

VITAMIN D METABOLITES PROTECT AGAINST SKIN CANCER AND PHOTOAGING

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Classical sunscreens, which reflect or absorb UV radiation, have been used to minimise the harmful effects of UV. More recent advances in skin cancer research point to the use of vitamin D metabolites as additional biological photoprotective agents. Topical application of the vitamin D hormone 1,25-dihydroxyvitamin D₃ (1,25(OH)₂D₃) has already been shown to protect skin from UV-induced DNA damage, immunosuppression and carcinogenesis. The vitamin D receptor is critical in this photoprotective pathway and without it, mice display increased susceptibility to UV-induced carcinogenesis.

In contrast to this, recent findings indicate that mice with a knockout of the 1 α -hydroxylase enzyme required to produce 1,25(OH)₂D₃ do not show the same increased susceptibility to photocarcinogenesis. This opens the possibility that other endogenous vitamin D compounds that do not require 1 α -hydroxylation may contribute to photoprotection. One such compound is 20-hydroxyvitamin D₃ (20OHD₃) produced in skin from vitamin D by the CYP11A1 enzyme. In this study, the effects of topical 20OHD₃ on protection against early markers of skin cancer were measured in acutely irradiated Skh:hr1 hairless mice. 20OHD₃ significantly reduced DNA damage and immune suppression after UV exposure. To determine whether the photoprotective effects of 1,25(OH)₂D₃ or 20OHD₃ translated to protection from photoaging, changes in various markers were monitored in chronically irradiated Skh:hr1 hairless mice. Vitamin D metabolites were protective against increases in epidermal thickness, mast cell quantity, and elastin quantity and organisation.

This study provides evidence that other vitamin D compounds made naturally in irradiated skin but that do not require 1 α -hydroxylation may act as possible other avenues for protection from skin cancer and photoaging. Further, the ability of these vitamin D metabolites to also protect from photoaging, as well as carcinogenesis, could be an avenue for encouraging consumers to be better protected against UV damage.