

**RECOVERY OF NEUROLOGICAL FUNCTION OF ISCHEMIC STROKE BY
ADMINISTRATION OF CONDITIONED MEDIUM FROM ADIPOSE-DERIVED
PERIVASCULAR STEM CELLS**

Y. Li¹, S. Mukhlis¹, V. Kumasheva¹, F. Olzhayev², A. Kaliyev³, B. Zhetpisbayev³,
Y. Makhambetov³ and V. Ogay¹

¹*Stem Cell Laboratory, National Center for Biotechnology (Astana, Kazakhstan)*

²*National Laboratory Astana, Nazarbayev University (Astana, Kazakhstan)*

³*National Center for Neurosurgery (Astana, Kazakhstan)*

ogay@biocenter.kz

Key words: Perivascular stem cells, stroke, conditioned medium, neurological recovery

Introduction: Perivascular stem cells (PSCs) are a rare population of multipotent progenitor cells with the capacity to self-renew and differentiate into mesenchymal and neuroectodermal lineages. Indeed, recently it has been shown that PSCs play an important role in repairing of the nervous tissue during cerebral ischemia, as they can differentiate into neurons and glial cells in the hippocampal subgranular zone of experimental animals. Thus, these data indicate that PSCs can be promising candidates for treatment of ischemic stroke. In this regard, the purpose of our study was to examine the effect of conditioned medium derived from PSCs on recovery of neurological function after ischemic stroke in rats.

Methods: Rat PSCs were isolated from subcutaneous adipose tissue by a FACS Aria cell sorter using antibodies against CD146 and CD34 and expanded in a-MEM supplemented with 10% fetal bovine serum. The conditioned medium was collected after incubation with PSCs (passage 3) for 24 hours. Adult male Wistar rats were subjected to 2 hours of middle cerebral artery occlusion (MCAO) followed by femoral vein injection of 150 ug protein from PSC-derived conditioned medium or an equal volume of vehicle phosphate-buffered saline 24 hours (PBS) later. For neurological recovery evaluation, a walking beam test was carried out. Animals were trained prior to MCAO, and neurological deficits were evaluated at 1, 7, 14 and 28 d after IV injection of the conditioned medium. Neurogenesis was evaluated with histological method.

Results: It was observed that intravenous injection of conditioned medium of PSCs improved neurological outcome but did not reduce the ischemic lesion of the brain. Histological analysis revealed that conditioned medium treatment increased neurogenesis and attenuated microglia infiltration in stroke rats compared with PBS-treated controls. In addition, number of blood capillaries was significantly increased along the ischemic boundary zone of the cortex and striatum in rats treated with conditioned medium of PSCs.

Conclusion: Thus, our results suggest that intravenous administration of conditioned medium of PSCs can improve functional recovery and enhance neurogenesis and represents a novel treatment for ischemic stroke.