STEM CELL REPORT

Stem cell therapy from old body fat

Simple stem cell therapies are making their way towards the clinic. Imagine you have just had liposuction to get rid of some excess fat. Instead of your old fat being thrown away it turns out that it can help to treat people with illnesses like Crohn's disease [1].

Stem cells from the 'old fat' are very low in the proteins which cause a donor to have a bad immune response. This means they are ideal to be used to treat wounds which are hard to treat. People who have Crohn's disease often get nasty wounds and these stem cells can really help them.

These 'hard-to-treat' wounds affect around 50,000 people in Europe every year. In a clinical trial this treatment, developed by TiGenix in Belgium, improved the chances of healing these wounds by 50% with no side effects [2].

Here is a link to a similar stem cell therapy this time to treat some symptoms of diabetes: http://www.gsu.edu/2013/12/19/researcher-uses-liposuction-fat-hair-treat-diabetics-wounds/.

[1] http://www.crohnsandcolitis.org.uk/
[2] https://www.newscientist.com/article/mg22730382-000-donated-liposuction-stem-cells-could-heal-difficult-wounds/

Let's Talk

STEM CELL REPORT

Regenerating whole limbs

Image: Dr. Bernhard Jank/Ott Laboratory

The first steps toward developing “bioartificial” replacement limbs that are suitable for transplantation have reportedly been taken by a team at Massachusetts General Hospital in Boston.

People can lose limbs for many reasons [1] and afterward they often have a prosthetic limb fitted. Prosthetic limbs have greatly advanced but they still have many limitations. Some patients, over the past 20 years, have received hand transplants from donors [2], but this procedure means they need long term treatment with medicines to prevent them from rejecting the new hand. This problem could be solved by using the patient’s own stem cells to regenerate the tissue for a new limb - rather than rely on a donor. The new procedure would also need a matrix or scaffold on which the new tissue could grow. Dr. Ott from the team at Massachusetts says: “Building limbs requires a specific supporting structure called the matrix. We have shown that we can maintain the matrix of all of these tissues in their natural relationships to each other.” However, the researchers still face many challenges such as the need to re-grow nerves of a regenerated limb into nervous system of the amputee.

Next, the team will attempt muscle regeneration using human cells, before expanding the process to human bone, cartilage and connective tissue.

(http://www.medicalnewstoday.com/articles/294850.php)

[1] http://www.nhs.uk/conditions/amputation/Pages/Introduction.aspx
[2] http://consumer.healthday.com/infectious-disease-information-21/misc-infections-news-411/doctors-perform-double-hand-transplant-in-a-child-701755.html

Let’s Talk

STEM CELL REPORT

An embryonic idea

Regenerative medicine is the science of producing tissues and organs from stem cells. It is a rapidly developing field.

This week, however, it took a leap forward. A team of researchers led by Madeline Lancaster of the Austrian Academy of Sciences, in Vienna, announced that they have grown things which, while not human brains, resemble brains in important ways.

Dr Lancaster's organoids, as she calls them, are a far cry from the brains in jars beloved of the writers of horror movies. But they do contain several recognisably different types of nerve cell and have features which look like those of real brains. They might be used to study human brain development and how things go wrong. This would be unethical in a living human being. They could be employed to test drugs in ways that cell cultures cannot be used.

(The Economist - 30th August 2013)

Image: https://www.kcuk.org.uk/combo-immunotherapy-may-herald-new-standard-care-kidney-cancer/

Let's Talk

STEM CELL REPORT

Mouse heart beats again

A newly beating heart is part-mouse, part-human.
For the first time, a mouse heart has been made to pulse again by stripping it of its own cells and rebuilding it with human ones.
To create the hybrid heart, Lei Yang at the University of Pittsburgh, took the heart from a mouse and removed all its cells. Then they repopulated with human heart stem cells that had differentiated into the three types of cell required for a heart. After a few weeks, the organ started to beat again. The engineered hearts contain about 70 per cent human heart cells.

Image: Karen Shaw/FreeDigitalPhotos.net

The stem cells came from induced pluripotent stem cells generated from human skin cells, and were then turned into heart cells. The hearts beat but aren't strong enough to pump blood effectively.

Yang's long-term goal is to create human hearts that can be used for transplants, for drug testing and to better understand how a heart develops.

(New Scientist - August 14th 2013)

Let's Talk

STEM CELL REPORT

Stem cells help your fingers regenerate

If you shave off the very tip of your finger or toe it should grow back. Now scientists understand more about how this happens. Mayumi Ito at New York University and her colleagues took a closer look at mouse digits because they have similar properties to human digits. Mayumi and her team identified a previously unknown population of stem cells at the base of each mouse toenail. Tests showed that these “nail stem cells” help with ordinary nail growth, but can also rebuild the entire digit tip after amputation. It seems that we partly retain the mechanisms that operate limb regeneration in amphibians. This may provide direct clues which might be able to extend our ability to regenerate limbs.

(Nature - June 2013).

