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Effects of UV rays and natural compound repairs using an ex-vivo human skin model: morphological and genotoxicological analysis

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Among the key factors in skin disorders such as wrinkling, dryness and photo-aging, the exposure to solar ultraviolet (UV) radiation plays a central role (1). Recently, compounds rich in polyphenols such as Thymus Vulgaris Leaf (TVL) extract and its major component Thymol (T) have been proposed in the prevention of UV-induced skin damages (2). Experiments were carried out in a human ex-vivo skin model, in which biopsies were obtained from aesthetic surgery of healthy 20-40 year-old women (n=6) after written informed consent (3). After 24 h, samples were pre-treated for 1 h with comparable concentrations of two compounds (TVL: 1.82 μg/mL and T: 1 μg/mL) before being irradiated with different UVB doses (0.24 J/cm^2 to 0.72 J/cm^2) or UVA radiation (8 J/cm^2 to 32 J/cm^2). Samples were harvested 24 h after irradiation and were processed both for light and transmission electron microscopy.Cell proliferation, Lactate Dehydrogenase assay, alkaline comet test, and histone H2AX phosphorylationwere evaluated. Both UVB and UVA induced an early inhibition of cell proliferation and DNA damage compared with respective controls. In particular, UVB rays were always more cytotoxic and genotoxic than UVA. The T-pretreatment showed a reduction of UVB-induced structural/ultrastructural and genotoxic damages. These results suggest that polyphenol fraction of tested substances may be useful for skin photoprotection after UV radiation damage in an ex-vivo human skin model. The present study suggests that this experimental setting can be a reliable approach for safety evaluation of UV skin exposure.

References

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Keywords
Ultraviolet radiations; polyphenol compounds; transmission electron microscopy.