



MONASH University

Medicine, Nursing and Health Sciences

Lotions Potions & Creams Wounds Australia Conference 2018

**Associate Professor Geoff Sussman
Clayton Campus**

Dry Skin

Dry Skin is part of the ageing process but is also present in younger people

Dry skin will increase the risk of skin breakdown and risk reducing the barrier function of the skin



Figure 2 Fissured skin in patient with chronic hand eczema.

Skin Dryness Scale

- 0 = Smooth, no evidence of dryness
- 1 = Slightly dry skin; occasional scale, not necessarily uniformly distributed
- 2 = Moderately dry skin; fairly uniformly distributed scale, but no widespread uplifting flaking
- 3 = Severely dry skin; pronounced scaling visible with the naked eye, definite uplifting of edges or scale sections- skin surface may have a whitish appearance
- 4 = extremely dry skin; more scale and pronounced separation of scale edges, some evidence of cracking

TERMS

Emollients

An agent that softens and smooths the skin

Moisturizers

An agent that add moisture to the skin

Skin Barrier

An agent that protects the skin from chemical agents, mechanical trauma encountered

During work

Skin Lipids

Lipids are a structural part and an important part of the functions of the skin and in particular trans-dermal transport mechanism.

Lipids are found in the stratum corneum are part of the formation of a permeability barrier because of their high melting point and polarity which results in water-resistant lipid bilayers.

What Lipids do Emollients Contain

- Animal Fats
- Vegetable Oils
 - Fixed
 - Essential/Volatile
- Mineral Oils
- Synthetic Oils
- Waxes

Types of Emollient Formulations

- Oil-in-Water Emulsions (Aqueous Creams)
- Water-in-oil Emulsions (Fatty Cream)
- Paraffins / Wax/Glycols (Ointments)

What do Emollient do

- These agents prevent the movement of water out of the skin relying on interposing an impervious barrier (usually Lipid) between the skin and the environment

What else do Emollient Contain

- Antioxidants
- Fragrances
- Preservatives
- Emulsifying Agents
- Humectants
- Colouring
- Sunscreens

Actions Emollients

- Anti-inflammatory
- Antimitotic
- Antipuritic

Emollients Actions

- **Anti-inflammatory**

There is widespread acceptance that emollients have a soothing effect on inflamed skin.

It is thought that they inhibit production of pro-inflammatory prostanooids by blocking cyclo-oxygenase activity

Emollients Actions

- **Antimitotic**

Emollients containing mineral oils have an antimitotic effect on the epidermis. There is Heightened mitotic activity in inflammatory Dermatoses It is not certain how this effect is caused

Emollients Actions

- **Antipruritic**

Emollients will help reduce itch. This may be due to their anti-inflammatory action and by their cooling action on the skin

Formulations

Many topical products have complex formulas containing many of the ingredient types. At times they contain multiple ingredients and in some cases these are unnecessary.

Some claims made are not based on evidence mostly just marketing

I. DRY SKIN CARE LOTION

A formulation from Costec Inc. containing petrolatum and lanolin. This formulation was published in Reference 36, p. 103.

Phase	Ingredient	%
A	Deionized water	74.40
	Disodium EDTA	0.05
	Sorbitol (70% aq.)	3.00
	Triethanolamine	1.85
	Methylparaben	0.02
	Sodium chloride	0.02
B	Mineral oil	7.00
	Petrolatum	3.00
	Lanolin	3.00
	Lanolin alcohol	3.00
	Stearic acid, triple pressed	2.50
	Cetyl alcohol	1.75
	Propylparaben	0.10
C	Quaternium-15	0.20
D	Fragrance	qs

Procedure: Combine phase A with mixing and heat to 75°C in main vessel. In a separate vessel, combine phase B and heat with mixing to 75°C. Add phase B to A (both homogeneous and at 75°C) with strong mixing. Maintain at 70 to 75°C for 15 minutes and then start cooling with moderate agitation. At 40°C, add phase C and then D. Continue mixing and cooling until uniform and at 25°C.

II. HAND AND BODY CREAM

This formulation was provided by Penreco and published in Reference 37, p. 98.

