Stem cell breakthrough: Bone marrow cells are the answer

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Using cells from mice, scientists from Iowa and Iran have discovered a new strategy for making embryonic stem cell transplants less likely to be rejected by a recipient's immune system. This strategy, described in a new research report appearing in the February 2010 print issue of The *FASEB Journal*, involves fusing bone marrow cells to embryonic stem cells. Once fused, the hybrid cells have DNA from both the donor and recipient, raising hopes that immune rejection of embryonic stem cell therapies can be avoided without drugs.

"Our study shows that transplanted bone marrow cells fuse not only with bone marrow cells of the recipient, but with non-hematopoietic cells, suggesting that if we can understand the process of cell fusion better, we may be able to target certain organ injuries with the patient's own bone marrow cells and repair the tissues," said Nicholas Zavazava, M.D., Ph.D., a University of Iowa researcher involved in the work.

Although the study holds great promise for future embryonic stem cell therapies, the results may be even more far reaching. Zavazava and colleagues used two different mouse strains, one as the donor and the other as the recipient. When bone marrow cells were engrafted into the recipient, they tested for the presence of both donor and recipient cells and found three different types of cells: donor cells, recipient cells, and fused cells that had DNA from the donor and recipient. They then discovered that these cells could fuse with many different types of cells in addition to embryonic stem cells, including those from the liver, kidney, heart, and gut. Although more work is necessary to determine

the exact clinical outcomes, the discovery raises the possibility that bone marrow cells could be fused to transplant organs to reduce the likelihood of rejection. They could also be fused to failing organs to support regeneration.

"Unlike machines where the same part can be used for several different makes and models, each of us is custom built, and our immune system does the quality control," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "As a result, human replacement parts, or organs, need to closely match the tissue of the recipient. This research uses bone marrow cells to fuse with a patient tissues so that nothing transplanted is rejected by our immune systems, and brings universal graft survival closer to reality."

More information: Sabrina Bonde, Mehrdad Pedram, Ryan Stultz, and Nicholas Zavazava. Cell fusion of bone marrow cells and somatic cell reprogramming by embryonic stem cells. *FASEB J.* 2010 24: 364-373. www.fasebj.org/cgi/content/abstract/24/2/364

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