The importance of emollients in treating the increasing incidence of atopic eczema

Emollients offer a safe and cost-effective means of managing dry skin conditions, such as eczema, with patient education an important part of treatment.

INTRODUCTION
The skin is the body’s largest organ and acts as a barrier to the penetration of environmental irritants and allergens. It also limits the inward and outward passage of water and electrolytes. The stratum corneum, the outermost layer of the epidermis, is largely responsible for this barrier function as it consists of toughened cells (corneocytes), which form a horn-like layer.

The skin of patients with eczema shows generalised dryness, with some areas exhibiting redness, inflammation and, sometimes, blisters. These sites of inflammation are invariably itchy and cause discomfort. Although any area of skin may be affected, the most common sites are in and around the skin creases, such as the front of the elbows and wrists, behind the knees and around the neck. In babies, the face is commonly affected.

The thickness of stratum corneum varies widely across different sites of the body. The sites most vulnerable to atopic eczema are those with the thinnest skin barrier (Cork et al, 2005).

The diagnostic criteria for atopic eczema are a combination of itchy skin and one or more of a number of factors (Hoare et al, 2000) (Box 1). However, while the term ‘atopic’ is commonly used when discussing eczema, it is important to note that around one-fifth of patients who appear to have typical atopic eczema are not defined as atopic by positive skin-prick test reactions to common environmental allergens.

STRUCTURE OF THE STRATUM CORNEUM
There are significant differences in the skin barrier of normal skin compared with skin affected by atopic eczema. The stratum corneum may be thought of as being similar to a brick wall (Elias, 1983) and the corneocytes analogous to the bricks in the wall, while lipid bilayers surrounding the corneocytes would correspond to the mortar between the bricks. In the same way that iron rods are used to increase the stability of tall brick walls, the corneocytes are held together by corneodesmosomes.

The integrity and thickness of the stratum corneum is maintained by the controlled shedding of skin cells near the surface in a process called desquamation. In normal skin, the corneodesmosomes at the surface of the skin are degraded by proteases. Returning to the analogy of the brick wall, this is similar to the iron rods near the surface becoming rusty, loosening the uppermost layers of bricks: the top layers are removed, but the integrity of the epidermal barrier is not compromised.
In eczematous skin, the balance between the structural integrity of the corneodesmosomes and the level of proteases and protease inhibitors is disturbed. In the brick wall model this would mean the iron rods are rusted all the way through and the wall is no longer sound; in the case of the skin it means the integrity of the stratum corneum is compromised (Elias, 1983).

A strong skin barrier is essential to protect against the penetration of allergens, irritants and microbes; disturbance of the stratum corneum leads to increased risk of sensitisation. This is a hallmark of eczema and restoring the skin barrier is central to the management of the condition.

CAUSES OF ATOPIC ECZEMA

Atopic eczema is characterised typically by immunoglobulin E (IgE) – mediated atopic (allergic) responses to common proteins (allergens). Altered skin structure and environmental factors also play a part in its cause.

Important, too, are genetic factors: approximately 50% of children will have eczema if both parents have it; this figure is around 20% if only one parent is affected (Cork et al, 2005).

Recent research has identified a number of genes that predispose to atopic eczema. The proteins encoded by these genes regulate the strength of the skin barrier and these genetic observations provide compelling evidence for a link between dysregulation of the stratum corneum and eczema.

The stratum corneum chymotryptic enzyme (SCCE) plays a central role in maintaining the stratum corneum, and the presence of a genetic mutation that leads to increased levels of this protease in patients with atop eczema has been recorded (Vasilopoulos et al, 2004).

Elevated SCCE can cause premature breakdown of the epidermal barrier, allowing the entry of irritants and allergens. Strong associations between single nucleotide polymorphisms (a single nucleotide variation within a DNA sequence) in genes coding for protease inhibitors involved in desquamation and eczema have also been reported (Vasilopoulos et al, 2007; Walley et al, 2001), while two independent atopic dermatitis-associated, loss-of-function mutations have been detected in the gene encoding filaggrin, which plays a key role in the formation of the skin barrier (Palmer et al, 2006).

