Intraspinal implant of mesenchymal stem cells may not heal the demyelinated spinal cord

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Multiple sclerosis is a disease caused by the loss of the myelinated sheath surrounding the nerve fibers of the spinal cord. Therapeutic hope for curing multiple sclerosis and other demyelinating diseases has included the possibility that stem cell transplants could help remyelinate the spinal cord. Accordingly, researchers from the University of Cambridge (UK) conducted experiments using animal models to see if the direct implantation of multipotent mesenchymal stem cells (MSCs) (derived from a different rat's adult bone marrow, i.e. allogenic) into the demyelinated rat spinal cord would be therapeutic and remyelinate the damaged area.

"MSCs are attractive candidates for cell-based therapies because of their ease of isolation, expansion and potential for autologous application," said Dr. David Hunt, of the Centre for Brain Repair at the University of Cambridge. "A number of in vitro and in vivo studies have reported that MSCs have differentiated into neuronal cells and Schwann cells as well as fat cells and bone cells. Our study showed that direct, intralesional injection of undifferentiated MSCs did not lead to remyelination. Once more, we found that the MSCs migrated into areas of normal tissue and were associated with axonal damage."

Despite the disappointing results of this study, Dr. Hunt feels that further experimentation with directly implanted MSCs is still called for since a variety of other MSC populations, such as autologous cells whereby the donor and recipient are the same organism, have been used in experimental and clinical settings with some degree of success.

"Our results contrast with previously published reports that demonstrated robust Schwann cell remyelination after bone marrow stromal cell injection," reported Dr. Hunt. "An important difference in results may lie in the distinct methodologies used to culture MSCs."

Although MSCs may possess neural differentiation capabilities in vitro, their in vivo behavior is unpredictable, said Dr. Hunt and his co-authors. However, they agree that MSCs should still be considered a promising tool for treating neurological disorders because they have shown pre-clinical efficacy for treating stroke and MS when injected intravenously with the ability to migrate to areas of inflammation and tissue damage and appear to exert a tissue protective effect through a range of mechanisms including immune modulation.

"This work demonstrates how important the route of administration and the culture conditions are when considering the efficacy and safety of a stem cell therapy," said Dr. Paul Sanberg, Distinguished Professor at University of South Florida Health and coeditor-in-chief of Cell Transplantation.

Source: Cell Transplantation Center of Excellence for Aging and Brain Repair