

〈シンポジウム〉

(化粧品の有効性を支える皮膚科学研究の今後と方向性)

## 紫外線による皮膚ダメージと修復プロセスから考える化粧品の有効性

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### UV-Induced Skin Damage and Its Repair Process

—A clue to develop effective cosmetics—

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#### Abstract

Ultraviolet ray (UV) is one of most important environmental risk factors for skin aging although genetic background accelerates basically the aging process. Continuous damages in DNA as well as skin tissues by UV must be repaired immediately, and photoaging may be caused by an age-dependent decrease in the repair capacity. Our group has taken a great interest in the DNA repair system for DNA damages by UV irradiation or reactive oxygen species. A reduction in the post-UV DNA repair capacity is associated with age. We confirmed a significant age-related decrease in the ability to restore damaged DNA. The experiments were performed using a cell reactivation assay to evaluate the functional recovery of transfected reporter genes damaged by UV light. Our results indicated the reduced post-UV DNA repair capacity in aging results from an impairment in the latter step of nucleotide excision repair due to a decrease in the expression of factors in DNA repair synthesis. The enzymes involved in this step might be candidates for target genes for skin care against UV and aging risks. To understand the physiological effects of UV on the skin, the expression patterns of the genes related to UV response must be analyzed on a genome-wide scale. To use the comprehensive results more efficiently, our analyses of the expression data should refer to information on gene functions and previous experimental results. Our group is working to construct a database of UV-regulated genes. Gene ontology annotation and links to major databases such as OMIM and LocusLink are assigned when available. Users can examine the visible time course of gene expression after UV irradiation and search for genes with patterns resembling those of examined. To investigate the function of UV-regulated genes, our group has also been attempting to extract information on their interactions with other genes from the MEDLINE by natural language processing. To extract accurate sentences describing the gene interactions, our database employs an efficient system to eliminate irrelevant hits from PubMed search returns. The system also employs an effective algorithm to identify abbreviations and their expansions automatically. In the future this will provide a powerful tool for automatically extracting sentences that describe gene interactions. Continuing efforts to complete the comprehensive database described above will allow us to apply new knowledge for further progress in skin care.

**Key words:** UV damage, DNA repair, nucleotide excision repair, database, natural language processing.