CURRENT TREATMENTS

Managing all forms of eczema begins with an effective skin care routine. The primary message is to avoid all soap and detergents, as these irritate the skin. Soap increases skin pH from 5.5 to ≥7.5, which is the optimal value for SCCE activity, hence increasing corneodesmosome breakdown, which results in the thinning of the stratum corneum (Cork et al, 2006). The National Eczema Society suggests that soaps made with a synthetic detergent (syndet) are less harmful for those wanting to use a commercially available bar, as they do not raise the pH in the same way.

Treatments fall into one of three main categories: corticosteroids; immunomodulatory treatments; and emollients. However, the use of emollients is central to managing eczema (PCDS/BAD, 2006) (Box 2).

THE ROLE OF EMOLLIENTS

Most patients with atopic eczema have disease-associated dry skin and require emollients. Unlike corticosteroids, which are used in response to an eczema flare-up, the main role of emollients is to prevent the eczema from flaring up. They do this by occluding water loss from, and directly adding water to, the dry outer layers of the skin, thereby moisturising it. This protective film over the skin not only keeps moisture in but also prevents irritants from penetrating it. The water trapped under the emollient is then able to pass into the corneocytes, reinforcing the integrity of the skin barrier.

Emollients are available in a variety of formulations, including lotions, ointments and creams. The properties of emollients differ (Clarke, 2004), and it is important that clinicians combine knowledge of skin structure with an understanding of these differences so that the most appropriate emollient is identified for individual patients. For example, lotions and creams have a higher water content than ointments, which tend to be greasy and are therefore less cosmetically acceptable.

Lotions

These are the most dilute emulsions and have the lowest occlusion properties, creating less of a barrier between the skin and the air. They are often used in the management of mild eczema.

Ointments

Ointments are greasy or fatty semi- solids, the base of which may be one of the following four types: fatty; absorption; emulsifying; and water-soluble.

Fatty bases are not absorbed, but form an occlusive layer on the skin surface. They tend to be greasy owing to the low water-absorbing capacity of the fatty bases, and therefore may be cosmetically unacceptable.

Absorption bases contain water-in-oil emulsifying agents, so can absorb water. They spread easily and are less occlusive than fatty bases.

Emulsifying bases contain surfactants to facilitate the formation of oil-in-water emulsions.

Water-soluble bases contain polyethylene glycols, which spread well and are easy to wash off the skin.

Creams

Creams can have an oil-in-water or water-in-oil base and tend to feel less greasy than ointments. They spread well and can be washed off easily. As they are less occlusive than ointments, creams tend to be less effective at hydrating the stratum corneum, although this can be markedly improved by including certain additives.

Emollients are a cost-effective treatment for dry skin conditions and reduce the requirement for corticosteroids. Randomised clinical trials demonstrated a significant reduction in topical corticosteroid use when

<table>
<thead>
<tr>
<th>BOX 2. CURRENT TREATMENTS FOR ATOPIC ECZEMA</th>
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<tbody>
<tr>
<td><strong>Corticosteroids</strong></td>
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<tr>
<td>Often used during flare-ups as they have an anti-inflammatory and immunosuppressive effect. Topical creams are often used to provide short-term symptomatic relief, while oral corticosteroids may be prescribed in severe cases.</td>
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<tr>
<td><strong>Immunomodulatory treatments</strong></td>
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<tr>
<td>Topical calcineurin inhibitors (pimecrolimus, tacrolimus) can be used as alternatives to topical corticosteroids and can be considered for facial areas and for patients who are intolerant to, or have not responded to, conventional corticosteroid therapy.</td>
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<tr>
<td><strong>Emollients</strong></td>
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<td>These act to reduce water loss from the skin by providing a seal or barrier – if the skin is less dry, itching is reduced. They also rehydrate dry skin by replacing water in the stratum corneum.</td>
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</table>

(For more details on different types of formulations, see Box 2.)
emollients were used in conjunction with moderate and high-potency corticosteroids (Grimalt et al, 2007).

