



# Topical treatment in dermatology

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# Topical preparations

Semi-solid preparations containing either dissolved or suspended functional ingredients.

## Ointments

- one-phase preparations in which a soluble part and a solid ingredient are mutually dispersed

## Creams

- double-phase preparations, contain a lipophilic phase and a water phase

## Lotions

- double-phase preparations, contain mostly water phase

## Gels

- colloidal mass of a water-soluble medicated material

# Ointments

- ▶ Contain about 80% of oil
- ▶ Cannot be removed or dissolved with water
- ▶ **Base of ointments (examples):** vaseline, animal oils, plant oils, esters of glycerol, wax, silicones
- ▶ **Action:** highly occlusive, soften stratum corneum of epidermis, decrease the trans-epidermal water loss
- ▶ **Indications:** diseases with hyperkeratosis (removal of scales and crusts)
- ▶ **Contraindications:** acute dermatitis with exudate

# Creams

- ▶ Semi-solid emulsions of oil and water
- ▶ Less greasy than ointments, contain about 50% of oil
- ▶ **Properties:** less occlusive than ointments, smooth texture, easily absorbed
- ▶ **Indications:** acute dermatitis with exudate, also in intertriginous areas
- ▶ **Warning:** a higher content of water require an addition of preservatives which may cause irritation

# Lotions

- ▶ Contain mostly water, may contain also alcohol,
- ▶ **Properties:** low-viscosity, much thinner formulation than ointment and cream, absorb quickly

# Gels

- ▶ Colloidal mass of a water-soluble medicated material, usually translucent
- ▶ Combination of cellulose, water, and alcohol
- ▶ **Properties:** non-occlusive, non greasy, easy-absorbable
- ▶ **Indications:** application on mucous membranes, scalp and acne-prone skin

# Topical corticosteroids - classification

**European classification:** 4 classes (I-IV): I the least potent, IV the most potent

**Classification in US:** 7 classes – 7 the least potent, 1 the most potent

The division is based on a result of a **vasoconstriction test**

The stronger vasoconstriction of blood vessels, the more potent corticosteroid

# European classification: 4 classes (I-IV): I the least potent, IV the most potent

## Class I: mild

- Hydrocortisone 0,5%
- Hydrocortisone acetate 1,0%
- Metylprednisolone 0,25%
- Dexametasone 0.1-0.2%
- Flucinilone acetamide 0,0025%

## Class II: moderate

- Flumetasone pivalate 0.02%
- Betametasone benzoate 0.025%
- Deoximetasone 0.05%
- Betamethasone dipropionate 0.05%
- Hydrocortisone butyrate 0.1%
- Triamcinolone acetamide 0.04%

## Class III: potent

- Flucinilone acetamide 0,025%
- Triamcinolone acetamide 0,1%
- Metylprednisolone aceponiate 0.1%
- Betamethasone benzoate 0.25%
- Betamethasone dipropionate 0.05%
- Mometasone furoate 0.1%

## Class IV: very potent

- Clobetasol propionate 0.05%
- Flucinolone acetamide 0.1%
- Halcyonine 0.1%

## Classification in US:

7 classes – 7 the least potent, 1 the most potent

<b>Class 7</b> Least potent	Hydrocortisone 1.0%; Hydrocortisone 2.5%
<b>Class 6</b> Mild	Desonide 0.05%; Fluocinolone 0.01%; Hydrocortisone butyrate 0.1%
<b>Class 5</b> Lower mid-strength	Fluticasone propionate 0.05%; Triamcinolone acetonide 0.025%
<b>Class 4</b> Mid-strength	Mometasone furoate 0.1%; Fluocinolone acetonide 0.025%; Triamcinolone acetonide 0.1%
<b>Class 3</b> Upper mid-strength	Fluticasone propionate 0.005%; Amcinonide 0.1%; Triamcinolone acetonide 0.5%
<b>Class 2</b> Potent	Betamethasone dipropionate 0.05%; Desoximetasone; Fluocinonide 0.05%
<b>Class 1</b> Super potent	Clobetasol propionate 0.05%; Diflorasone diacetate 0.05%; Fluocinonide 0.1%



## Classification in US:

7 classes – 7 the least potent, 1 the most potent

### Examples:

Class VII (least potent)

Class VI (mild)

Class V (lower mid-strength): **fluticasone propionate 0.05% cream**

Class IV (mid-strength): **mometasone furoinate 0.1% cream**

Class III (upper mid-strength): **fluticasone propionate 0.05% ointment**

Class II (potent): **betametasone dipropionate 0.05% cream, mometasone furoinate 0.1% ointment**

