Dedicated to Advancing Stem Cell Research

Coalition for the Advancement of Medical Research

Embryonic Stem Cell Research Progress

Human embryonic stem cell (hESC) research is an amazingly new science, begun in 1998 by Dr. James Thomson of the University of Wisconsin. Despite extremely limited funding, this research has already made a substantial contribution in the fight to find better treatments and cures for diseases and disorders affecting more than 100 million Americans. Below are examples of embryonic stem cell research progress:

ALS: Amyotrophic Lateral Sclerosis, Lou Gehrig's Disease: At the University of Wisconsin at Madison, scientists have turned hESC into motor neurons (nerves which carry messages between brain and body), offering possibilities for repairing damage caused by ALS, spinal cord injury, and other nerve-related disorders.
--Nature Biotechnology; January 30, 2005

ALZHEIMER'S DISEASE: "Until now, it was impossible to study the complete progress of this horrific disease, which robs sufferers of both memory and life. We do not know how or why or even exactly when it begins. With human embryonic stem cells, (hESC), however, we may be able to isolate the disease and observe its progress from inception to death on human tissue cells, not human beings. hESCs may also provide a new way to design better Alzheimer's medicines, and test new ideas of how Alzheimer's disease develops, and how it might be treated."
-- Dr. Lawrence Goldstein, University of California, San Diego; March 26, 2005

BIOLOGICAL PACEMAKERS: In Israel, Dr. Izhak Kehat and Dr. Lior Gepstein grew heart stem cells in a Petri dish, and transplanted them into the severely damaged hearts of pigs. Eleven of thirteen hearts regained more normal heart rates. Control animals had no improvement. Their work indicates that stem cell transplantation can translate into clinical benefit for heart disease sufferers.
--*Washington Post*; September 26, 2004

BLINDNESS: The major cause of blindness in Americans over age 60 is macular degeneration: the loss of retinal cells in the eye. Dr. Robert Lanza and Dr. Irina Klimanskaya of Advanced Cell Technology in New Jersey used hESC to make retinal cells, which may one day offer the return of vision to millions suffering from blindness due to retinal disease.
-- *Medical Science News*; September 23, 2004

CANCER: The speed at which cancer develops is a major obstacle in curing this devastating disease. At Kumamoto University in Japan, and Cambridge University in England, surface proteins were developed that could mark cancer stem cells, laying ground work for new drugs that may one day slow, or even turn off, tumor formation. Advancing understanding about cancer stem cells draws from knowledge gained about the growth and development of hESCs. This work will open the door to a day when cancer treatments may be truly curative.
-- University of Cambridge; January 19, 2005

CYSTIC FIBROSIS: Cystic fibrosis inflames the lungs, strangling CF patients in thick slimy mucous. Using hESCs, Dr. Stephen Minger of King's College, London, developed a stem cell line of cystic fibrosis. Now the disease can be studied in a human cell line that has genetic mutations akin to those seen in CF sufferers.
-- BBC News; September 9, 2004

DEAFNESS: The death of tiny hair cells inside the ear contributes to deafness for an estimated 28 million Americans. These cells do not naturally regrow. However, using hESC techniques, Dr. Stefan Heller of Boston's Eye and Ear Infirmary has generated these inner-ear hair cells, raising the possibility that this technique may lead to new treatments for the deaf.
-- Proceedings of National Academy of Sciences; October 27, 2004

DIABETES: At Stanford University, researchers have made insulin-producing cells from mouse embryonic cells. When transplanted into diabetic mice, these cells reduced blood sugar fluctuations and increased lifespan (1). And at the University of Miami, Dr. Juan Dominguez Bendala isolated a protein necessary to turn embryonic stem cells into large quantities of insulin-producing pancreatic cells (2). Additionally, scientists at Novocell turned hESCs into cells that produced insulin in mice. Those cells kept blood sugar in check after the mice's own insulin-producing cells were destroyed (3).
-- 1.http://www.diabetes.co.uk/htm/news/newstemcellstudy.htm
-- 2. Beacon Journal, Miller School of Medicine, University of Miami; September 7, 2004
-- 3. *New York Times*; February 28, 2008

GROWING HUMAN TISSUE: At the Massachusetts Institute of Technology (MIT), Dr. Robert Langer used embryonic stem cells to grow liver, cartilage, nerve tissue and blood vessels, all of which appeared to function normally when transplanted into mice.
-- *Boston Globe*; October 28, 2003

HEART DISEASE: Cardiomyocytes derived from human embryonic stem cells in pro-survival factors enhance function of infarcted rat hearts. The ability of hES cell-derived cardiomyocytes to partially remuscularize myocardial infarcts and attenuate heart failure encourages their study under conditions that closely match human disease.
-- Center for Cardiovascular Biology, Institute for Stem Cell and Regenerative Medicine, University of Washington; September 25, 2007

HEMOPHILIA: At the University of North Carolina, Chapel Hill, Dr. Jeffrey Fair and Dr. Oliver Smithies used ES cells to reverse hemophilia (blood clotting disorder) in mice.
-- *Science Daily*; February 15, 2005

IMMUNE SYSTEM DISEASE: In Cambridge, Massachusetts, adult mice were bred without the gene RAG-2, needed for the immune system. Using Somatic Cell Nuclear Transfer to make the cells, RAG-2 was given to the mice, partially restoring the non-functioning immune system. This successful proof-of-principle experiment reveals possible benefits for the battle against AIDS.
-- *Cell*; April 5, 2002, (1) 17-22

PARKINSON'S: Israel's Dr. Benjamin Reubinoff transplanted human embryonic stem cells into the brains of rats that did not have dopamine-producing nerve cells. (Dopamine in a healthy body controls motion; loss of dopamine production in the brain is associated with a Parkinson's sufferer's shaking). Implanted stem cells became dopamine-producing cells and brought significant improvements in the animal's motion relative to controls.
-- BBC News; June 30, 2004

SPINAL CORD INJURY PARALYSIS: Using hESCs, Dr. Hans Kierstead at the Roman Reed Laboratory at UC Irvine restored myelin insulation around damaged nerves, returning motion to partially paralyzed rats.
—*Journal of Neuroscience*; March 2005

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