

PHARMACEUTICS

UNIT 5 NOTES

SEMI SOLID DOSAGE FORM

- INTRODUCTION
- TYPES
- FACTORS AFFECTING DERMAL PENETRATION OF DRUGS



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SEMI - SOLIDS

- Semi solid dosage forms are topical (dermatological) preparations used for therapeutic, protectives or cosmetic function.
- They are generally applied over the skin but can also be applied nasally, vaginally or rectally.
- Pharmaceutical semi solid dosage forms generally include : ointments, pastes, creams and gels.
- They contain one or more active pharmaceutical ingredients (API) dissolved or uniformly dispersed in a suitable base.

Advantages

- It is used externally hence probability of side effects are very less.
- First pass metabolism is avoided.
- Suitable for unconscious patients.
- Suitable dosage form for bitter drugs.
- More stable than liquid dosage form.

Disadvantages

- No dose accuracy.
- They are bulky to handle.
- Application with finger may cause contamination.
- Physio-chemically less stable compared to solid dosage form.
- May cause irritation or allergy in some patients.



Ideal Properties of Semi Solid Dosage Forms

It can be defined on the basis of 3 parameters :

- Physical Properties
- Physiological Properties
- Application Properties

Physical Properties

- They should have smooth texture.
- They should be elegant in appearance.
- They should be non-dehydrating.
- They should be non-gritty in nature.
- They should have non-greasy and non-staining properties.
- They should be non-hygrosopic in nature.

Physiological Properties

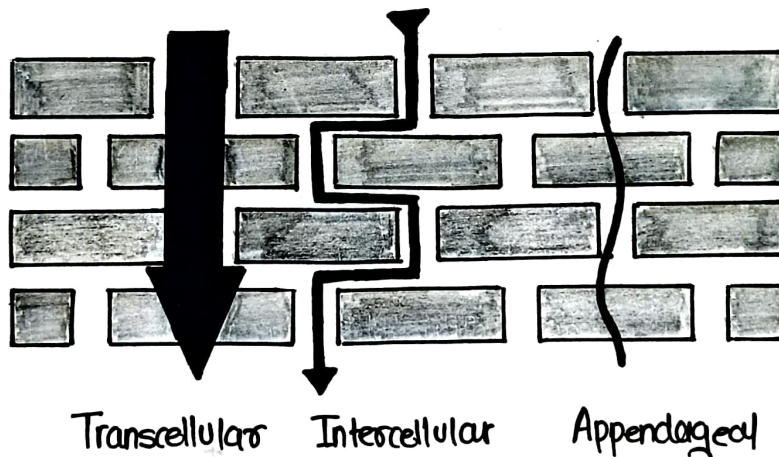
- They should be Non-irritating in nature.
- They should not alter skin membrane
- They should be easily miscible with skin secretion.

Application Properties

- They should be easily applicable with efficient drug release.
- They should have high aqueous washability.

MECHANISM OF DRUG PERMEATION

- It can also be known as Dermal Penetration of Drugs
- The skin has two main layers
 - ① Epidermis (Outermost layer)
 - ② Dermis (Active part of skin containing hair follicles & blood supply)
- Epidermis itself divides into 5 other parts but the main layer that controls the penetration of drugs is called Stratum Corneum.
- The permeation / penetration of drugs occurs through three major routes:
 - (1) Transcellular
 - (2) Intercellular
 - (3) Appendageal



FACTORS INFLUENCING DERMAL PENETRATION OF DRUGS

These factors can be further divided into two categories

- ① Biological Factors
- ② Physiochemical Factors

Biological Factors

Biological Factors mainly includes :

- Skin Condition
- Skin Age
- Blood Flow
- Regional Skin Sites
- Skin Metabolism
- Species Difference
- Skin Hydration

Skin Hydration

- When the amount of water is sufficient or in excess the tissue swells and softens.
- Drugs through this softens tissues easily penetrates the skin.
- Hence, Hydration increases drug penetration.

Skin Condition

- The penetration of drugs through skin is affected by Age, Disease, Climate and Injury.
- Drug absorption occurs rapidly in children.
- Diseases and Injured skin increases drug penetration
- Drug Penetration is less in healthy skin.



Skin Age

- The young skin is more permeable than older.
- The skin of the childrens are more sensitive to the toxic effects of drugs.
- Skin Age plays an important role in dermal penetration of drugs.

Blood Flow

- Blood flow through the skin also affects the dermal penetration of drugs.
- When blood flow is reduced, amount of drug penetration increases.

Regional Skin Site

- Dermal Penetration of drugs changes with varying of skin thickness.
- Facial skin is generally more permeable compare to other body sites.

Skin Metabolism

- The skin metabolizes steroid hormones, chemical carcinogens and some other drugs.
- So skin metabolism determines efficacy of drug permeated through skin

Species Difference

- The condition and thickness of skin varies in different species.
- Mice, rat, rabbits have more hair follicles but they lack sweat glands, so drug penetration is different in their skin compare to human skin.

Physiochemical Factors

Physiochemical factors mainly includes :

- Temperature and pH
- Drug Concentration
- Solubility of Drugs
- Diffusion Coefficient
- Molecular Size and Shape

Temperature and pH

- The increase in temperature increases the dermal penetration of drugs through skin.
- Drug with pH value near 5 easily penetrates the skin.

Drug Concentration

- The drug penetration is depends upon the concentration gradient.
- Concentration gradient will be higher if concentration of drug will be more across the barrier.

Solubility of Drugs

- Highly lipid soluble drugs easily penetrates the skin compare to hydrophilic drugs

Diffusion Coefficient

- The diffusion coefficient of drug depends on the properties of drugs & diffusion medium.

Size and Shape

- Penetration of drugs is inversely depends on size.
- Small molecules penetrates faster than larger ones.

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