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Advanced glycation end-products inhibit mesenchymal-epidermal interaction by up-regulating proinflammatory cytokines

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Background: It is known that age-related increase of advanced glycation end-products (AGEs) is associated with senescence. Despite numerous cutaneous reports, effects of AGEs on hair follicle homeostasis have yet to be described. It is, therefore, of interest to investigate how AGEs affect functions of dermal papilla cells (DPCs) that play essential roles in hair growth regulation.

Objectives: In order to understand the basis of AGE actions on hair follicular physiology, we first investigated the effect of AGEs on the mesenchymal-epidermal interaction using DPCs and epidermal keratinocytes (KCs). To further elucidate the underlying molecular mechanisms, we examined proinflammatory cytokines in DPCs.

Methods: Primary human DPCs were cultured in the absence and presence of AGE-BSA. After KCs were grown in the DPC-conditioned media, the proliferation activity of the cells was determined by MTT assay. Gene expression levels of alopecia-related proinflammatory cytokines were examined by RT-PCR.

Results: The proliferation activity of KCs significantly decreased when the DPC-conditioned medium was prepared in the presence of AGE-BSA. This inhibitory effect was dose-dependent and the glycated protein itself had no effect on the viability of KCs at the tested concentrations. The expression levels of proinflammatory cytokines (IL-1 α , IL-1 β , IL-6, IL-8 and TNF- α) in DPCs were markedly increased by the AGE-BSA treatment.

Conclusions: AGE-BSA up-regulates a series of proinflammatory cytokines in DPCs, which inhibits the mesenchymal (DPC)-epidermal (KC) interaction. Our current findings suggest that AGEs could trigger senescence of hair follicles and progress age-related alopecia's, by targeting DPCs.

Biography

Mitsuyoshi Miyata has completed his PhD at the age of 28 years from the Tokyo University of Marine Science and Technology. At present, he is a chief investigator at Saravio Central Institute, Saravio Cosmetics Ltd. He has been consistently engaged in the study of beauty and health science, especially in the development of cosmetic materials and functional foods.

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