

What are stem cells?

The national institute of health defines **stem cells** as unspecialized cells capable of renewing themselves through cell division, even after long periods of inactivity. Stem cells are formed at conception and have the ability to become different kinds of tissues of the body including muscle, nerve, organs, bone, blood and more. Their exceptional ability to become other types of cells makes them essential in repairing and renewing all kinds of tissues and body organs. Unlike other types of cells in the body, they can divide and replicate repeatedly. Regenerative Medicine potentially may replace more traditional forms of treatment such as surgery to remove or replace a poorly functioning body part or organ.

In mammals, two broad categories of stem cells exist, **embryonic** and **adult stem cells**.

Embryonic stem cells are located in the inner mass of a blastocyst (an embryo at a very early stage of development), and they eventually give rise to every cell type of the adult organism. In contrast, **adult (mesenchymal stem cells)** exist in the adult body and are found in variety of places including fat, bone marrow, cartilage, and muscle tissues. While the ethical controversy over usage of embryonic stem cells continues, scientists and doctors around the world are finding many uses for adult stem cells. Adult stem cells available in your own body may provide the key to reversing many disease processes.

A growing body of research on both animals and humans underscores the enormous potential for use of adult stem cells to help the body repair and regenerate damaged tissues. Several highly regarded centers outside of the United States currently use stem cell therapy to treat a variety of chronic degenerative conditions including joint arthritis, spine conditions, severe neurological disease, cardiac diseases, and renal failure. In the United States, physicians are beginning to offer patients stem cell treatments although the FDA considers these treatments experimental. Central data banks have been created to monitor outcomes of patients treated with stem cell therapies in the United States in order to create best practice protocols. It may take years to determine the absolute best ways of using stem cells.

What is the Rejuva-disc procedure?

The **Rejuva-disc** procedure is a cutting edge treatment designed to help an individual's body repair a damaged or degenerative disc in the lumbar spine. The Rejuva-disc procedure involves harvesting adult mesenchymal stem cells from an individual's own body through a mini-liposuction, processing and refining the stem cells over a few hour laboratory processes, then injecting them back into the intervertebral disc within the same day.

What's up with fat? Fat has stem cells?

Adipose tissue—commonly referred to as “fat”—is the human body's most abundant known source of stem cells. Adipose derived adult stem cells contain approximately 300,000-1,000,000 cells per ml of fat—far more the amount number of adult stem cells derived from bone marrow. This means millions of stem cells can be utilized for during stem cell treatments. These highly desirable mesenchymal cells are capable of morphing into various cell types that repair the body. Wouldn't it be ironic that excess fat, a major contributor to poor health, holds to the key to treating many chronic medical conditions?

How do adult mesenchymal stem cells repair tissue?

Stem cells are thought to mediate repair through five primary mechanisms: 1) providing an anti-inflammatory effect, 2) homing to damaged tissues and recruiting other cells such as endothelial progenitor cells that are necessary for tissues growth, 3) supporting tissue remodeling over scar formation, 4) inhibiting apoptosis (cell death), and 5) differentiation into bone, cartilage, tendon, and ligament tissue.

The tissue in which stem cells are transplanted drastically changes the reparative capacity of transferred cells. The microenvironment provides growth factors and other chemical signals that guide appropriate differentiation of transplanted cells to sites of trauma or disease. Repair and recovery can then be mediated via three primary mechanisms: 1) formation and/or mobilization of new blood cells to the damaged region; 2) prevention of cell death; and 3) suppression of inflammation.

What are the advantages of adipose stem cells over bone marrow stem cells?

- Harvesting of fat stem cells through a mini-liposuction is generally less traumatic to the body than the harvest of bone marrow stem cells.
- High doses of stem cells can be obtained from adipose tissue: mesenchymal stem cell yields from fat are much higher than from bone marrow.
- Adipose derived stem cells do not need to be cultured outside of the body to produce adequate numbers for treatment.
- Our technology allows using *less than minimally manipulated* (FDA requirement) methods of refining the adipose derived stem cells.
- Patients receive their own cells and therefore chances of an abnormal immune reaction are minimized.

Links

- <http://www.ncbi.nlm.nih.gov/pubmed/18298653>
- <http://blog.preferredpaincenter.com/2010/08/14/can-stem-cells-regenerate-intervertebral-discs.aspx>
- <http://www.discoverymedicine.com/Morikuni-Tobita/2011/02/23/adipose-derived-stem-cells-current-findings-and-future-perspectives/>

- <http://www.ncbi.nlm.nih.gov/pubmed?term=stem%20cells%2C%20degenerative%20disc%20disease>
- <http://www.ncbi.nlm.nih.gov/pubmed?term=stem%20cells%2C%20joint>