Phase	Ingredient	%
A	Deionized water	70.60
	Carbomer	0.20
B	Propylene glycol	7.00
	Methylparaben	0.20
	Panthenol	0.10
C	Mineral oil (and) hydrogenated butylene/ethylene/styrene co-polymer (and) hydrogenated ethylene/propylene/styrene co-polymer	7.00
	Propylene glycol dicaprylate/dicaprylate	5.00
	Isostearyl alcohol	2.00
	Propylparaben	0.10
	Cetyl alcohol	2.00
	Glycerol stearate (and) PEG-100 stearate	2.50
	Potassium cetyl phosphate	1.75
	Tocopheryl acetate	0.10
D	Triethanolamine	0.15
E	Diazolidinyl urea	0.20
F	Soy lecithin	1.00
	Fragrance	0.10

Procedure: Disperse phase A. Add phase B. Heat to 75 to 80°C and mix until uniform and lump free. Combine C and heat to 80°C and mix until all the solids are dissolved. Add phase C to the A+B mixture. Mix for 30 minutes until good agglomeration. Add D. Mix until completely smooth and homogeneous. Cool to 50°C. Add E and cool to 40°C. Add F. Continue mixing and cooling to 30°C.

Other Contents included in a Preparation

Preservatives are substances added to protect the product from Microbial contamination.

Antioxidants are substance that prevents or inhibits oxidation. They are used to protect ingredients which are subject to chemical degradation by oxygen

pH buffers are a compound or a mixture of compounds that, when present in a product resists changes in pH (acidity or alkalinity) due to other factors

Other Contents included in a Preparation

Viscosity inducing agents change flow characteristics will impact in both a positive and a negative way. Thicker products are useful when they need to remain in place eg. Some amorphous Hydrogel, Hydrocolloid paste, Cadexomer Iodine

Thinner products allow better diffusion across a wider area eg. Saline, Antiseptics

Surfactants & Emulsifying Agents

Surfactants are compounds that reduce the surface tension on the skin eg. Soaps or soap substitutes eg QV Wash, Antiseptics eg. Cetrимide

Emulsifying agents are compounds that allow two immiscible phases (Oil and Water) to combine forming an emulsion eg. Soft soap, Hard soap, Detergents
Fats eg. Waxes, wool fat, wool alcohols

Main Ingredients

- Glycerin
- Glycols
- Natural moisturizing agents
- Urea
- Soft paraffin
- Lanolins
- Fatty acids

MAIN INGREDIENTS

UREA

This is a physiological substance occurring in human tissues, blood and urine. Urea has many actions on skin it is easily absorbed. Creams with 10% urea decrease transepidermal water loss. Urea is thought to accelerate barrier recovery of the skin. Urea also acts as a Keratolytic when used as 10-20% concentration. Urea does however have some side-effects especially in high concentrations >20%. It has caused skin irritation and inflammation and also Increases transepidermal water loss.

MAIN INGREDIENTS

SOFT PARAFFIN

Soft paraffin derived from petroleum is a common ingredient in many topical products and as the base on many. It is produce as Yellow soft paraffin and as a bleached form white soft Paraffin.

Cleansers and moisturisers

Cleansers and moisturisers are needed to help maintain our skin in good condition. The skin provides mechanical strength and resistance, it controls transport of substances from the outside of our bodies to the inside and vice versa, and it prevents ingress of foreign chemical substances, microbes and allergens

Cleansers

Cleansers are designed to remove dirt, sweat, sebum, and oils from the skin. This is achieved through the use of surfactants that aid in the uplifting of dirt and solubilisation of oils. The cleansing process also helps to promote normal exfoliation and rejuvenate the skin.

Cleansers

Quality cleanser must minimise the damage caused by surfactants while also compensating for any damage by providing moisturising benefits. Gentle surfactants are vital, and these can be anionic, non-ionic, amphoteric or cationic. The moisturisers that can be added are emollients, humectants or occludents. Lastly, the pH of the cleanser must be balanced to that of the skin and be acidic.

THE IMPORTANCE OF CLEANSER pH

The skin is naturally acidic, that is, it has a low pH. This is known as the 'acid mantle' and forms part of the skin's defence system against infection.

