

Inhibition of ultraviolet-induced sunburn by a soybean Kunitz trypsin inhibitor

Hiroshi Kobayashi

Department of Obstetrics and Gynecology, Nara Medical University

Background: Cytokines are produced as a consequence of photo-damaged DNA and oxidative stress in ultraviolet (UV)-exposed keratinocytes. A soybean Kunitz trypsin inhibitor (KTI) down-regulates the expression of proinflammatory cytokines such as TNF-alpha in tumor cells and inflammatory cells.

Purpose: We analyze the effect of KTI on TNF-alpha production in UV-exposed primary human keratinocytes.

Results: Here, we show 1) UV induced up-regulation of TNF-alpha mRNA and protein expression in keratinocytes; 2) cells treated with KTI before UV irradiation showed a significantly lower accumulation of TNF-alpha protein in a dose-dependent manner and reduces UV-induced up-regulation of TNF-alpha mRNA expression; 3) KTI inhibits the induction of TNF-alpha target molecules interleukin-1beta (IL-1beta) and IL-6 proteins; 4) UV irradiation transiently activates JNK and Akt signaling but only weakly activates ERK and p38; 5) KTI specifically inhibits UV-induced activation of ERK, JNK and p38, but not Akt; 6) treatment of cells with SP600125, a pharmacological inhibitor of JNK, predominantly suppresses UV-induced up-regulation of TNF-alpha expression; 7) KTI does not enhance suppression of UV-induced JNK phosphorylation by SP600125.

Conclusions: KTI specifically inhibits UV-induced up-regulation of cytokine expression predominantly through suppression of JNK signaling pathway.