# Reciprocal activity of ginsenosides in the production of pro-inflammatory repertoires, and their potential roles in neuroprotection in vitro

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**Abstract**

Ginsenosides, active constituents found in most Ginseng species (e.g. *Panax ginseng* (*Araliaceae*)), have attracted interest due to their potential roles in the CNS, antineoplastic and immunomodulatory effects, and stimulation of phagocytosis. In the present study, we investigated the effects of the ginsenosides Rb1 and Rg1 with respect to the nitric oxide and cytokines responsible for chronic inflammation in the rat brain. We found that Rb1 and Rg1 exert an opposite effect in a dose-dependant manner (50~250 μg/ml). While Rg1 stimulated nitric oxide and pro-inflammatory cytokines (IL-1β, IL-6, and TNF-α), Rb1 significantly inhibited these pro-inflammatory repertoires compared to those of control groups. In addition, gene expressions for bcl-2 and bax, which are known to be related with apoptosis, were well regulated at 250 μg/ml of Rb1 and Rg1. Moreover, in the combination of Rb1 and Rg1, Rb1 significantly inhibited the stimulative function of Rg1 in NO assay at the same dose. This attenuation was stably maintained up to 72h. In conclusion, it is considered that a neurodegenerative disease such as Alzheimer's disease, which is mainly caused by cell death through chronic inflammation and cell stress, could be controlled by the administration of well established, non-toxic, natural Rg1 and Rb1 in elderly people.