

ADULT & NON-EMBRYONIC STEM CELL RESEARCH

Advances & Updates for December 2005

HIGHLIGHT OF THE MONTH –

“Two kidney dialysis patients from Argentina have received the world's first blood vessels grown in a laboratory dish from snippets of their own skin, a technique that doctors hope will someday offer a new source of arteries and veins for diabetics and other patients.”

— *The Associated Press, November 16, 2005*

ADVANCES IN HUMAN TREATMENTS USING ADULT STEM CELLS –

UMBILICAL CORD BLOOD STEM CELLS: On November 30, 2005, two local DC TV stations reported on life-saving cures emerging from umbilical cord blood stem cells. *Channel 7* focused on the Korean cord blood stem cell **treatment for spinal cord injury** and the procedure's first U.S. patient, a Virginia woman. *Channel 4* highlighted two children in a local family (Riverdale, MD) **cured of SCIDS** (severe combined immune deficiency syndrome) by cord blood from unrelated donors. — *The video segments and transcripts are available at the following websites:* <http://www.nbc4.com/health/5438374/detail.html> (NBC, Channel 4); and, <http://www.wjla.com/news/stories/1105/281912.html> (ABC, Channel 7)

CANCER: “An experimental two-drug combination has made it possible for [a cancer patient] to receive a successful transplant of her own stem cells [from the patients' bone marrow] ...” — *The Kansas City Star, December 13, 2005*

HEART:

- **Adult stem cells repair heart damage:** Legendary Hawaiian singer Don Ho, 75, known for his signature song “Tiny Bubbles,” successfully underwent a new treatment that has not been approved in the United States. The surgery involved multiplying stem cells taken from his blood and injecting them into his heart in hopes of strengthening the organ. — *The Associated Press, December 7, 2005*
- **Surgical treatment for congestive heart failure with adult stem cell transplantation:** this study is one of the first prospective randomized approaches to cellular therapy for certain types of heart failure. It will help form a foundation in surgical cellular therapy. Autologous (derived from the patient's body) adult stem cell transplantation has been touted as the latest tool in regenerative medical therapy. Its potential for use in cardiovascular disease has only recently been recognized. — *The Journal of Thoracic and Cardiovascular Surgery, December 2005*

IMMUNE SYSTEM: Scientists use stem cells in therapy to fight AIDS through a process by which they “insert a gene into bone marrow stem cells that can either prevent the HIV virus from infecting the cells or deactivate any virus already in the cells.” — *Contra Costa Times, Pittsburgh Post-Gazette, November 6, 2005*

NEW SOURCES FOR NON-EMBRYONIC STEM CELLS:

- **Placental (amniotic) stem cells isolated from human term placenta** express similarity to embryonic stem and germ cells (show pluripotent flexibility; can form all 3 representative tissue types; express pluripotency genes; proliferate extensively in culture and are unlikely to form tumors—unlike embryonic stem cells). — *Stem Cells 23, 1549-1559, November 2005*
- “A Florida State University research team reports that it has designed a biomedical device that will allow **stem cells derived from adult bone marrow to be grown in sufficient quantities to permit far more research**—and allow faster growth of tissues that can be transplanted into patients.” — *Stem Cell Research News, November 15, 2005*

67 CURRENT HUMAN CLINICAL APPLICATIONS USING ADULT STEM CELLS*

ANEMIAS & OTHER BLOOD CONDITIONS:

- Sickle cell anemia
- Sideroblastic anemia
- Aplastic anemia
- Red cell aplasia (failure of red blood cell development)
- Amegakaryocytic thrombocytopenia
- Thalassemia (genetic [inherited] disorders all of which involve underproduction of hemoglobin)
- Primary amyloidosis (A disorder of plasma cells)
- Diamond blackfan anemia
- Fanconi's anemia
- Chronic Epstein-Barr infection (similar to Mono)

AUTO-IMMUNE DISEASES:

- Systemic lupus (auto-immune condition that can affect skin, heart, lungs, kidneys, joints, and nervous system)
- Sjogren's syndrome (autoimmune disease w/ symptoms similar to arthritis)
- Myasthenia (An autoimmune neuromuscular disorder)
- Autoimmune cytopenia
- Scleromyxedema (skin condition)
- Scleroderma (skin disorder)
- Crohn's disease (chronic inflammatory disease of the intestines)
- Behcet's disease
- Rheumatoid arthritis
- Juvenile arthritis
- Multiple sclerosis
- Polychondritis (chronic disorder of the cartilage)
- Systemic vasculitis (inflammation of the blood vessels)
- Alopecia universalis

CANCERS:

- Brain tumors—medulloblastoma and glioma
- Retinoblastoma (cancer)
- Ovarian cancer
- Skin cancer: Merkel cell carcinoma
- Testicular cancer
- Lymphoma
- Non-Hodgkin's lymphoma
- Hodgkin's lymphoma
- Acute lymphoblastic leukemia
- Acute myelogenous leukemia
- Chronic myelogenous leukemia
- Juvenile myelomonocytic leukemia
- Cancer of the lymph nodes: Angioimmunoblastic lymphadenopathy

- Multiple myeloma (cancer affecting white blood cells of the immune system)
- Myelodysplasia (bone marrow disorder)
- Breast cancer
- Neuroblastoma (childhood cancer of the nervous system)
- Renal cell carcinoma (cancer of the kidney)
- Soft tissue sarcoma (malignant tumor that begins in the muscle, fat, fibrous tissue, blood vessels)
- Various solid tumors
- Waldenstrom's macroglobulinemia (type of lymphoma)
- Hemophagocytic lymphohistiocytosis
- POEMS syndrome (osteosclerotic myeloma)
- Myelofibrosis

CARDIOVASCULAR:

- Acute Heart damage
- Chronic coronary artery disease

IMMUNODEFICIENCIES:

- Severe combined immunodeficiency syndrome
- X-linked lymphoproliferative syndrome
- X-linked hyper immunoglobulin M syndrome

NEURAL DEGENERATIVE DISEASES & INJURIES:

- Parkinson's disease
- Spinal cord injury
- Stroke damage

OCULAR:

- Corneal regeneration

WOUNDS & INJURIES:

- Limb gangrene
- Surface wound healing
- Jawbone replacement
- Skull bone repair

OTHER METABOLIC DISORDERS:

- Sandhoff disease (hereditary genetic disorder)
- Hurler's syndrome (hereditary genetic disorder)
- Osteogenesis imperfecta (bone/cartilage disorder)
- Krabbe Leukodystrophy (hereditary genetic disorder)
- Osteopetrosis (genetic bone disorder)
- Cerebral X-linked adrenoleukodystrophy

*** There remain no current clinical trials in humans with embryonic stem cells:**

"It is nearly certain that the [human] clinical benefits of the [embryonic stem cell] research are years or decades away. This is a message that desperate families and patients will not want to hear."

— Science, June 17, 2005