PHOTOBIOLOGY AND PHOTOPROTECTION

TOPICAL APPLICATION OF ANTIOXIDANT BLEND SERUM DEMONSTRATED BIOLOGICAL PROTECTION AGAINST SOLAR RADIATION, ASSESSED BY IN VITRO MODEL AND BY CLINICAL STUDY

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Introduction: Our skin is exposed to a wide range of radiation on the solar spectrum that are known to accelerate extrinsic skin aging by forming reactive oxygen species (ROS) that cause oxidative stress. Ultraviolet (UV) radiation is the most well-known factor that contributes to early skin aging. Physical protection against UV provides only partial defense and does not address skin recovery from the residual biological damage. It is important to have additional biological protection to prevent skin damage from oxidative stress.

Objective: The goal of this study was to evaluate biological protective activity of an antioxidant blend serum (LVD) against solar-simulated UV-radiation, by in vitro and clinical study methods, assessed by gene expression and histological analysis.

Materials and Methods: An in vitro study was conducted using a 3D skin construct model with 200mJ/cm2 UVB irradiation after LVD application. Tissues were assessed after 24hours by gene expression (qPCR) and histology. In the clinical study, LVD was applied to the buttocks for 10 consecutive days and then, subjects were irradiated with 3MEDs by solar simulator. 24hours after irradiation, digital photographs were taken prior to collecting biopsy samples. Immunohistochemistry was performed on biopsy samples with biomarkers: CPD (cyclobutane pyrimidine dimer), mutated-p53 and MMP1. Expression intensity were quantified from digital images.

Results: In vitro study showed protection against sunburn cells formation and DNA damage when LVD was applied before UVB radiation. Gene expression demonstrated upregulation of extracellular matrix genes (COL1A1. COL3A1, ELN, FBN1) and antioxidants (SOD2, GSR, CAT). In the clinical study, digital photography showed protection against erythema on areas treated with LVD. Biopsy samples also showed reduction of CPD, mutated-p53 and MMP1 expression in areas treated with LVD.

Conclusions: Topical application of LVD demonstrated biological protection against UVA/UVB radiation assessed by in vitro model and by clinical study.