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A review of stem cell therapy

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Abstract
Stem cells and derived products offer great promise for new medical treatments. Learn about stem cell types, current and possible uses, ethical issues, and the state of research and practice. Stem cells are the body's raw materials — cells from which all other cells with specialized functions are generated. Under the right conditions in the body or a laboratory, stem cells divide to form more cells called daughter cells.
These daughter cells either become new stem cells (self-renewal) or become specialized cells (differentiation) with a more specific function, such as blood cells, brain cells, heart muscle cells or bone cells. No other cell in the body has the natural ability to generate new cell types.

Keywords: stem cell, research, treatment, conclusion

Introduction
A stem cell is a cell with the unique ability to develop into specialised cell types in the body. In the future they may be used to replace cells and tissues that have been damaged or lost due to disease.

What is a stem cell?
Our body is made up of many different types of cell?.
Most cells are specialised to perform particular functions, such as red blood cells? that carry oxygen around our bodies in the blood, but they are unable to divide.
Stem cells provide new cells for the body as it grows, and replace specialised cells that are damaged or lost. They have two unique properties that enable them to do this:
They can divide over and over again to produce new cells.
As they divide, they can change into the other types of cell that make up the body.

Different types of stem cell
There are three main types of stem cell:
Embryonic stem cells
Adult stem cells
Induced pluripotent stem cells
Embryonic stem cells
Embryonic stem cells supply new cells for an embryo? as it grows and develops into a baby.
These stem cells are said to be pluripotent, which means they can change into any cell in the body.
Adult stem cells
Adult stem cells supply new cells as an organism grows and to replace cells that get damaged.
Adult stem cells are said to be multipotent, which means they can only change into some cells in the body, not any cell, for example:
Blood (or 'haematopoietic') stem cells can only replace the various types of cells in the blood.
Skin (or 'epithelial') stem cells provide the different types of cells that make up our skin and hair.
Induced pluripotent stem cells
Induced pluripotent stem cells, or ‘iPS cells’, are stem cells that scientists make in the laboratory.
‘Induced’ means that they are made in the lab by taking normal adult cells, like skin or blood cells, and reprogramming them to become stem cells.
Just like embryonic stem cells, they are pluripotent so they can develop into any cell type

Why are stem cells useful?
Stem cells have several uses including:
Research–to help us understand the basic biology of how living things work and what happens in different types of cell during disease.
Therapy–to replace lost or damaged cells that our bodies can’t replace naturally.
Stem cell research
Research is looking to better understand the properties of stem cells so that we can:
Understand how our bodies grow and develop
Find ways of using stem cells to replace cells or tissues? that have been damaged or lost.
We can use stem cells to study how cells become specialised for specific functions in the body, and what happens when this process goes wrong in disease.
If we understand stem cell development, we may be able to replicate this process to create new cells, tissues and organs?.
We can grow tissue and organ structures from stem cells, which can then be studied to find out how they function and how they are affected by different drugs?.

Therapy
Cells, tissues and organs can sometimes be permanently damaged or lost by disease, injury and genetic conditions?.

Stem cells may be one way of generating new cells that can then be transplanted into the body to replace those that are damaged or lost.

Adult stem cells are currently used to treat some conditions, for example:

Blood stem cells are used to provide a source of healthy blood cells for people with some blood conditions, such as thalassaemia, and cancer patients who have lost their own blood stem cells during treatment.

Skin stem cells can be used to generate new skin for people with severe burns.

Age-related macular degeneration (AMD) is an example of a disease where stem cells could be used as a new form of treatment in the future:

Some people with age-related macular degeneration lose their sight because cells in the retina[?] of the eye called retinal pigment epithelium (RPE) cells stop working.

Scientists are using induced pluripotent stem cells to produce new RPE cells in the lab that can then be put into a patient's eye to replace the damaged cells.

Stem cells could be used to generate new organs for use in transplants:

Currently, damaged organs can be replaced by obtaining healthy organs from a donor, however donated organs may be 'rejected' by the body as the immune system sees it as something that is foreign.

Induced pluripotent stem cells generated from the patient themselves could be used to grow new organs that would have a lower risk of being rejected.

