Genetics and Molecular Research

Effect of procyanidine on VEGFR-2 expression and transduction pathway in rat endothelial progenitor cells under high glucose conditions

Y. Liu*, W.-J. Liao*, Z. Zhu*, H. Zeng, H.-Q. He, X.-L. Sun, X.-F. Xu, L. Huang, W.-M. Wang, X.-Y. Zhou and Y.-Z. He

Department of Vascular Surgery, Affiliated Hospital of Luzhou Medical College, Jiang Yang District, Luzhou, Sichuan, China

*These authors contributed equally to this study.
Corresponding authors: Y.-Z. He / Y. Liu
E-mail: heyanzheng2012@163.com / lyong74@163.com

Genet. Mol. Res. 15 (1): gmr.15016925
Received August 10, 2015
Accepted October 30, 2015
Published March 31, 2016
DOI http://dx.doi.org/10.4238/gmr.15016925

ABSTRACT. The protective effect of procyanidine and its oligomers against high glucose-mediated oxidative stress injury in endothelial progenitor cells (EPCs), and effect of procyanidin on vascular endothelial growth factor receptor-2 (VEGFR-2) expression and downstream signal pathway were analyzed *in vitro*. Rat bone marrow mononuclear cells were isolated, cultured under normal and high glucose (HG) conditions, and the changes in cell morphology observed. The EPCs were identified, and the oxidative stress products produced by EPCs (under normal and HG conditions) were quantified. Subsequently, an appropriate number of EPCs were cultured with and without procyanidin (OPC), and the MDA concentration and relative expression of VEGFR-2, AKT, IκB-α, and nuclear factor (NF)-κB were detected 1, 3, 5, and 7 days post-culture. We observed minor (round, translucent, gradually adhering) and significant (fusiform morphology/ pebble distribution) cell morphological changes 3 and 7 days post-culture,

respectively. Apoptosis and oxidative stress product release in EPCs cultured with HG increased significantly compared to the control group ($P < 0.05$). The oxidative stress product generation and relative expression of VEGFR-2, AKT, IκB-α, and NF-κB were not significantly affected by OPC addition in normal glucose conditions ($P > 0.05$); alternately, products generated as a result of oxidative stress were significantly reduced, the relative expression of VEGFR-2, AKT, and NF-κB protein was upregulated, and that of IκB-α was downregulated ($P < 0.05$) in HG + OPC EPCs. Therefore, procyanidin may promote cell proliferation by alleviating oxidative damage to EPCs under HG conditions, and upregulating VEGFR-2 expression and its downstream signal pathway.

Key words: Procyanidine; Progenitor cells; High sugar concentration; Oxidative stress; VEGFR-2

