MESENCHYMAL STEM CELL TRANSPLANTATION AMELIORATE MOTOR AND COGNITIVE DYSFUNCTION IN A TOXIC MODEL OF CEREBELLAR DEGENERATION

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The cerebellum has been considered as a key structure for the processes involved in sensori-motor integration which ultimately leads to motor planning and execution of coordinated movement. Furthermore, recent studies have been shown cerebellar activation in cognitive and emotional paradigms. Thus, motor deficits, cognitive abnormalities and behavioral changes can be associated with cerebellar degeneration. In current study, the Chemical neurotoxin Pyridine-2,3-dicarboxylic Acid (Quinolinic Acid, QA) was used to create partially cerebellar degeneration in adult male wistar rats which are suitable to use in stem cell transplantation studies. Stereotaxically administration of QA (0.2 mmol) into the right cerebellar cortex (folia VI) caused noticeable motor and memory disturbance in all treated animals. 48 h after lesion induction, rat bone marrow derived mesenchymal stem cells (MSCs) were transplanted into the damaged folia. The efficiency of cellular transplantation for promotion of functional recovery was assessed by several motor and memory tests during seven weeks after engraftment. Histological analysis of the cerebellum indicated that the donor cells have survived in cerebellum, and a significant decrease in the atrophy of right cerebellar cortex was obvious (p≤0.01) in the transplanted rats compared to the controls. These results indicate that transplantation of MSCs can remarkably reduce the behavioral and memory abnormalities of these animals and utilizing the bone marrow derived adult stem cells could open a new treatment for cerebellar diseases.