Role of MicroRNAs in Ginsenoside-Rg1-induced Angiogenesis

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Abstract

Ginsenoside-Rg1, one of the active components of ginseng, has confirmed as an angiogenesis inducer. On the other hand, microRNAs (miRNAs), a group of small non-coding RNAs, have become the focal point of recent biological research owing to their functions as post-transcriptional modulators in gene expression. Using miRNA microarray analysis, 15 down-regulated miRNAs (e.g. miR-214) and 3 up-regulations among the total 553 identified human miRNAs were discovered to be affected by Rg1 treatment in human umbilical vein endothelial cells (HUVEC). Database search indicates that endothelial nitric oxide synthase (eNOS) is a target of miR-214. Further validation by qRT-PCR confirmed that Rg1 can reduce miR-214 expression. Since eNOS is highly related to angiogenesis and Rg1 has been already confirmed to be capable of inducing the synthesis of eNOS, introduction of miRNA inhibitor or precursor to HUVEC indeed affected the expression of eNOS and the tube formation assay accordingly. Taken together, this study showed that Rg1 can suppress the repressor miRNA in HUVEC, leading to an increase in eNOS expression which can promote angiogenesis. This result signifies a new understanding towards how a simple natural compound can affect physiological changes through modulation of miRNA expression.
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