Sesamin induces nitric oxide and decreases endothelin-1 production in HUVECs: possible implications for its antihypertensive effect

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摘要

Abstract

OBJECTIVE: Sesamin has been proved to be antihypertensive. Nitric oxide (NO) is the most important vascular relaxing factor that is regulated in endothelium. Endothelin-1 (ET-1) is characterized as a potent vasoconstrictor and is also regulated in endothelium. Alterations in the endothelial production of NO and ET-1 are known to correlate with hypertension. This study investigated the effect of sesamin on NO and ET-1 in the human umbilical vein endothelial cells (HUVECs). DESIGN: The concentrations of NO and ET-1 in the medium of HUVECs treated by sesamin were measured. The mRNA and protein expressions of nitric oxide synthase (NOS), endothelin converting enzyme-1 (ECE-1), and endothelin-1 (ET-1) were also investigated. Other than the mRNA and protein expression, NOS activity and cyclic GMP (cGMP) were detected. METHODS: The NO concentration was detected by colorimetric assay. The cGMP and ET-1 were analyzed by EIA. The eNOS, ECE-1, and ET-1 mRNA expressions were assayed by Northern blot. The eNOS and ECE-1 protein expressions were analyzed by Western blot. The NOS activity was assayed by detecting the level of [H]-1-citrullin transformed from [H]-1-arginine. RESULTS: Sesamin not only increased the NO concentration in the medium of HUVECs in a dose-dependent manner after 24 h, but also induced eNOS mRNA and protein expressions. NOS activity in the HUVECs was also induced by sesamin. The content of cGMP was induced by sesamin through NO signaling. On the other hand, the ET-1 concentration in the medium of HUVECs treated by sesamin was suppressed in a dose-dependent manner after 24 h. The ECE-1 protein and mRNA expressions were also inhibited by sesamin. However, the mRNA expression of prepro ET-1 was not influenced by sesamin. CONCLUSION: From the above results, it is suggested that sesamin may improve hypertension by its ability to induce NO and inhibit ET-1 production from endothelial cells. The increase of NO by sesamin is through the induction of eNOS gene expression. The decrease of ET-1 by sesamin is through the inhibition of ECE gene expression, but is not through the inhibition of prepro ET-1 gene expression.