





Intal[®] Inhaler

(cromolyn sodium
inhalation aerosol)

METERED DOSE INHALER
FOR ORAL INHALATION ONLY.

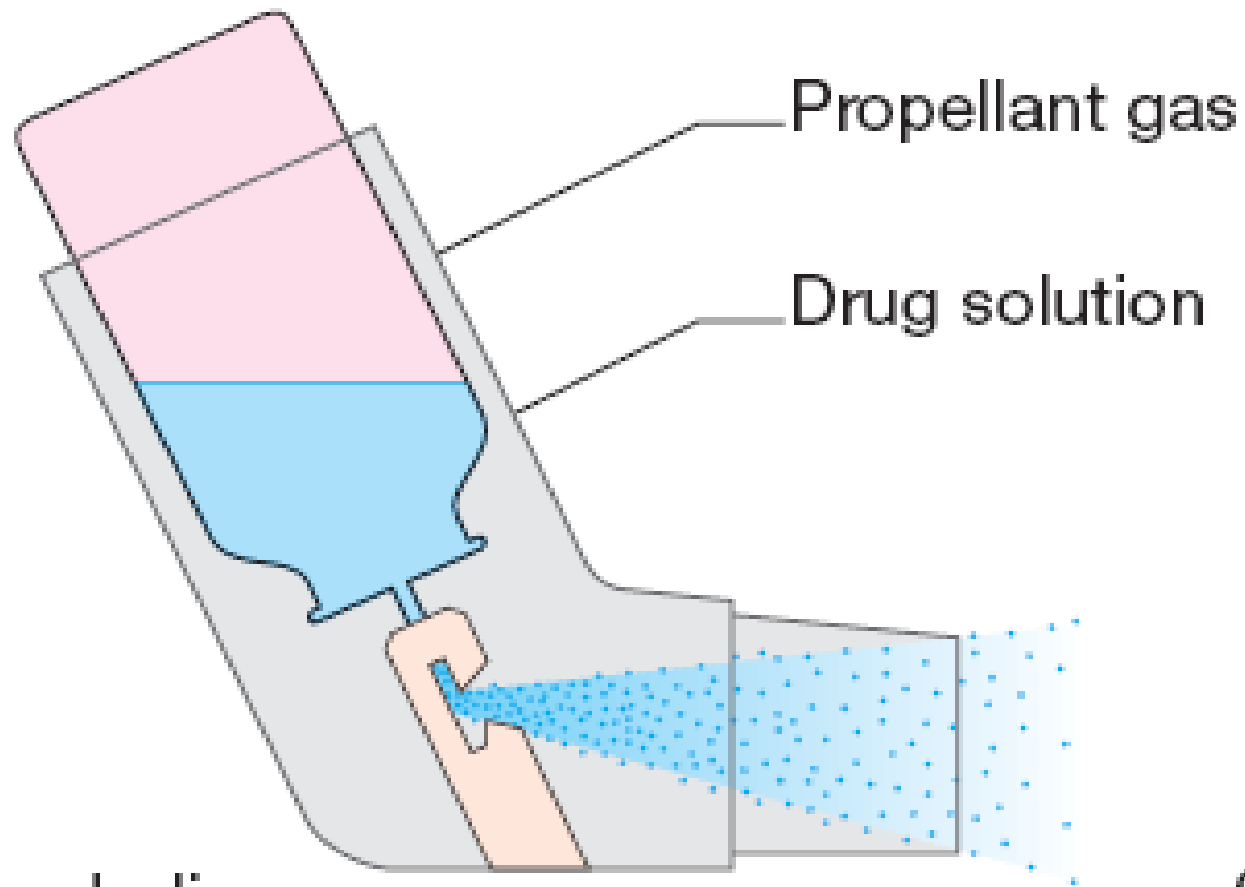
Caution: Federal law prohibits
dispensing without prescription.

Each canister contains one canister with
mouthpiece.

200
Metered
Inhalations
(14.2 g)

WALBYN
WALBYN, INC. and WALBYN RESPIRATORY
A Division of Wallace Fineberg Food Pharmaceuticals Inc.
Cincinnati, OH 45202
Made in England





Jet nebulizer

NDC 0000-8088-02

HYTONE[®] 2%^{0/}
(hydrocortisone)

LOTION



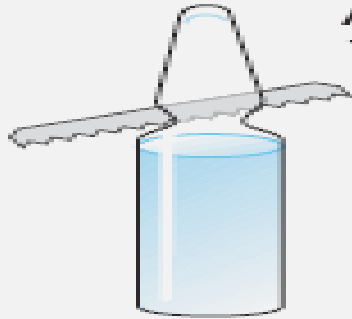
SHAKE WELL BEFORE USING

CAUTION: Federal law prohibits
dispensing without prescription.

