Evaluation for the inhibitory activities of flavanone- and thioflavanone-derivatives on nitric oxide production from lipopolysaccharide-induced macrophage cells

Je-Hyuk Lee a, Jae-In Lee b, Gun Hee Kim a,*

a Plant Resources Research Institute, Duksgun Women’s University, Seoul 132-714, Korea

b Department of Chemistry/Plant Resources Research Institute, College of Natural Science, Duksgun Women’s University, Seoul 132-714, Korea

Flavanones are well known to have the physiological antioxidant, anti-inflammatory, blood lipid and cholesterol-lowering and anticarcinogenic activities. And the chemical modifications of flavanone are associated with their bioavailability and bioactivity in the body. Derivatives of flavanones and thioflavanones were synthesized from 2-hydroxybenzoic acids and thiosalicylic acid. Flavanone derivatives were composed of flavanones and chloroflavonones with one to three methoxy substituents (-OCH3). Thioflavanone has the chemical formula replaced oxygen atom of flavanone by sulfur atom. Derivatives of thioflavanone contains the methoxy (-OCH3), methyl (-CH3), nitro (-NO2), hydroxyl (-OH), chloro (-Cl), and fluoro (-F) substituents in thioflavanone skeleton. To investigate the anti-inflammatory effect of flavanones and thioflavanones, it was investigated to modulate nitric oxide (NO) synthesis from lipopolysaccharide (LPS)-stimulated cultures of macrophages cells. Among several flavanone-derivatives, 5-methoxyflavanones (5-methoxyflavanone, 5-methoxy-4′-chloroflavonone, and 5,4′-dimethoxyflavanone) and 3′,4′-dimethoxyflavanone provided a potent inhibition of NO production from LPS-induced macrophage cells. In thioflavanones, 3′-nitrothioflavanone and 3′-hydroxythioflavanone showed the increased inhibitory activity on NO production than basal thioflavanone compound. From the above, it could be concluded that the chemical modifications of flavanone and thioflavanone improve the bioavailability and bioactivity in the body, and there is a relationship between the functions and chemical structures of flavanones/thioflavanones.