Basics of topical steroids and their application

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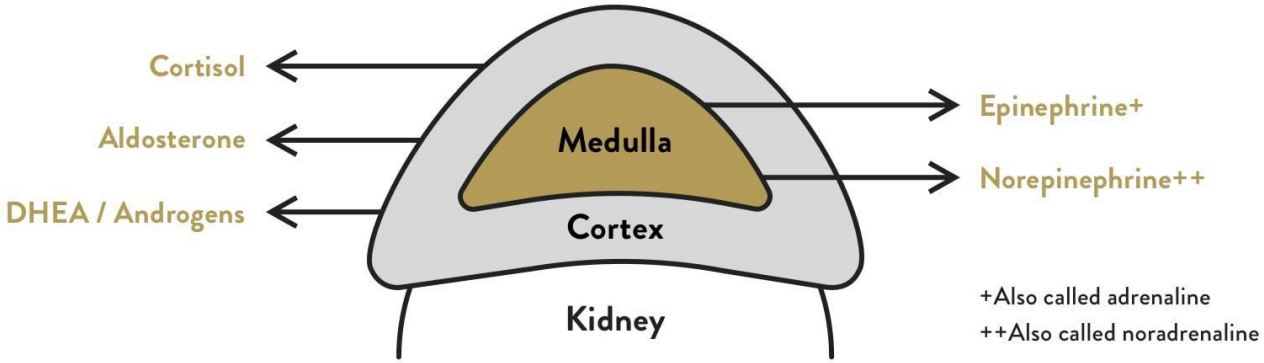
Basics of topical steroids and their application

- Since the introduction of hydrocortisone in 1952 topical steroids remain the mainstay of treatment in inflammatory skin conditions.

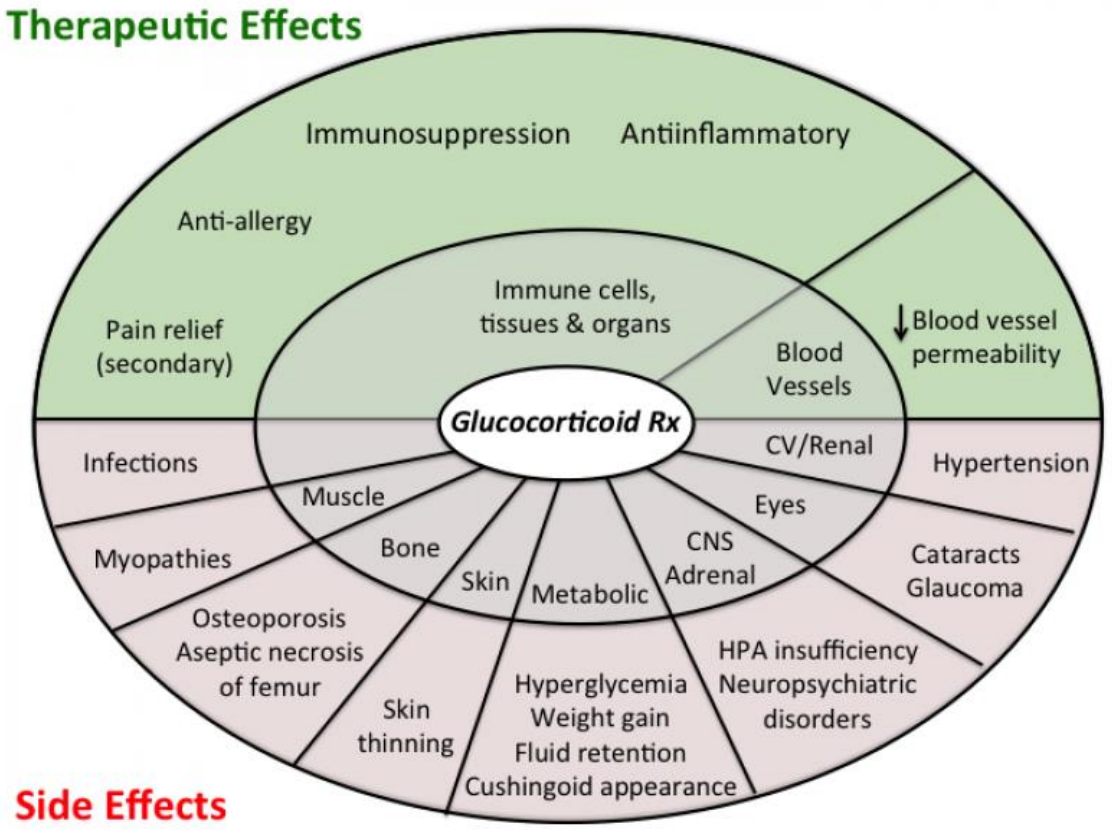
- Topical steroids are also called topical corticosteroids, glucocorticosteroids, and cortisone
- Glucocorticoids bind to the glucocorticoid receptor
- Synthesised in the adrenal cortex



