EMOLLIENT INGREDIENTS:
MAKING THE BEST CLINICAL
CHOICE FOR OLDER PATIENTS

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In our article in the last issue, *What is an emollient and what does it do?*, we looked at the basics of emollient therapy and how they helped skin. The article discussed the different types of emollient formulation available (such as gels, creams, and ointments) and how they differed in terms of patient acceptability. Finally, it looked at the importance of patient choice, and how harnessing that could improve patient concordance to facilitate the optimum outcome for both patient and prescriber – namely, regular application.

This second article discusses how this knowledge could be used to make clinical decisions around emollient choice, and how to decide which emollient might best suit a particular patient. It will consider some of the different ingredients used in emollients, and how these different ingredients lead to slightly different emollient qualities which might suit particular age ranges and severity of skin. The article will pay particular attention to the properties and use of Hydromol Cream.

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- Older skin
- Natural moisturising factor
- Solar elastosis

**Why are we prescribing emollients?**
Broadly speaking, emollients are prescribed for anyone with dry, scaly, or itchy skin conditions, particularly the inflammatory dermatoses such as eczema and psoriasis. At the extremes of life’s age ranges, we see other skin conditions such as the hereditary ichthyoses in the young, and actinic damage caused by excessive sun exposure in the elderly. Clinically, all dermatologically dry skin has low or depleted levels of NMF (natural moisturising factor – see Figure 1) – a collection of small, hygroscopic (water attracting) molecules that are essential for appropriate levels of stratum corneum hydration, barrier homeostasis and skin flexibility and plasticity. By using emollients, we are aiming to rehydrate the skin, restore the barrier function and replace lost intradermal moisture, and thus restore normal skin hydration levels and functionality.

However, in older adults and the elderly, essential skin frailty can add a layer of complexity to dermatological management. Skin impairment and skin disease is very commonly seen in the older person, and a large proportion of people over the age of 70 will commonly present with at least one skin problem.

At this point, it is worth considering the differences in older skin to understand why emollient choice can be particularly important.

**What are the structural and anatomical differences in older skin?**
It is well known that the skin undergoes physiological decline with advancing age, becoming thinner and more fragile. The changes are particularly focused around the stratum corneum, the outermost layer of the epidermis, which acts as a protective barrier against the environment and helps with hydration and water retention.2 The epidermis thins with age, with the hard, keratin-based cells (corneocytes) of the outer stratum corneum losing their binding ability and becoming less capable of acting as an effective barrier.

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capacity to trap and collect water is much reduced, leading to the skin becoming drier. The lack of effective barrier means irritants and other damaging agents are less likely to be rapidly removed and often do not provoke sensations such as itch or pain that usually serve as warning signals in younger skin.3 Thus, older, drier skin is not only more vulnerable to environmental insults, but the individual fails to recognise the adverse effects, causing a subtle, chronic irritant dermatitis.

In addition to these changes, the vasculature progressively atrophies, along with deterioration in the supporting dermis, with collagen and elastin fibres becoming sparse and increasingly disordered, with a reduction in skin strength and elasticity. There is also a decreased efficiency of the pilosebaceous unit, which results in less sweat and sebum to lubricate the skin, again resulting in more potential for cracks and fissuring. Thus, older skin has a much-reduced ability to retain moisture and elasticity, and the decreased blood supply means skin cell regeneration and healing is also more difficult.4

However, in tandem with these structural and physiologic changes occurring as a natural ongoing consequence of intrinsic aging, there are also the effects of a lifetime of cumulative extrinsic damage and exposure, such as extremes of weather, smoking, medication (particularly diuretics) and nutrition. Sun damage, or photo-ageing, superimposes chronic sun damage on skin already affected by intrinsic ageing, leading to furrows, dryness, irregular pigmentation and a yellow tinge – this collective appearance is called ‘solar elastosis’. Depending on the extent of both the ageing process and the degree of sun exposure, pre-malignant lesions such as actinic keratoses can be seen – superficial, rough/scaly, pinky-red skin defects in areas of chronic sun exposure.