Class I (super potent): **betametasone dipropionate 0.05% ointment**

## Classification in US:

7 classes – 7 the least potent, 1 the most potent

Ex: hydrocortisone

Class VI (mild)

Class VI (mild)

Class V (lower mid-strength): betametasone dipropionate 0.05% cream

Class IV (mid-strength): mometasone furoate 0.1% cream

Class III (upper mid-strength): fluticasone propionate 0.05% ointment

Class II (potent): betametasone dipropionate 0.05% cream

furoinate 0.1% ointment

Class I (super potent): betametasone dipropionate 0.05% ointment

**OINTMENTS ACT MORE POTENT THAN CREAMS**

# The choice of appropriate corticosteroid

## Very potent corticosteroids

- ▶ Should be used only in **severe course of dermatitis**
- ▶ Should be used in localizations **OTHER than** face and intertriginous areas
- ▶ May be applied on a small skin surface, scalp, palms and soles, nails, extensor surfaces of limbs, skin with thick scales
- ▶ Period of time (usage): **less than 4 weeks** with maximal frequency once a day
- ▶ EXAMPLES: **clobetasole propionate, betamethasone dipropionate**

# The choice of appropriate corticosteroid

## Moderate and potent corticosteroids

- ▶ Usage in „moderate” course of dermatitis
- ▶ Applied on skin **OTHER** than face and intertriginous areas
- ▶ May be used on flexor surfaces of limbs but in a period of time **< 6-8 weeks** with maximal frequency once a day
- ▶ EXAMPLES: **mometasone furoinate, fluticasone propionate**

# The choice of appropriate corticosteroid

## Mild corticosteroids

- ▶ May be used on a large skin surface areas, thin skin, face, eyelids, genital areas, intertriginous areas
- ▶ May be applied on a skin for longer period of time, **e.g repetitive cycles of 1-2 weeks treatment, up to once or twice a day**
- ▶ EXAMPLES: **hydrocortisone, dexamethasone**

# Methods of treatment with topical corticosteroids

## Classical continuous therapy

First – potent corticosteroid

Then – mild corticosteroid

## Intermittent therapy

3 times a week

Weekends

Alternating (e.g. clobetasole/  
hydrocortisone)

Pulses

# Adverse reactions of topical corticosteroids

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Atrophy of epidermis and dermis

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Acne

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Local infections

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Hypertrichosis

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Stretch marks

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Purpura

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Erythema and teleangiectasias

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Contact allergic dermatitis

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Impaired wound healing

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Perioral dermatitis

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Glaucoma

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The probability of cutaneous adverse effects depends on a **potency** of corticosteroid used for treatment

**To minimize the risk**



**Use a corticosteroid of a lowest potency for the shortest period of time and only when indicated**



# How to calculate the amount of corticosteroid required for the treatment?

1 surface of a hand of a patient  
=  
1% of **Body Surface Area (BSA)**



# Fingertip unit (FTU)

- ▶ Defined as the amount of ointment or cream expressed from a tube with a 5 mm diameter nozzle applied from the distal skin-crease to the tip of the index finger of an adult
- ▶ 1 FTU = 500 mg of ointment/cream
- ▶ 1 FTU for the treatment of 2% BSA

