

A pilot study of the photoprotective effect of almond phytochemicals in a 3D human skin equivalent.

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Abstract:

UV exposure causes oxidative stress, inflammation, erythema, and skin cancer. α -Tocopherol (AT) and polyphenols (AP) present in almonds may serve as photoprotectants. Our objectives were to assess the feasibility of using a 3D human skin equivalent (HSE) in photoprotectant research and to determine photoprotection of AT and AP against UVA radiation. AT or AP was applied to medium (25 and 5 μ mol/L, respectively) or topically (1 mg/cm² and 14 μ g/cm²), followed by UVA. Photodamage assessed 96 h post UVA included HSE morphology, keratinocyte proliferation, apoptosis, and differentiation. UVA induced disorganization of basal layer, alteration of epidermal development, and fibroblast loss which were alleviated by all nutrient pretreatments. UVA significantly decreased keratinocyte proliferation compared to controls, and all pretreatments tended to negate the reduction though only the medium AT effect was statistically significant ($p < 0.05$). UVA led to a significant 16-fold increase in apoptosis of fibroblasts compared to the control which was alleviated by topical AP pretreatment and completely negated by topical AT ($p < 0.05$). In conclusion, we validated the feasibility of using HSE in evaluation of photoprotectants and found that AT and AP, applied to medium or topically, provided some degree of photoprotection against UVA.