Using a high-pH cleanser can have many adverse effects on the skin, with high-pH cleansers able to increase the skin's natural pH. Skin that has a high pH is more prone to dehydrate; this is due to disruption of the lipid bilayers, allowing increased water loss

Greive K Cleansers and moisturisers: the basics Wound Practice and Research Volume 23(2)June 2015

Cleansers

- Cleansing with soap or high-pH syndets increases propionibacteria on the skin, while using low-pH syndets decreases it. It has been found that it's the pH of the cleanser and not the cleanser ingredients that affect skin microbiology

pH of Popular Soaps

Brand	pH
J & J Baby Soap	11.9
Palmolive regular	11.0
Velvet	11.0
Neutrogena	9.5
Cussons Baby Soap	10.9
Cussons Imperial Leather	10.8
Pears	10.8
Simple Soap	11.2
Dove white	7.53
Lux	12.38
Camay	10.38

Cleansers

Using high-pH cleansers, such as soap, can activate epidermal proteases. Inappropriate protease activity can lead to a loss of corneocyte cohesion and increased epidermal permeability. Overall, this results in dry, flaky, irritated skin.

It is important that any cleanser used on the skin has a slightly acidic pH to maintain the skin's natural environment.

Cleansers and moisturisers

A quality cleanser needs to cleanse gently and maintain the skin's barrier function and flora. They should use a combination of gentle surfactants with added moisturisers, be free from unnecessary ingredients such as fragrance, colours and essential oils, and have a pH that is slightly acidic to match the skin.

Cleansers and moisturisers

By adding moisturisers to cleansers, we can help to prevent and reverse any skin changes induced by the surfactants.

In the western world we tend to overclean our skin. Cosmetic manufacturers will often recommend a cleanser be used morning and night, and patients like to see foam, so they use a lot more cleanser than they need to.

Cleansers

For the best skin health, cleansers should be used when microbial contamination is a risk, such as after using the toilet, prior to eating, and so on, or when the skin is noticeably dirty or smelly. It's also important to remember that a little cleanser goes a long way and foam quantity does not equal cleansing power.

Moisturisers

A quality moisturiser is essential for healthy skin maintenance. It's important to remember that there is no one perfect moisturiser for every person and that matching the correct moisturiser to the patient is essential for ongoing compliance and good skin health.

Moisturisers

A moisturiser is a topical product designed to help treat and prevent dry skin. It's common to think that a moisturiser adds water to the skin; however, this is a misunderstanding. Rather, a moisturiser works by preventing or reducing water evaporation from the skin. This action allows the skin to rehydrate from within.

Moisturisers

The terminology surrounding moisturisers can be a little confusing, so we should define a few words for this review. The words 'moisturiser' and 'emollient' are often used interchangeably and can mean different things, or the same thing, depending on who is using the terms. A 'moisturiser' is a finished product used for topical application, while an 'emollient' is an ingredient that can be used in a moisturiser.

Moisturisers

A moisturiser is needed to help keep the skin looking young and fresh. Hydrated skin is plump, luminescent and elastic. Dehydrated skin is tired looking, particularly around the eyes, dull and lacks spring and elasticity. We need to use moisturisers for the treatment and prevention of dry skin, flaky skin, itchy skin and inflamed skin.

Effective Moisturisers

Moisturising agents can be divided into two types: lipophilic or hydrophilic. Hydrophilic moisturisers are also known as humectants, while lipophilic moisturisers can be subdivided into emollients and occludents.

Greive K Cleansers and moisturisers: the basics Wound Practice and Research Volume 23(2)June 2015

Effective Moisturisers

Humectants are hygroscopic substances. They absorb water from their environment, which is the product that they have been formulated into, and they promote water retention in the skin. Humectants penetrate the skin readily and act like biological sponges, absorbing water from the product and delivering it to the skin.

Effective Moisturisers

Emollients provide an 'oily' film over the skin surface where they trap water, allowing the stratum corneum (SC) to swell and close the cracks in the dry skin. Emollients help prevent the penetration of irritants and allergens while also improving the appearance of the skin by smoothing flaky skin cells.

