

## Beneficial effect of ginseng saponin in vascular disfunctions associated with chronic methionine-induced hyperhomocysteinemia

Jong-Hoon Kim<sup>a</sup>, Chang-Won Kang<sup>a</sup>, Myung Jo You<sup>a</sup>, Il Jeoung Yu<sup>a</sup>, Jungkee Kwon<sup>a</sup>, In-Soo Yoon<sup>b</sup>, Jun-Ho Lee<sup>b</sup>, Sang Min Jeong<sup>b</sup>, Byung-Hwan Lee<sup>b</sup>, Joon-Hee Lee<sup>b</sup>, Mi-Kyung Pyo<sup>b</sup>, Sun-Hye Choi<sup>b</sup>, Shi Fu Quan<sup>c</sup>, Jong-Hwan Lee<sup>c</sup>, Chi-Bong Choi<sup>d</sup>, Hyewhon Rhim<sup>c</sup>, Soo Yeun Cho<sup>b</sup>, and Seung-Yeol Nah<sup>\*,b</sup>

<sup>a</sup>Department of College of Veterinary Medicine, Chonbuk National University, Jeonju, 561-756 Korea

<sup>b</sup>Ginsentology Research Laboratory, Department of Physiology, College of Veterinary Medicine, Seoul 143-701 Korea and Bio/Molecular Informatics Center and Institute of Biomedical Science and Technology, Konkuk University

<sup>c</sup>Department of Anatomy, College of Veterinary Medicine, Konkuk University

<sup>d</sup>Department of Surgery, College of Veterinary Medicine, Konkuk University; 143-701 Korea; and <sup>e</sup>Biomedical Research Center, KIST; Seoul 130-701 Korea.

Recent studies have shown that *Panax* ginseng has a variety of beneficial effects on the cardiovascular systems. Homocysteine (Hcy), which is derived from L-methionine (Met), has been closely associated with the increased risk of cardiovascular diseases. In the present study, we examined whether *in vivo* long-term administration of ginseng saponins (GS), active ingredients of *Panax* ginseng, attenuate adverse vascular effects associated

with chronic Met-induced hyperhomocysteinemia (H-Hcy). We found that plasma Hcy level, which was measured after 30 and 60 d, in GS (100 mg/kg)\_Met co-administration group was significantly reduced when it was compared with Met alone treatment group. We could also observe the alleviation of endothelial damages of aortic artery vessels in GS (100 mg/kg)\_Met co-administration group compared with Met alone treatment group. We compared aortic vasocontractile and vasodilatory responses between Met alone and GS (100 mg/kg)\_Met co-treatment groups. We found that norepinephrine-induced vasocontractile responses were greatly decreased in GS (100 mg/kg)\_Met co-treatment group and that carbachol-induced dilatory responses were greatly enhanced in GS (100 mg/kg)\_Met co-administration groups as compared with Met alone treatment group.

The present results indicate that *in vivo* long-term administration of GS attenuates adverse vascular effects associated with chronic Met-induced H-Hcy in rats.

**Key words** *Panax* ginseng; Ginseng saponin; methionine; hyperhomocysteinemia; vascular dysfunction