The wide range of emollient formulations, and the presence of additives such as preservatives, means that not all emollients suit all people, so it is important to identify the best product for the individual. Children and young people may prefer creams and lotions because these are less greasy and can give a more acceptable cosmetic result.

Without exception, emollients need to be used regularly, particularly after bathing or washing, to ensure skin rehydration and flexibility. Children at nursery school and young people at school or college should always have supplies of emollient with them (RCN, 2008; National Collaborating Centre for Women’s and Children’s Health, 2007). Staff at nurseries and schools should be advised on how much and how often an emollient should be applied, in case their help is needed.

Older children who are able to apply their own emollient should do so regularly throughout the day, and especially before their skin is exposed to anything that might irritate it, such as messy play, swimming or extremes of temperature (RCN, 2008).

As a general rule, the drier the skin, the more greasy the emollient should be. However, it is important to modify this ideal to accommodate the individual’s preferences and lifestyle (Dermatology UK, 2007). More than one emollient may be required; complete emollient therapy uses a combination of cream, ointment, emollient bathing products and soap substitutes.

Patient concordance is key to the effective use of emollients in controlling eczema. This means taking time to ensure that patients can make an informed choice about which product(s) to use.

Patients who do not like a particular emollient will not use it, so the use of preferred products enhances concordance.

ADJUVANT COMPOUNDS IN EMOLlientS

The effectiveness of an emollient may be enhanced by including some of the components of the skin’s natural moisturising factors, specifically urea and sodium pyrrolidone carboxylic acid. These compounds, along with glycerine, are humectants. A humectant is a water-binding substance capable of retaining a large amount of water (relative to its weight) in the skin, helping to keep the skin smooth and supple. As the humectant penetrates the epidermis, it draws in water from the dermis, increasing hydration of the stratum corneum (Dermatology UK, 2007).

Direct comparisons of the efficacy of these different humectants in the management of dermatitis and eczema are limited; however, one study reported that a moisturising cream containing 4% urea was superior to a similar cream containing 20% glycerine (Lodén et al, 2001).

The bulk of evidence supporting the benefit of including adjuvant humectants in emollients concerns urea. Historically, urea was perceived as an irritant, but this is not the case when it is formulated and used as directed. Emollients containing 5% or 10% urea are available and are suitable for sensitive/allergy-prone skin.

When used as an emollient adjuvant, urea penetrates the stratum corneum, where it readily absorbs and retains water, increasing the skin’s capacity to hold moisture, hence rehydrating it. This mirrors the natural function of urea. While early formulations of urea-containing emollients were noted to cause transient burning or stinging upon application (Hoare et al, 2000), newer formulations are well-tolerated.

Clinical evidence for the benefit of urea in treating atopic eczema comes from a randomised clinical trial (Kuzmina et al, 2002), where a 10% urea cream was more effective in reducing transepidermal water loss and clinical signs of dry skin than another emollient cream that did not contain urea.

Another study compared the efficacy of 10% urea lotion with a urea-free formulation in patients with atopic eczema. It reported that the moisture content of the skin was significantly higher in patients using the urea-adjuvanted formulation, reaching a maximum of 42% (Bohnsack et al, 1997).

Urea-containing emollients are well suited to the care of large areas of skin – even over long periods – in patients with atopic eczema. It is recommended that such emollients are used once or twice a day as an add-on therapy to their regular emollient regimen.
SAFETY OF EMOLLIENTS

Emollients are safe to use and cause little concern with regard to tolerability. They are widely prescribed for dry skin disorders, where they have a long history of use – they have been used in the management of atopic eczema for 5,000 years (Cork et al, 2003).

