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Inhibitory Effect of Ginsenoside Rg_3 and Ginsenoside Rh_2 on Activated Microglia

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Ginseng (the roots of *Panax ginseng* C.A. Meyer, Araliaceae) has been used as a traditional medicine in many countries. The major components of ginseng are ginsenosides. Red ginseng produced by steaming fresh ginseng at 98-100℃ for 2 - 4 h has different ginsenosides (e.g. ginsenoside Rg_3) compared to fresh ginseng. Ginsenoside Rg_3 is metabolized to ginsenoside Rh_2 by human intestinal bacteria. The ginsenoside Rh_2 have been reported to exhibit antitumor, antiallergic and brain ischemia-protective activities.

We therefore isolated ginsenoside Rg_3 from steamed ginseng, transformed it to ginsenoside Rh_2 by human intestinal bacteria, and isolated Rh_2. Then we studied the antiinflammatory effect of ginsenoside Rh_2 on activated microglial BV2 cells. The Ginsenoside Rh_2 potently inhibited the production of NO and prostaglandin E2 in LPS/IFN-γ–induced BV2 cells. The ginsenoside Rh_2 also reduced the expression levels of the inducible NO synthase (iNOS) and cyclooxygenase (COX)-2 proteins. The ginsenoside Rh_2 inhibited the NO level produced by iNOS enzyme activity in cell-free system, but did not inhibit COX-1 and 2 activities. The ginsenoside Rh_2 potently inhibited the levels of TNF-α and IL-1β in LPS/IFN-γ-induced BV2 cells. These findings suggest that the protective effect of ginsenoside Rh_2 against ischemic brain injury may originate from the repressing proinflammatory cytokines and gene expression of iNOS and COX-2.