The Importance of Maintaining Skin Structure at a Cellular Level and the Role of Ceramides

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Background & History

A seventy-eight-year-old female presented for a routine outpatient visit late in 2019 with a complaint of her ostomy pouch not sealing to her skin. She has a past history of rectal adenocarcinoma and underwent an abdomino-perineal resection (APR) at a tertiary hospital in 2016. She had no other pre-existing conditions or was taking any medications known to cause skin irritation. She reported feeling anxious and upset as she was not able to pursue her usual social activities which she described as having a profound impact on her quality of life.

On examination, the pouch was held in place with multiple pieces of tape to try and stop it from lifting. There were well demarcated areas of erythema extending beyond the confines of the skin barrier which were intermittently itchy but not painful. *(See Figure 1)*

The stoma was flush, round with a central os, and 25mm in diameter. A deep skin crease extended from the medial edge of the stoma to her umbilicus making it essential to use some form of convexity for correct fit. She was currently using a soft convex closed pouch infused with a moisturiser (aloe vera) as part of the ingredients in the skin barrier. Her application technique was satisfactory. She had not recently changed soap or cleaning products and she used a pH neutral cleanser to bathe. She was not allergic to the tape and reported no other skin rash or symptoms. She was highly resistant to change to another product, having used the current pouch for over twelve months.

A diagnosis of an inflammatory skin condition, most likely atopic dermatitis, was made and a potent topical cortico-steroid lotion (Mometasone furoate 0.1%) was ordered and prescribed for daily application. The lotion does not affect pouch adhesion due to its aqueous formulation. The topical steroid may be applied once daily for up to 3 to 4 weeks with cessation advised following resolution of red, moist skin patches.

Review occurred at one week where there had been a partial response with less erythema noted. *(See Figure 2)* The pouch was still not adhering well to the remaining areas of erythema and she was still applying tape to keep the pouching system fixed to her abdomen. Due to only partial response, she was amenable to trialling another pouch that contained different ingredients. A pre-cut soft convex bag with a humectant, Manuka honey, was applied.

Further review in one week showed further improvement with use of the new barrier with a humectant – Manuka Honey. *(See Figure 3)* The moist areas of skin had resolved and there was less erythema however she continued to complain of itchiness.

She was agreeable to trial a second pouch containing a different formulation in the skin barrier that is infused with ceramide – the CeraPlus™ skin barrier*. She was again reviewed at one week and was found to have complete resolution of the atopic dermatitis with healthy appearing peristomal skin and no symptoms. *(See Figure 4)* She also reported being extremely happy with the new pouch and was keen to change. She was able to engage again in her usual social activities and no longer felt anxious.

Discussion

Stoma patients are dependent on the integrity of the peristomal skin to maintain a normal lifestyle. Loss of skin integrity can be related to:

- Chemical injury
- Mechanical destruction
- Infectious conditions
- Immunological reactions
- Disease related[1]

Peristomal skin damage from any of the above can impair pouching system adhesion resulting in leakage. Skin barriers are formulated to provide a barrier to the peristomal skin by maintaining moisture balance by absorbing stoma effluent and sweat.

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Figure 1 Initial Presentation

Figure 2 At Week 1. Initial treatment with topical cortico-steroid with usual skin barrier containing an emollient.

Figure 3 At Week 2. Visible partial response to treatment with topical cortico-steroid and skin barrier with humectant. Discontinued use of topical cortico-steroid.

Figure 4 At Week 3. Visible full response to management with the use of a skin barrier infused with ceramide.

LEVEL OF EVIDENCE - CASE STUDY

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Many of today's skin barrier formulations also help to maintain the epidermal structure by inclusion of a moisturiser. There are four types of moisturiser[9]:

- **Humectants** – hydrate the skin by attracting and binding water e.g. Honey
- **Emollients** – hold water between the epidermal cells with the aim of reducing trans-epidermal water loss (TEWL) e.g. Aloe Vera
- **Occlusives** – seal moisture into the skin by creating a barrier e.g. Beeswax
- **Ceramides** – waxy, lipid molecules that link cells together in the stratum corneum to form a waterproof, protective barrier[2]

Manufacturers of ostomy products now include moisturisers in some skin barriers. Hollister incorporates ceramides (CERs) in the CeraPlus™ skin barrier* range and some accessories. CERs boost moisture density by not only decreasing TEWL as humectants, emollients and occlusive do, but also promote a healthy lipid matrix within the first layer of the epidermis, the stratum corneum (SC).[3,7,8]

CERs are crucial to the function of this lipid matrix and play a fundamental role in maintaining the barrier function of the skin.[3] The amount of CERs decreases with age. Ostomy patients are at increased risk for decreased levels of CERs due to skin occlusion, exposure to stoma effluent and/or skin stripping due to skin barrier removal, increasing the risk to chemical, mechanical, infectious and immunological reactions.

Most skin disorders that have a diminished barrier function such as atopic dermatitis, present with a decreased total ceramide content.[4,8] Formulations containing CERs may improve skin conditions by increasing the amount of CERs in the SC.[5]

The patients first response to poor pouch adhesion is often to change their pouching system more frequently causing decreased levels of CERs, initiating a cycle of increased skin reactions. In the case described, atopic dermatitis is characterised by disruption of the lipid matrix due to reduced CER levels.[4,7,8] Providing a product infused with CERs to the SC, appeared to break this cycle, and quickly promoted healthy peristomal skin.

Conclusion

Not all infused skin barriers are the same. The most significant issue that occurs with peristomal skin is the loss of skin integrity which affects the adhesion of the pouching system and can lead to skin injury. Providing a CER infused skin barrier to the skin is highly effective in promoting healthy skin, particularly within the lipid matrix in the SC. Skin barriers that contain CERs, are designed to help maintain the adhesive properties of the barrier, while helping maintain healthy peristomal skin. Further, CER infused barriers have been demonstrated to better decrease TEWL from damaged/eroded skin and help protect the skin's natural moisture barrier.[6] These skin barriers may be useful products to promote healthy, robust peristomal skin both in prevention and management of skin disorders.

To learn more about CeraPlus™ Products, click here or scan the QR code

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Remois

*Contains the Remois Technology of Alcare Co., Ltd.

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Disclaimer: This case study represents this nurse's experience in using the CeraPlus™ skin barriers with the named patient, the exact results and experience will be unique and individual to each person.

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