HEART TREATMENTS

ADULT STEM CELLS VS. EMBRYONIC STEM CELLS

Adult Stem Cell Successes in Humans and Animals:

2006 Scientists in Boston and Arkansas showed that patients with chronic heart failure improved after injection of a protein that mobilizes their adult stem cells into the bloodstream, sending them to the heart. Joseph J, et al., "Safety and effectiveness of granulocyte-colony stimulating factor in mobilizing stem cells and improving cytokine profile in advanced chronic heart failure", *American Journal of Cardiology* 97, 681-684, March 1, 2006.

2005 University of Pittsburg doctors found that patients with congestive heart failure improved greatly when treated with their own adult stem cells. Patel AN, et al., "Surgical treatment for congestive heart failure with autologous adult stem cell transplantation: a prospective randomized study", *Journal of Thoracic and Cardiovascular Surgery* 130, 1631-1638, December 2005.

2005 German doctors showed repair of chronic heart damage up to 8 ½ years old using the patients' own adult stem cells for treatment. Strauer BE, et al., "Regeneration of human infracted heart muscle by intracoronary autologous bone marrow cell transplantation in chronic coronary artery disease", *Journal of the American College of Cardiology* 46, 1651-1658, November 1, 2005.

2005 Scientists in Belgium found that patients treated with adult stem cells showed improved heart performance after heart attack damage. Bartunek J, *et al.*, "Intracoronary injection of CD133-positive enriched bone marrow progenitor cells promotes cardiac recovery after recent myocardial infarction, *Circulation* 112, I-178-I-183, August 30, 2005.

2005 In a follow-up study, Texas doctors found that after treatment with a patient's own adult stem cells, heart muscle repair occurred. Dohmann HFR, et al., "Transendocardial autologous bone marrow mononuclear cell injection in ischemic heart failure", *Circulation* 112, 121-126, July 26, 2005.

2005 Scientists found that rats injected with cardiac stem cells experienced heart tissue regeneration, with the damaged area decreasing by 29%. Researchers claim these results make cardiac stem cells excellent candidates for cardiac regeneration, and give the possibility that the patient's own stem cells could be collected, expanded and stored for subsequent therapeutic repair. Dawn B et al., "Cardiac stem cells delivered intravascularly traverse the vessel barrier, regenerate infarcted myocardium, and improve cardiac function", *Proceedings of the National Academy of Sciences USA* 102, 3766-3771, March 8, 2005.

2005 Cardiologist Douglas Losordo at Tufts University showed that a type of human bone marrow stem cell can turn into most tissue types of the body. When transplanted into rats which had heart attacks, the stem cells repaired damaged heart tissue. Yoon Y-s et al.,

"Clonally expanded novel multipotent stem cells from human bone marrow regenerate myocardium after myocardial infarction", *Journal of Clinical Investigation* 115, 326-338, February 2005.

2004 German scientists found that the transfer of bone marrow stem cells improved patients' heart function after severe heart attack. Wollert KC et al., "Intracoronary autologous bone-marrow cell transfer after myocardial infarction: the BOOST randomised controlled clinical trial", *Lancet* 364, 141-148, July 10, 2004.

2004 Researchers from the Texas Heart Institute received FDA approval for bone marrow stem cell transplants in patients with severe heart failure. This study showed that after 12 months, patients who were treated had significant improvement in ability to exercise. Perin EC, et al. "Improved exercise capacity and ischemia 6 and 12 months after transendocardial injection of autologous bone marrow mononuclear cells for ischemic cardiomyopathy." *Circulation* September 14, 2004.

2003 Researchers found that infusing bone marrow stem cells into patients after a heart attack aided regeneration of the heart. A major reason for the effective treatment was the ability of the infused cells to migrate to the damaged area. Britten MB et al., "Infarct remodeling after intracoronary progenitor cell treatment in patients with acute myocardial infarction"; *Circulation* 108, 2212-2218; November 2003.

Touted ESCR Heart Studies—Mixed Results in Animals:

2006 Injection of embryonic stem cells into mouse heart improved heart function. Singla DK, et al. "Transplantation of embryonic stem cells into the infracted mouse heart: formation of multiple cell types", *Journal Molecular Cellular Cardiology* 40, 195-200, January 2006.

2005 When placed into the heart, embryonic stem cells triggered significant immune response. Kofidis T et al., "They are not stealthy in the heart: embryonic stem cells trigger cell infiltration, humoral and T-lymphocyte-based host immune response", *European Journal of Cardio-thoracic Surgery* 28, 461-466, September 2005.

2005 Embryonic stem cells injected into animal heart cause accelerated immune response. Swijnenburg R-J et al., "Embryonic stem cell immunogenicity increases upon differentiation after transplantation into ischemic myocardium", *Circulation* 112, I-166-I-172, August 30, 2005.

2004 Doctors at the Mayo Clinic transformed embryonic stem cells into fully functional cardiac cells and transplanted them into damaged regions of the hearts of rats. The results showed that the walls of the heart were stronger. Hodgson DM, et al. "Stable benefit of embryonic stem cell therapy in Myocardial infarction," *American Journal of Physiology-Heart and Circulatory Physiology*, August 2004.

2003 Researchers injected mouse embryonic stem cells into the hearts of rats after induced heart attack. The cells turned into heart cells and improved heart function over a period of 32 weeks. Min JY et al. "Long-term improvement of cardiac function in rats after infarction by transplantation of embryonic stem cells." *The Journal of Thoracic and Cardiovascular Surgery* 125, 361-369 February 2003.