

Effects of *in vitro* immune stimulation by ginsenoside Rb1

Department of Pharmacy, College of Pharmacy, Research Center for Proteineous Materials, Chosun University, Kwangju, South Korea

Ji Young Kim, Eun Hee Han, Hye Gwang Jeong*

*To whom correspondence should be addressed: Department Pharmacy, Chosun University, 375 Seosuk-dong, Kwangju 501-759, South Korea

Tel: +82-62-230-6639; Fax: +82-62-230-6639; [E-mail: hgjeong@chosun.ac.kr](mailto:hgjeong@chosun.ac.kr)

Abstract

Red ginseng is a classical traditional Chinese medicine. Among Chinese herbs, red ginseng has been considered as one of the tonics. Many studies indicated that red ginseng could enhance immune function of the human body. Red ginseng total saponin, ginsenoside, the most important active constituents identified in red ginseng can protect against myocardial ischaemia damage and protect endothelium against electrolysis-induced free radical injury. Macrophages play a significant role in host defense mechanisms. When activated, they inhibit the growth of a wide variety of tumor cells. The aim of this study was to determine the effects of pure ginsenoside Rb1 on immunostimulatory activity such as murine macrophage phagocytosis and proliferation of splenocytes. Furthermore, we investigated the effects of ginsenoside Rb1 on the production of nitric oxide (NO), reactive oxygen species (ROS) and proinflammatory cytokines (IL-1beta, IL-6, and TNF-alpha) in murine macrophage, RAW 264.7 cells. ROS have emerged as important signaling molecules in the regulation of various cellular processes. Ginsenoside Rb1 significantly increased production of ROS in dose

dependent manner. As NO plays an important role in immune function, ginsenoside Rb1 treatment could modulate several aspects of host defense mechanisms due to stimulation. Treatment with ginsenoside Rb1 to macrophages induced the production of NO and proinflammatory cytokines and expression levels of these genes in a dose-dependent manner. Furthermore, incubation of RAW 264.7 cells with ginsenoside Rb1 showed a dose dependent increased phagocytosis activity and lymphocyte proliferation of splenocytes. Therefore, these results suggest that ginsenoside Rb1 has promising potential as a natural medicine for stimulation of the immune system.