2 FL OZ (59 mL)

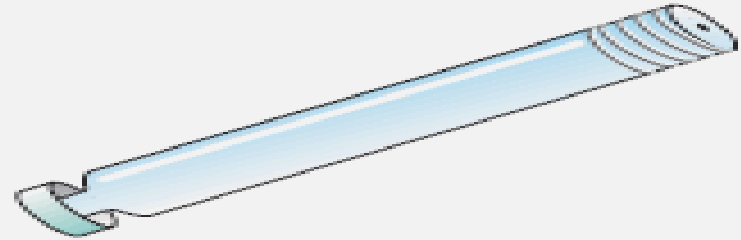


■ Sterile, iso-osmolar



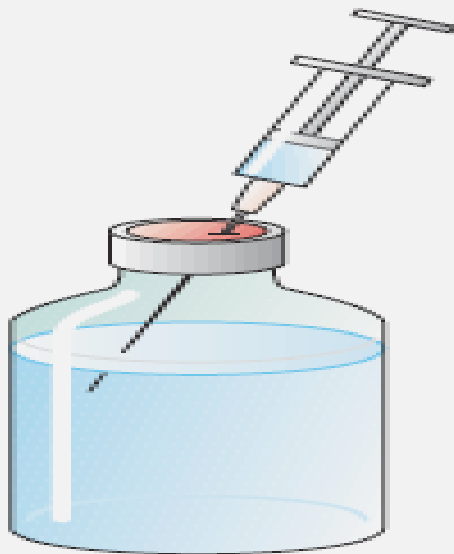
Ampule
1 – 20 ml

Cartridge
ampule 2 ml

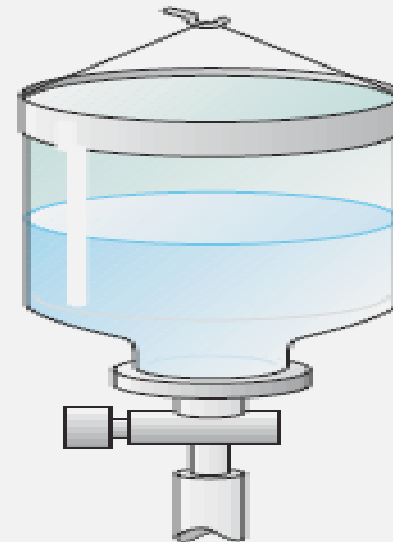


With and without
fracture ring

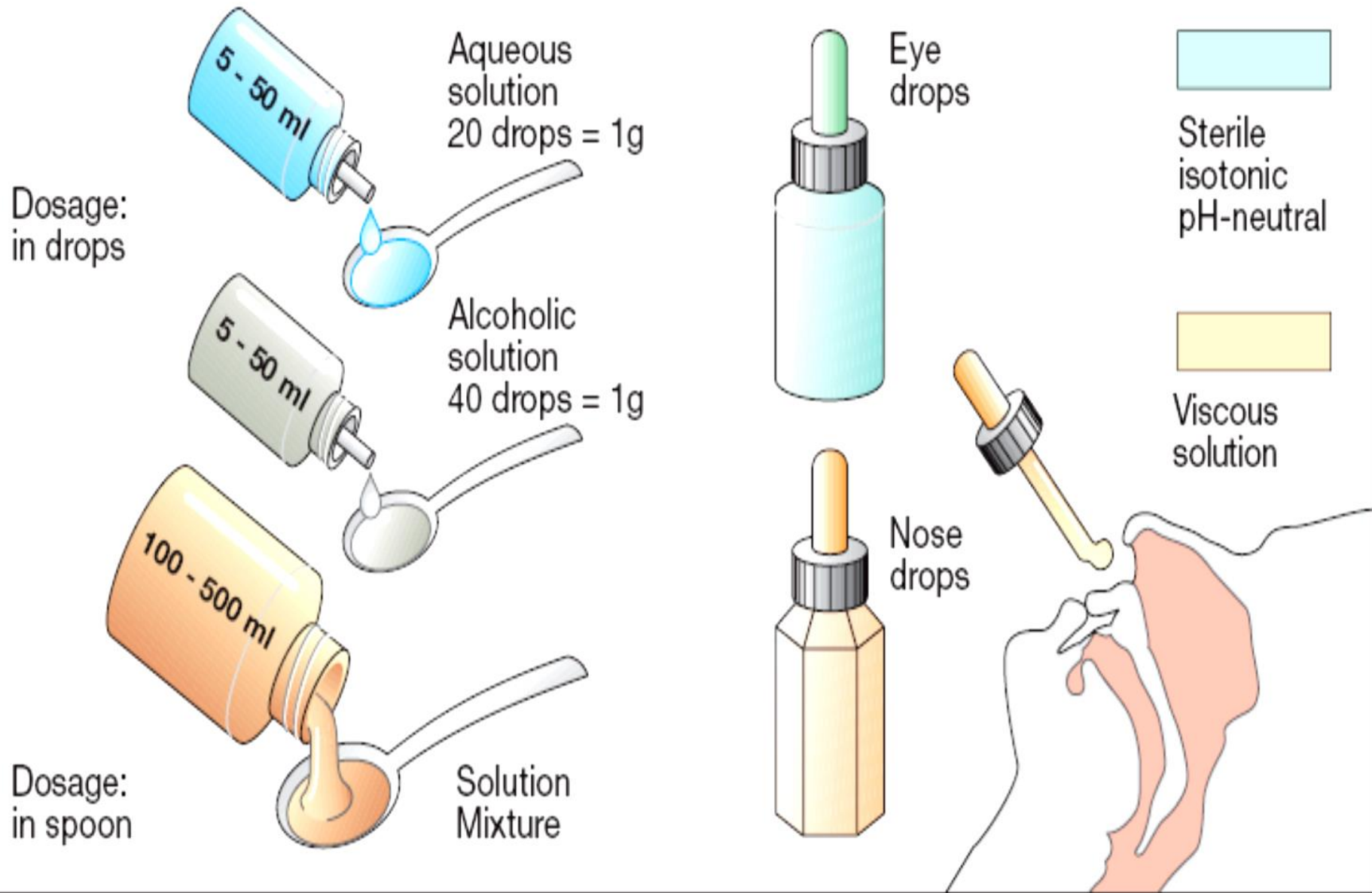
Often with
preservative



Multiple-dose
vial 50 – 100 ml,
always with
preservative

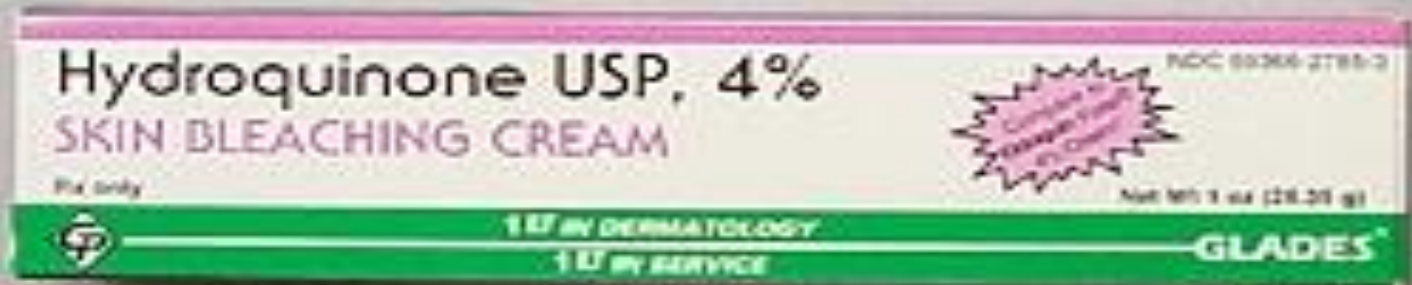


Infusion
solution
500 – 1000 ml

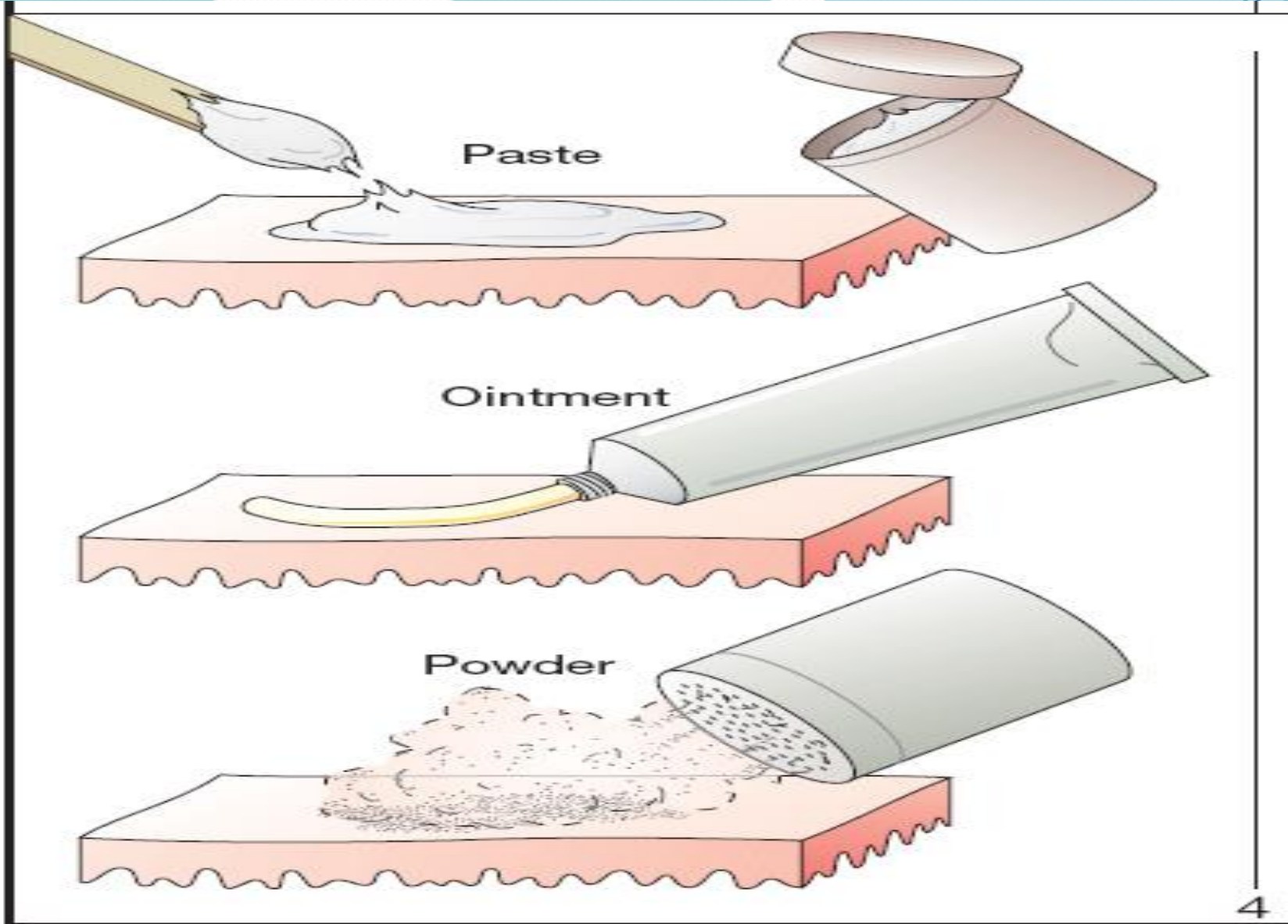


A. Liquid preparations









2.5mg/day

NDC 57544-600-60



ANDRODERM[®]
TESTOSTERONE TRANSDERMAL
SYSTEM

50 Androderm Transdermal Systems
Each 37 cm² System contains 12.2 mg Testosterone
Nominal delivery of 2.5 mg/day

 **WATSON PHARMA**



NDC 57544-600-60



ANDRODERM[®]
