

Abstract

The Effects of Protopanaxadiol Enriched Extracts from Ginseng (*Panax ginseng*) on Lipid Uptake, GLUT4 and 79 Adipokines Responsible for Adipogenesis in Adipocyte-Like 3T3-L1 Cells †

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Obesity is a serious health problem and known to cause a series of metabolic disorders. Ginseng (*Panax ginseng*) is an important traditional Chinese herb and has been used for thousands of years in Asia. Mounting evidence has demonstrated that ginseng and its major bioactive constituents, ginsenosides, exhibit glucose and lipid-lowering properties. However, the effects of the two major ginsenosides chemical classifications, namely, protopanaxadiol (PD) and protopanaxatriol (PT)-type ginsenosides on adipocyte differentiation have to be elucidated. PD and PT-type enriched fractions, were investigated for their potentials in influencing lipid acquisitions, adipocyte viability and Glut4 mRNA levels in cultured 3T3-L1 cells, a model of adipocytes. It was shown that both enriched PD- and PT-type ginsenosides did not influence adipocyte viability when administered at 10 µg/mL after 10 d differentiation, PD enriched fraction resulted in modest but significant increase in cell viability ($95.1 \pm 1.9\%$, $p < 0.05$). Intriguingly, oil red O (ORO) lipid staining assay demonstrated that PD fraction, but not PT fraction, resulted in sharp decrease in the amount of lipid droplets formed, suggesting an increase in lipolytic activity. Glucose uptake in differentiated adipocyte-like 3T3-L1 cells were assessed and Glut4 expression was most significantly augmented in PD fraction treated cells (14.2 ± 0.5 fold, $p < 0.05$) compared to untreated control. Among 79 adipokines responsible for adipogenesis, 50 genes were significantly up-regulated and only 1 was down-regulated ($p < 0.05$) by PD fraction via RT-PCR gene array analysis. This study clarified the chemical components of ginseng involved in lipid uptake and adipogenesis in our cultured adipocyte-like cell model.



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