Human cord blood-endothelial progenitor cells alleviate intimal hyperplasia of arterial damage in a rat stroke model.

Hongming Sun, [1] Ryuta Morihara, [1] Tian Feng, [1] Zhihong Bian,[1] Haibo Yu, [1] Xiao Hu, [1] Xinran Hu, [1] Yuting Bian, [1] Ryo Sasaki, [1] Yusuke Fukui, [1] Mami Takemoto, [1] Taijun Yunoki, [1] Yumiko Nakano, [1] Koji Abe, [2] and Toru Yamashita[1]

1) Department of Neurology, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University, 2-5-1 Shikata-cho, Kita-ku, Okayama 700-8558, Japan
2) National Center Hospital, National Center of Neurology and Psychiatry, 4-1-1 Ogawa-higashi-cho, Kodaira-shi, Tokyo 187-8551, Japan

Address correspondence and reprint requests to:

Dr. Toru Yamashita, Department of Neurology, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University, 2-5-1 Shikata-cho, Kita-ku, Okayama 700-8558, Japan.

Tel: 81-86-235-7365, Fax: 81-86-235-7368,

E-mail: toruyamashita@okayama-u.ac.jp

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Abbreviations

ANOVA, analysis of variance; CCA, common carotid artery; hCB-EPCs, human cord blood-endothelial progenitor cells; HBSS, Hank's balanced salt solution; H&E, hematoxylin-eosin; ICA, internal carotid artery; MCA, middle cerebral artery; PBS, phosphate-buffered saline; PFA, paraformaldehyde; tMCAO, transient middle cerebral artery occlusion.

Keywords: ischemic stroke, human cord blood-endothelial progenitor cells, mechanical thrombectomy, intimal hyperplasia.

Abstract

Human cord blood-endothelial progenitor cells (hCB-EPCs) isolated from the human umbilical cord can be used to repair damaged arteries. In this study, we used an animal model with pathological changes that mimics artery wall damage caused by stent retrievers in humans. We injected hCB-EPCs to investigate their effect on endothelial hyperplasia and dysfunction during intimal repair. Four groups were established based on the length of reperfusion (3 d and 28 d), as well as the presence or absence of hCB-EPC therapy. Damage to the internal carotid artery was evaluated by hematoxylin-eosin and immunohistochemical staining. Stroke volume was not significantly different between non-EPC and EPC groups although EPC treatment alleviated intimal hyperplasia 28 d after intimal damage. VEGF and eNOS expression were significantly higher in the EPC-treated group than in the non-EPC group 3 d after intimal damage. In addition, MMP9 and 4HNE expression in the EPC-treated group was significantly lower than in the non-EPC group. Ultimately, this study found that venous transplantation of hCB-EPCs could inhibit neointimal hyperplasia, alleviate endothelial dysfunction, suppress intimal inflammation, and reduce oxidative stress during healing of intimal damage.