Evaluation of an Advanced Antioxidant Containing Topical Allyl Pyrroloquinoline Quinone and a Double-Conjugated Retinoid/AHA Cream in Subjects with Fitzpatrick Skin Types IV and V and Mild to Moderate Photodamage

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INTRODUCTION

- Both intrinsic and extrinsic factors contribute to skin aging, triggering the generation of Reactive Oxygen Species (ROS) and damaging skin cells.[1]
- Topical antioxidants traditionally focus on supplementing skin's defense of free radical damage incurred by extrinsic exposures.
- Free radicals produced as a result of intrinsic aging reduce efficiency of mitochondria, accelerating mitochondrial damage and dysfunction to skin cells.[2]
- Pyrroloquinoline quinone (PQQ) is a potent free radical scavenger that supports efficient mitochondrial energy creation, critical to the renewal and repair process of the skin.[3]
- An antioxidant comprised of Topical Allyl Pyrroloquinoline Quinone has been combined with WEL antioxidant technology to comprehensively address the effects of both extrinsic and intrinsic aging.[1,4-5]
- Herein, we describe an open-label study evaluating the use of an advanced antioxidant in combination and a double-conjugated retinoid/alpha hydroxy acid cream (AHARet) in subjects with Fitzpatrick Skin Types (FST) IV and V and mild to moderate photodamage.

OBJECTIVES

- Evaluate the efficacy, tolerability and subject satisfaction of an advanced antioxidant (TAP) in combination with a double-conjugated retinoid/alpha hydroxy acid cream (AHA-Ret) for improvement in the appearance of photodamage in subjects with FST IV and V.

METHODS

- A single-center, open-label clinical trial evaluated the efficacy and tolerability of twice-daily (AM/PM) application of TAP in conjunction with nightly use of AHARet over 12 weeks.
- Subjects 40-65 years of age with FST IV and V, and mild (3) to moderate (6) photodamage based on a 10-point grading scale (0=None to 7-9=Severe) were eligible for enrollment.
- Exclusion criteria included dermatological disorders (e.g., severe acne vulgaris), autoimmune diseases, acute illness, open wound/lesion or irritated skin in the area to be treated; and, subjects who were pregnant, lactating or planning a pregnancy during the study period.
- Subjects were deemed eligible for inclusion following a 2-week wash out period of any cosmetic product containing AHAs, BHAs, peptides, growth factors, skin lightening/brightening agents, non-prescription vitamin A derivatives, plant stem cell extracts, vitamin C-based topical antioxidants, other antioxidants or like products; and following a 4-week wash out period of products containing prescription retinoids or hydroquinone.
- Subjects who had taken Isotretinoin within the prior 6 months or had undergone chemical peels, microdermabrasion, microneedling, or a like procedure within the prior 3 months, were also excluded from study participation.
- The study Investigator evaluated changes from baseline in the appearance of Lines/Wrinkles, Skin Texture, Skin Tone, and Skin Dullness at 4, 8, and 12 weeks using a 6-point grading scale (0 [None] to 5 [Severe]).
- Global improvement was assessed over 12 weeks using a 5-point grading scale (0 [None] to 5 [Marked Improvement]).
- Bioinstrumentation was utilized to capture changes from baseline in melanin and erythema over 12 weeks using a Mexameter (Courage+Khazaka electronic GmbH, Germany).
- Digital images were obtained at baseline, 4, 8, and 12-weeks using Canfield VISIA Imaging Systems (Canfield Scientific, Parsippany, NJ).
- Subjects completed self-assessment questionnaires through week 12.
- Adverse Events (AEs) were captured throughout the study period.
- Subjects were provided with a standardized skincare regimen that included the study products, a basic cleanser and a mineral-based sunscreen (SPF 56). A basic moisturizer was used as needed.

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RESULTS

DEMOGRAPHICS

- Twenty-two (22) female subjects were enrolled, and 21 subjects completed the study (1 subject withdrew [unrelated illness])
  - Mean age:
    - 58 years
  - Fitzpatrick Skin Type (FST):
    - FST IV: 50%
    - FST V: 50%
  - Ethnicity:
    - African American: 36%
    - Caucasian: 32%
    - Asian/Pacific Islanders: 14%
    - 'Other' (Multi-race/Caucasian, Multi-race/African American, Middle Eastern): 18%
  - Race:
    - Hispanic: 41%
- Fifty percent (50%) of subjects presented with mild (3) photodamage and 50% of subjects presented with moderate (4-6) photodamage.