Medical issues should also be considered, such as incontinence, leading to damp waterlogged skin at risk of breaking down, and pruritus (itching), leading to excorations and the thickened skin of chronic scratching (lichenification) – both of which disrupt an already damaged skin barrier. Pruritus is particularly common in the elderly, owing to the reduced sebum production and dried out dysfunctional stratum corneum, as well as the increased sensitivity to irritants as mentioned above.

All these factors and changes leave the older adult being increasingly susceptible to both vascular disorders such as stasis dermatitis, and skin injuries such as pressure ulcers, skin tears and excoriations, with an increased risk of infection and a steadily decreasing ability for the skin to repair as well as it used to.5 As the cellular turnover and repair are much slower, the time to recover from such damage is prolonged and the consequences of both external and internal injury can be more severe than in younger skin, with a greater risk of subsequent infection. It is also worth remembering that immune responsiveness is compromised in older skin, resulting in a much higher risk and incidence of malignant tumours (largely linked to the cumulative degree of lifetime sun exposure and damage) as well as infections.

Differences in emollient formulations and additives

An emollient, as previously discussed, is any topical application that is applied to the skin to soothe, smooth, soften and hydrate the skin. They have two basic ingredients – water, and a greasier, lipid, component such as an oil, a fat, or both.6 Depending on the proportions of each, the formulations change from liquids (lotions) and semi-solids (gels and creams), which are more water-based, to solids (ointments) which are much thicker in texture with very little or no water and composed mainly of oil or fat.

The simplest emollients on the market are basic formulations derived from various proportions of water, liquid paraffin, white soft paraffin and yellow soft paraffin. The more liquid, water-based preparations also contain an emulsifier (such as ceteryl alcohol, isopropyl myristate, or emulsifying wax) to hold the water and the lipid component together in a stable manner. These simple emollients benefit the skin chiefly by adding oil and water to the skin and providing hydration. In addition, their occlusive nature – particularly with the oilier products like ointments – means they provide a covering to the surface of the skin, which traps...
water beneath and slows down water evaporation (known as TEWL – or transepidermal water loss – see Figure 2) and thus increasing the ongoing moisture content of the stratum corneum simply by preventing loss.

In recent years, however, emollients have become much more sophisticated, with the addition of multiple different chemicals designed to not only prevent water evaporating, but also to draw more fluid in from the dermis to hydrate the epidermis. Potential classes of additive include:

1. **Humectants** – these are low molecular weight additives, which can penetrate the stratum corneum and attract water through both the dermis and the atmosphere – thus increasing the water content of the epidermis. Typical humectants would include glycerin, urea, lactic acid, and glycolic acid, as well as NaPCA (sodium pyrrolidone carboxylate), which we will discuss in more detail later.

2. **Colloidal oat protein** – this natural product seems to have anti-inflammatory and anti-histaminic activity and has been shown to improve and strengthen the skin barrier.

3. **Anti-infective agents** – some emollients contain antiseptic agents such as chlorhexidine and benzalkonium chloride. These will decrease the bacterial load on the skin, particularly staphylococcus aureus, which is long known to be a factor in the severity of atopic eczema and help with secondary infection.

4. **Anti-pruritic agents** – additives such as lauramidocylates have anaesthetising properties to help reduce pruritus, and menthol is also effective by evaporating on contact with itchy skin, providing a cooling soothing sensation.

**How could emollients specifically help older skin?**

As already mentioned, the issues causing drier skin in the elderly are complex but stem from both the overall aging process itself, cumulative levels of skin damage and environmental insult, and low levels of NMF – the hygroscopic “glue” that holds the corneocytes together in the stratum corneum and has a profoundly humectant effect on the skin. NMF consists of several substances including amino acids, pyrrolidone carboxylic acid (PCA), urocanic acid, urea, lactic acid and citrates, and it accounts for 20-30% of the dry weight of the stratum corneum. Therefore, any emollient which contains humectants to mimic the naturally occurring NMF would be much more effective at promoting increased hydration in aging skin, by pulling water into the epidermis from the dermis, as well as helping to hold water in the stratum corneum. Swelling it up and making the skin appear and feel smoother.