Fragrances and preservatives are the major sensitisers in topical formulations, and almost all moisturisers designed for cosmetic use contain fragrances (Lodén, 2005). Emollients, however, tend to be bland and unperfumed so are unlikely to cause skin sensitivity (Patient UK, 2004a).

The application of any topical agent can cause stinging, but this is not an allergic reaction. Although this may occur with an emollient, in practice it is not a significant problem. Fewer than 20% of patients report adverse reactions to their emollient, compared with more than 55% of those using an aqueous cream, which is best regarded as a soap substitute and not a ‘leave-on’ emollient (Cork et al, 2003).

Any side-effects tend to be product-specific and can be overcome by changing the prescribed emollient. In rare instances, occlusion of the skin may occur due to blockage of the hair follicles, leading to irritation, inflammation and, occasionally, folliculitis. This can usually be avoided by stroking rather than rubbing the product into the skin and following the direction of hair growth.

PATIENT EDUCATION AND CONCORDANCE

Atopic eczema is an episodic disease, punctuated by flares and remissions, but it can be managed effectively in many patients with the correct emollients and concomitant education. As emollients prevent the skin from drying, they can help prevent eczema from flaring up, so patients should be advised to continue using them even when they have no areas of inflamed skin (Patient UK, 2004a).

Finding the most suitable emollient may be a matter of trial and error. In theory, greasier, oil-based products are the most effective, but these are rarely tolerated and are not generally used by patients with mild to moderate eczema (Cork et al, 2003).

To be effective, emollients must be applied liberally and frequently – many patients underestimate the quantity required and the frequency of application necessary to achieve the maximal effect. Leave-on topical emollients should be applied regularly to maintain hydration levels. Quantities vary between patients, but 500–600g/week for adults and 250g/week for children (Dermatology UK, 2007).

Emollients should form the basis of atopic eczema management in children, and should be used even when the eczema is clear (National Collaborating Centre for Women’s and Children’s Health, 2007).

Applying emollients can be time-consuming and tedious, so it is important that patients appreciate the benefits they offer, as this will have a positive impact on concordance. Intensive education from specialist dermatology nurses has been shown to improve patient concordance, massively increasing emollient use and resulting in an 89% reduction in eczema severity (Cork et al, 2003).

Suggested amounts for a single application for an adult range from 2g per body site for light-dose regimens to 10g per site for heavy doses, based on the following body sites: arm; chest; abdomen; upper back; lower back; thigh; shin (Dermatology UK, 2007). Recommendations for emollient quantities based on twice-daily application for one week for an adult have been published (Dermatology UK, 2007), and are summarised in Table 1.

Continual treatment with complete emollient therapy – that is, using a combination of cream, ointment, bath oil and emollient soap substitute – maximises the beneficial effects of emollients in eczema (PCDS/BAD, 2006). Best-practice guidelines (Dermatology UK, 2007) indicate that patients should be advised to use an emollient as a soap substitute when washing, and apply a topical leave-on product afterwards.

Children and young people are often prescribed a bath emollient, and are advised to bathe daily for at least 10–20 minutes to allow it to absorb fully (RCN, 2008). The skin should be patted dry gently, leaving it slightly moist before applying the leave-on product. Topical emollients should be gently smoothed into the skin in the direction of hair growth – this facilitates absorption and is preferable to application by rubbing, which introduces air bubbles into the emollient, hindering its absorption. Large quantities of the product should be dispensed using a pump dispenser; if a pot of emollient is used, a clean spoon or spatula should be used to scoop out the desired amount before it is applied to the skin. It is important to avoid possible microbial contamination of the emollient.