Effective Moisturisers

Occludents form a film or barrier on the skin and restrict the escape of water vapour, trapping water in the skin's uppermost layers and protecting against moisture loss. Some common occludents are lanolin, waxes and soft white paraffin, which is also called petrolatum

Greive K Cleansers and moisturisers: the basics Wound Practice and Research Volume 23(2)June 2015

Effective Moisturisers

- Some lipophilic moisturisers, such as petrolatum, can enter the intercellular space of the stratum corneum (SC) and become part of the lipid structure of the SC to provide an increased barrier to water loss

- Greive K Cleansers and moisturisers: the basics Wound Practice and Research Volume 23(2)June 2015

When Moisturisers Go Wrong

While it may seem pretty straightforward to create a good moisturiser, we have an excellent example of a product currently available that can do a lot of damage to the skin: Aqueous Cream BP. Aqueous Cream was originally designed to be a soap-alternative skin cleanser. It's non-foaming, thick and has a cream-like appearance.

When Moisturisers Go Wrong

The problem with using Aqueous Cream as a leave-on moisturiser is that it contains sodium lauryl sulphate as the surfactant cleanser.

When sodium lauryl sulphate is used as a cleanser and washed off the skin, it does not cause any issues, but when left on the skin, its surfactant action can be damaging to both normal and atopic skin.

When Moisturisers Go Wrong

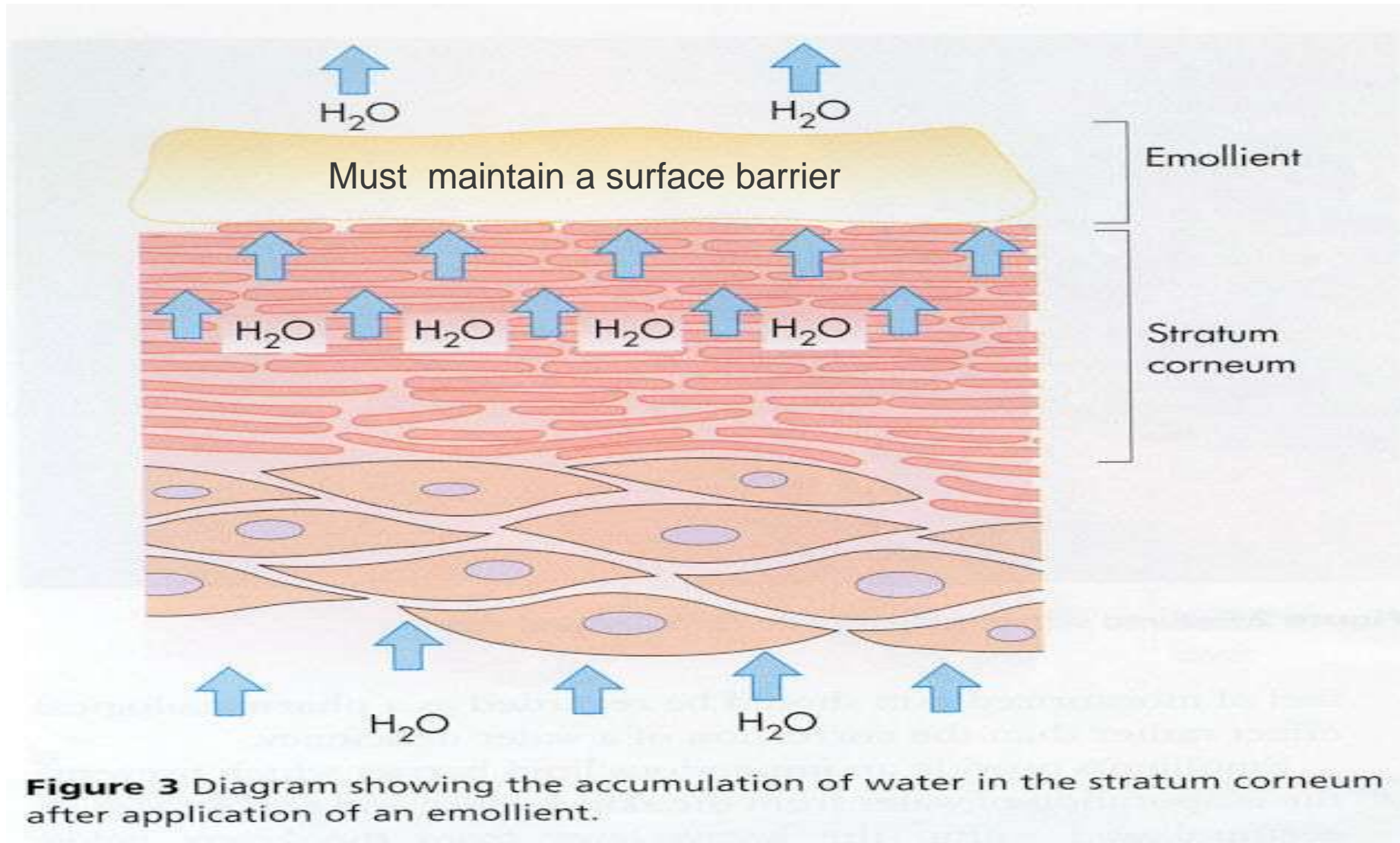
When Aqueous Cream was applied to normal skin, twice daily for four weeks, it resulted in increased protease activity that led to inflammation and increased skin shedding, along with accelerated skin turnover with immature and small corneocytes emerging. Ongoing use of Aqueous Cream has also been found to progressively thin the stratum corneum.

