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## Cardiac Cell Transplant Studies Show Promise In Cardiac Tissue Repair

*STAFF*

Two studies published in the current issue of CELL TRANSPLANTATION examine the efficacy of transplanting bone marrow cells (BMCs) for the repair of heart tissue.

The first study found that implanting adult cardiomyocytes (heart muscle cells) in combination with BMCs has two advantages over transplanting cardiomyocytes alone. First, while cardiac function was preserved by implanting cardiomyocytes alone, the therapeutic effects of transplanting them along with bone marrow cells was enhanced. Second, programmed cell death (apoptosis) of the host cardiomyocytes was reduced significantly after the implantation of BMCs alone or in combination with cardiomyocytes when compared with results after the implanting of cardiomyocytes alone.

"Our findings indicate that cardiomyocytes and bone marrow cells can assist and compliment each other," said the study's lead author Tao-sheng Li, MD, PhD of the Department of Surgery and Clinical Science at the Yamaguchi University Graduate School of Medicine. "This technique shows promise as a feasible new strategy for myocardial repair."

Cardiomyocyte survival was counted at one, three and seven days after culture to see if protection against apoptosis was successful.

Cardiac function was measured before and 28 days after treatment. Results showed that cardiomyocyte survival increased significantly in the co-cultured group. Although cardiomyocytes shrank as the post-culture time was extended, morphological change was milder in the co-cultured group.

The second study, carried out at the University of Padua, compared transplantation of two sources of mesenchymal stem cells (MSCs) – derived from bone marrow (BM-MSCs) and from fetal amniotic fluid (AF-MSCs) – to discover which type of cell was most effective in replenishing damaged rat heart tissues.

"The choice of stem cell type to be used in therapeutic cardiovascular regeneration of acute or chronic myocardial ischemia could be of paramount importance if specific combinations of differentiated cell phenotypes are to be obtained," said Severio Sartore, PhD, the study's lead author. "The study found that "the capability of both MSCs to be converted to CM-like cells (cardiomyocyte or heart muscle cells) is quite low and many cells appear with more than one nucleus..."

It was unclear to researchers whether those cells had divided or fused. Furthermore, although both MSCs have "similar biological profiles" they did not possess equal differentiation potential. "The differentiation potentials of MSCs observed in vitro need a definitive in vivo confirmation for future cell therapy experiments aimed at replenishing damaged cardiovascular tissue," concluded Sartore and his team. "While the two MSCs can contribute roughly at the same extent to capillary formation, AF-MSCs are not able to participate in the formation of arterioles and hence to vascular SMCs (smooth muscle cells)."

Sartore noted that in previous studies when AF-MSCs were transplanted into porcine models of myocardial ischemia they were converted to vascular cells, but not to cardiomyocytes. "Both of these papers further help delineate the evolving role of bone marrow in cardiac cell therapy, not only as a regenerative means but also supportive to other cells and tissues" said Amit N. Patel, M.D., director of cardiovascular regenerative medicine and associate professor of surgery at the University of Utah School of Medicine, and a section editor for CELL TRANSPLANTATION.