The use of *Aquaphilus dolomiae* ferment filtrate restorative cream with topical corticosteroids, a potential option to mitigate concerns for dermal thinning and barrier disruption.

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INTRODUCTION

The introduction of topical corticosteroids (TC) by Sulzberger and Witten in 1952 is considered to be the most significant landmark in the history of therapy of dermatological disorders.[1] At the same time, steroid use has been associated with atrophic changes affecting both epidermis and dermis. Microscopic degenerative changes in epidermis are evident following 3-14 days of treatment. Initially epidermis becomes thin due to reduction in epidermal cell size, which reflects a decreased metabolic activity. After prolonged exposure there is a reduction in cell layers, that is, stratum granulosum disappears and stratum corneum becomes thin. Synthesis of stratum corneum lipids and keratohyalin granules and formation of corneodesmosomes (required for structural integrity of stratum corneum) are suppressed.[1,3,4] A questionnaire-based study of 200 dermatology outpatients with atopic eczema (age range 4 months to 67.8 years) was conducted to assess the prevalence and source of topical corticosteroid phobia. The most frequent cause for concern was the perceived risk of skin thinning (34.5%).[2]

Some studies have shown, topical corticosteroids, despite their ability to decrease inflammation through several mechanisms, induce abnormalities in lipid synthesis and intercellular bilayer structure in the stratum corneum, which appear to prolong epidermal barrier recovery.[5] Topical steroids application can lead to subtle changes in the epidermal barrier as observed by decreased formation of lipid lamellar bodies and delayed barrier recovery. This effect, theoretically may worsen barrier impairment in atopic dermatitis and psoriasis.[1] *Aquaphilus dolomiae* ferment filtrate, a novel biotechnological ingredient derived from non-pathogenic, highly flagellated bacteria demonstrated in vitro stimulatory effects on keratinocyte migration and fibroblast proliferation. Due to the mechanism of action, it was hypothesized that a cream containing this postbiotic ingredient would have protective effects of the skin barrier and potential collagen sparing effects when used concurrently with a topical corticosteroid.

OBJECTIVE

The objective of two ex vivo studies was to evaluate the barrier protective benefits of a restorative cream containing *Aquaphilus dolomiae* ferment filtrate and the collagen sparing effects of the cream when used concurrently with a topical corticosteroid.

METHODS

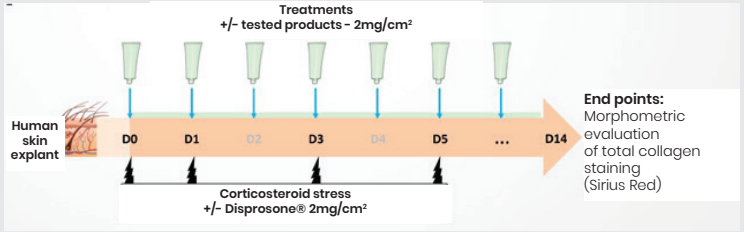
STUDY 1

Sodium Dodecyl Sulfate stress on the skin is known to induce a permeabilization of the skin barrier. This ex vivo study was evaluating the penetration of Lucifer Yellow to determine protective effect. Three models of human skin explants were each treated with 10% Sodium Dodecyl Sulfate. Quantification of the penetration of Lucifer Yellow (LY) in the different layers of the Stratum Corneum (SC) were evaluated on non-treated skin, Sodium Dodecyl Sulfate stressed skin with no treatment, Sodium Dodecyl Sulfate stressed skin treated with a cream not containing *Aquaphilus dolomiae* ferment filtrate and Sodium Dodecyl Sulfate stressed skin treated with a restorative cream containing *Aquaphilus dolomiae* ferment filtrate.

STUDY 2

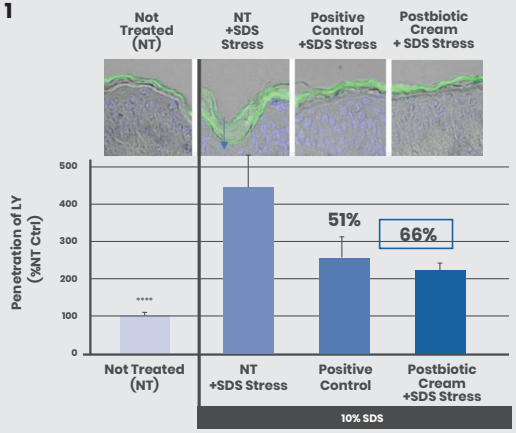
Six human skin explant models were stressed with the topical application of a topical corticosteroids (4x 2mg/cm² Diprosone®) at Days 0, 1, 3 and 5. A topical treatment with the *Aquaphilus dolomiae* ferment filtrate restorative cream was applied daily (15x 2mg/cm²). A morphometric evaluation was conducted with Sirius Red staining to visualize and assess collagen fibers in the tissue section of skin before corticosteroid stress, with corticosteroid stress and corticosteroid stress with a daily application of the *Aquaphilus dolomiae* ferment filtrate restorative cream. *See Figure 1.*

Figure 1



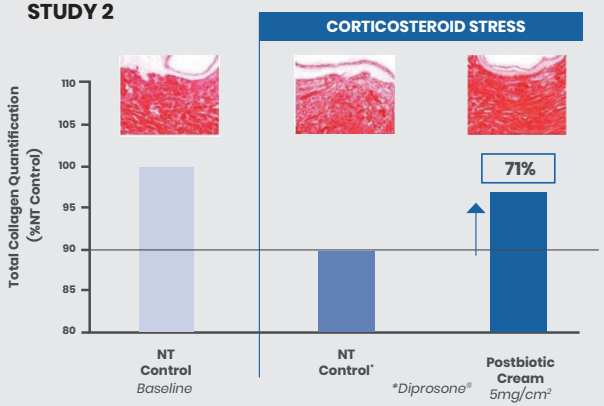
RESULTS

STUDY 1



Aquaphilus dolomiae ferment filtrate restorative cream significantly reduced the penetration of Lucifer Yellow in the layers of the stratum corneum by 66% indicating a protective effect on the skin barrier.

STUDY 2



Aquaphilus dolomiae ferment filtrate restorative cream significantly increased the total quantity of collagen based on migration substrate quality after treatment with topical corticosteroids with an increase of 71% compared to corticosteroids alone.

CONCLUSION

The inflammatory benefits of topical corticosteroids for inflammatory skin disorders are undisputed. With a rising concern of the potential negative effects, there is a concerted effort among many healthcare providers to reduce reliance of topical corticosteroid use when clinically appropriate. Given the risk and concern of epidermal thinning and barrier disruption, early studies indicate the potential use of an *Aquaphilus dolomiae* ferment filtrate restorative cream in conjunction with topical corticosteroids might mitigate some of the negative effects. This initial data is promising and indicates the need for further studies.

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