

Study of the antioxidant effect of White Plus Serum on UVs irradiated skin explants

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Introduction

Studies have suggested that the UVs components of the solar spectrum induce photo-oxidation of skin surface lipids, squalene and cholesterol, resulting in their degradation. In addition, UVs lead to oxidative stress. Skin response to UVs involves an increase in malondialdehyde (MDA) that reflects oxidation of lipids from membranes and that correlates with a decrease of two antioxidant enzymes activity: catalase (CAT) and superoxide dismutase (SOD).

The aim of this study is to test the antioxidant property of a new cosmetic serum, White Plus Serum, that contains a known antioxidative ingredient: a *Camelia sinensis* extract. For this purpose we exposed skin explants to both UVA and UVB and tested the effect of the serum on: (1) surface lipids composition, (2) MDA production and (3) activity of antioxidant enzymes.

Materials and Methods

Human skin explants

Hypodermic layer from phototype II-III skin samples was isolated and placed epidermal layer face up in BEM (BioEC, France).

Serum application, irradiation and sampling

White Plus Serum (2mg/cm²) was applied or not to the skin samples. After 10 minutes, they were irradiated with an SPF compliant artificial UV source (UVA + UVB) which radiation was defined, known and similar to the zenith's sun at sea level. Minimal erythema dose (MED) used was 1 MED (500W for 7 minutes and 26 seconds). Explants were then sampled at 0 minutes, 5 minutes, 60 minutes and 24 hours after irradiation.

At the time of sampling, the different lipidic epidermal layers were separated. Layer 0 was removed by palpation-rolling using a glass rod and placed in 5ml hexane. Layer 3 was accessed by 3 scotch's tape delaminations and layer 5 by 2 additional scotch's tape delaminations. Layers 3 and 5 were sampled using a swab imbibed with TrisHCl and 0.1% Triton. All samples were frozen at -80°C until further analysis.

Quantification of neutral lipids: cholesterol and squalen

Neutral lipids were only quantified in layer 0. After liquid-liquid extraction cholesterol and squalene were quantified by GC/MS. Results are expressed in µg/mg total proteins.

Quantification of malondialdehyde (MDA)

MDA, produced by reactive oxygen on polyunsaturated fatty acids, was quantified in layer 5 after liquid/liquid extraction by GC/MS/ NCI and results are expressed in ng/mg total proteins.

Determination of catalase (CAT) and superoxide dismutase (SOD)

The activity of CAT, an enzyme that protects cells against hydrogen peroxide, and SOD, an enzyme degrading free radicals, were measured in layer 3 and expressed in IU/mg total protein.

