

Stem Cell Article Summaries

Stem Cells Repair Heart Attack Damage

Stem Cells, the bodies “master cells” can develop into a wide variety of different cell types to replace those that have died or is damaged. US scientists say stem cells taken from adult animals can start rebuilding tissues damaged by heart attacks.

If during a heart attack, more than 40% of the principal pumping chamber of the organ is damaged, very little can be done to save the patient. Dr.’s believe that a ready supply of the replacement cells, could save some of these patients.

An experiment carried out on mice, stem cells were taken from the bone marrow and were injected into the damaged mouse hearts. The stem cells began to develop into replacement cardiac muscle cells. The cells even migrated into the damaged areas of the hearts and also produced blood vessels needed to supply the new muscle with blood. After 9 days, the new heart muscle cells were present in 68% of the damaged portion of mouse hearts. The treatment only worked in 12 out of the 30 cases- 40%. This was thought to be caused by the difficulty of achieving an accurate injection.

It also provides encouragement that useable stem cells can be found from other sources apart from the human embryo, which remains controversial.

Professor Francis Collins of National Genome Research Institute says “this study offers hope that we might one day be able to reverse the damage caused by a heart attack.”

Reference: BBC News Saturday March 31,2001

Bone Marrow Stem Cells May Present Alternative Treatment for Heart Attack Victims

Recent animal studies demonstrate that injection of bone marrow stem cells into a diseased mouse heart can repair the heart and increase chance of survival. Donald Orlic Ph.d. and his colleagues from the National Genome Research Institute and New York Medical College presented these findings at the 43rd Annual Meeting of the American Society of Hematology in Orlando Florida.

Researchers in the study induced myocardial infarction in mice, and injected them with hormone-like proteins (cytokines) to induce the movement of bone marrow stem cells to the diseased hearts. A large number of these circulating bone marrow stem cells traveled to the site of injury and gave rise to new healthy tissue.

27 days post heart attack, 70% of the damaged area was undergoing regeneration. The new tissue consisted of developing muscle cells and blood vessels, suggesting that the new coronary vessels were connected using surviving coronary vessels.

Reference: Bloodline (online service)

Stem Cells Help Regenerate Tissue Damaged from Heart Attack

Stem cells from bone marrow could eventually be used to mend damaged hearts, according to researchers led by Dr. Margaret Goodell and Dr. Karen Hirschi at Baylor College of Medicine.

Goodell, Hirschi and their team discovered that stem cells of an adult mouse transplanted in the bone marrow of another adult mouse had the capability to transform into blood vessels and cardiac muscle, which helped restore the tissue that had been damaged by a heart attack.

By delivering stem cells to the heart via the blood stream, the research shows that the transformation into blood vessels and heart tissue is part of the repair process. Using the bloodstream to deliver stem cells to the heart eliminates the risk of infection and open-heart surgery, which would be necessary to inject stem cells directly into the heart.

The results of this research are published in the June 1, 2001, issue of The Journal of Clinical Investigation.

Scientists Repair Damage from Heart Attack Using Adult Bone Marrow Stem Cells in Mice

Bethesda, MD – Research shows that it is possible to rebuild heart-attack-damaged hearts with adult stem cells from bone marrow. Scientists at the National Institutes of Health (NIH) at the New York Medical College, demonstrated for the first time that adult stem cells isolated from mouse bone marrow could become functioning heart muscle cells when injected into a damaged mouse heart. The new cells at least partially restore the hearts ability to pump blood.

The researchers transplanted stem cells from male mice into female hearts after inducing heart attacks so they could show definitively that any new heart muscle came from donor cells. Over the next 7 to 11 days, the stem cells began to multiply and transform themselves into heart muscle cells and migrated into the damaged area. After a 9 day average, the newly formed heart muscle cells occupied 68% of the damage portion of the heart. In addition, the

stem cells also began producing smooth muscle cells and endothelial cells that organized themselves into new blood vessels.

Anversa predicts that if follow-up studies go well, clinical trials on humans could begin in 3 years

Reference: Bloodline (Online) The research team was led by Donald Orlic, Phd., a staff scientist in the genetics and molecular biology branch of the Division Intramural Research at the National Human Genome Research Institute (NHGRI) and Piero Anversa M.D., Professor of medicine and Director of the Cardiovascular Research Institute at New York Medical College. These results were published in the April 4,2001,issue of Nature.

Advances in Alternatives to Embryonic Stem Cell Research

French scientists implanted skeletal stem cells back into the patient for the treatment of heart disease. The encouraging result after eight months follow-up underlines the potential of this new approach. Further clinical trials are now underway in Europe and the US for other patients with heart disease. No human trials using embryonic stem cells have ever been reported.

A review of potential heart treatments