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Stem cell experts close in on major cures

Cures for conditions such as type 1 diabetes, blindness and Parkinson's are close to development, say the world's leading stem cell researchers, who are gathered in Edinburgh this week.

Stem cell treatments for heart disease and stroke may be further away, but progress is being made, according to scientists attending the inaugural UK National Stem Cell Network Science Meeting.

The conference is designed to bring scientists and stakeholders together to help translate pioneering research into effective transplant therapies.

Some of the most promising research being presented relates to diseases like diabetes type 1 and Parkinson's.

These diseases are caused by the loss of a single type of cell, which researchers hope could be replaced by a stem cell transplant.

Dr Chris Mason, of University College London and the UK National Stem Cell Network, said: "People are beginning to experience the real value of stem cell therapies.

"Hundreds of cancer patients have received stem cells as part of their therapy. In London, patients with age-related blindness are having cells from their good eye used to regenerate their bad eye."

He added: "The problem with the drugs we see on the market just now is they are only able to manage the condition. By developing stem cell therapies, we will deliver treatments which actually cure the patient. Type 1 diabetes is a great example. We can manage the disease with insulin. But a one-off injection of stem cells would make treatment affordable, even in the poorest developing countries, where health services cannot afford the lifelong cost of insulin for diabetics."

Research which involves creating early stage human embryos to harvest stem cells has faced ethical opposition from pro-life groups and the Catholic Church of Scotland.

Some critics argue scientists should focus instead on treatments which take adult stem cells and reverse their development, so they behave like embryonic stem cells.

However, Dr Willy Lensch, from the Children's Hospital in Boston, said: "This research is exciting but it does not mean we should close the door to embryonic stem cells or human-animal hybrids. We do not know which sources of stem cells will be the most useful treatments in the long run."

1 STROKE Inserting tiny scaffolding into the brain could dramatically reduce damage caused by strokes, the UK National Stem Cell Network Annual Science Meeting will hear today.

Strokes cause temporary loss of blood supply to the brain which results in areas of brain tissue dying - causing loss of bodily functions such as speech and movement. Neural Stem Cells (NSCs) offer exciting possibilities for tissue regeneration, but transplantation in rats with stroke damage has so far had limited success in reducing the size of lesions.

However, Dr Mike Modo from the Institute of Psychiatry at Kings College London, is developing cell-scaffold combinations that could be injected into the brain to provide a framework inside the cavities caused by stroke so that the cells are held there until they can work their way to connect with surrounding healthy tissue.

1 HEART DISEASE The conference will hear from Professor Christine Mummery, from the Netherlands, one of the world's leading heart stem cell experts. Professor Mummery said: "We have made real progress in producing the right sort of cells that would be needed to repair hearts damaged by disease. But there are hurdles still to overcome."

Her laboratory has attempted to help mice recover from heart attacks, by treating them with heart cells which have been grown from human embryonic stem cells. "Only one cell type dies in a myocardial infarction - cells from the left ventricle - so in theory if you put these cells back you should get a pumping heart," she said.

1 DIABETES Doctor Josh Brickman, of Edinburgh University's Institute for Stem Cell Research, has made progress in creating specialised liver and pancreas stem cells in mice and humans. His work is a small part of a global effort to find stem cell treatments for type 1 diabetes. "Here is a disease which stands a great chance of being cured, if we could only produce stem cells of the right type - insulin-producing pancreatic beta cells."

1 PARKINSON'S Scientists believe it may be possible to take a small sample of skin from a Parkinson's patient, and turn it into a stem cell transplant, which could restore their normal brain function. This week, researchers from Massachusetts Institute of Technology reported they had eased the symptoms of Parkinson's disease in rats, using this method.

Parkinson's is caused by insufficient levels of the hormone dopamine in a specific part of the midbrain - due to the death of a particular type of brain cells. The researchers took skin cells, then reprogrammed them to act like embryonic stem cells - and then differentiated them into dopamine-producing neurons. When they grafted these neurons into rats with Parkinson's-like symptoms, the rats showed marked improvement.