Curcumin suppresses UVB- and interleukin 1α- induced inflammatory reactions in human keratinocytes and skin fibroblasts

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Ultraviolet B (UVB) irradiation induces acute and chronic skin disorders, characterized by inflammation such as erythema and edema, and deep wrinkle formation (termed photoaging). These clinical symptoms have been reported to contribute to the functional and structural abnormalities of the epidermis and dermis, including the augmented degradation of extracellular matrices (ECMs). On the other hand, curcumin, which is a yellow pigment isolated from the rhizomes of Curcuma longa, has been reported to exhibit anti-oxidative and anti-inflammatory actions in various cell species. However, whether or not curcumin exhibits anti-inflammatory actions in UVB-irradiated skin is not fully understood. In the present study, we demonstrated that curcumin dose-dependently decreased the UVB-augmented production of prostaglandin E2 (PGE2) in human epidermal keratinocytes (HEK). In addition, curcumin suppressed the UVB-induced gene expression of cyclooxygenase 2 in HEK. On the other hand, since UVB irradiation has been reported to augment the production of interleukin 1α (IL-1α) in the skin in vivo and in vitro, IL-1α-induced production of promatrix metalloproteinases (proMMPs)-1 and -3 was inhibited in curcumin-treated human skin fibroblasts (HSF). In addition, curcumin suppressed the IL-1α-augmented gene expression of proMMPs-1 and -3 in HSF. Furthermore, the IL-1α-augmented level of hyaluronic acid (HA) was decreased due to the suppression of HA synthase 2 (HAS-2) mRNA expression by curcumin in HSF. Thus, these results provide novel evidence that curcumin exhibits anti-inflammatory actions in UVB-irradiated skin by inhibiting not only epidermal PGE2 synthesis but also the subsequent IL-1α-mediated abnormal production of proMMPs and HA in HSF.