It is not unusual to need to apply emollients every two to three hours, particularly to exposed areas such as the hands. Leave-on emollients should be applied before going to bed. Patients may find it acceptable to use a greasy product, such as an ointment, at this time. After emollients are applied they should

### TABLE 1. RECOMMENDED EMOLLIENT QUANTITIES FOR WEEKLY TWICE-DAILY APPLICATION

<table>
<thead>
<tr>
<th>Body sites</th>
<th>Creams and ointments</th>
<th>Lotions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>15–30g</td>
<td>100ml</td>
</tr>
<tr>
<td>Both hands</td>
<td>25–50g</td>
<td>200ml</td>
</tr>
<tr>
<td>Scalp</td>
<td>50–100g</td>
<td>200ml</td>
</tr>
<tr>
<td>Both arms or both legs</td>
<td>100–200g</td>
<td>200ml</td>
</tr>
<tr>
<td>Trunk</td>
<td>400g</td>
<td>500ml</td>
</tr>
<tr>
<td>Groin and genitalia</td>
<td>15–25g</td>
<td>100ml</td>
</tr>
</tbody>
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**BOX 3. PRINCIPLES OF EFFECTIVE EMOLLIENT USE IN ATOPIC ECZEMA MANAGEMENT**

- Be aware that effective skin care is central to the management of eczema: avoid soap and other irritants; re-establish the skin barrier using emollients.
- Start complete emollient therapy for maximal benefit; that is, a combination of cream, ointment, bath oil and emollient soap substitute.
- Use emollients liberally and frequently – they should be prescribed in large quantities.
- Suggested amounts for generalised eczema are 600g/week for adults and 250g/week for a child.
- Use an adjuvanted emollient: one containing 5–10% urea can significantly increase skin hydration and may be useful in managing flare-ups.
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be allowed to absorb before other topical products, such as corticosteroids, are applied (Dermatology UK, 2007). Flare-ups can often be managed by advising more frequent application (or greater quantities of) emollient, or by changing to an emollient with increased hydration properties; for example, one with a higher lipid content or greater urea concentration.

In addition to providing information about emollient application technique and stressing the importance of eliminating exposure to soaps/detergents, patient education should cover the importance of avoiding irritants and triggers. Common advice is to wear cotton clothes next to the skin rather than irritating fabrics such as wool; avoid extremes of temperature; rinse clothes thoroughly to remove any traces of detergent after laundering; and, regularly clean and vacuum bedrooms, mattresses and bedclothes to reduce house dust mite exposure (Patient UK, 2004b).

The principles involved in ensuring the effective use of emollients in the management of atopic eczema are listed in Box 3 (p21).

CONCLUSION

Genetic predisposition to the development of a defective skin barrier in atopic eczema is exacerbated by environmental allergens and soap. The resultant breakdown in the skin barrier allows irritants and allergens to penetrate, which can trigger a flare-up of symptoms and may lead to progression of the condition.

The first step in atopic eczema management should be to restore normal skin barrier function. Soap and detergents should be eliminated from washing regimens and complete emollient therapy should be started. Sufficient quantities of emollients need to be used, and they should be applied regularly and in the correct manner; that is, stroking in the direction of hair growth rather than rubbing in. Patient education is essential.

Emollients are essential in the management of patients with both eczema and other dry skin conditions, but they are under-used in general practice. For these patients, emollients effectively reduce water loss from the epidermis, resulting in softer, more supple skin. Used regularly, emollients may help control flare-ups of eczema, soften scaly, thickened skin in other conditions, such as psoriasis, and reduce the need for topical corticosteroids.

Explaining carefully to patients with dry skin conditions how to use emollients, as well as indicating how much to use, may encourage concordance. Sufficient quantities should be prescribed once the agent of choice is established. When used correctly, emollients are a cost-effective treatment for dry skin conditions.

Adjuvant emollients containing urea may enhance skin barrier repair to a greater extent than their base emollient and should therefore be considered for patients who would benefit from the increased levels of hydration these products offer. »

REFERENCES


Patient UK (2004b) Atopic Eczema – An Overview. tinyurl.com/eczema-overview


