

## The Anti-Lipid Activity of the Major Polyphenolic Compounds Isolated From Kumquat

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### Extended Abstract

Obesity has been classified as a chronic disease by World Health Organization (WHO), and it is also the risk factor to cause diabetes, hypertension, and cardiovascular disease (Lönn et al., 2010; Hsu and Yen, 2008). Kumquat (*Fortunella margarita* Swingle), possessing unique polyphenol compounds, which are different from common citrus fruits, is an important citrus fruit grown in Ilan county of Taiwan. In the hot water-extract of kumquat, four major polyphenol compounds were isolated and identified as 3', 5'-di-C- $\beta$ -glucopyranosylphloretin (DGPP), margaritene, isomargaritene, and fortunellin. These compounds were then assayed with 3T3-L1 cells for their anti-lipid activities.

The oil accumulation in cells was determined by using Oil red O staining technique, and triglyceride content was assayed with a commercial kit. The results demonstrated all of these compounds could reduce the oil accumulation in 3T3-L1 cell. Besides, the triglyceride contents in 3T3-L1 cells were reduced by 14%, 47%, 55% and 44%, respectively, at concentration of 200  $\mu\text{g/mL}$ , which was non-toxic to cells. The mRNA expression analysis, using reverse transcription-polymerase chain reaction (RT-PCR), revealed that these polyphenol compounds but not DGPP could suppress the expression of PPAR  $\gamma$ , C/EBP  $\alpha$ , and fatty acid synthase (FAS). Accordingly, margaritene, isomargaritene, and fortunellin could reduce lipid content by inhibiting adipogenesis. Besides, the expression of hormone-sensitive lipase (HSL) and adipose triglyceride lipase (ATGL) could be increased by these four compounds and therefore enhanced the lipolysis activity. The results showed these polyphenolic compounds could exert their anti-lipid activities by reducing adipogenesis and enhancing lipolysis pathways. The overall results suggested that kumquat has the potential for use as a natural anti-lipid dietary supplement product.

**Keywords:** kumquat 、 3T3-L1 adipocytes 、 triglyceride 、 adipogenesis 、 lipolysis

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