

The New Jersey Commission on Spinal Cord Research – Grantees  
Department of Neuroscience and Cell Biology

FACULTY

01-3009-SCR-S-0

**Ira Black, deceased**

"Transplantation of Adult Bone Marrow Stromal Cell-Derived Neurons to Spinal Cord" – Completed

The therapeutic utility of transplanting adult bone marrow stromal cells (MSC) into the spinal cords of both intact and injured rats was examined. The objective was to characterize engraftment, survival and differentiation of the MSCs and to assess the spinal cord reaction to transplantation.

Data accumulated during the funding period has suggested that MSCs can be transplanted into the intact spinal cord and may be useful after injury. There was no inflammation evident in the intact cords from 3 days until 2 months postoperatively. When numbers of MSCs were evaluated to assess survival, quantitative morphometry revealed that 16.25 $\pm$ 6.29% of the cells survived at 1 week. Evaluation of the MSCs at times up to 7 weeks revealed differentiated and undifferentiated transplanted cells exhibited morphologies with extensive processes. Pre-differentiated MSCs expressed neuronal markers tau and Neu N, but not medium or heavy chain neurofilament. Interestingly, neurofilament + fibers invaded the graft and formed associations with the donor cells. A subpopulation of undifferentiated MSCs exhibited neuron specific enolase. The data suggest that MSCs may be useful in addressing issues of spinal cord injury. Future work needs to further evaluate the fate of these cells when transplanted into the intact and lesioned spinal cord.

These studies beyond interesting Dr. Black in spinal cord research also enhanced Dr. Black's research on stem cells and supported his efforts on behalf of the Stem Cell Institute of New Jersey.

**Publications:**

Black, I.B., Woodbury, D.: Adult rat and human bone marrow stromal stem cells differentiate into neurons. *Blood Cells Mol. Dis.*, 27(3), 632-636, 2001.

Muñoz-Elias, G., Woodbury, D.L., and Black, I.B.: Differentiating marrow stromal stem cells express neuronal gene products and morphologies during cell division. *Soc. Neurosci.* Vol. 27, 2001.

Woodbury, D., Reynolds, K., Crockett, D.P., and Black, I.B.: Adult bone marrow stromal stem cells express germline, ectodermal, endodermal and mesodermal genes prior to neurogenesis. *Soc. Neurosci.* Vol. 27, 2001.

Woodbury, D., Reynolds, K., Black, I.B.: Adult bone marrow stromal stem cells express germline, ectodermal, endodermal, and mesodermal genes prior to neurogenesis. *J. Neurosci. Res.*, 96, 908-917, 2002.