When Moisturisers Go WrongNG

When applied to skin with atopic dermatitis/eczema, twice daily for four weeks, Aqueous Cream significantly decreases barrier function and increases skin permeability. It also leads to a worsening of the skin's condition and structure, while moving those with dermatitis/eczema towards the disease state.

Greive K Cleansers and moisturisers: the basics Wound Practice and Research Volume 23(2)June 2015

Measures to Ensure Skin Tone



Measures to Ensure Skin Tone

Using appropriate moisturising agents to ensure suppleness and to minimise the drying effects of the ageing process on the skin including.

- Skin Creams
- Skin Ointments eg.
- Wool Alcohols Ointment
- Bath Oils
- Barrier Films

The Use of Moisturizers

Sorbolene and other aqueous creams are of little value as Moisturizers. Recent published studies in the British Journal of Dermatology have reported a significant increase in trans-epidermal water loss and another study reported

Impacts on cellular and molecular level of the skin. Increased desquamatory and inflammatory protease activity. Changes in corneocyte maturity and size indicate an accelerated skin turnover induced by chronic application of these emollients.

Danby et al The effects of aqueous cream on the skin barrier in patients with a previous history of atopic dermatitis *BJ Derm* 2011;65,329-334

Mohammed D et al Influence of aqueous cream on corneocyte size, maturity, skin protease activity, protein content and transepidermal water loss. *B J Dermat* 2011; 164:1304-1310

The Use of Moisturizers

Changes in SC thickness, baseline transepidermal water loss (TEWL) and rate of increase in TEWL during tape stripping were observed in skin treated with Aqueous Cream BP. The mean decrease in stratum corneum (SC) thickness was 12% ($P = 0.0015$) and the mean increase in baseline TEWL was 20% ($P < 0.0001$). Reduced SC thickness and an increase in baseline TEWL, as well as a faster rate of increase in TEWL during tape stripping, were observed in 16 out of 27 treated skin sites.

Conclusions The application of Aqueous Cream BP, reduced the SC thickness of healthy skin and increased its permeability to water loss.

These observations call into question the continued use of this emollient on the already compromised barrier of eczematous skin.

The Use of Moisturizers

Conclusions We report rapid minimally invasive measures of the effects of Aqueous Cream BP at the cellular and molecular level of the skin. Treatment with this formulation is associated with increased desquamatory and inflammatory protease activity. Changes in corneocyte maturity and size are also indicative of accelerated skin turnover induced by chronic application of this emollient. These findings question firmly the routine prescription of this preparation as a moisturizer in patients with atopic dermatitis.

