# PHOTOPROTECTIVE EFFECTS OF ORAL MINERALS IN UVA-IRRADIATED HUMAN DERMAL FIBROBLAST

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It has been well known that exposure to solar radiation results in the cutaneous aging in human skin. UV radiation plays a major role in changing dermal structure and activating a family of hydrolytic enzymes called matrix metalloproteinase(MMPs). MMPs degrade the components of extracellular matrix such as collagen, laminin, fibronectin and proteoglycan. Repeated exposure of skin cells to UV results in the rapid production of reactive oxygen species, in turn upregulates MMP gene expression. The degradation and damage by MMPs eventually results in the visible skin wrinkling or photoaging.

In this investigation, oral mineral powder derived from various medicinal ores was developed. Nano-biotechnology could provide a theoretical basis and technical support for the improvement of the solubility and bioavailability of the bioactive components of the oral mineral powder. The mean size of the fine particles of the powder was almost in the nano range. The protective effects of oral minerals against UVA-irradiated damages of human dermal fibroblast were examined in this investigation.

## Materials and Methods

Human dermal fibroblast (HDF) was maintained in Dulbecco's Modified Eagle's Media (DMEM) with 10% fetal bovine serum and kept in a humidified 5% $CO_2$ at 37 . Cell viability was measured using MTT (3-(4,5-dimethylthiazol-2,yl)-2,5-diphenyltetrazolium bromide) assay. MMP activity was determined by zymography, RT-PCR and ELISA

## Results

MMP-2 is primarily responsible for the degradation of the helical damains of type IV collagen, while MMP-1 is more selective for type I collagen. The effect of oral minerals on the MMP-1 and MMP-2 activity was shown in Fig. 1. The mRNA expression level of MMP-1 and MMP-2 was also inhibited by oral minerals (Fig. 2).

Several other photoprotective effects such as enhancement of collagen production and decrease of gelatinase level will be shown in this investigation. These results suggest that nano-biotechnology enhances oral mineral powder into a better anti-wrinkle material in cosmetics.

References

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[2] Kim HH, Shin CM, Park CH, Kim KH, Cho KH, Eun HC, Chung JH. Eicosapentaenoic acid inhibits UV-induced MMP-1 expression in human dermal fibroblasts. *J. Lipid Res.* 46 (2005): 1712-1720.

Figures

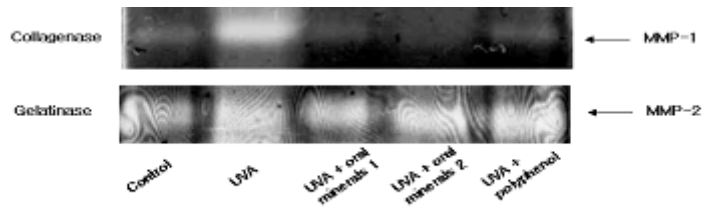


**Fig. 1. Effect of oral minerals on the MMP-1 and MMP-2 activity in UVA- irradiated human dermal fibroblast**

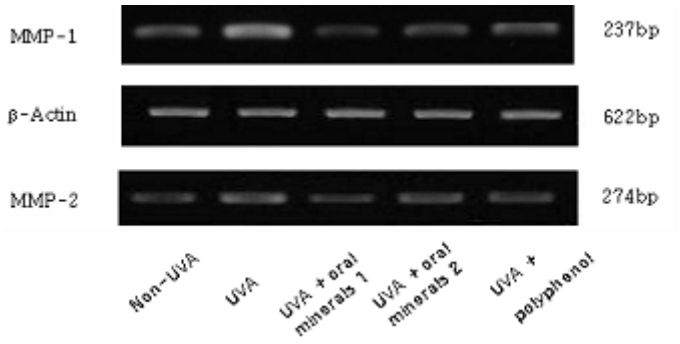


**Fig. 2. Effect of oral minerals on the mRNA expression level of MMP-1 and MMP-2 in human dermal fibroblast irradiated with UVA.**