

# Pharmaceutics 1

## Chapter 4

### Semisolid dosage form

#### Pastes

## Lecture 7



# Pastes

- The USP defines **pastes** as semisolid dosage forms that contain one or more drug substances intended for topical application.
- Pastes are divided into fatty pastes (e.g., zinc oxide paste) and those made from a single-phase aqueous gel (e.g., carboxymethylcellulose sodium paste). Another official paste is triamcinolone acetonide dental paste.
- The term **paste** is applied to ointments in **which large amounts of solids** have been incorporated (e.g., zinc oxide paste).



- In the past, pastes have been defined as concentrates of absorptive powders dispersed (usually) in petrolatum or hydrophilic petrolatum.
- These fatty pastes are stiff to the point of dryness and are reasonably absorptive considering they have a petrolatum base.
- Pastes often are used in the treatment of oozing lesions, where they act to absorb serous secretions. Pastes also are used to limit the area of treatment by acting both as an absorbent and a physical dam.



- **Pastes** also provide a protective layer over skin lesions and, when covered with suitable dressings, prevent excoriation of the patient's skin by scratching.
- **In addition,** the water-impermeable film formed on application is opaque and thus can often serve as a sunblock.
- **Pastes** are less greasy than ointments because of the absorption of the fluid hydrocarbon fraction to the insoluble particles.



- Because of their stiffness and impenetrability, pastes are not suited for application to hairy parts of the body.
- There are two types of paste:
  - a) Fatty pastes (e.g: laser's paste) .
  - b) Non greasy pastes (e g: - bassorin paste).
- Zinc oxide paste (Lassar's Plain Zinc Paste), which is prepared by mixing 25% each of zinc oxide and starch with white petrolatum.
- The product is very firm and is better able to protect the skin and absorb secretions than is zinc oxide ointment.



## Types of pastes

Based on the type of base used in formulation, pastes are classified as follows:

### ■ *Fatty Pastes*

- These formulation consist of fatty or oleaginous bases.

Eg: Zinc oxide paste.

### ■ *Aqueous Gel Pastes*

- These are prepared with water miscible bases.

Eg: Sodium hydroxymethyl cellulose paste, Titanium dioxide paste.

### ■ *Hydrocolloid Pastes*

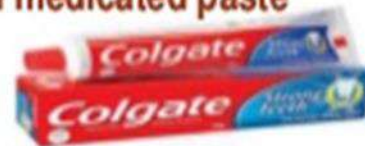
- These preparations consists of hydrocarbon bases.

Eg: Tooth paste, Zinc oxide gelatin paste.

#### Medicated Paste



#### Non medicated paste



# Characteristics of Pastes

- Pastes are stiffer than other semisolid dosage forms such as ointments and creams hence they remain stable at site of application.
- Because of high powder contents pastes are porous; hence, perspiration can escape.
- They do not interfere with the non-infected areas of the skin.
- These are considerably less greasy when compared to ointments.
- They are mostly applied over moist lesions as they possess good adhesive property towards the skin.
- Most of the pastes are unsuitable for treating scalp conditions because they are difficult to remove from the hair.



# Greasy pastes

- Grease & powders in equal proportion



- Paste advantages over ointment:

- ✓ Better adhesion
- ✓ Better transmission of perspiration & exudate
- ✓ cooling , maceration reduced

## Lassar's paste

➤ Uses: diaper rash , burns, cuts & scrapes

➤ by forming a barrier from irritants

➤ moisturizing

## LASSAR'S PASTE

Zinc oxide 25%

Starch 25%

Salicylic acid 2%

Vaseline ad 100





# PASTES

❖ are homogeneous, **semi-solid preparations** containing concentrations of insoluble powdered substances (usually not less than 20%) dispersed in a suitable base.

❖ The pastes are usually less greasy, more absorptive, and stiffer in consistency than ointments because of the large quantity of powdered ingredients present. Some pastes consist of a single phase, such as hydrated pectin, and are a thick, rigid material that does not flow at body temperature.

❖ They have good adhesion on skin and less tendency to be rubbed off.

❖ Thus when protective, rather than therapeutic action is desired, the formulation pharmacist will favor pastes; when therapeutic action is required, he will prefer ointments and creams..



# Pastes

- **Pastes** contain more solid materials than do ointments and are therefore stiffer and less penetrating. Pastes are usually employed for their protective action.
- Thus, when protective rather than therapeutic action is desired, the formulation pharmacist will favor a paste, but when therapeutic action is required, he will prefer ointments and creams.
- Commercially, many therapeutic agents are prepared in both ointment and cream form and are dispensed and used according to the particular preference of the patient and the prescribing practitioner.

