

# Stem Cell Research

## Embryonic NO! Adult YES!

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**What are stem cells and why are they important?** Stem cells are unspecialized cells that renew themselves for long periods of time through cell division. Unspecialized means the stem cell does not have any tissue specific structures that allow it to perform specialized functions. A stem cell cannot work with its neighbors to pump blood like a heart muscle, it cannot carry oxygen like a red blood cell, and it cannot fire electrochemical signals like a nerve cell. However under certain physiological or experimental conditions they can be induced to become specialized cells with special functions such as the beating cells of the heart muscle or the insulin producing cells of the pancreas or nerve, skin, skeletal or muscle cells.

There are two types of stem cells: Embryonic Stem Cells and Adult Stem Cells. **Embryonic stem cells** are “harvested” from aborted fetal tissue or through the use of “excess” in vitro fertilization embryos the couple agrees to donate for research. In in vitro fertilization many embryos are created, and only a few are implanted in the mothers womb. The rest, with the consent of the couple, may be used to harvest embryonic stem cells. The inner cell mass of a 3-5 day gestation embryo – about 30 cells – are “harvested” and grown in the laboratory; this “harvesting” kills the 3-5 day gestation pre-born baby. In other words, the death of a tiny human being is required to obtain these stem cells. **Adult stem cells** are present in every living organism to maintain and repair tissue damaged through normal wear and tear, disease or injury. Scientists have found these unspecialized “adult stem cells” in many tissues including the brain, peripheral blood, blood vessels, skeletal, muscle, skin and liver. In fact adult blood forming stem cells have been used in transplants for 30 years - bone marrow transplants. Another source of non-embryonic stem cells is the umbilical cords and placentas from live births. Every year more than 4 million umbilical cords are simply discarded. Stretched end to end they would reach further than New York to Houston. **California Right to Life Education Fund is in favor of**

***ongoing research with non-embryonic stem cells, whereas we are opposed to embryonic stem cell research.***

### **Advantages of Adult Stem Cell Therapies:**

How many humans have been treated by embryonic stem cells? ZERO! Indeed before human trials can even be safely undertaken researchers will have to overcome two serious difficulties: Embryonic Stem Cells (1) cause tumors and (2) may be rejected by the patients immune system, much like the issue of organ transplant rejection. Surmounting these difficulties – if they can be surmounted – will be a long and expensive process. However with adult stem cells there is not the issue of rejection,

because the patient’s own stem cells are used. Nor so far does adult stem cell therapy appear to cause tumors. This puts adult stem cell therapies years ahead of embryonic stem cell research therapies.

### **Recent Adult Stem Cell Research:**

- Researchers in Germany injected stem cells into six patients with **damaged heart muscles** during coronary bypass surgery. All survived and five of the six had strikingly improved blood flow to the heart – although it is not clear if this was due to the bypass or the stem cells (or both.) Another study in Hong Kong involved eight patients receiving stem cells through a catheter. All had improved heart function three months after the procedure. Both of these preliminary studies show promising results and point to the need for more research to determine whether stem cell transplantation will be of benefit to heart patients. (The Lancet Jan 4, 2003)
- A man in his mid 50s had been diagnosed with **Parkinson’s** at age 49. The disease grew progressively worse, leading to tremors and rigidity in his right arm. Traditional drug therapies did not help. Stem cells were harvested from the patient’s brain using a routine biopsy procedure. These cells were

***Non-embryonic stem cells from adult stem cells and umbilical cords and placentas can be obtained without causing harm to the person donating them.***

cultured and expanded to several million cells, 20 percent matured into dopamine secreting neurons. In March 1999 these cells were injected into the patients brain. Three months after the procedure, the patient's motor skills had improved 37 percent and there was an increase in dopamine production of 55.6 percent. One year after the procedure, the patients overall "Unified Parkinson's Disease Rating Scale" had improved to 83 percent – this at a time he was taking no other Parkinson's medication!

- A study conducted at Washington Medical Center in Seattle involving 26 rapidly deteriorating MS patients. Physicians stimulated stem cells from the patient's bone marrow to enter the blood stream. These cells were then harvested. Subsequently the patients were given high doses of chemotherapy, destroying their immune system. Finally the researchers reintroduced the patient's stem cells, hoping they would rebuild healthy immune systems and ameliorate the MS symptoms. Of the 26 patients, 20 stabilized and six improved. Three patients experienced severe infections and one died. .
- Israeli doctors inserted a paraplegic's own white blood cells into her severed spinal cord, after which she regained bladder control and can wiggle her toes and move her legs. (Globe and Mail June 15, 2001)
- Immune systems destroyed by cancer were restored in children using umbilical cord blood. (Time April 16, 2001)
- At Harvard University, mice with Type I diabetes were completely cured of their disease. The experiment was so successful human trials are now planned. (Harvard University Gazette July 19, 2001) Compare this to a study using embryonic stem cells in which only a 3 percent insulin production rate was achieved, and all the mice died. (STATS-Statistical Assessment Service-May 2001)
- And my favorite... Cells from liposuctioned fat (North America's most plentiful resource) have been transformed into bone, muscle, cartilage and mature fat cells, according to the journal *Tissue Engineering*.

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**- Dr. Donald Orlic, National Genome Research Institute, March 2001**

Dr. Donald Orlic of the National Genome Research Institute told NBC News in March of 2001 that, “we are currently finding that these adult stem cells can function as well, perhaps even better than embryonic stem cells.” Eric Olson, chair of the Department of Molecular Biology at University of Texas Southwestern Medical Center said that almost “every other week there's another interesting finding of adult cells turning into neurons or blood cells or heart muscle cells. Apparently our traditional views need to be re-evaluated.” And finally Markus C. Grompe, a professor of molecular medical genetics at Oregon Health Sciences University said of one study: (Washington Times July 31, 2001)

#### **Resources on the internet:**

- [www.stemcellresearch.org](http://www.stemcellresearch.org) - “Do No Harm – Coalition of Americans for Research Ethics” includes a quarterly recap of some of the major research in the area of stem cells.
- [www.nih.gov/news/stemcell/index](http://www.nih.gov/news/stemcell/index) National Institute of Health Website. Includes a “Primer on Stem Cells”
- [www.cbhd.org/resources/overview/stemcell.html](http://www.cbhd.org/resources/overview/stemcell.html) Center for Bioethics and Human Dignity – stress on adult over embryonic stem cell research.