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Kuniyoshi Kaseda

Saravio Central Institute, Saravio Cosmetics Ltd, Japan

Hot springs energize hair follicle dermal papillae

We have investigated the fundamental functions of hair follicle cells along with microorganisms of the world famous Beppu hot spring spas. I would like to present how these unique spa-derived microorganisms affect the functions of human dermal papilla cells (HDPCs).

HDPCs play essential roles in hair follicular morphogenesis and in hair growth cycles. We have discovered novel functions of mitochondria, an energy producing organelle, and primary cilia, a signaling center, in HDPCs. In brief, HDPCs showed two types of mitochondria, i.e. filamentous and rounded morphologies. PDGF-AA, an anagen-inducing growth factor, increased the population of the filamentous mitochondria and elevated cellular ATP level. Interestingly, the filamentous mitochondria dominated migrating HDPCs. By genetically modifying the length of the primary cilia, it was demonstrated that the sensory organelle is involved in communication with other cells through the regulation of growth factor(s) production. Additionally, bFGF elongated the primary cilia. Thus, HDPCs maintain the energy producing and the sensory organelles, as required. A spa-derived hydrolyzed yeast extract was found to enhance ATP production by increasing filamentous mitochondria and it augmented the strength of the cellular signaling by elongating the primary cilia of HDPCs.

Also, I am going to introduce our latest research on age-related hair problems: an advanced glycation end-product upregulated the proinflammatory cytokines such as IL-1 α , IL-1 β , IL-6, IL-8 and TNF- α in HDPCs, which in turn inhibited the mesenchymal-epidermal interaction. Another hot spring microorganism (a green alga) suppressed the up-regulation of these cytokines, suggesting that the algal extract prevents the progress of age-related alopecias.

In the present talk, these different issues will be illustrated through several case studies.

Biography

Kuniyoshi Kaseda has completed his PhD at the age of 28 years from the Kyushu Institute of Technology and postdoctoral studies at the National Institute of Advanced Industrial Science and Technology as well as at the Marie Curie Research Institute. He is, at present, the director at the Saravio Central Institute of Saravio Cosmetics Ltd. He has published a wide range of reputed journals, in Biophysics, Cell biology, Cosmetic science and so on.

kaseda@saravio.jp

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