Basics of topical steroids and their application

Topical steroids have an anti-inflammatory action but can induce:

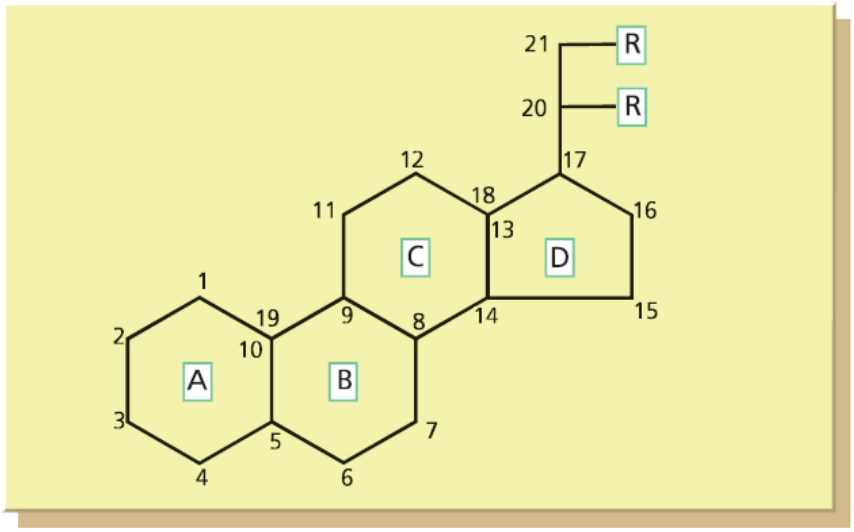
- Immunosuppression
- Vasoconstriction
- Glucocorticoid activity (Cushing's syndrome)
- Mineralocorticoid activity
- Antimetabolic effect



Potencies of topical steroids

Modifications to both the ring stricture and the sidechains:

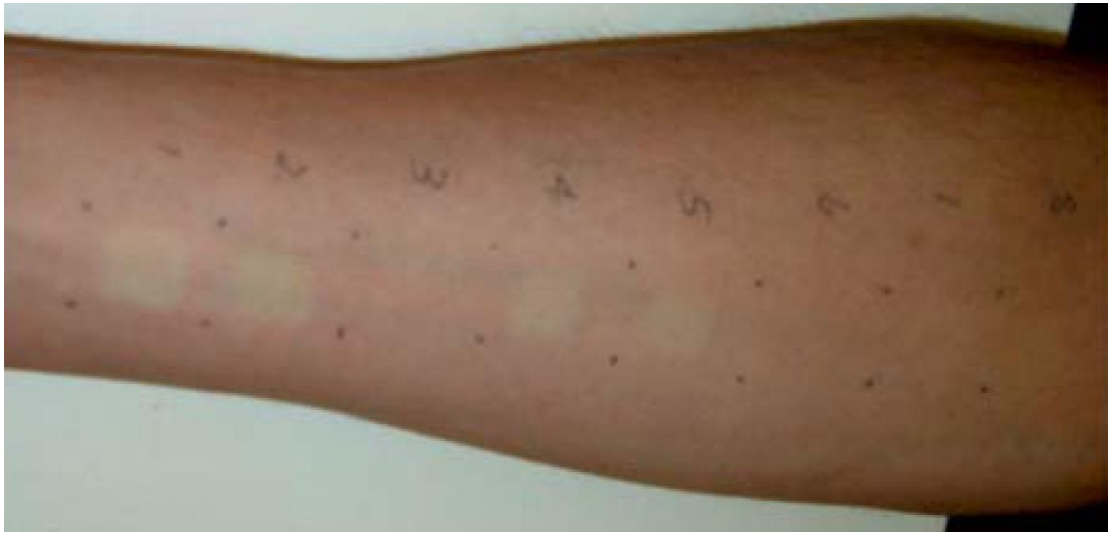
- increased specificity of action,
- increased penetration
- increased potency
- reduced side effects



Potencies of topical steroids / Classification

Vasoconstrictor assay:

- most widely used approach for assessing the potency the vasoconstricting property
- manifests as pallor of the skin which can be assessed visually or measured instrumentally.



