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Stem cell research hopes to repair brain damage of Parkinson's disease

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Australian scientists have developed a new technique using stem cells, in the hope to replace damaged cells in Parkinson's disease. The technique could be developed for application in other degenerative conditions.

Drs Clare Parish and Lachlan Thompson lead the research from the Florey Neuroscience Institutes and the University of Melbourne. They are members of the newly established Stem Cells Australia collaboration being launched at the University of Melbourne today.

Stem Cells Australia is a new $21m Australian Research Council Special Research Initiative bringing together Australia's leading stem cell scientists.

Led by internationally renowned stem cell expert Professor Martin Pera and administered by the University of Melbourne, the Initiative links Australia's leading experts in bioengineering, nanotechnology, stem cell biology, advanced molecular analysis and clinical research to solve some of the our biggest health challenges.

"Stem Cells Australia will not only play a major role in leading Australian research into stem cell science, it will help the Australian community to understand the impact of scientific breakthroughs in this fast-paced and fascinating field," he said.

Opening Stem Cells Australia on behalf of Innovation Minister Senator Kim Carr, ARC Chief Executive Officer Professor Margaret Sheil said

the Initiative would make an important contribution to life-changing research.

"It will enable the delivery of stem cell research breakthroughs that will help ease suffering and save lives," Professor Sheil said.

Key areas of research include investigating the use of stem cells to rejuvenate and repair damaged and diseased cells in organs such as the heart, brain and blood that are affected in conditions such as heart disease, Parkinson's disease, stroke and Leukemia.

In regards to Parkinson's disease there is a progressive and permanent loss of a group of dopamine-producing brain cells that form an essential pathway in the brain circuitry controlling movement.

Drs Parish and Thompson's respective research groups have developed a novel technique using stem cells to replace the dopamine-producing brain cells.

The first step of the technique is led by Dr Parish's team which has expertise in generating the dopamine brain cells that are missing in Parkinson's disease.

"By following what we know about brain development we have been able to re-create an environment in the culture dish that allows us to generate specific cell types that may be therapeutic," she said.

"A limitation of the procedure, however, is that it is inefficient. This means that only around 30 per cent of the cells become dopamine brain cells while the others may remain as stem cells. This poses significant risks in a transplantation setting because the stem cells may continue to grow and form tumours," she said.

Dr Lachlan Thompson's team is working on an innovative approach using a state of the art cell-sorting technology to solve this problem.

"Overall we have identified some interesting findings that help us to isolate the dopamine brain cells and discard the stem cells prior to transplantation," he said.

"It's a strategy that we hope will bring us a step closer to clinical trials for a stem cell based treatment for Parkinson's. The broader significance is that this novel approach will likely be applicable to the development of stem cell-based treatments for other neurological conditions such as stroke, motor neuron disease and Huntington's disease," he said.

"There is still a lot of basic research to do to develop this technology to a point where it would be safe to proceed with trials in patients, however, there's no reason to think that it couldn't happen within the next 5-10 years with the proper funding."

Stem Cells Australia is a collaboration with eight Australian research partners: The University of Melbourne, Monash University, Walter and Eliza Hall Institute of Medical Research, The University of Queensland, University of NSW, Victor Chang Cardiac Research Institute, CSIRO and Florey Neuroscience Institutes. Former Governor of Victoria Professor David de Kretser is the Chair of the Governance Committee.

Professor Martin Pera said one of the major assets of the unique multidisciplinary approach of Stem Cells Australia is that it will foster and train the next generation of Australian stem cell scientists, cementing Australia's position in the field.

"This collaboration will not only support excellence in stem cell research to address diseases that are hardest to treat, but will also guide public debate about the important ethical, legal and societal issues associated

with stem cell science," he said.

Provided by University of Melbourne