Synopsis of Original Research Paper

Biological protection from ultraviolet radiation by interleukin-12

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Interleukin-12(IL-12), one of the cytokines produced in UV-irradiated human skin, has been reported to prevent UV-induced immunosuppression through the mechanisms involving enhancement of DNA repair. This fact let us to speculate on the potential use of IL-12 for biological protection against harmful solar UV radiation. We examined effects of exogenously-added IL-12 on UV-irradiated human epidermal keratinocytes, the expression of IL-12 in those cells, and UV-induced intracellular signaling molecules responsible for IL-12 production. The removal of cyclobutane pyrimidine dimers (CPD) from the genomic DNA in cells irradiated with 100J/m^2 of UV-B (80μW/cm^2) was accelerated by the presence of human recombinant IL-12 at doses of 50 or 100ng/ml. Treatment of the irradiated cells with IL-12 also resulted in elevated survival level following UV-B irradiation. When cells were irradiated with 200J/m^2 of UV-B, IL-12 concentration in conditioned medium for 24h post-irradiation was approximately 12pg/ml, which was 10 fold higher than that in unirradiated control. Expression for IL-12A(p35) mRNA was also increased to 2.4 fold over the control level in 16h following exposure. Both the IL-12 secretion and IL-12 mRNA expression were inhibited by a JNK inhibitor and by an antioxidant. These results suggested that UV-induced oxidative stress in the cells triggers activation of intracellular signaling, including a JNK pathway. Although the downstream signaling is to be determined, activated JNK would lead to secretion of IL-12 through upregulation of IL-12 mRNA expression. IL-12 then enhances elimination of CPD from damaged DNA. Thus, UV-induced signaling pathways toward production of IL-12 are possibly a positive autocrine regulation of DNA repair system. To potentate this mechanism may lead to a new approach toward biological protection against solar UV light.