- degree of pallor correlates fairly well with clinical potency and with the potential for side effects such as atrophy.
- pallor reaches a peak at around 9-12 h after application

Potencies of topical steroids / Classification

Europe employs a four-category scale:

- mild
- moderate
- potent
- very potent.

In the USA, topical steroids are ranked using a scale ranging from class 1 (super potent) to class 7 (mild).

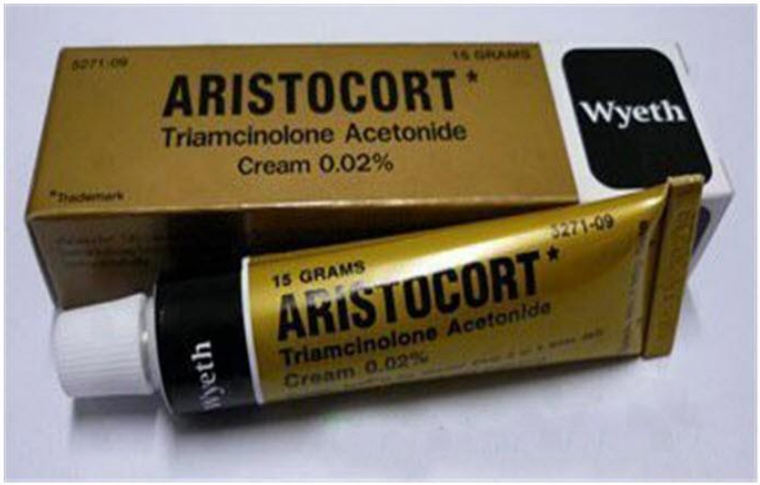
The percentage of a topical corticosteroid is its strength	The percentage value of different formulations of topical corticosteroids does not indicate their potency, e.g. hydrocortisone 1% is a weaker formulation than hydrocortisone butyrate 0.1%.

Potencies of topical steroids / Mild

Mild	Hydrocortisone 1% (Stat dispensing, three or six month quantities)	●	30 g, 100 g, 500 g DermAssist, Pharmacy Health

Potencies of topical steroids / Moderate

Moderate (2–25 × as potent as hydrocortisone)	Clobetasone butyrate 0.05%	◑	30 g Eumovate	
	Triamcinolone acetonide 0.02%	●	100 g Aristocort	100 g Aristocort



Potencies of topical steroids / Potent

Potent‡ (100–150 × as potent as hydrocortisone)	Betamethasone dipropionate 0.05% * †	●		15 g, 50 g Diprosone	15 g, 50 g Diprosone
	Betamethasone valerate 0.1%†	●	Lotion 50 mL Betnovate Application 100 mL Beta	50 g Beta	50 g Beta
	Diflucortolone valerate 0.1%	◑		50 g Nerisone	50 g Nerisone
	Hydrocortisone butyrate 0.1%	●	Lotion 100 mL Locoid Scalp Topical emulsion 100 mL Locoid Crelo	30 g, 100 g Locoid Lipocream	100 g Locoid ointment
	Methylprednisolone aceponate 0.1%	●		15 g Advantan	15 g Advantan
	Mometasone furoate 0.1%	●	Lotion 30 mL Elocon	15 g, 50 g Elocon	15 g, 50 g Elocon

Potencies of topical steroids / Very potent

Very potent[‡] (up to 600 × as potent as hydrocortisone)	Betamethasone dipropionate 0.05% (in propylene glycol base) * †	●		30 g Diprosone OV	30 g Diprosone OV
	Clobetasol propionate 0.05% † (Stat dispensing, three or six month quantities)	●	Application 30 mL Dermol	30 g Clobetasol (BNM)¤ Dermol	30 g Clobetasol (BNM)¤ Dermol

Optimised vehicle (OV) refers to a modified formulation which increases skin penetration of betamethasone dipropionate resulting in a preparation much more potent than the standard one

Potency can be significantly altered by the vehicle in which the topical steroid comes

Therapeutic Index (TIX) of topical steroids

Classification according to the relationship between the desirable and undesirable effects

	Mometasone furoate	Methylprednisolone aceponate	Prednicarbate	Hydrocortisone butyrate	Clobetasol propionate	Betamethasone valerate	Triamcinolone acetate	Hydrocortisone
Vasoconstriction (4)	8	8	8	8	12	8	8	4
Efficacy for atopic dermatitis compared to other TCs (5)	10	10	10	10	15	10	10	5
Total A	**18**	**18**	**18**	**18**	**27**	**18**	**18**	**9**
Skin atrophy (6)	6	6	6	6	12	12	12	6
HPA axis suppression (2)	2	2	2	2	4	2	4	2
Allergenic potential (1)	1	1	1	1	1	1	1	1
Total B	**9**	**9**	**9**	**9**	**17**	**15**	**17**	**9**
Therapeutic Index (Total A/ Total B)	**2**	**2**	**2**	**2**	**1.5**	**1.2**	**1.06**	**1**



