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Fact Sheet: Fetal Stem Cells

Stem Cells are cells with the ability to divide for indefinite periods in culture and to give rise to specialized cells.[1] Stem cells can be isolated from a variety of sources: **adult** donors, induced pluripotent cells (**iPS**), **embryos**, and **aborted fetuses**.[2]

Fetal **liver** and **thymus** tissue samples or stem cells are grafted into immunodeficient mice to create **humanized mouse models** (**SCIDhu**) of the immune system. These models can also be developed with adult peripheral blood. SCID mice are also being injected with stem cells from aborted **fetal brains**.

Intact, beating **fetal hearts** have been used in recent cardiac stem cell experiments.[3,4,5] These studies describe using **Langendorff perfusion**, a method for keeping a beating heart alive outside the body,[6] to preserve aborted fetal hearts before stem cell extraction.

Fetal stem cells have been ineffective and dangerous when used as disease treatments. An attempt in 2009 to treat a boy with A-T using aborted fetal brain cells generated tumors in his brain.[7]

StemCells, Inc., one company developing fetal stem cell therapies similar to the one used in the A-T case, had a whistleblower lawsuit filed against it in 2014 alleging impurities in its fetal brain-derived cell lines that put patients at risk of infection or death.[8] StemCells, Inc. clinical trials using aborted fetal brain cells to treat spinal cord injury (SCI) have shown no improvement of motor function in patients,[9] in contrast to studies using adult **autologous** (from the patient) stem cells that have shown motor improvement in SCI patients since 2008.[10]

Meanwhile, cell-based therapies using a patient's own, **autologous** stem cells are showing promising results. In a 2012 study of patients with cervical SCI, patients who received multiple transplants of autologous bone marrow stem cells showed improved motor function.[11] In a 2015 study, a 15-year-old paraplegic patient was able to walk again after receiving stem cell injections from her own bone marrow. [12]

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[1] "Stem Cell Basics," Stem Cell Information, *NIH*. http://stemcells.nih.gov/info/basics/pages/basics1.aspx
[2] "Stem Cell Facts," *ISSCR*. http://www.isscr.org/docs/default-source/isscr-publications/stem-cell-facts-brochure92203E27C59B.pdf
[3] Dey et al, "Sca-1+ Cells from Fetal Heart with High Aldehyde Dehydrogenase Activity Exhibit Enhanced Gene Expression for Self-Renewal, Proliferation, and Survival." *Oxidative Medicine and Cellular Longeivity, 2015.* http://www.hindawi.com/journals/omcl/2015/730683/
[4] Wu et al, *Circulation* 2012. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3481839/
[5] Wu et al, *Circulation: Cardiovascular Imaging* 2012. http://circimaging.ahajournals.org/content/5/4/481.full
[6] Emka Technologies, http://isolated-organ.emka.fr/1-emkapack4g-3.html
[7] Rechavi et al, "Donor-Derived Brain Tumor Following Neural Stem Cell Transplantation in an Ataxia Telangiectasia Patient." *PLOS Medicine*, 17 February 2009. http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000029
[8] *Williams v. StemCells, Inc.* Alameda County Superior Court, 14 July 2014. http://www.ipscell.com/wp-content/uploads/2014/07/stemcells-lawsuit.pdf
[9] "Half of the patients transplanted had significant post-transplant gains in *sensory* function." (emphasis added) See "StemCells, Inc. Initiates Phase II Clinical Trial in Cervical Spinal Cord Injury." *StemCells, Inc.* 7 October 2014. http://investor.stemcellsinc.com/phoenix.zhtml?c=86230&p=irol-newsArticle&ID=1974747
[10] Deda et al, "Treatment of chronic spinal cord injured patients with autologous bone marrow-derived hematopoietic stem cell transplantation: 1-year follow-up." *Cytotherapy* 2008. http://www.ncbi.nlm.nih.gov/pubmed/18615345
[11] Park et al, "Long-term results of spinal cord injury therapy using mesenchymal stem cells derived from bone marrow in humans." *Neurosurgery* May 2012. http://www.ncbi.nlm.nih.gov/pubmed/22127044
[12] Majka et al, "Continuous Improvement After Multiple Mesenchymal Stem Cell Transplantations in a Patient With Complete Spinal Cord Injury." *Cell Transplantation* 24 March 2015. http://www.ingentaconnect.com/content/cog/ct/2015/00000024/00000004/art00008