TESTOSTERONE TRANSDERMAL SYSTEM
Nominal delivery of 2.5 mg/day

Warnings:
See Important Information about ANDRODERM[®] Testosterone Transdermal System on the adjacent page.

Directions:
See Important Information about ANDRODERM[®] Testosterone Transdermal System on the adjacent page.

How to Use:
See Important Information about ANDRODERM[®] Testosterone Transdermal System on the adjacent page.

Side Effects:
See Important Information about ANDRODERM[®] Testosterone Transdermal System on the adjacent page.

Other information:
See Important Information about ANDRODERM[®] Testosterone Transdermal System on the adjacent page.

See Important Information about ANDRODERM[®] Testosterone Transdermal System on the adjacent page.

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NDC 62794-204-83

TRANSLUCENT NITREK[®] Nitroglycerin Transdermal System

Each system contains 44.8 mg of nitroglycerin in an acrylic
pressure sensitive adhesive with a cross linking agent.

FOR TRANSDERMAL USE ONLY

Rated release at 0.4 mg/hr

30 Systems

Patent: See instructions on page 10 (2)

0.4 NITREK[®]
mg/hr (16 cm²) Nitroglycerin
0.4 mg/hr

NDC 62794-204-18

2043

TRANSLUCENT NITREK[®] Nitroglycerin Transdermal System

Each system contains 44.8 mg of nitroglycerin.

Approximate rated release of 0.4 mg/hr

FOR TRANSDERMAL USE ONLY

EPICOR PHARMACEUTICALS, INC.

Madison, NJ 07940

System: 1 System



0.4
mg/hr (16 cm²)





Suppository



$< 35\text{ }^{\circ}\text{C}$



Vaginal tablet



$> 35\text{ }^{\circ}\text{C}$ Melting point