Choosing a topical steroids

Table 40-3 Considerations for choosing a topical corticosteroid product

Potency (Class)	Type of dermatosis	Extent of dermatoses	Duration of TCS Usage	Location of dermatoses	Usage in infants and children	State of the epidermis
Superpotent (I)	Dermatoses resistant to intermediate or high potency TCS	Avoid extensive application (>50 g weekly)	For short term use only, ideally 2–3 weeks at a time	Do not use on the face, axillae, submammary area or groin	Avoid use in infants and children under 12 years	Best for thick, lichenified or hypertrophic skin; avoid with thin skin

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High (II & III)	Severe	Avoid extensive application (>50 g weekly)	For short term use only, ideally 2–3 weeks at a time	Do not use on the face, axillae, submammary area or groin	Avoid use in infants and children under 12 years	Best for thick, lichenified or hypertrophic skin; avoid with thin skin

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Intermediate (IV & V)	Moderate	Best for short term treatment of extensive dermatoses	Avoid extended use (>1–2 weeks) in infants and children	Best on trunk and extremities	Avoid extended use (>1–2 weeks) in infants and children	Safer for short term use on thin skin; less effective on thicker skin

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Low (VI & VII)	Steroid sensitive	Preferred for treatment of large areas	Best if long term treatment is required	Best choice for face, axilla, groin, and other moist, occluded areas	Infants and children	Best for thin skin; not effective on thicker skin

Importance of the vehicle

Ointments:

- For very dry non-hairy skin
- No requirement for preservative reducing risk of irritancy and contact allergy
- Occlusive, increasing risk of folliculitis and miliaria

Creams:

- semi-solid emulsions containing both lipid and water.
- Cooling and soothing, and are well absorbed into the skin
- Allrounder

Lotions / Solution:

- For scalp (alcohol based), easy to spread
- liquid formulations, simple suspensions or solutions of medication in water, alcohol or other liquids
- Those containing alcohol often sting, especially when applied to broken skin.
- When left on the skin, the liquid will evaporate, leaving a film of medication on the surface

Importance of the vehicle

Table 40-4 Considerations for choosing a vehicle for the topical corticosteroid

Preparation	Composition	Skin hydration versus drying	Preferred dermatoses or site of use	Preferred location of use	Cosmesis	Potential for irritation
Ointment	Water in oil emulsion	Very good skin hydration	Best for thick, lichenified, or scaly dermatoses	Best for thick palmar or plantar skin; avoid with naturally occluded areas	Very greasy	Generally low
Cream	Oil in water emulsion	Moderate in skin hydrations potential	Best for acute, subacute or weeping dermatoses	Good for moist skin and intertriginous areas	Elegant	Variable; require preservatives
Gel	Cellulose cut with alcohol or acetone	Drying	Scalp or dermatoses in dense hair areas	Best for naturally occluded areas, scalp, and mucosa	Elegant	Higher
Lotion	Oil in water	Drying	Scalp or dermatoses in dense hair areas	Best for naturally occluded areas and scalp	Elegant	Higher
Solution	Alcohol	Drying	Scalp or dermatoses in dense hair areas	Best for naturally occluded areas and scalp	Elegant	Higher

Quantity of application

Quantity of cream or ointment required for a single total body treatment of a male adult have varied considerably:

- range of 12-27 g (average 18g) was required for applications by 'trained operators', whilst a range of 8-115 g (average 44 g) was required when the treatment was self-administered

- In another study, in which treatment was applied by nurses, an average of 12 g of ointment was required

- A more recent study, male patients treating themselves applied an average of 20 g of ointment, and females applied 17 g

