MCB, vol. 16, supplemental 1, pp.89, 2019

Effect and Mechanism of Kir2.1 Channel Overexpression on Transdifferentiation of Endothelial Progenitor Cells

Jifeng Li[1, #], Yanting He[1, #], Xiaoyun Zhang[1], Hong Li[1], Xiumei Guan[1], Min Cheng[1, *] and Xiaodong Cui[1, *]

Abstract: Objective: The propose of the study is to investigate the specific effects of the mechanically sensitive channel Kir2.1 on the transdifferentiation of EPCs so as to understand the molecular mechanism of pathological vascular remodeling. **Methods:** Endothelial progenitor cells (EPCs) were isolated from rat bone marrow and cultured in EGM2 medium *in vitro*. The recombinant lentiviral vectors carrying Kir2.1 (NM_017296.1) gene was designed and constructed in order to overexpress the gene. The smooth muscle cells (SMCs) molecules marker on EPCs, such as α-SMA, FSP1 and α-SM22, were detected by RT-PCR and cellular immunofluorescence. In addition, cell angiogenic capacity and migration in vitro were assessed by Matrigel and Transwell methods respectively. Moreover, neointimal thickening was evaluated in the surgery model of balloon injury of rat carotid artery *in vivo.* **Result:** The results showed that the expression levels of α-SM22, FSP1 and α-SMA were up-regulated in the Kir2.1 overexpression group compared with the control. The number of migrating cells in the Kir2.1 overexpression group was significantly higher than that in the scramble group, while quantitative assessment further confirmed that the Kir2.1 overexpression strongly attenuated the ability of bone marrow-derived EPC to form tube-like structures in Matrigel assay. Compared with the control group, morphometric analysis showed ratio of intimal area/medial area (I/M) in rats was increased in rats transplanted with Lenti-Kir2.1 overexpression. **Conclusion:** It is indicated that the overexpression of channel Kir2.1 induces EPCs transdifferentiated into mesenchymal transition SMCs (EndoMT). It may provide a potential target for the treatment or prevention of pathological vascular remodeling disease.

Keywords: Endothelial progenitor cells, transdifferentiation, smooth muscle cell.

Acknowledgement: This work was supported by the National Natural Science Foundation of China (Grants 31570941, 81700406, 81870237), the Natural Science Foundation of Shandong Province (Grants ZR2016CM20), and National Students' Innovation and Entrepreneurship Training Program (201810438020), and the Project of Shandong Province Higher Educational Science and Technology Program (Grants J14LK12, J18KA275).

[1] Clinical Medical School, Weifang Medical University, Weifang, Shandong, 261053, China.

[*] Corresponding Authors: Xiaodong Cui. Email: xiaodongcui@wfmc.edu.cn;

Min Cheng. Email: mincheng@wfmc.edu.cn.

[#] Jifeng Li and Yanting He contributed equally to this study.