The Vascular Modulation Effect of *Panax Ginseng*

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ABSTRACT

The famous herb, ginseng, bears the Latin name *Panax ginseng*, meaning “all healing”. With various pharmacological effects, it is being crowned as “king of herbs”. *Shengnong Bencao Jing* first documented the use of ginseng to repair the five viscera and also listed the ability of weight reduction and promotion of longevity. Though ginseng contains many complicated ingredients, one of the most active groups of compounds is called ginsenosides. Ginsenosides can be subdivided into three categories: protopanaxadiol (PPD)-type, protopanaxatriol (PPT)-type and oleanolic acid derivatives.

Despite the facts that ginseng has been used for thousands of years as therapeutic agent, its pharmacological and physiological effects are not clearly known. Our laboratory discovered that Rg1, naturally found in largest amount as the PPT-type ginsenosides, it generates a series of signals to promote angiogenesis and affects a wide range of physiological activities including wound healing, fetal development and cell growth. Interestingly, Rb1, a component of the PPD-type ginsenosides, suppresses the development of new blood vessels. These counteracting effects were interpreted as “Yin/Yang” effects within the context of Traditional Chinese medicine.

*Panax ginseng* was believed to have cardiovascular protective effects. We hypothesized that the protection may be due to the anti-obesity, anti-migration, anti-proliferation and anti-inflammation properties of *Panax ginseng*. In the current study, we used animal models, physiological models, aortic tissues and vascular cells to investigate the effectiveness of *Panax ginseng*. The results showed that *Panax ginseng* can restore diabetes-induced impaired vasorelaxation via NO-dependent or NO-independent pathways. Moreover, *Panax ginseng* can
reduce serum triglyceride but not cholesterol in the diabetic animal model. The animals fed with ginseng extracts show an increased amount of normal visceral adipose tissue. In cell culture, results showed that ginsenosides have different effects on vascular smooth muscle cell migration and proliferation. We also found that ginseng or ginsenosides may have anti-inflammatory effects, but limited to reducing inflammation at the gene level instead of improving the pathological conditions. Conversely, some of the ginsenosides may exert inflammation through exaggerated production of inducible form of nitric oxide synthase. These findings have provided us information on the medicinal effects of *Panax ginseng* and the potential application of *Panax ginseng* for therapeutic uses.
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