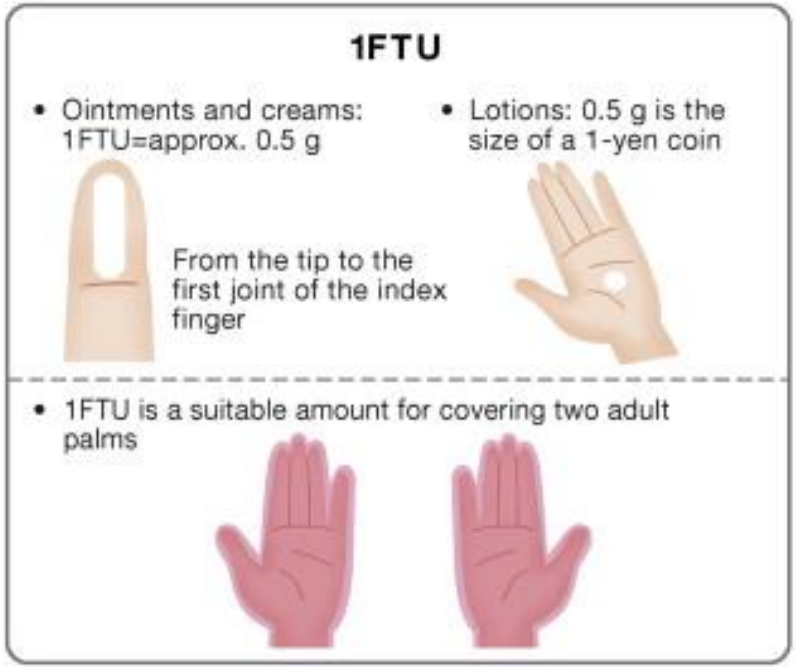
Quantity of application

Finger tip unit

The quantity of ointment or cream, (extruded from a tube with a nozzle of 5 mm diameter), of one finger tip covers, on average, an area of two adult palms.

Rule of hand

The rule of hand states that an area of the size that can be covered by four adult hands (palms, including the digits) can be treated by 1 g of ointment or 2 fingertip units.



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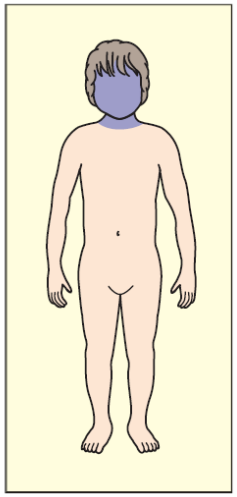
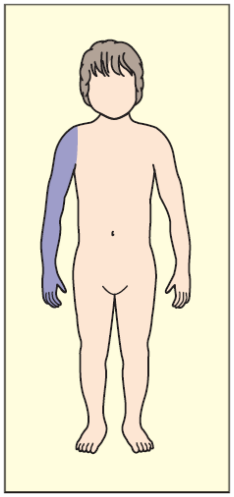
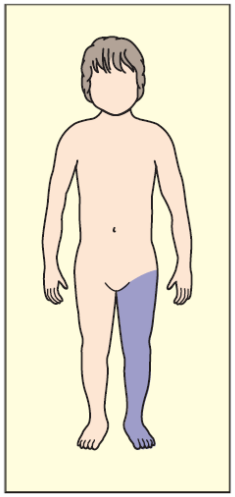
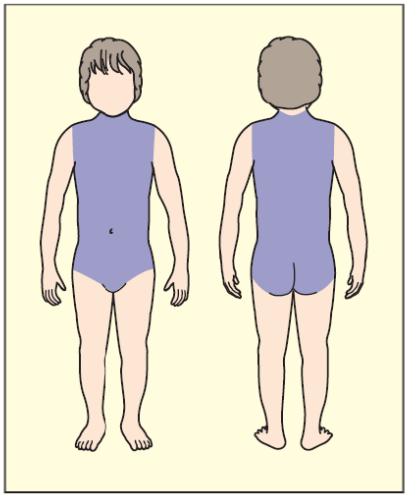
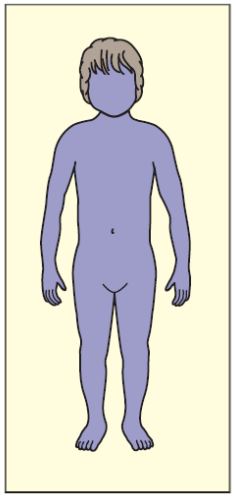










Age	Face and neck	One upper limb	One lower limb	Trunk (including buttocks)	Whole body
3–6 month	1	1	1.5	2.5	8.5
1–2 years	1.5	1.5	2	5	13.5
3–5 years	1.5	2	3	6.5	18
6–10 years	2	2.5	4.5	8.5	24.5
Adult	2.5	4.5	7.6	13.5	40

Frequency of application

Once-daily application!

- as twice daily
  - application is only marginally more effective
  - requires double the amount of medication and increasing both systemic exposure to the drug
  - More time consuming and less cost efficient

- The pharmacological actions of a drug may persist long after it has left the surface of the skin.