# Pharmaceutics 1

## Chapter 5

### Semisolid dosage form

### Creams



# • Creams:

they are viscous semisolid emulsion

system with opaque appearance compared with the translucent ointments.

- Consistency and rheological characters depend on weather.

- **Pharmaceutical creams** are semisolid preparations containing one or more medicinal agents dissolved or dispersed in either a water-in-oil (W/O) emulsion or an oil-in-water (O/W) emulsion



# Difference between cream & ointment:

1-Ointments have a higher concentration of oil, compared to **creams**. So more greasier and stickier

2-Creams may work better on larger areas of the skin because of their "spreadability"

3-Cream is an emulsion. It is thicker than lotion, but thinner than ointment.

4-Creams are prepared in a approximately equal proportions, i.e. 50 % oil and 50 % water. While, **an ointment is 80 % oil and 20 % water**.

**Hence, it is oilier than a cream.**



- Due to this, **ointments** are often prescribed for dry skin, as they keep the skin moist for a longer period of time.
- **Creams** are absorbed faster into the skin due to their high water content. As the water evaporated, it tends to cause the skin to dry up faster. Hence, **creams** are better suited for greasy and oily skin.



- Creams are moderate in moisturizing. Like lotions, they are commonly used for moisturizing, mainly for cosmetic purposes.
- However, they may be medicated, especially for irritation, rashes and allergies, or other skin problems.
- Ointments, on the other hand, are usually medicated.
- creams are absorbed faster into the skin than ointments.
- Ointments tend to stay longer on the surface of the skin and take longer to get absorbed.



# Types of cream

- 1. Oil-in-water (O/W)** - Composed of small droplets of oil dispersed in a continuous phase,
  - O/W creams are more comfortable and cosmetically acceptable as they are less greasy and more easily washed off using water.
- 2. Water-in-oil (W/O)** - Composed of small droplets of water dispersed in a continuous oily phase.
  - W/O creams are more difficult to handle but many drugs which are incorporated into creams are hydrophobic and will be released more readily from a water-in-oil cream than an oil-in-water cream.
  - W/O are also more moisturising as they provide an oily barrier which reduces water loss from the stratum corneum , the outermost layer of the skin.





<b>Parameter</b>	<b>Ointment</b>	<b>Cream</b>
<b>Absorption</b>	<b>Not easily absorbed</b>	<b>Quickly absorbed by the skin</b>
<b>Consistencies</b>	<b>Have thicker consistencies</b>	<b>Have lighter consistencies</b>
<b>Greasiness</b>	<b>More greasy</b>	<b>Less greasy</b>
<b>Transparency</b>	<b>Clear</b>	<b>White</b>
<b>Conc. Of oil</b>	<b>Have a higher concentration of oil</b>	<b>Have a lower concentration of oil than ointment</b>
<b>Spreading ability</b>	<b>Low</b>	<b>High</b>
<b>Stability on skin</b>	<b>Stay longer on the surface</b>	<b>Stay short time on the surface</b>
<b>Healing power</b>	<b>Slow</b>	<b>Fast</b>



- Many patients and physicians prefer creams to ointments because they (1) are easier to spread and remove. Pharmaceutical manufacturers frequently manufacture topical preparations of a drug in both cream and ointment bases to satisfy the preference of the patient and physician.
- When the term “cream” is used without further qualification, a water-washable formulation is generally inferred.



# • Ideal characteristics of cream:

- It should liquefy at body temperature.
- It should penetrate the epidermis (via natural opening).
- Its viscosity should be low enough to permit easy spreading.
- It should be non-toxic.
- It should be non-irritant.
- It should be non-inflammatory.



# • Advantages of cream:

1-They gives prolong contact in their site of application

2- Injured area can be dried quickly by creams than other semi-solid

3- Non-irritating when applied to the skin.

4- Easily water washable and to wipe away.

5-Less greasy compared to ointment.

6- Easy to spread on the skin's surface (i.e. easy to apply).



# Disadvantages of creams:

- Stability is not as good as ointment.
- They are less hydrophobic than other semisolid preparation, so risk of contamination is high than the others.



# Pharmaceutics 1

## Chapter 5

### Semisolid dosage form

# Creams

By Mohammed Hussien Taleb



# • Creams:

they are viscous semisolid emulsion

system with opaque appearance compared with the translucent ointments.