EFFICACY

- As early as week 4, significant mean percent improvements from baseline in the appearance of Erythema (47%, p=.004), Dullness (30%; p<.0001), Skin Texture (27%, p<.0001) and Skin Tone (11%, p=.01) occurred (Table 1).
- There were continued improvements through week 12 in Dullness (64%, p<.0001), Skin Texture (54%, p<.0001) and Skin Tone (27%, p<.0001; Figures 2-4).
- As early as week 4, 73% of subjects achieved a ≥1-grade improvement from baseline in the appearance of Dullness with 100% of subjects showing at least a ≥1-grade improvement at 12 weeks.
- Seventy-one percent (71%) of subjects demonstrated a ≥1 grade improvement in the appearance of Skin Tone at 12 weeks.
- Mexameter measurements demonstrated significant mean percent reductions from baseline in both erythema and melanin as early as 4 weeks with significant mean percent reductions in melanin occurring throughout the study (Figure 1).

Table 1. Mean Percent Improvements from Baseline.

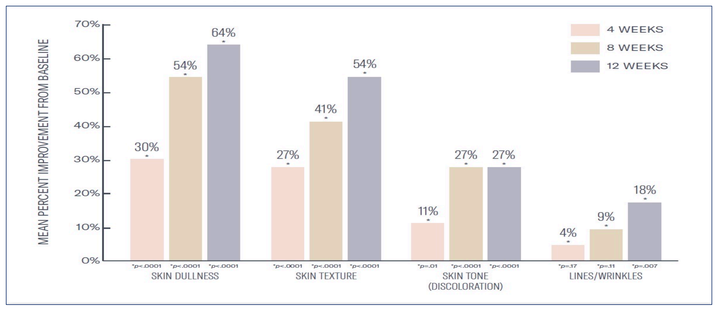
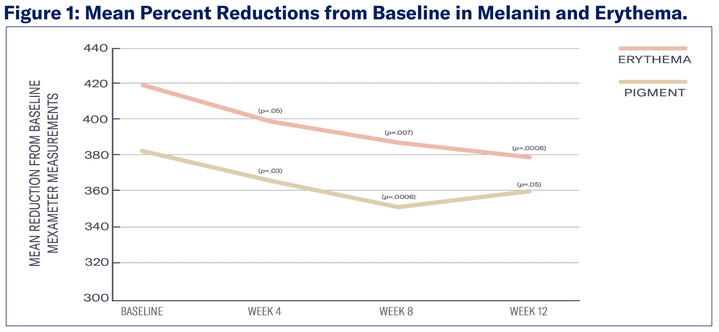


Figure 1: Mean Percent Reductions from Baseline in Melanin and Erythema.



SUBJECT SATISFACTION

- Subjects reported high levels of satisfaction throughout the study period.
- After only 4 weeks, 91% of subjects reported brighter-looking skin, 86% reported improvements in overall appearance and photodamage, and 82% of subjects reported their skin looked healthier.

TOLERABILITY

- All AEs were mild, localized and transient.
  - Reports of dryness resolved with the use of a basic moisturizer
  - Two (2) subjects each reported mild burning or stinging upon application (AHARet); possibly-related AEs included mild irritation, redness, and peeling/flaking
- No subject discontinued the study owing to an AE.