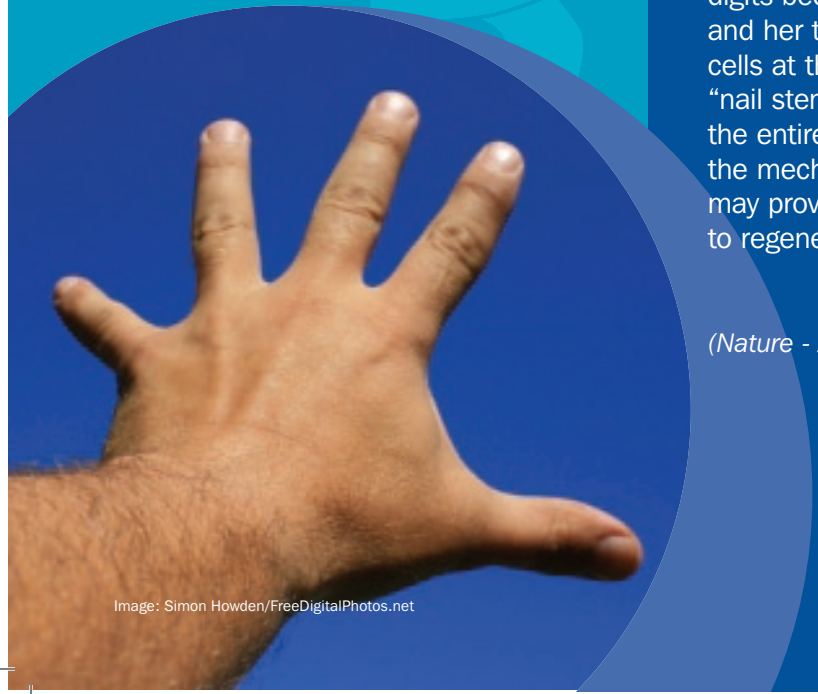

Image: Simon Howden/FreeDigitalPhotos.net

Let's Talk

STEM CELL REPORT

Artificial skin

Scientists have grown artificial skin using stem cells from the umbilical cord. To grow the artificial skin, the researchers used a biomaterial made of fibrin and agarose, designed and developed by the University of Granada.

One of the problems major-burn victims currently have is that, in order to apply the current techniques of artificial skin, a number of weeks are needed. That is because the skin needs to be grown from parts of the patient's healthy skin. "Creating this new type of skin using stem cells, which can be stored in tissue banks, means that it can be used instantly when injuries are caused, and which would bring the application of artificial skin forward many weeks," said Antonio Campos, Professor of Histology at the University of Granada.

Image: arztsamui/FreeDigitalPhotos.net

http://zeenews.india.com/news/health/health-news/artificial-skin-created-using-stem-cells-from-umbilical-cord _ 25244.html

Let's Talk

STEM CELL REPORT

The bone-marrow register

A schoolgirl has become the youngest person to donate stem cells to a non-relative. Victoria Rathmill, 17, donated after she was found to be a match to a patient suffering from blood cancer. Victoria, from Macclesfield, Cheshire, joined the Anthony Nolan bone marrow register in February after a family friend was diagnosed with leukaemia. An Anthony Nolan spokesperson said Victoria's donation made her the youngest person to provide stem cells to a non-relative. The charity's bone marrow register is just one of two in the world that accept donors under the age of 18.

Ms Rathmill said: "At first I was like, 'I'll join when I'm 18, I'm not going to make any difference', but then a friend of our family got ill and so I felt the need to join up. It was only a couple of weeks after I signed up that I told my mum. Though she was taken aback a bit at first, she thought it was a nice thing to do, especially given our friend's experience." Victoria's mother said, ''It never occurred to me to try and stop her from helping another person - it makes me very proud".

There are currently about 1,600 people in the UK waiting for a bone-marrow transplant and 37,000 worldwide.

http://www.bbc.co.uk/news/uk-england-manchester-24999170

Let's Talk

STEM CELL REPORT

Brown fat stem cells

Brown fat stem cells hold possibilities for treating diabetes and obesity

Obesity and diabetes have become a global epidemic leading to severe cardiovascular (heart and circulatory) disease. Children have large amounts of brown fat that is highly metabolically active and this allows them to eat large amounts of food and not gain weight. It was thought that brown fat stem cells did not exist in adults but researchers have found them! Adults have a lot of white fat in their bodies, which leads to weight gain and cardiovascular disease but this does not happen with brown fat. Scientists have identified brown fat stem cells in the chest of patients aged from 28 to 84 years. They have been able to isolate the human stem cells, culture and grow them, and implant them into a pre-human model. This has shown positive effects on glucose levels- a good sign for treating diabetes.

This new discovery of finding brown fat stem cells may help in identifying potential drugs that may increase the body's own ability to make brown fat or find new ways to directly implant the brown fat stem cells into patients.

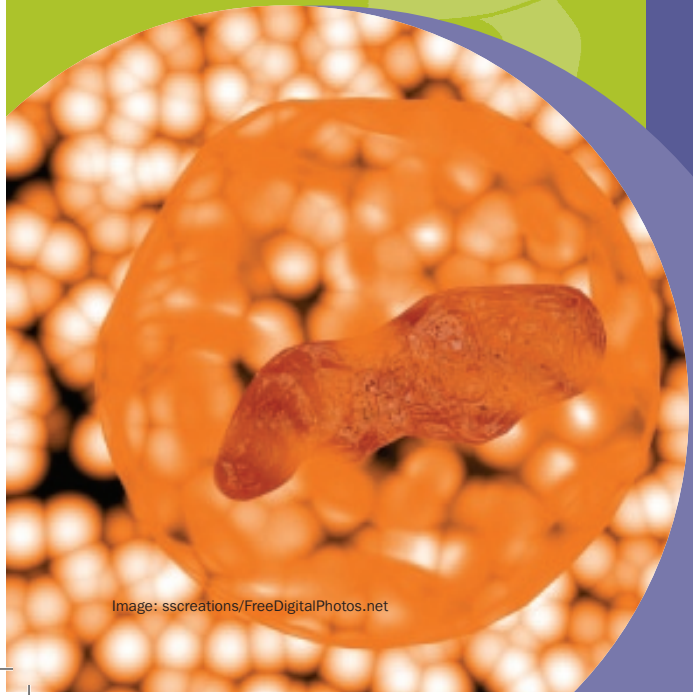

Image: sscreations/FreeDigitalPhotos.net

http://www.sciencedaily.com/releases/2013/11/131121125655.htm

Let's Talk