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Abstract

Effect of Saponins from *Panax notoginseng*
on TNF-alpha-induced Adhesion Molecule
Expression in Human Coronary Artery
Endothelial Cells

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Atherosclerosis (AS), a progressive disease characterized by the accumulation of lipids and fibrous elements in the large arteries, is the cause of the majority of cardiovascular disease and causes more global death and disability than any others. AS can cause cardiovascular and cerebrovascular diseases by blocking large and medium-sized arteries, and finally, it can lead to heart, brain, and other organs and tissues ischemic necrosis, myocardial infarction, and brain death. AS is also called as number one killer of endangering human health and lives in China in recent years. *Panax notoginseng*, as a commonly used “blood circulation promoting” herb in Traditional Chinese Medicine, is a potential candidate for the purpose.

The pathogenesis of atherosclerosis involves a complex series of events, many pathologists raised hypothesis and considered AS as a chronic inflammatory process,

with the formation of atherosclerotic plaque as the end results. The endothelial dysfunction, migration and proliferation of smooth-muscle cells, formation of necrotic core and fibrous-cap formation may form the advanced, complicated lesion of atherosclerosis.

Panax notoginseng, commonly used in the prescriptions of Traditional Chinese Medicine for blood circulation promotion and to be a potential candidate for the disease cure. However, the biological effects of saponins extract from *Panax notoginseng* on atherosclerosis, specifically vascular inflammation and the underlying mechanisms are yet to be fully elucidated. This investigation describes the anti-inflammatory effects of three saponin fractions (total saponin fraction “PNS”, protopanaxadiol-type saponin fraction “PDS” and protopanaxatriol-type saponin fraction “PTS”), and two purified ginsenosides (Rg1 and Rb1) on Human Coronary Artery Endothelial Cells (HCAECs) *in vitro*.

As we known, elevated levels of a inflammatory cytokine, such as tumor necrosis factor- α (TNF- α), can adversely affect the arterial wall and induce the inflammatory response. Thus, TNF- α -stimulated HCAECs was used as a vascular inflammatory model in this study. The three saponin fractions (PNS, PDS and PTS) and two purified ginsenosides (Rb1 and Rg1) were identified to decrease the THP-1 monocyte cells adhesion to HCACEs stimulated with TNF- α by a cell-cell adhesion assay. In order to identify mechanism underlysing the suppressive effect of constituents from *Panax notoginseng* on TNF- α stimulated cell-cell adhesion, the change of cell surface expression of adhesion molecules, ICAM-1 and VCAM-1, on endothelial cell were determined by cell-ELISA and immunostaining assays. Moreover, mRNA and total

intracellular protein expression levels of ICAM-1 and VCAM-1 were determined by real-time PCR and Western blot analysis, respectively.

Keywords: saponins; *Panax notoginseng*; atherosclerosis; adhesion molecules