Pluripotent stem cells

Signals in the body tell a cell what type of specialised cell it should be by switching some genes[?] on and some genes off.

To generate induced pluripotent stem cells, scientists re-introduce the signals that normally tell stem cells to stay as stem cells in the early embryo. These switch off any genes that tell the cell to be specialised, and switch on genes that tell the cell to be a stem cell.

Conclusion

Stem cell transplants, also known as bone marrow transplants. In stem cell transplants, stem cells replace cells damaged by chemotherapy or disease or serve as a way for the donor's immune system to fight some types of cancer and blood-related diseases, such as leukemia, lymphoma, neuroblastoma and multiple myeloma. These transplants use adult stem cells or umbilical cord blood.

Researchers are testing adult stem cells to treat other conditions, including a number of degenerative diseases such as heart failure. For embryonic stem cells to be useful in people, researchers must be certain that the stem cells will differentiate into the specific cell types desired.

Researchers have discovered ways to direct stem cells to become specific types of cells, such as directing embryonic stem cells to become heart cells. Research is ongoing in this area.

Embryonic stem cells can also grow irregularly or specialize in different cell types spontaneously. Researchers are studying how to control the growth and differentiation of embryonic stem cells.

Embryonic stem cells might also trigger an immune response in which the recipient's body attacks the stem cells as foreign invaders, or the stem cells might simply fail to function normally, with unknown consequences. Researchers continue to study how to avoid these possible complications. Therapeutic cloning, also called somatic cell nuclear transfer, is a technique to create versatile stem cells independent of fertilized eggs. In this technique, the nucleus, which contains the genetic material, is removed from an unfertilized egg. The nucleus is also removed from the cell of a donor.

This donor nucleus is then injected into the egg, replacing the nucleus that was removed, in a process called nuclear transfer. The egg is allowed to divide and soon forms a blastocyst. This process creates a line of stem cells that is genetically identical to the donor's cells — in essence, a clone.

Some researchers believe that stem cells derived from therapeutic cloning may offer benefits over those from fertilized eggs because cloned cells are less likely to be rejected once transplanted back into the donor and may allow researchers to see exactly how a disease develops.

Researchers haven't been able to successfully perform therapeutic cloning with humans despite success in a number of other species. However, in recent studies, researchers have created human pluripotent stem cells by modifying the therapeutic cloning process. Researchers continue to study the potential of therapeutic cloning in people.

References

1. Anastasiadis K. *et al*. Implantation of a novel allogenic mesenchymal precursor cell type in patients with ischemic cardiomyopathy undergoing coronary artery bypass grafting: An open label phase IIa trial [Abstract], 2016. http://link.springer.com/article/10.1007%2Fs12265-016-9686-0
2. Dryden J. Stem cells from diabetic patients coaxed to become insulin-secreting cells, 2016. https://medicine.wustl.edu/news/stem-cells-diabetic-patients-coaxed-develop-insulin-secreting-cells/
3. Embryonic stem cells. Where do they come from and what can they do, 2015. http://www.eurostemcell.org/factsheet/embryonic-stem-cells-where-do-they-come-and-what-can-they-do
4. Hanna J. Preservation of stem cells, 2009. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2781093/
5. Kolata G. Stem cell therapies are still mostly theory, yet clinics are flourishing, 2016. http://www.nytimes.com/2016/07/28/upshot/stem-cell-therapies-are-still-mostly-theory-yet-clinics-are-flourishing.html?_r=1
6. Lo B. *et al*. Ethical issues in stem cell research, 2009. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2726839/
7. McDonald C. The end of root canals, 2016. ? http://www.popsci.com/end-root-canals
8. Millman JR. *et al.* Generation of stem cell-derived β-cells from patients with type 1 diabetes, 2016. http://www.nature.com/articles/ncomms11463
9. Stem cell basics I. (n.d.). http://stemcells.nih.gov/info/basics/1.htm
10. Turner L. *et al*. Selling stem cells direct in the USA: Assessing the direct-to-consumer industry, 2016. http://