• Consistency and rheological characters depend on weather.

• **Pharmaceutical creams** are semisolid preparations containing one or more medicinal agents dissolved or dispersed in either a water-in-oil (W/O) emulsion or an oil-in-water (O/W) emulsion



# Difference between cream & ointment:

1-Ointments have a higher concentration of oil, compared to **creams**. So more greasier and stickier

2-Creams may work better on larger areas of the skin because of their "spreadability"

3-Cream is an emulsion. It is thicker than lotion, but thinner than ointment.

4-Creams are prepared in a approximately equal proportions, i.e. 50 %

oil and 50 % water. While, **an ointment is 80 % oil and 20 % water**.

**Hence, it is oilier than a cream.**





- Due to this, **ointments** are often prescribed for dry skin, as they keep the skin moist for a longer period of time.
- **Creams** are absorbed faster into the skin due to their high water content. As the water evaporated, it tends to cause the skin to dry up faster. Hence, **creams** are better suited for greasy and oily skin.



- **Creams** are moderate in moisturizing. Like lotions, they are commonly used for moisturizing, **mainly for cosmetic purposes.**
- However, **they may be medicated**, especially for irritation, rashes and allergies, or other skin problems.
- **Ointments**, on the other hand, are usually medicated.
- **creams** are absorbed faster into the skin than **ointments.**
- **Ointments** tend to stay longer on the surface of the skin and take longer to get absorbed.



# Types of cream

- 1. Oil-in-water (O/W)** - Composed of small droplets of oil dispersed in a continuous phase,
  - O/W creams are more comfortable and cosmetically acceptable as they are less greasy and more easily washed off using water.
- 2. Water-in-oil (W/O)** - Composed of small droplets of water dispersed in a continuous oily phase.
  - W/O creams are more difficult to handle but many drugs which are incorporated into creams are hydrophobic and will be released more readily from a water-in-oil cream than an oil-in-water cream.
  - W/O are also more moisturising as they provide an oily barrier which reduces water loss from the stratum corneum , the outermost layer of the skin.



<b>Parameter</b>	<b>Ointment</b>	<b>Cream</b>
<b>Absorption</b>	<b>Not easily absorbed</b>	<b>Quickly absorbed by the skin</b>
<b>Consistencies</b>	<b>Have thicker consistencies</b>	<b>Have lighter consistencies</b>
<b>Greasiness</b>	<b>More greasy</b>	<b>Less greasy</b>
<b>Transparency</b>	<b>Clear</b>	<b>White</b>
<b>Conc. Of oil</b>	<b>Have a higher concentration of oil</b>	<b>Have a lower concentration of oil than ointment</b>
<b>Spreading ability</b>	<b>Low</b>	<b>High</b>
<b>Stability on skin</b>	<b>Stay longer on the surface</b>	<b>Stay short time on the surface</b>
<b>Healing power</b>	<b>Slow</b>	<b>Fast</b>



- Many patients and physicians prefer creams to ointments because they (1) are easier to spread and remove. Pharmaceutical manufacturers frequently manufacture topical preparations of a drug in both cream and ointment bases to satisfy the preference of the patient and physician.
- When the term “cream” is used without further qualification, a water-washable formulation is generally inferred.



# • Ideal characteristics of cream:

- It should liquefy at body temperature.
- It should penetrate the epidermis (via natural opening).
- Its viscosity should be low enough to permit easy spreading.
- It should be non-toxic.
- It should be non-irritant.
- It should be non-inflammatory.



# • Advantages of cream:

1-They gives prolong contact in their site of application

2- Injured area can be dried quickly by creams than other semi-solid

3- Non-irritating when applied to the skin.

4- Easily water washable and to wipe away.

5-Less greasy compared to ointment.

6- Easy to spread on the skin's surface (i.e. easy to apply).



# Disadvantages of creams:

- Stability is not as good as ointment.
- They are less hydrophobic than other semisolid preparation, so risk of contamination is high than the others.