Results and Discussion

Figure 1. Quantification of cholesterol and squalen in lipidic epidermal layer 1

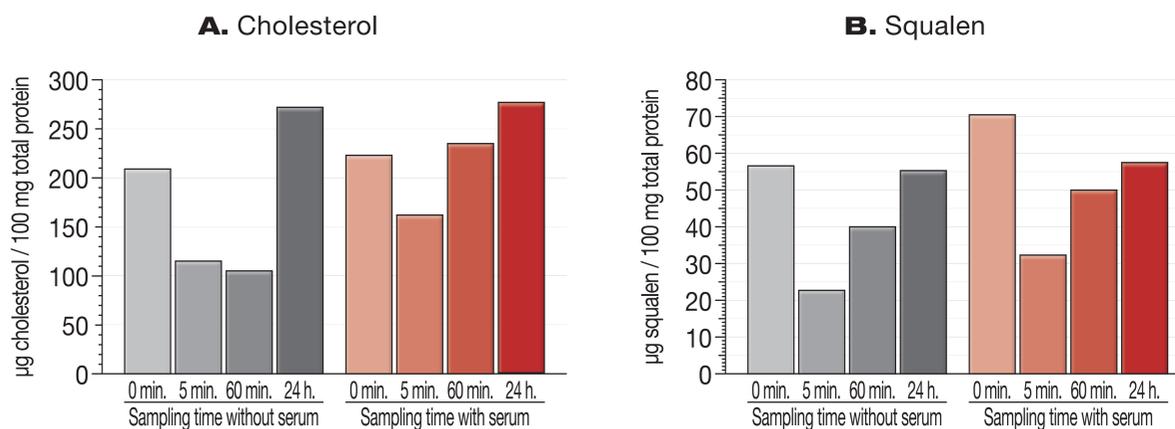


Figure 3. Quantification of CAT and SOD activities in lipidic epidermal layer 3

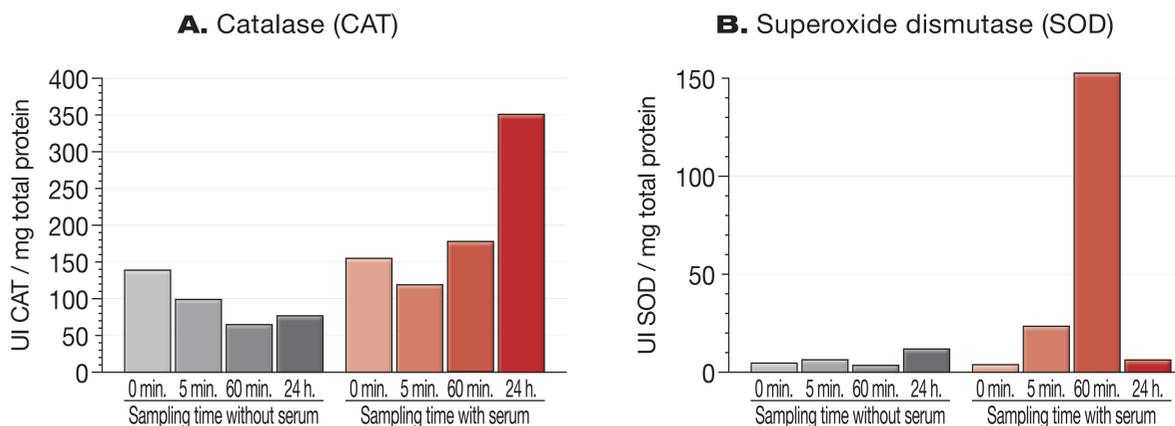
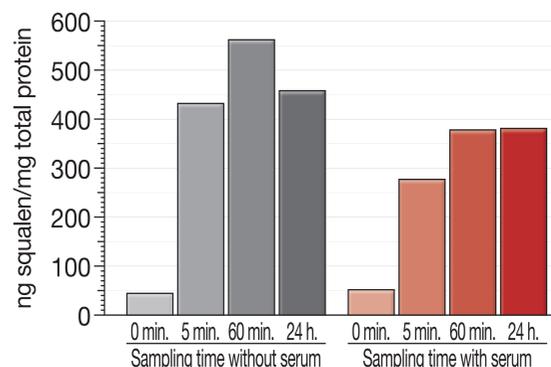


Figure 2. Quantification of malondialdehyde (MDA) in lipidic epidermal layer 5



Submitted to Uvs exposure, skin samples show (1) a decrease of squalene and cholesterol, (2) a reduction of SOD and CAT activity and (3) a large increase of MDA. These results reflect the already known photo-oxidation of skin surface lipids and the reduction in CAT and SOD activity.

Treatment of skin samples with the serum (1) reduces squalene and cholesterol degradation that are restored more rapidly, (2) increase CAT and SOD activity especially after 24 hours and (3) lead to reduced MDA accumulation.

Conclusion

In our experimental conditions, the Cosmetic Serum has a protective effect against the oxidative effects induced by UVs irradiation. Indeed, it limits the decrease of surface lipids levels, a result that correlates with a decreased MDA production. Moreover, it increases the antioxidant enzymes activity of SOD and catalase. All these demonstrate that the Cosmetic Serum has protective activity against oxidative stress that position it as a good candidate for skin protection against solar exposition.