- Thus the ability of a potent topical corticosteroid to inhibit flares of atopic eczema when applied just twice weekly

- Increasing the interval between applications can be a useful method of gradually reducing the intensity of a treatment

Hazards associated with topical steroids

Contact allergy to topical steroids:

- 4.9% are allergic to one or more corticosteroid molecules, most commonly hydrocortisone, budesonide or hydrocortisone butyrate
- Four chemical groupings within which cross-reactivity is most likely to occur

Group A
- Cloprednol
- Cortisone
- Cortisone acetate
- Fludrocortisone
- Hydrocortisone
- Hydrocortisone acetate
- Methylprednisolone acetate
- Prednisolone
- Prednisolone acetate
- Tixocortol pivalate

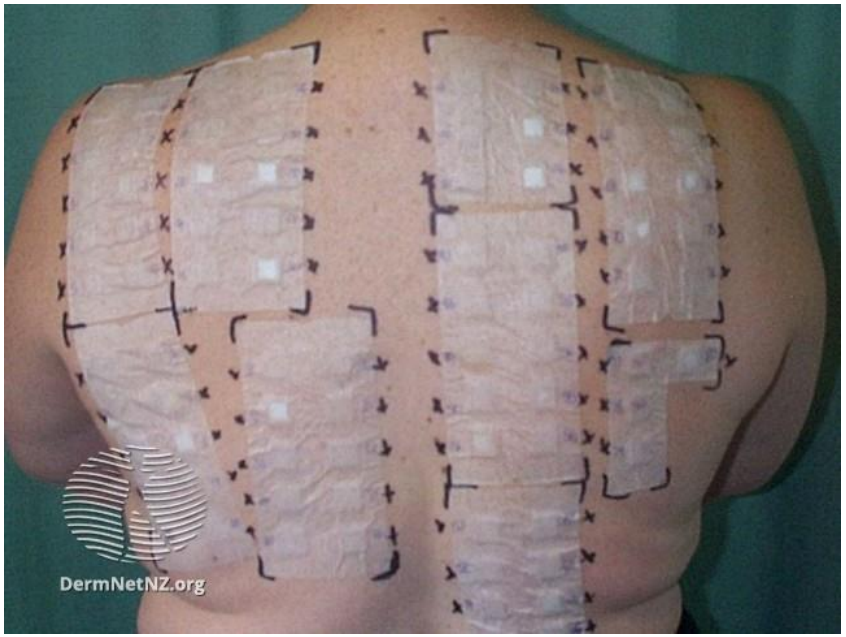
Group B
- Amcinonide
- Budesonide
- Desonide
- Fluocinolone acetonide
- Fluocinonide
- Halcinonide
- Triamcinolone acetonide
- Triamcinolone alcohol

Group C
- Betamethasone
- Betamethasone sodium phosphate
- Dexamethasone
- Dexamethasone sodium phosphate
- Fluocortolone

Group D
- Alclometasone dipropionate
- Betamethasone dipropionate
- Betamethasone valerate
- Clobetasol-17-propionate
- Clobetasone-17-butyrate
- Flucortolone caproate
- Flucortolone pivalate
- Fluprednidene acetate
- Hydrocortisone-17-butyrate
- Hydrocortisone-17-valerate

Hazards associated with topical steroids

- Irritant reactions due to incorrect vehicle, e.g. alcohol containing lotion
- Contact allergy to preservatives or constituents of the vehicle
- Particularly patients with chronic wounds have a high risk of contact allergies
- Ointments have fewer ingredients and bear lower risks for a contact allergy



Hazards associated with topical steroids
Application on face

- Perioral dermatitis and rosacea
- Cataract and glaucoma (if applied around eyes)

Hazards associated with topical steroids
Skin atrophy

- Atrophic changes affect both the epidermis and the dermis
- When steroid exposure is prolonged fragility and striae may develop
- The loss of connective tissue support for the dermal vasculature results in erythema, telangiectasia and purpura.
- Inhibition of melanocyte function gives rise to hypopigmentation

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Rapid development of skin thinning of 15% reduction in thickness after 3 weeks of treatment under occlusion with 0.1%betamethasone valerate

Hazards associated with topical steroids
Systemic side effects

- 20% of patients developed temporary reversible adrenal suppression after applying 98 g of a super-potent corticosteroid preparation over 2 weeks
- Children and babies have a high ratio of surface area to body volume and are more vulnerable to pituitary-adrenal suppression as a result of systemic absorption.
- Even hydrocortisone applied topically may suppress the adrenocortical response in some children

Hazards associated with topical steroids
Absorption

Site	Relative absorption
Forearm	1
Sole	0.1
Ankle	0.4
Palm	0.8
Back	1.7
Scalp	3.5
Axilla	3.6
Forehead	6
Scrotum	42

Adapted from Feldmann and Maibach 1967 [11].