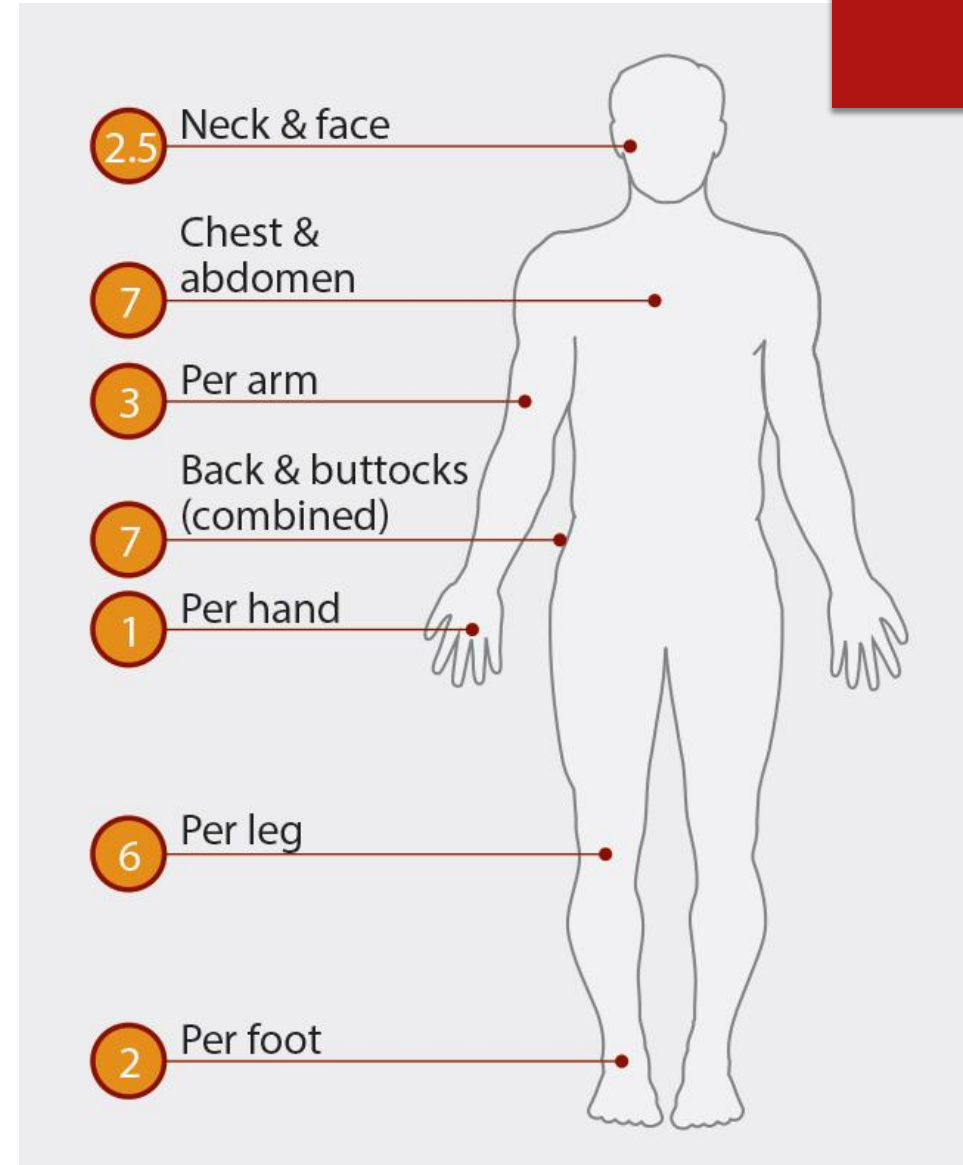
4 hand areas = 2 FTU = 1 g



Distal skin-crease

# Fingertip unit (FTU)

- ▶ 1 FTU per hand
- ▶ 2 FTU per foot
- ▶ 2.5 FTU per neck and face
- ▶ 3 FTU per arm
- ▶ 6 FTU per leg
- ▶ 7 FTU per back & buttocks or chest & abdomen



# Topical treatment in psoriasis

## Indication

- **BSA**  $\leq 10$  % and **PASI**  $\leq 10$  and **DLQI**  $\leq 10$  points
- Residual skin lesions after systemic treatment



# Topical treatment in psoriasis

It is advised to use keratolytic preparations at the beginning of treatment which contain:

- Urea
- Salicylic acid
- Ointments with sulphur

To remove the scale and improve the penetration and absorption of a medication

# Topical treatment in psoriasis

## Derivatives of vitamin D

### Action

- ▶ Inhibit the proliferation of keratinocytes
- ▶ Induce the maturation of keratinocytes
- ▶ Verified clinical efficacy
- ▶ Good cosmetic properties
- ▶ High safety profile

- **calcipotriol**
- **tacalcitol**

It is advised to combine derivatives of vitamin D with topical corticosteroids regarding their synergic action.

# Topical treatment in psoriasis

## High potency topical corticosteroids

- ▶ Effective but treatment with the **high risk of adverse effects**
- ▶ Sudden withdrawal of topical corticosteroids may lead to **rapid reoccurrence** and an exacerbation of psoriatic skin lesions – their severity may be even greater than before the treatment

**Rebound effect** – the relapse of skin lesions in a short period of time after discontinuation of treatment

# Topical treatment in psoriasis

## Combined formulations

- Betamethasone dipropionate + calcipotrol
- Betamethasone dipropionate + salicylic acid

## Advantages

- ▶ Higher efficacy
- ▶ Better tolerance and easier application on the skin
- ▶ Better compliance



# Topical treatment in psoriasis

## Calcineurin inhibitors

- Pimecrolimus (cream)
- Tacrolimus (ointment) 0.03% or 0.1%

## Indications

- ▶ Skin lesions localized on a face
- ▶ Treatment of inverse psoriasis (flexural, intertriginous areas)
- ▶ Treatment „off label”

