



EXCLUSIVE Melbourne surgeons inject stem cells into man's head in world-first Parkinson's trial

BRAIN REBOOT

3D RECREATION OF PATIENT'S SKULL



LUCIE VAN DEN BERG

STEM cells have been injected into the brain of a Victorian patient as part of a world-first trial to treat Parkinson's disease.

In experimental surgery, Royal Melbourne Hospital neuroscientists transplanted millions of cells at 14 injection sites via just two 1.5cm holes in the skull.

The cells, which can metamorphose into brain cells, had been

frozen and flown in from the United States, in a global collaboration.

It is hoped the cells will boost levels of the neurotransmitter dopamine, a lack of which causes tremors, rigidity and slowness.

The therapy, which pushes the frontiers of science and surgery, had shown great promise in pre-

clinical trials, paving the way for human trials.

The identity of the patient, 64, remains private while he recovers from the pioneering surgery.

Months of planning, which involved designing the operation from scratch, winning regulatory approval, and importing a machine that has never been used in Australia, was required.

Using a three-dimensional model of the patient's brain, neurologist Andrew Evans and neurosurgeon Girish Nair spent weeks doing "dummy runs", devising a way to enter the brain.

Hospital staff donated their time for the eight-hour operation.

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Using the imported machine, the doctors travelled deep into the brain, making tiny tracks in the delicate tissue with cannulas to reach seven target sites on each side of the brain, leaving only a small surgical footprint.

A minuscule quantity of cells was implanted at a precise rate, totalling 300 microlitres.

Risks include paralysis, stroke, or death. If the cells es-

caped into the spinal fluid they could be lost; if they were injected too slowly they could become stuck; or they could grow rapidly into a tumour.

The surgery used pluripotent stem cells, which can change into any cell in the body. But being highly susceptible to their environment, "peer pressure" influences their transformation.

Dr Evans, the trial leader, said: "The idea with cellular re-

placement therapy is to be able to implant cells that will differentiate or change from stem cells into cells that either produce dopamine or provide other forms of support to remaining neurons."

The unique treatment uses neural stem cells, derived from unfertilised eggs manufactured in a laboratory by the International Stem Cell Corporation in the US.

"Eventually we hope that we can use our therapy to cure



14 Sep 2016

Herald Sun

Author: Lucie van den Berg • Page: 1

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Parkinson's disease," the ISCC's chief scientific officer Russel Kern said.

The team did a scan 24 hours after the operation and were relieved to discover all target sites had been reached without complications.

The patient recovered quickly and was discharged within 72 hours.

No drugs have succeeded in stopping the progression of Parkinson's, which affects 10 million people worldwide, and treatments for symptoms eventually become ineffective.

It is not yet known if the treatment has been successful, and a cautious Dr Evans said the trial first had to determine its safety. Eleven more patients will now have the surgery.

Final results will be known in two years.

lucie.vandenberg@news.com.au

BRAIN/STEM CELL TRANSPLANTS

- Two holes 15mm in size are drilled in the top of the skull.
- A cannula (small plastic tube) 1.65mm diameter is carefully guided down through the brain tissue forming two tiny tracks.
- Seven sites on each side of the brain are injected with the stem cells.
- Each injection site receives 21.4 micro litre of stem cells (a micro litre is one-millionth of a litre) at a rate of five micro litres per minute.
- The patient gets 300 micro litres in total before the cannula is threaded back out along the two tracks and out of the two holes.
- This type of stem cell, a pluripotent stem cell, is a master cell that can change into any cell in the body but it is highly influenced by its environment.
- At six and 12 months, they will scan the patient to see if the cells have changed into brain cells that boost dopamine levels.