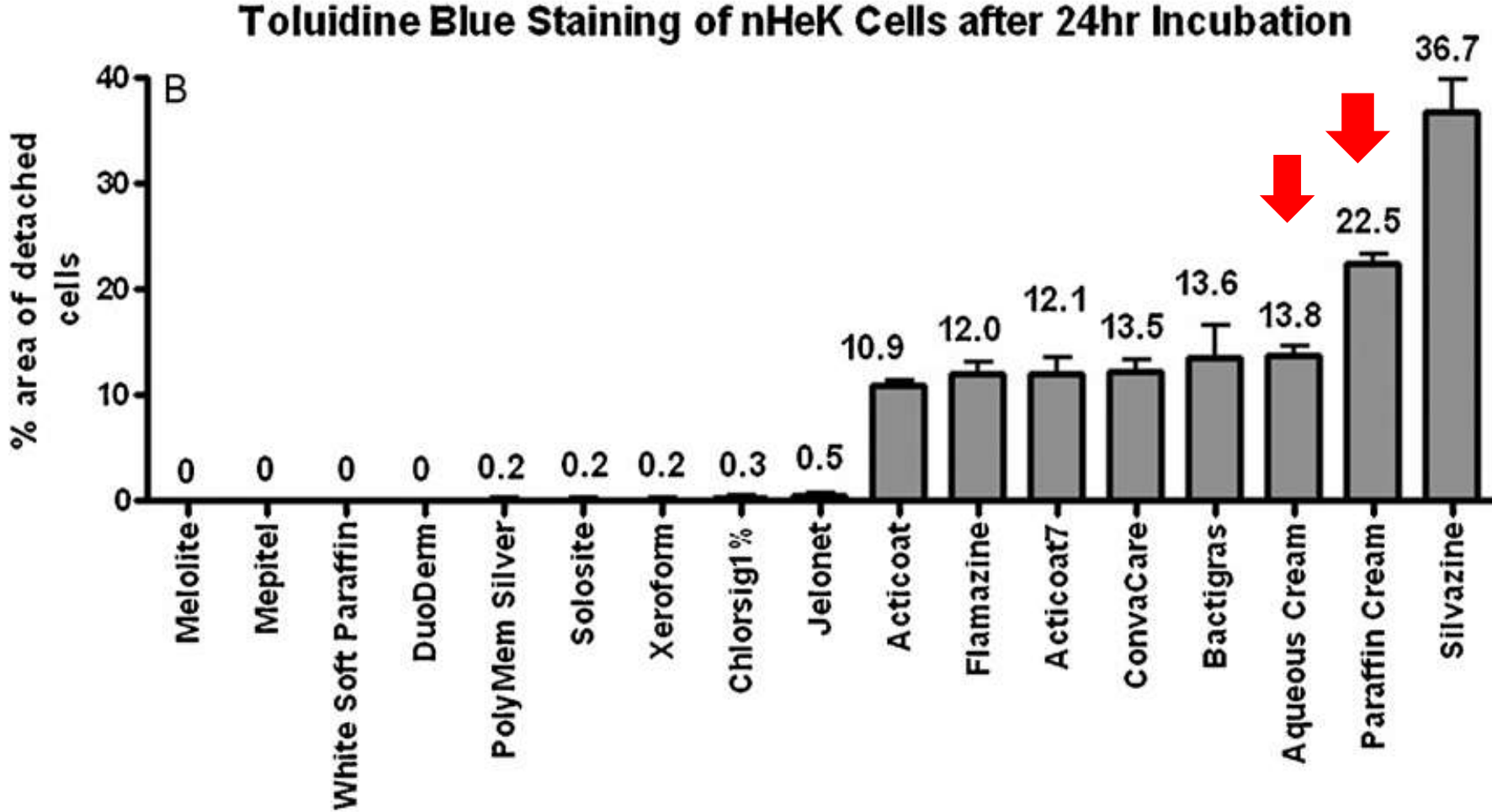
D. Mohammed, P.J. Matts, J. Hadgraft and M.E. Lane Influence of Aqueous Cream BP on corneocyte size, maturity, skin protease activity, protein content and transepidermal water loss British Association of Dermatologists 2011 164, pp1304–1310

The Use of Moisturizers

Conclusions Aqueous cream BP used as a leave-on emollient caused severe damage to the skin barrier in volunteers with a previous history of atopic dermatitis (AD). Aqueous cream BP should not be used as a leave-on emollient in patients with AD.

