New hope in central nervous system injury

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Winner of the Young Neurosurgeons Abstract Award, Abdullah H. Feroze, B.S., presented his abstract, entitled Neural Placode Tissue Derived from Myelomeningocele Repair Serves as a Viable Source of Oligodendrocyte Progenitor Cells, during the 83rd Annual Scientific Meeting of the American Association of Neurological Surgeons (AANS).

Central nervous system injury remains a leading cause of permanent functional compromise. Despite evidence suggesting potential for restoration of neurological function through cell-based repopulation across a number of clinical applications, successful efforts through the use of primary tissue, embryonic stem cells and induced pluripotent stem cells remain limited.

Recent evidence suggests the tendency of neural stem cells to reside adjacent to ependymal-lined surfaces along the central nervous system axis. Given such neuro-anatomical correlation and regenerative capacity in fetal development, study authors assessed myelomeningocele-derived neural placode tissue as a potentially novel source of neural stem and progenitor cells.

During the study, non-functional neural placode tissue was harvested from infants during the surgical repair of myelomeningocele, and the tissue was further analyzed by in vitro studies, flow cytometry and immunofluorescence. To assess lineage potential, neural placode-derived neurospheres were subjected to differential media conditions. Through assessment of PDGFRα- and CD15 cell marker expression—markers of

oligodendrocyte and neural progenitor cells, respectively—Sox2+Olig2+ putative oligodendrocyte progenitor cells (OPCs) were successfully isolated.

The PDGFRαhi CD15hi cell population demonstrated the highest rate of self-renewal capacity and multipotency of cell progeny. Immunofluorescence of neural placode-derived neurospheres demonstrated preferential expression of oligodendrocyte progenitor marker, CNPase, whereas differentiation to neurons and astrocytes was also noted, albeit to a significantly more limited degree.

Such findings suggest that non-functional neural placode tissue derived from myelomeningocele repair contains multipotent self-renewing progenitors that are preferentially biased towards oligodendrocyte progenitor cell differentiation and presents a novel source of such cells for that may be used in the treatment of a variety of pediatric and adult neurologic diseases, including spinal cord injury, multiple sclerosis and metabolic leukoencephalopathies in either autograft, or allograft, capacities.

Provided by American Association of Neurological Surgeons