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Enhanced α-tocopherol content and free radical scavenging activity of *Codonopsis lanceolata* transformed with γ-TMT gene

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Codonopsis lanceolata is an important medicinal plant that synthesis tocopherol, which is an antioxidant and a phytochemical associated with reduced cancer risk, coronary heart disease, and psychoneurosis. γ-tocopherol is the most abundant form of tocopherol found in the *Codonopsis lanceolata*, whereas, α-tocopherol, which is the most biologically active form of vitamin E, exist in low amount. Therefore, to shift the tocopherol composition, over expression of the γ-TMT gene successfully established in *Codonopsis lanceolata*. HPLC analysis of leaf and roots of T_1 transgenic lines revealed an increased α-tocopherol content by 6.52 and 2.60 fold respectively over the controls plants. The antioxidant activity of methanolic crude extracts of transgenic and non transgenic control plants was investigated using 1,1-diphenyl2-picrylhydrazyl (DPPH) radical scavenging method. Free radical scavenging activity was evaluated using α-tocopherol, Butylated Hydroxyanisol (BHA) and Butylated Hydroxy toluene (BHA) as standard antioxidants. In general, the transgenic *Codonopsis lanceolata* showed strong DPPH radical scavenging activity over the non transformed control plant. Thus, over expression of γ-TMT gene resulted in increased α-tocopherol content with an enhanced antioxidant activity.

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Inhibitory effect mechanism of *Prunus persica* (Fructus) extract on melanin synthesis and photoaging

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In our previous study, *Prunus persica* (Fructus) extract (PFE) was found to be the inhibitory effects on melanogenesis with employing tyrosinase activity and melanin synthesis in melan-a cells. The BuOH-soluble fraction, especially, inhibited melanin formation in a dose-dependent manner without cytotoxic effects. In this study, the gene expression levels of tyrosinase and tyrosinase-related protein-1, -2 (TRP-1, -2) were analyzed by a real-time reverse transcriptase-polymerase chain reaction (RT-PCR). Exposure of mouse melan-a cells to PFE and the BuOH-soluble fraction of the extract markedly reduced the mRNA expression of tyrosinase and TRP-1 & -2.

In addition, antiaging effects of PFE were performed using HaCaT human keratinocytes and human skin fibroblast cells. PFE attenuated cell damage induced by hypoxanthine-xanthine oxidase in a dose-dependent manner indicating that PFE has the potential of the scavenging effect of reactive oxygen species (ROS) in human skin cell. Moreover, PFE significantly suppressed UVA-induced ROS production determined by the oxidation of DCFH to highly fluorescent 2',7'-dichlorodihydro-fluorescein (DCF) using FACS analysis. Additional study revealed that UVA irradiation of HaCaT cells increased the gelatinolytic activities of MMP-2, -9, which was significantly suppressed by the treatment with PFE at the test concentration of 5 mg/ml. PFE also showed the suppressive effect of the mRNA expression of MMP-9.

These results suggest that PFE might be applicable as natural ingredients for skin-whitening and antiaging agents.

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