S.G. Danby, T. Al-Enezi, A. Sultan, J. Chittock, K. Kennedy and M.J. The effect of aqueous cream BP on the skin barrier in volunteers with a previous history of atopic dermatitis *Cork British Association of Dermatologists* 2011 165, pp329–334

Tissue Toxicity

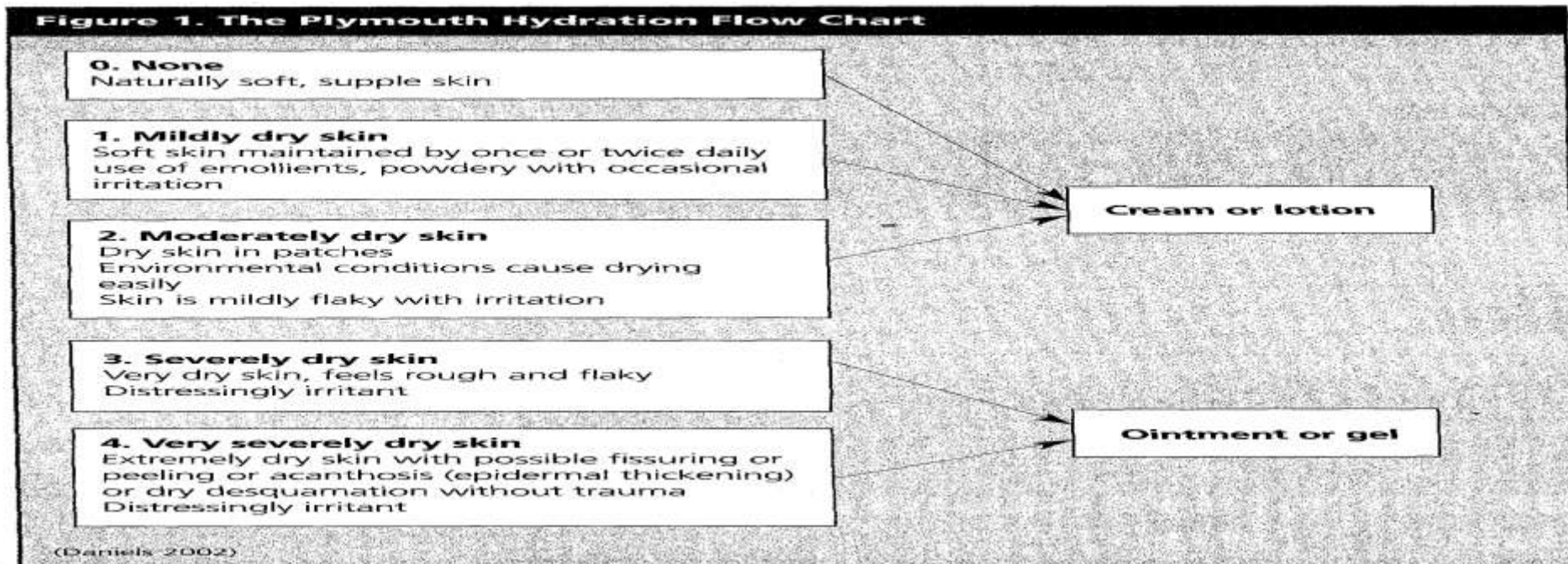


Margit Kempf *, Roy M. Kimble, Leila Cuttle Cytotoxicity testing of burn wound dressings, ointments and creams: A method using polycarbonate cell culture inserts on a cell culture system burns 37 (20 1 1) 9 9 4 – 1 0 0 0

Which Moisturiser is best to use

Patient Group / Skin Type	Product Type
Younger Patients and most Adults	a Cream
Older patients with good skin	An Ointment
Older patients with fragile skin	A Lotion

Because creams need to contain preservatives to prevent bacterial growth where ointments do not it is preferable to use ointments in particular on children and older people as the chemicals will cause stinging.