# Types of creams

1-Oil-in-water (O/W) creams

2-Water-in-oil (W/O) creams



# (1) Oil-in-water (O/W) creams

- Oil-in-water (O/W) creams which are composed of small droplets of oil dispersed in a continuous phase.
- More comfortable and cosmetically acceptable as they are less greasy and more easily washed off using water.
- Emulsifying agents of natural origins( bees wax, wool alcohols, wool fat).
- Emollient and creamy, white or translucent and stiff.
- **E.g. Vanishing Cream, Hydrophilic ointment.**



## (2) Water-in-oil (W/O) creams

- Water-in-oil (W/O) creams which are composed of small droplets of water dispersed in a continuous oily phase.
- More difficult to handle but many drugs which are incorporated into creams are hydrophobic and will be released more readily from a W/O cream than an O/W cream.
- More moisturizing as they provide an oily barrier which reduces water loss from the stratum corneum (the outermost layer of the skin). e.g. Cold Cream



# Uses

1-This may be a physical or a chemical barrier as with sunscreens.

2-To aid in the retention of moisture (especially W/O creams).

3-Cleansing & Emollient effects.

4-As a vehicle for drug substances such as local anaesthetics, anti-inflammatories (NSAIDs or corticosteroids), hormones, antibiotics, antifungals or counter-irritants..



- Vanishing creams are oil-in-water emulsions containing large percentages of water and stearic acid or other oleaginous components.
- After application of the cream, the water evaporates, leaving behind a thin residue film of the stearic acid or other oleaginous component.
- Vanishing creams get their name from the fact that they seemed to disappear when spread onto the skin. Produce emollient and moisturizing effect.



- The traditional formula is based on high quality stearic acid as the oil phase.
- This provides an oil phase which melts above body temperature and crystallizes in a suitable form so as to be invisible and give non greasy film.
- The emulsifier is a soap which is formed in situ by adding sufficient alkali or base to neutralize a portion of the available fatty acids.



**Table 6.** Typical vanishing cream formulation [206].

<b>Stearic Acid Based Vanishing Cream</b>		<b>Palm Oil Based Vanishing Cream</b>	
<b>Ingredients</b>	<b>(%)</b>	<b>Ingredients</b>	<b>(%)</b>
Stearic Acid	12.5	Natural palm oil base	12.5
Cetyl alcohol	1	Triethanolamine	1
Glycerol	6	Glycerol	6
Potassium hydroxide	1	Citric acid	0.2
Propyl Paraben	0.025	Propyl Paraben	0.025
Methyl Paraben	0.05	Methyl Paraben	0.05
Rose oil	Qs	Rose oil	Qs
Purified water	29.34	Purified water	30.1



**—Cold Cream:** It is an emulsion of water in oil (W/O).

- Normally the following ingredients are used:
- 1- Mineral oil.
- 2- White beeswax.
- 3- Borax responsible for whiteness of cold cream (used as emulsifier) .
- 4- Alcohol, glycerin, and lanolin.
- 5- Perfume





## • Medicated creams

- Medicated creams are contains **active pharmaceutical ingredients**. e.g.:
- Cetrimide cream used as antiseptic.
- Zinc oxide cream used as astringent.
- Hydrocortisone cream - treat rashes like poison oak or poison ivy

## • cosmetic creams:

- All purpose cream, **baby cream**, **barrier cream**, **bleaching cream**, cleansing cream, cold cream, **hair cream**, hand cream, **vanishing cream**.



- Cleansing cream:

- Cleaning cream used for removal of facial makeup, surface grime and oil from the face and neck. Leaving an emollient residual film on the skin to keep it smooth and soft.



# Preparation of creams

1. Preparation usually involves separating the formula components into two portions: lipid and aqueous.
2. The lipid portion contains all water-insoluble components, and the aqueous portion contain the water-soluble components.
3. Both phases are heated to a temperature above the melting point of the highest melting component.



**4-**The phases then are mixed, and the mixture is stirred until reaching **ambient** temperature or the mixture has congealed.

**Mixing generally is continued during the cooling process to promote uniformity.**

**5-**Traditionally, the aqueous phase is added to the lipid phase, but comparable results have been obtained with the reverse procedure.

**6-**High-shear homogenization may be employed to reduce particle or droplet size and improve the physical stability of the resultant dosage form.



7-The active pharmaceutical ingredients (APIs) can be added to the phase in (a) which it is soluble at the beginning of the process, or (b) it can be added after the cream is prepared by a suitable dispersion process such as levigation or milling with a roller mill.

8-Creams usually require the addition of a preservative(s) unless they are compounded immediately prior to use and intended to be consumed in a relatively short period of time.



- advice you to watch this video which concern by preparation of cream (as lab)
- <https://www.youtube.com/watch?v=gYg2sFqkptc>

# • The end of chapter

