PCA skin®

C&E Advanced

Proven protection against UV-induced photodamage

Introduction

Skin, the largest organ in our body, is under constant external attack. In particular, UV radiation can break down key elements of the skin's extracellular matrix and induce damaging inflammatory responses. **PCA SKIN**®'s **C&E Advanced** combines four key antioxidants, 20% L-ascorbic acid (vitamin C), 5% tocopherol (vitamin E), 1% hexylresorcinol, and 1% silymarin to protect skin against these deleterious effects, as measured in the expression of four critical biomarkers.

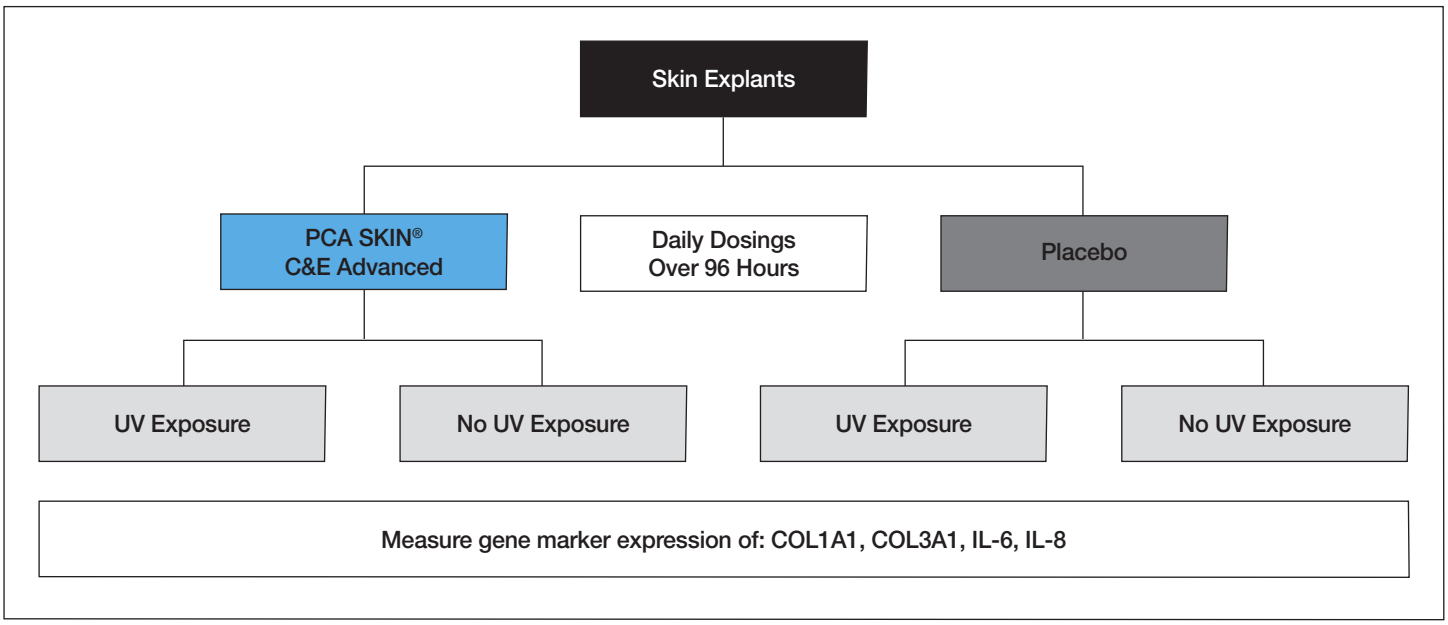
Objective

Compare gene marker response of skin explants treated with the full formula (**C&E Advanced**) or the matching placebo, which lacked L-ascorbic acid, tocopherol, hexylresorcinol, and silymarin upon UV radiation. UV-induced photodamage to skin was assessed by measuring the expression of four key gene markers, two of which correspond to collagen production and two of which correspond to inflammatory response.

Experimental Design

Human skin explants were treated with either the full formula or the placebo for 96 hours; product was reapplied every 24 hours. At the conclusion of the 96-hour treatment time, half the skin samples from either product set were exposed to 250 mJ/cm2 of UVB radiation while the other half were unexposed (Figure 1). Then, the gene marker expression was determined for all skin samples using quantitative polymerase chain reaction (q-PCR).

Figure 1



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Results and Analysis

Skin samples were treated with either **C&E Advanced** or the corresponding placebo, then half the samples from each set were exposed to UVB radiation while the other half were unexposed, thus generating four distinct sample groups. For each group, the gene marker expression of COL1A1, COL3A1, IL-6, and IL-8 were measured. COL1A1 and COL3A1 are responsible for the production of collagen, a key component of the skin's extracellular matrix, whose production decreases with age and exposure to external aggressors like UV radiation. IL-6 and IL-8 are responsible for the production of interleukins, key biomarkers of inflammation whose production increases in the presence of external aggressors like UV radiation. The change in gene marker expression was assessed for each product set (**C&E Advanced** and placebo) with and without UV exposure. Changes in gene marker expression greater than a two-fold increase or less than a two-fold decrease were considered biologically relevant and significant.

Skin treated with the placebo experienced significant decreases in COL1A1 and COL3A1 expression, and significant increases in IL-6 and IL-8 expression, following UV exposure (Table 1). Conversely, skin treated with the full formula (**C&E Advanced**) experienced no significant change in the expression of any of these four gene markers following UV exposure. This indicates that the placebo offered no protection to the skin against UV-induced photodamage, with a major decrease in the ability to generate collagen and a major increase in inflammatory response. On the other hand, skin treated with **C&E Advanced** was fully protected from the damaging effects of UV radiation, with no significant loss in collagen generation or increase in inflammatory response. This indicates that the highly efficacious blend of 20% L-ascorbic acid, 5% tocopherol, 1% hexylresorcinol, and 1% silymarin present in **C&E Advanced** forms a powerful system that provides long term protection to the skin.

Table 1

Linear Fold Change Upon UV Radiation			
	Gene Markers	Placebo	**C&E Advanced**
Collagen	COL1A1	- 2.4*↓	n.s.
	COL3A1	- 2.9*↓	n.s.
Inflammation	IL-6	2.5*↑	n.s.
	IL-8	2.3*↑	n.s.

*Indicates statistically significant change with unpaired t-test, N=3, $p<0.05$ while n.s. means no statistically significant change.

Conclusion

C&E Advanced significantly inhibited UV-induced collagen degradation and inflammatory response. In other words, it provided significant protection to skin against UV-induced photoaging.