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Arctiin blocks hydrogen peroxide-induced senescence and cell death through microRNA expression changes in human dermal papilla cells

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Accumulating evidence indicates that reactive oxygen species (ROS) are an important etiological factor for the induction of dermal papilla cell senescence and hair loss, which is also known alopecia. Arctiin is an active lignin isolated from *Arctium lappa* and has anti-inflammation, anti-microbial and anti-carcinogenic effects. In the present study, we found that arctiin exerts anti-oxidative effects on human hair dermal papilla cells (HHDPCs). To better understand the mechanism, we analyzed the level of hydrogen peroxide (H₂O₂)-induced cytotoxicity, cell death, ROS production and senescence after arctiin pretreatment of HHDPCs. The results showed that arctiin pretreatment significantly inhibited the H₂O₂-induced reduction in cell viability. Moreover, H₂O₂-induced sub-G1 phase accumulation and G2 cell cycle arrest were also down-regulated by arctiin pretreatment. Interestingly the increase in intracellular ROS mediated by H₂O₂ was drastically decreased in HHDPCs cultured in the presence of arctiin. This effect was confirmed by senescence associated-beta galactosidase (SA-β-gal) assay results; we found that arctiin pretreatment impaired H₂O₂-induced senescence in HHDPCs. Using microRNA (miRNA) microarray and bioinformatic analysis, we showed that this anti-oxidative effect of arctiin in HHDPCs was related with mitogen-activated protein kinase (MAPK) and Wnt signaling pathways. Taken together, our data suggest that arctiin has a protective effect on ROS-induced cell dysfunction in HHDPCs and may therefore be useful for alopecia prevention and treatment strategies.

Biography

Jiyoung Lee has completed her Master's degree from Chungnam National University. She is the Senior Researcher of Future R&D Center, Coreana Cosmetics Co. Ltd.

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