# Topical treatment in psoriasis

## Cignoline

- ▶ Keratolytic and anti-proliferative properties

## Numerous side effects

- ▶ Discoloration of skin and fabrics
- ▶ Characteristic irritating smell
- ▶ Skin irritation
- ▶ Cannot be used on a face, in intertriginous areas and in case of severely inflamed skin lesions

Currently cignoline **is not** a substance of a first choice in the treatment of psoriasis

# Topical treatment in acne

## Topical retinoids

- ▶ Derivatives of vitamin A
- ▶ Normalize the proces of keratinization
- ▶ Anticomedogenic
- ▶ Keratolytic
- ▶ Anti-inflammatory (weak – adapalene)

## Action

Retinoids prevent the formation of „keratin plugs” in follicular ostia and in consequence the formation of comedones

# Topical treatment in acne

## Topical retinoids

## Side effects

- ▶ Dryness of skin
- ▶ Erythema and irritation
- ▶ Burning sensation
- ▶ Itch

## Topical retinoids:

- Adapalene
- Trifarotene
- Tretinoin
- Isotretinoin

# Topical treatment in acne

## Benzoyl peroxide

- ▶ Often combined with topical antibiotics or retinoids
- ▶ Prevent antibiotic resistance

## Action

- ▶ Antibacterial
- ▶ Comedolytic

Formation of Reactive Oxygen Species (ROS) which act on a cell wall of *Propionibacterium acnes*

## Side effects

- ▶ Dryness of skin
- ▶ Exfoliation of epidermis
- ▶ Burning sensation
- ▶ Erythema
- ▶ Discoloration of hair and fabrics

# Topical treatment in acne

## Topical antibiotics

## Action

- ▶ Antibacterial – reduce the amount of *Propionibacterium acne*
- ▶ Anti-inflammatory – act anti-chemotactic and decrease the inflow of leukocytes

### Topical antibiotics:

- Erythromycin 2% - solution, gel
- Clindamycin 1% - solution, gel

# Topical treatment in acne

## Side effects

- Skin dryness
- Excessive exfoliation of epidermis
- Itching
- Burning sensation

An indication for using emollients/moisturizers to decrease the erythema

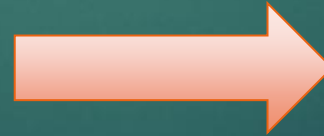
# Topical treatment in acne

## An assessment of the results of treatment

- ▶ The improvement is visible only after 2-3 months of treatment
- ▶ Results are highly dependable on the patient's compliance

### Combined formulations:

- Clindamycin 1%+ benzyl peroxide
- Adapalene + benzyl peroxide
  - Erythromycin 2% + tretinoin
  - Clindamycin 1% + tretinoin



Higher efficacy than monotherapy



# Antifungal preparations

- ▶ Effective for superficial and limited infections of skin

Fungal infection of **scalp** and involvement of more than 3 **nails** > 50% of surface is an indication for **systemic treatment**.

- ▶ Topical preparations are often used in combination with systemic treatment of onychomycosis

# Antifungal preparations

## Antifungal antiseptics

- Undecylenic acid
- 3% resorcinol

## Antifungal antibiotics

- Nystatin
- Natamycin

## Antifungal chemotherapeutics

- Imidazoles (ketoconazole, itraconazole, miconazole etc.)
  - Amorolfine
- Cyclopiroxolamine
- Terbinafine

# Topical treatment of scabies

**Permethrin 5% cream**  
**Permethrin 4% gel**



One-time usage, repetition  
after 14 days

**Crotamitone**  
**(ointment, solution)**



Once daily for 3-5 days

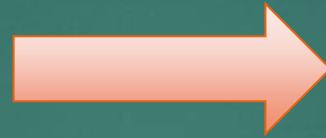
# Topical treatment in androgenetic alopecia

## **Minoxidil 2% or 5% solution**

- ▶ Minoxidil was primarily used orally for the treatment of hypertension
- ▶ Its mechanism of action is not fully elucidated - stimulated hair growth because of the increase of the blood flow in capillaries around hair follicle
- ▶ First results after 2 months
- ▶ The highest efficacy when used >12 months

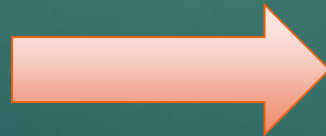
# Topical treatment of warts

**palmoplantar warts**



- 5-fluorouracil
- Salicylic acid
- Lactic acid

**anogenital warts**



- Podophyllotoxin
- Imiquimod