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Poster Presentation

PuraMatrix Supports Neural Stem Cells to Repair Brain Injury

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Abstract

One of the main problems following road accidents is brain injury after which death and disability in the most active population occurs. Considering the fact that there is no definite clinical treatment for repair of damaged brain tissue, the present study examined the effects of autologous adult neural stem/progenitor cells (NS/PCs) seeded in a nanoscaffold named PuraMatrix in acute brain injury. Twenty male Wistar rats were randomly divided into phosphate buffer saline (PBS), PuraMatrix, NS/PCs and PuraMatrix+ NS/PCs groups. Initially, the right brain SVZ of all subjects were stereotactically harvested. Then, NS/PCs were cultured for 45 days and pre labeled with bromodeoxyuridine (BrdU). At day 45, brain injury was done in left side and treatment was done. The animals were evaluated in terms of behavioral and neurological status for 4 weeks then, decapitated. Nissl and TUNEL staining as well as immunohistochemistry for BrdU, GFAP, Iba1 and CD68 were performed. Treatment of brain injury with PuraMatrix, NS/PCs or PuraMatrix + NS/PCs resulted in neurologic status improvement. The lesion volume was decreased in PuraMatrix+ NS/PCs group compare to PBS group. Astrogliosis rate was higher in PBS group than others. By 3D transplantation of NS/PCs, the rates of microglial and macrophagal reaction as well as apoptosis were reduced, while the survival rate in the site of injury was increased. Autologous transplantation of adult NS/PCs with PuraMatrix by the new injection method may be useful for reduction of brain damage as well as improvement of neurologic condition following acute brain injury.

Keywords: Brain injury, Neural stem cells, Autologous transplantation, Nanoscaffold, neural tissue engineering, Rat.

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