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Anti-Oxidative and Anti-Senescence Effects of Green Tea-Derived Exosome-Like Nanoparticles (Gtdens) In Skin by Inhibiting the Phosphorylation of MAPK14 (P38)

Wooram Choi [1], Jeong Hun Cho [2], Sang Hee Park [3], Dong Seon Kim [1], Hwa Pyoung Lee [1], Yong Deog Hong [2], Hyoung-June Kim [2], Jongsung Lee [1,3], Jae Youl Cho [1,3]

[1]Department of Integrative Biotechnology, Sungkyunkwan University, Suwon 16419, Republic of Korea
chwoo1028@naver.com; wetdry20@skku.edu; lhp0507@naver.com; bioneer@skku.edu; jaecho@skku.edu
[2]Research and Innovation Center, AMOREPACIFIC, Yongin 17074, Republic of Korea
huny841215@amorepacific.com; hydhong@amorepacific.com; leojune@amorepacific.com
[3]Department of Biocosmetics, Sungkyunkwan University, Suwon 16419, Republic of Korea
84701@naver.com

Extended Abstract

Recently, plant-derived exosome-like nanoparticles (PDENs) have been isolated, and biopharmaceutical research is focusing on the properties and functions of the plant compounds. First, microvesicles are created by budding of cellular membranes into small vesicles with diameters of 0.1 to 1.0 μm [1]. Apoptotic bodies are produced from cells undergoing programmed cell death, and they have sizes from 0.05 to 5 μm in diameter [2]. Exosomes are formed from early endosomes, usually formed through endocytosis or autophagosomes. In this study, we extract and purify green tea-derived exosome-like nanoparticles (GtDENs) to determine their physiological functions and the associated underlying molecular mechanisms. GtDENs show the protective effects in a skin cell line, HaCaT cells, against external stress such as UVB, H_2O_2, t-BHP. These observations are the result of alleviated mRNA expressions of genes such as MMP3, p21, BAX, and CASP, which are up-regulated by external stimuli. In the protein signaling pathway, GtDENs can down-regulate the phosphorylation of proteins in MAP kinase and AP-1 signaling such as c-Fos and p38. In particular, p38 was revealed to be the target protein of GtDEN binding. Caffeine, the main component encapsulated in GtDENs, also showed protective effects in skin cell lines and binds to p38 protein at the amino acids Ala34, Thr68, and Glu71. These findings identify GtDENs as novel transporters with efficacy in protecting skin from oxidation and senescence.

References

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