Absorption varies considerably depending on the region of skin being treated

Topical corticosteroids should not be applied to broken skin	The consensus of paediatric dermatologists in Australia and New Zealand is that topical corticosteroids can be applied to areas of eczema with broken skin.[5] This concern possibly arose as topical corticosteroid absorption will be greater through broken skin. However, this can prevent patients having topical corticosteroids applied to areas of active eczema particularly when severely inflamed or excoriated. All skin with an active eczema flare will have reduced barrier function, and the best way to address this is through appropriate use of topical corticosteroids.

Topical steroids and emollients

- “When using the two treatments, apply the emollient first. Wait 10-15 minutes after applying an emollient before applying a topical steroid. That is, the emollient should be allowed to absorb before a topical steroid is applied. The skin should be moist or slightly tacky but not slippery, when applying the steroid”

- “Twenty to thirty minutes between the two treatments to avoid diluting the topical steroid and reducing its effectiveness”

Wet Wrap Therapy

Tool in the treatment of severe eczema flare-ups (atopic dermatitis)

- Put moisture into the skin
- Increase absorption of topical steroids into the skin
- Act as a barrier to keep the patient from scratching
- Cooling – as water gradually evaporates from the bandages this cools the skin and helps relieve inflammation, itching and soreness.

Wet Wrap Therapy

Steps:

- Patient may first soak in a bath with bath oil or emollient solution
- Steroid cream is liberally applied to the area
- Bandages (e.g. Tubifast) soaked in warm water are wrapped or applied over the top of the creams
- Dry bandages are placed over the top of the wet bandages to protect clothing
- Later on, the dry bandage may be removed and water sprayed on the underneath layer to keep it damp, before reapplying the dry outer bandage.

When to use wet dressings

- Wet dressings play an important role in the treatment of eczema
- Wet dressings should be used when your child is hot and itchy and if they wake at night due to the itch
- Your child may also need a wet dressing if there is blood on the sheets or if the eczema is still present despite treatment with cortisone ointments, moisturisers and bath oils
- Early use of wet dressings will reduce the amount of cortisone creams needed to control the eczema
- Parents and children who have used wet dressings generally express great satisfaction with the technique and many have found them to be life changing

How wet dressings help eczema

- Wet dressings help to reduce itch by **cooling** the skin. The itch is worse when the skin is hot and inflamed
- Wet dressings help with the treatment of **infection**, as they help to clean the skin's surface
- Applying moisturiser under the wet dressings helps to **rehydrate** the skin
- Wet dressings **protect** the skin from fingernails and scratching, and help the skin to heal
- Wet dressings help to develop a good **sleep** pattern for the child and their family

How to apply a wet dressing

1. Getting started

You will need:

- Bowl
- Tepid water
- Bath oil
- Cortisone or anti-inflammatory cream (if prescribed)
- Moisturiser
- Disposable towels
- Crepe bandages

2. Setting up

- Wash your hands
- Fold disposable towels in half
- Fill bowl with tepid water
- Add one capful of bath oil and disposable towels to bowl
- Spoon creams out onto a dry towel

3. Applying the creams

- Apply cortisone or anti-inflammatory creams, as prescribed, to all areas affected with eczema
- Apply moisturiser over the cortisone ointments and to the whole of the body and face

4. Applying the wet towels

Wrap the wet towels around the areas of eczema, using a few layers

5. Applying the crepe bandage

- Wrap crepe bandages around the wet towels, firmly but not tightly
- Avoid direct contact of the bandage with the skin

6. Applying the wet t-shirt and bandana

- Wet cool compresses can be applied to the neck as a scarf (only knot once), and a wet bandana can be applied to the head
- The scarf and bandana should be applied only under supervision and not at bedtime
- For the trunk, apply a wet T-shirt or singlet. This can be repeated as often as needed and a dry T-shirt can be applied over the top

7. Cool compressing

- Cool compressing is a wet dressing for the face
- Wet disposable towels in a bowl of cool water and bath oil
- Hold the towels on to the face for 5–10 minutes
- Apply moisturiser immediately after compressing
- Cool compressing should be applied as often as needed until the itch is relieved