www.cell.com/cell-stem-cell/fulltext/S1934-5909(16)30157-6
11. Where do we get adult stem cells? (n.d.). http:// stemcell.childrenshospital.org/about-stem-cells/adult-somatic-stem-cells-101/where-do-we-get-adult-stem-cells/
12. White M. How scientific progress is changing the stem cell debate. *Pacific Standard*, 2015. https://psmag.com/how-scientific-progress-is-changing-the-stem-cell-debate-2c7720fb7cf6#.sc9optpop
13. Ashikujaman Syed. Nipah Virus outbreak in the World. Int. J. Adv. Res. Biol. Sci. 2018; 5(9):131-138.
14. Ashikujaman Syed. Up Dated Concepts of Cirrhosis'. Int. J. Adv. Res. Biol. Sci. 2019; 6(3):7-10.
15. Ashikujaman Syed. Jaundice it is not a disease, it is a symptom of several possible underlying illnesses. Int. J. Curr. Res. Med. Sci. 2018; 4(11):16-26.
16. Md Rashedul Islam Rashed, Ashikujaman Syed, Md Al Sabah, Mia Md Momin. Review of diabetes types and Care. Int. J. Curr. Res. Med. Sci. 2018; 4(11):27-32.
17. Ashikujaman Syed. Alzheimer Disease Research. Int. J. Curr. Res. Med. Sci. 2018; 4(11):40-46.
18. Ashikujaman Syed. 'Snake Bites Problem in over the world' Int. J. Curr. Res. Med. Sci. 2019; 5(2):16-19.
19. Ashikujaman Syed. 'A review of Filariasis'. Int. J. Curr. Res. Med. Sci. 2019; 5(2):26-30.
20. Ashikujaman Syed. Ebola Virus Disease. Int. J. Curr. Res. Med. Sci. 2019; 5(3):18-23.
21. Ashikujaman Syed. Antibiotic Use and Resistance. Int. J. Curr. Res. Med. Sci. 2019; 5(4):17-23.
22. Ashikujaman Syed. 'Consanguineous marriages & Risk Factors'. Int. J. Curr. Res. Med. Sci. 2019; 5(4):24-30.
23. Ashikujaman Syed. New Concepts of Tumour microenvironment. Int. J. Curr. Res. Med. Sci. 2019; 5(6):14-22.
24. Ashikujaman Syed. Chikungunya Virus: An Infectious Disease. Int. J. Curr. Res. Biol. Med. 2018; 3(10):20-30.
25. Ashikujaman Syed. Mixed Connective Tissue Disease (MCTD)' in the World. Int. J. Curr. Res. Biol. Med. 2018; 3(10):48-54.
26. Ashikujaman Syed, Saptarshi Panigrahi, Somnath Surai. 'Body Check-up in Diabetes Patients'. Int. J. Curr. Res. Biol. Med. 2019; 4(3):5-22.
27. Ashikujaman Syed. Varicella - Zoster virus. Int. J. Curr. Res. Biol. Med. 2019; 4(4):10-14.
28. Ashikujaman Syed. In-vivo imaging study of distribution of liposoluble fluorescent drugs after epicardium-in-situ administration by ASD. Int. J. Adv. Res. Biol. Sci. 2019; 6(6):58-70.
29. Mahla RS. "Stem cells application in regenerative medicine and disease threpeutics". International Journal of Cell Biology. 2016; 2016 (7):1–24. doi:10.1155/2016/6940283. PMC 4969512. PMID 27516776
30. Karanes C, Nelson GO, Chitphakdithai P, Agura E, Ballen KK, Bolan CD, *et al*. "Twenty years of unrelated donor hematopoietic cell transplantation for adult recipients facilitated by the National Marrow Donor Program". Biology of Blood and Marrow Transplantation. 2008; 14(9 Suppl):8–15.
31. Strauer Bodo, Steinhoff G. "10 years of intracoronary and intramyocardial bone marrow stem cell therapy of the heart: from the methodological origin to clinical practice". J Am Coll Cardiol. 2011; 58(11):1095–1104.
32. Francis Darrel P. "Autologous bone marrow-derived stem cell therapy in heart disease: Discrepancies and contradictions". Int J Cardiol. 2013; 168(4):3381–403. doi:10.1016/j.ijcard.2013.04.152. PMID 23830344