The Role of a Moisturizer in Age Care

A cluster randomised controlled trial was conducted to evaluate the effectiveness of a twice-daily moisturising regimen as compared to 'usual' skin care for reducing skin tear incidence. The facilities were sorted into pairs and matched in terms of bed numbers and whether they provided high or low care. One facility from each matched pair was randomised to the intervention group

The Role of a Moisturizer in Age Care

A total of 1396 skin tears on 424 residents were recorded during the study. In the intervention group, the average monthly incidence rate was 5.76 per 1000 occupied bed days as compared to 10.57 in the control group. The application of moisturiser twice daily reduced the incidence of skin tears by almost 50% in residents living in aged care facilities.

Barrier Applications

Designed to prevent Water, Solvents, Alkalis and other Noxious agents from coming in contact with the skin surface

In a similar way to Emollients Barrier Cream interpose an impervious barrier between the skin and the environment.

Barrier Applications

A barrier preparation can then be applied to the peri-wound area as a skin protectant. Various skin barrier preparations are available including ointments, creams, and a barrier film that leaves a protective film on the skin surface. The barrier film comes as a spray and also in an impregnated foam on a stick. It can be applied to vulnerable skin under adhesive dressings to aid adhesion and prevent trauma on removal.

Barrier Applications

There is no evidence that one barrier/protectant in the market is better than any other; the performance of each product depends on the overall formulation and frequency of application, rather than on the principal ingredient. Skin protectants such as solvent-based polymer film barriers and zinc oxide–thickened mechanical ointments are the only products with the highest level of supporting evidence.

Allergic Reactions

A number of ingredients in topical preparations may cause an allergic reaction. It is important to monitor patients for any adverse reaction to any products applied. The reaction may take the form of a rash, Pain or discomfort, erythema, acne

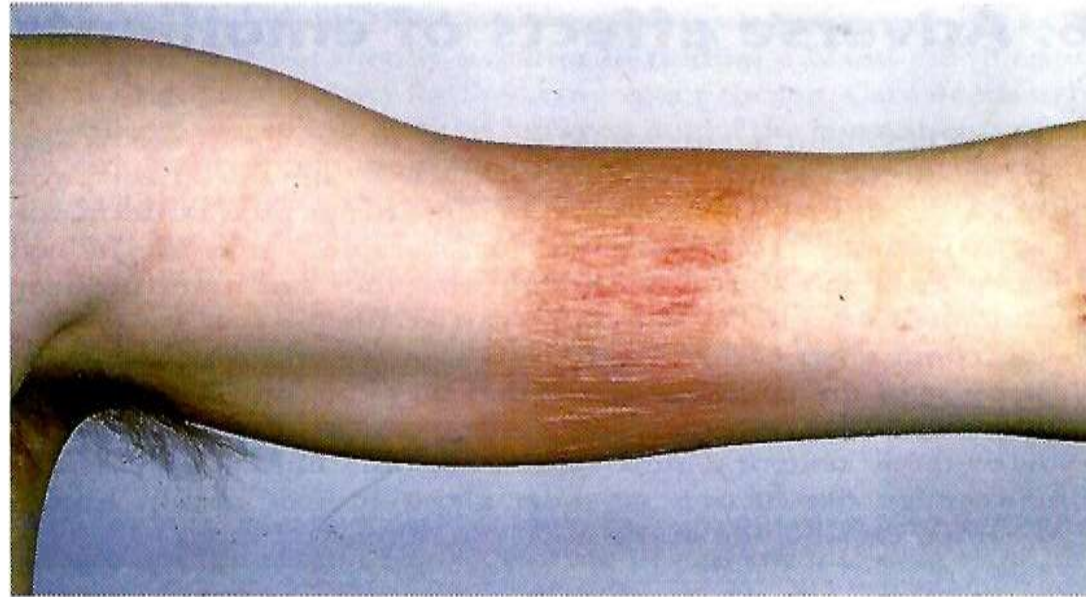


Figure 15 Irritant reaction from topical application of a topical medicament containing 20% propylene glycol.

Allergic Reactions

Some ingredients in topical preparations may cause allergic contact dermatitis



Figure 16 Allergic contact dermatitis resulting from use of a lanolin-containing emollient to treat 'dry skin'.

Conclusion

- The products you apply to your skin or a wound can have either a positive or negative impact.
- Choose carefully for the best outcome.