Important information about wet dressings

- Wet dressings are best applied at night, however they can beused during the day if the eczema is severe
- Wet dressings will dry after a few hours. Do not leave the dressings on dry (unless your child is sleeping) as dry dressings can irritate the skin by causing it to become hot, dry and itchy
- Crepe bandages used for wet dressings may be washed in the washing machine. Do not wash or reuse the disposable towels
- Do not use antiseptic bath oils in the wet dressings as these may irritate and burn your child's skin

Occlusive Therapy

Occlusive therapy is highly effective

- For hands use rubber gloves
- For arms/legs cover with a plastic wrap such as Glad wrap
- Secure the dressing with tape on either end.
- A sock will hold the plastic dressing against a foot.
- The dressing may stay on for 4 hours.
- Not longer than one week


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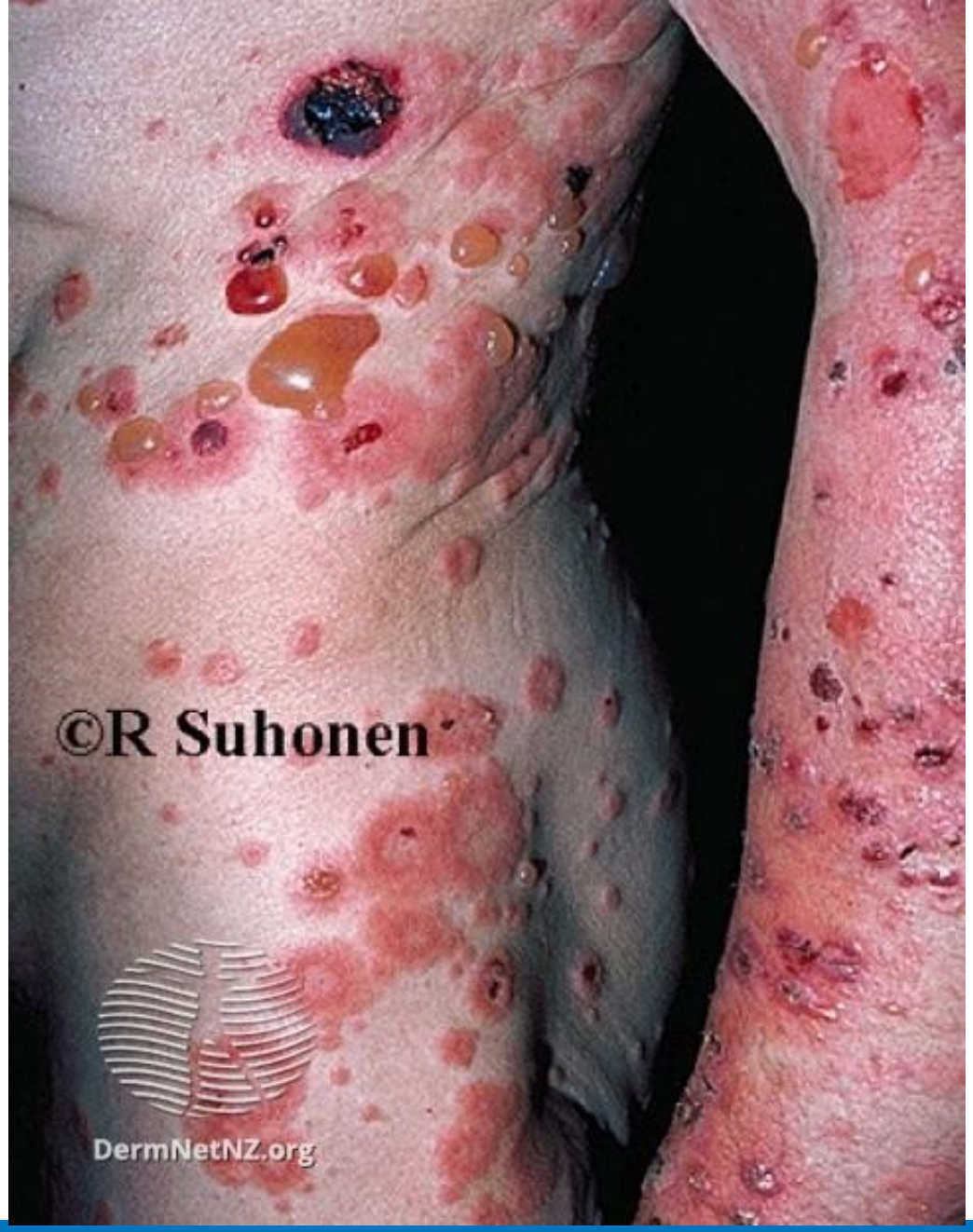
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Capital & Coast
District Health Board
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