The optimum emollient to use should therefore have the properties of:

1. Simple occlusion to improve the skin barrier function and decrease both water loss and irritant entry, and;
2. Humectants to attract and retain moisture in the epidermis.

One of the most common humectants used in the UK market is urea, which provides excellent hydration for the skin and is available in a variety of proprietary products, including Hydromol Intensive.

In addition to being a good humectant, it also has keratolytic effects and will soften and aid the peeling away of any hyperkeratotic areas of skin when the skin is rubbed and washed, particularly on feet at higher strength e.g., 25% or more. Urea preparations are usually well tolerated but are known to cause mild stinging on initial application, itching and skin rash. These usually do not require medical attention unless they continue and become bothersome.

An alternative humectant to consider for daily usage is glycerin (also called glycerine or glycolol), which has been used in emollients for more than 50 years and is both safe and effective. Colourless and odourless, it is widely used but can sometimes leave skin feeling tacky, depending on the formulation used.

However, one of the components of NMF, sodium PCA (pyrrolidone carboxylic acid), has been shown to have greater water absorption ability than glycerin alone. Sodium PCA functions as a humectant when used in concentrations of 2% or higher, and has a good hygroscopic effect, which makes it a highly effective moisturiser. This particular humectant can only be found in Hydromol Cream emollient, in combination with occlusive agents to reduce water loss from the skin to increase the overall effectivity of the product.

**Other dangers faced by elderly skin**

As dry skin is such a common feature of ageing, it contributes to many other secondary associated conditions, such as sun damage, and the potential for excoriation and lichenification posed by senile pruritus which we have mentioned.
above. The twin factors of being both more susceptible to skin infections and less able to mount an effective immune response to heal them must also be factored into effective skincare for the elderly.

An additional challenge is that all frail patients with aged and fragile skin are at much increased risk of wounds, such as skin tears<sup>16</sup> – wounds that may result from blunt trauma, any fall, poor handling, or equipment injuries and even an act as simple as dressing removal (MARI – medical adhesive related skin injury). They can occur anywhere, but are often sustained on the arms, legs and hands.<sup>17</sup>

A skin tear can be painful, disfiguring and sustained on the arms, legs and hands. 17 As a final comment, it is important to reiterate that the most important practical factor in emollient choice is that of patient acceptability. The best emollient is always the one that the patient uses. This approach is backed up by the British Association of Dermatology, the Primary Care Dermatology Society and National Institute for Health and Care Excellence guidelines, as well as patient support groups like the National Eczema Society. Hydromol Cream is the only emollient available on prescription which contains NaPCA, as a highly effective humectant<sup>18</sup> – there are no non-proprietary substitutions possible.

**Conclusion**

We have shown that ageing skin undergoes a variety of physiological changes, which leave it much more vulnerable to dehydration, infection, and damage, with an increased possibility of adverse immunological change such as actinic keratoses. A chief component of the subsequent impaired functioning of the skin is the lowered levels of NMF – a selection of chemicals with a profoundly humectant action which both hydrate the stratum corneum and help maintain an effective skin barrier function to decrease trans-epidermal water loss and prevent entrance of infective and irritant agents.

When looking to fortify and protect ageing skin with an emollient, the ideal emollient should have both occlusive and humectant properties. Hydromol Cream, containing the humectant SPC, which is a close chemical relative to the PCA found in the NMF produced by the body, is a sensible choice. It is part of a range of emollients including an ointment (the most widely prescribed emollient ointment in the UK),<sup>19</sup> a bath and shower product for washing, and an intensive cream containing urea for extra humectant activity for use on profoundly dry fissured skin. The full range can be prescribed with confidence as part of a complete emollient therapy regime for dry or frail skin.

As a final comment, it is important to remember that emollients can be of great benefit and should be used at least daily on any dry skin or high-risk sites for injury.

Ideally, an emollient with a high degree of humectant activity should be considered, as optimising the water balance in the stratum corneum to firm and plump the tissues present is going to be helpful to the primary hydrating emollient activity. It is worth noting that Hydromol Cream contains paraffin, which provides the occlusive mode of action.

**References**

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