Figure 2: Improvements from Baseline to Week 4

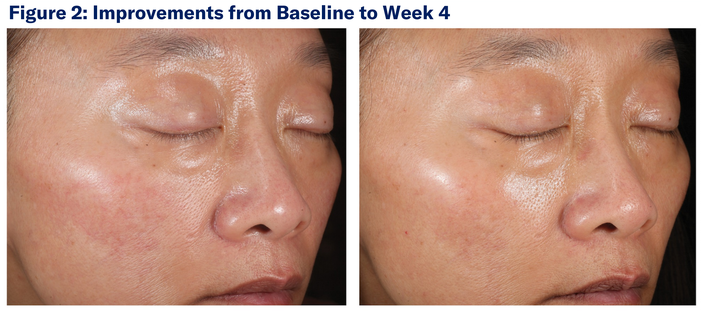


Figure 3: Improvements from Baseline to Week 8

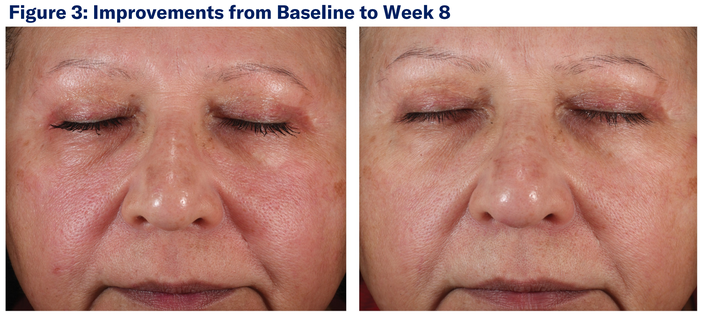


Figure 4: Improvements from Baseline to Week 12

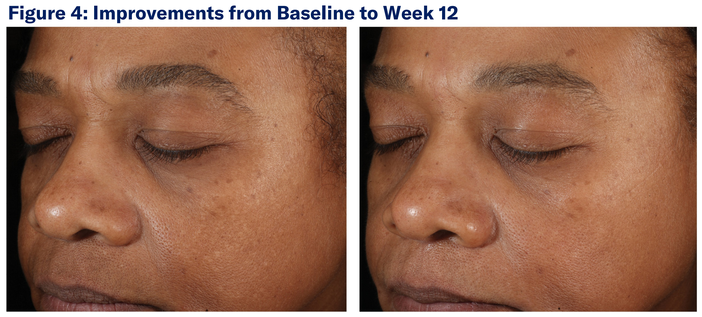
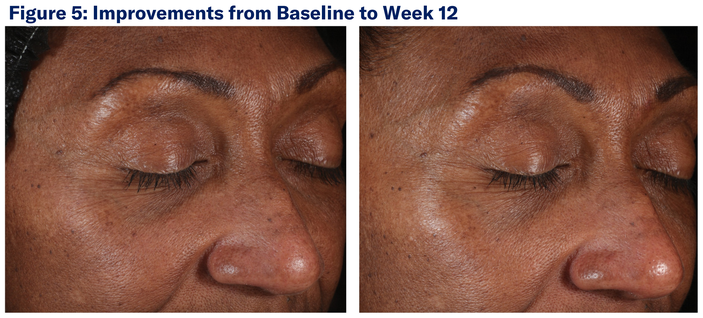


Figure 5: Improvements from Baseline to Week 12



CONCLUSIONS

- Use of a skincare regimen including an advanced antioxidant and retinoid/AHA cream led to early, significant visible improvements from baseline in the appearance of Erythema, Skin Dullness, Skin Texture, and Skin Tone in females with FST IV and V, and mild to moderate photodamage.
- Early, significant reductions from baseline were demonstrated in melanin and erythema based on Mexameter measurements.
- Subjects reported high levels of satisfaction with the study product throughout the study period.
- The regimen was well tolerated and no subject discontinued use of study products due to an AE.
- A skincare regimen comprised of an advanced antioxidant containing topical allyl pyrroloquinoline quinone, a double-conjugated retinoid/AHA cream and a mineral-based SPF 56 demonstrated improvements in the appearance of skin in females with FST IV and V, across a variety of ethnicities.

References: (1). McDaniel DH, et al. *J Clin Aesthet Dermatol.* 2019;12(4):33-40. (2). Cadenas E, et al. *Free Radic Biol Med.* 2000;29(3-4):222-230. (3). Chowanadisai W, et al. *J Biol Chem.* 2010;285(1):142-152. (4) Pecorelli A, et al. *Arch Dermatol Res.* 2021;313(3):139-146. (5). Wortzman M, Nelson DB. *J Cosmet Dermatol.* 2021;20(4):1160-1165.