Effect of apigenin, kaempferol and resveratrol on the expression of interleukin-1β and tumor necrosis factor-α genes in J774.2 macrophages

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Abstract:
Flavonoids have been reported to bring benefits in lowering inflammation, oxidative stress and exert positive effects in cancer and cardiovascular and chronic inflammatory diseases. Apigenin, kaempferol and resveratrol present in fruits, vegetables and grain were investigated for their effect on the synthesis of interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α) at transcriptional level in lipopolysaccharide (LPS)-stimulated J774.2 macrophages. Apigenin (30 μM), kaempferol (30 μM) and resveratrol (50 μM) significantly decreased the number of TNF-α mRNA copies in LPS-activated J774.2 macrophages. Apigenin and kaempferol caused inhibition of IL-1β gene expression in J774.2 macrophages, but resveratrol was ineffective. These results indicate that apigenin, kaempferol and resveratrol exert inhibitory effects on the TNF-α and except for of resveratrol on IL-1β gene expression in J774.2 macrophages at the transcriptional level. In addition, the studied compounds may be the mediators responsible for protective role of a diet high in fruits and vegetables in the cardiovascular and inflammatory diseases.

Key words:
apigenin, kaempferol, resveratrol, IL-1β mRNA, TNF-α mRNA, J774.2 macrophages

Introduction

Many epidemiological studies have shown that an increased intake of polyphenolic phytochemicals such as flavonoids and phenolic acids found in a number of vegetables and fruits may contribute to low incidence of cardiovascular diseases [14, 19]. Dietary intakes of flavonoids are inversely correlated with the plasma low-density lipoprotein (LDL)-cholesterol concentration [1]. Flavonoids and polyphenolics have a great potential to delay LDL oxidation through their radical-scavenging capacity [16]. Wine flavonoids have been shown to protect against atherosclerosis by inhibiting the accumulation of oxidized LDL in atherosclerotic lesions, and removing atherogenic lesions in apolipoprotein E-deficient mice [3]. In addition some flavonoids inhibit platelet aggregation in vitro and tromboxane synthesis in vivo [24]. This observation demonstrates that flavonoids may confer protection against early events in atherogenic lesion formation.

Interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α) are well known cytokines, secreted in great amounts by the activated macrophages. It was demonstrated that IL-1β and TNF-α may contribute to the