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Baicalein attenuates LPS-induced oxidative stress and inflammation, might be via CaMKII inhibition

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Oxidative stress and inflammation are two major contributing factors to most chronic diseases including cancer, diabetes, cardiovascular, neurological and pulmonary diseases. Baicalein, a flavonoid bioactive compound from Scutellaria baicalensis Georgi (also known Scutellaria Radix or Huang Qin), has demonstrated antioxidant and anti-inflammatory potentials. However, the in-depth mechanistic studies on this compound with protective effects remain to be discovered. This study on lipopolysaccharide (LPS)-induced reactive oxygen species (ROS) in macrophages showed that pre-treatment with baicalein significantly attenuated oxidative stress by reducing the ROS levels in a dose-dependent manner (0.1 μM, 0.33 μM, 1 μM, 3.3 μM and 10 μM). The antioxidant effects of baicalein were 100 times stronger than N-Acetylcysteine (NAC), a commercial antioxidant agent. Furthermore, the antioxidant effects of baicalein showed the same inhibitory pattern with KN-93, a specific inhibitor of CaMKII, in the LPS-induced ROS production in vitro. Moreover, pre-treatment of baicalein also significantly decreases LPS-induced inflammation in macrophages by reducing the pro-inflammatory mediators, including IL-6, monocyte chemoattractant protein 1 (MCP-1), macrophage inflammatory protein -1(MIP-1), regulated on activation in normal T-cell expressed and secreted (RANTES) and tumor necrosis factor (TNF α) in a dose-dependent manner as well. We are currently identifying if CaMKII (Ca^{2+}/calmodulin-dependent protein kinase II) would be a potential primary target by baicalein with utilizing small-molecule affinity purification, and if the decreased oxidative stress which could lead to the reduced inflammation by baicalein's inhibition of CaMKII involves the attenuation of p38MAPK and JNK signaling pathway for LPS-induced cytokine production by macrophage.

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