

Improvement of capillary function by *Acanthopanax senticosus*

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[Study objectives]

Capillaries account for about 95% of the vasculature in the human body, provide oxygen and nutrients to tissues throughout the body, and collect carbon dioxide and waste materials from tissues that are no longer needed. Research has indicated that capillaries decrease gradually with aging, which is closely related to the decline in function of tissues and organs, and maintaining capillaries is very important in anti-aging. For example, wrinkles are a feature of aging of skin due to decreased capillary function. In addition, it has become known that capillaries in the brain of patients with Alzheimer's disease are less abundant than those in healthy individuals. *Acanthopanax senticosus* is a crude drug listed in "Shennong Bencaojing," a medical text on agriculture and medicinal plants written in China about 2000 years ago. It is widely used as a functional food with recent studies reporting its anti-fatigue, sleep-improving, and autonomic nervous system regulating effects. In this study, the effects of *Acanthopanax senticosus* on the stability of capillaries and lymphatic vessels were investigated using human umbilical vein endothelial cells (HUVEC) based on the activation of receptor tyrosine kinase (Tie2), which is expressed in vascular and lymphatic endothelial cells and involved in the stabilization of their structure.

[Study method]

To cultured human umbilical vein endothelial cells (HUVEC), *Acanthopanax senticosus* root extract was added at concentrations of 0.01, 0.1, 1.0, 10, and 100 µg/mL to determine the effect on cell growth and then the activation of Tie 2 receptor was examined at concentrations of 0.1, 1.0, 10, and 100 µg/mL. For the measurement of Tie2 receptor activation, angiopoietin-1 (spiked concentration, 0.5 µg/mL), a protein produced by vascular cells and activated by binding to Tie2 receptor, was used as a positive control for comparison.

[Results]

Acanthopanax senticosus root extract significantly enhanced the proliferation of human umbilical endothelial cells at all of the five concentrations as compared with the control group, which was not treated with the extract (Figure 1). At concentrations of 1.0 and 10 µg/mL, *Acanthopanax senticosus* root extract significantly activated Tie2 receptor compared with the control group. The activation rate by *Acanthopanax senticosus* root extract at 1.0 µg/mL was almost equivalent to that by angiopoietin-1, the positive control (Figure 2).

These results indicate that intake of *Acanthopanax senticosus* may stabilize the structure of capillaries and lymphatic vessels, prevent decrease in capillaries due to aging or other reasons (also called as "ghost vessels"), and normalize their function.

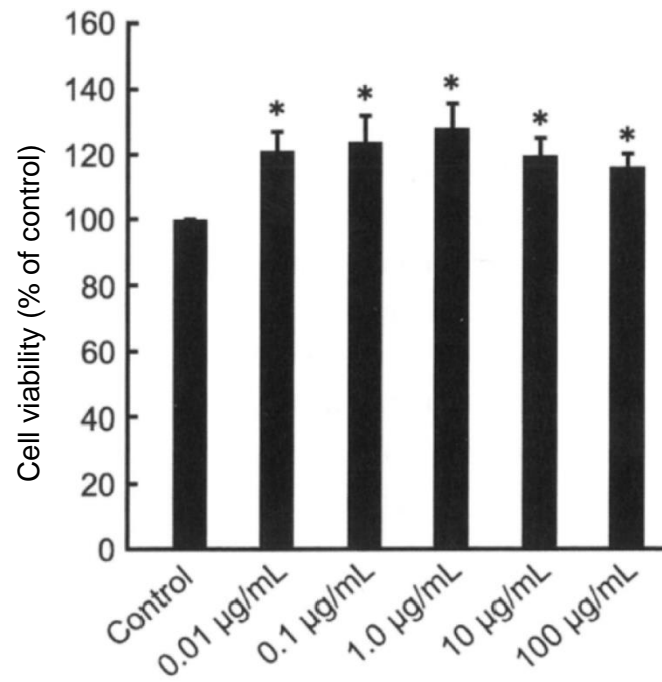


Figure 1. Effect of *Acanthopanax senticosus* on the proliferation of vascular endothelial cells

The data show the mean \pm standard error (6 measurements).

* $p < 0.05$, compared with control.

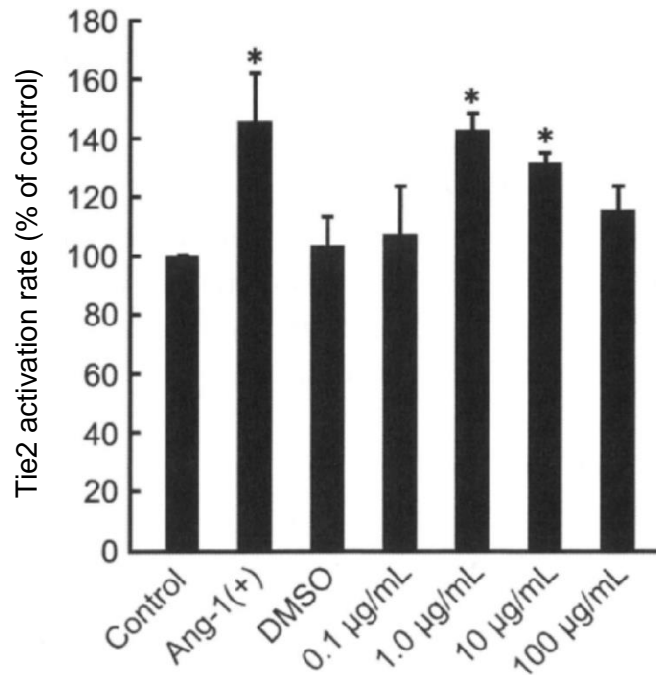


Figure 2. Effect of *Acanthopanax senticosus* on Tie2 activation in vascular endothelial cells

The data show the mean \pm standard error (4 measurements).

* $p < 0.05$, compared with control.

Ang-1: angiotensin-1; DMSO: dimethyl sulfoxide

<<Details>>

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Title: Activation by *Acanthopanax senticosus* of Vascular Endothelium-Specific Receptor Tyrosine Kinase Tie2 in Human Umbilical Vein Endothelial Cells (HUVECs)

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