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Improvement of cognitive functions attributed to the implantation of donor bone marrow-derived primary cd45$^-$ cd11b$^-$ cells to ischemic hippocampus in a mouse stroke model

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Transplantation of bone marrow-derived mesenchymal stem cells in animal models of traumatic brain injury and ischemic stroke has demonstrated improvements of motor functions; however the beneficial effects on cognition were not fully elucidated. We stereotactically transplanted bone marrow-derived primary GFP$^+$CD45$^-$CD11b$^-$cells into the cerebral ventricle of mice 24 h after induction of ischemic stroke. Cognitive functions in terms of spatial learning and memory ability were assessed using a watermaze system. Brain sections of mice sacrificed four weeks post-transplant were examined for migration, homing and differentiation of transplanted cells at different time intervals up to four months. Ischemic mice displayed a significant improvement of cognitive functions in terms of the shortened time latency in the watermaze at four weeks post-transplant. GFP$^+$ cells were noted to migrate along nerve fiber tracts to the CA1 region of the lesion hippocampus evident of cell death, and differentiate into neurons at 15 weeks post-transplant. Preliminary data of the study suggest that improvement of cognitive functions shortly post-transplant might be attributable a chaperone effect of fiber-guided and targeted migration of donor bone marrow-derived primary stem cells to nourish auto-regeneration in lieu of differentiation into functional neurons to replace the dead counter-parts.

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