Stem cell hope for treating Parkinson's

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Doctors could try to regrow the damaged brains of Parkinson's disease patients with grafts of skin cells after a successful experiment in monkeys.

About 130,000 Britons are affected by the condition, where the brain cells responsible for producing an important messenger chemical slowly die off, impairing patients' ability to control their movements. There is as yet no treatment that can reverse the decay.

One of the brightest hopes for healing the damage is to grow the lost neurons back from transplanted stem cells, which can form almost any kind of body part, including brain tissue.

In a significant step towards this goal, scientists in Japan have used injections of neurons derived from human adult stem cells to repair the brains of long-tailed macaques with the monkey equivalent of Parkinson's.

The team's achievement, described in the journal *Nature*, marks the first time that the therapy has been shown to be safe and effective in one of our fellow primate species, and follows a number of similar feats in smaller mammals such as mice and rats.

The brain relies heavily on the substantia nigra, a pea-sized structure at its base, to make dopamine, a molecule that carries signals around the motor and reward networks. As the dopamine-making cells die off en masse, patients develop tremors, stiffness and difficulty with walking.

In the 1990s there were attempts to replace these neurons with stem cells taken from the brains of aborted foetuses, but the approach is ethically controversial and has been banned in many countries. Jun Takahashi and his group at the University of Kyoto have achieved similar results with cells that had been swabbed from the skin of four healthy human adults and then chemically stripped of their identity so that they became induced pluripotent stem (IPS) cells, which can turn into neurons.

These were then converted into dopamine-producing cells and transplanted into the midbrains of four male long-tailed macaques which had been injected with a neurotoxin to mimic the effects of Parkinson's.

After a year, the macaques treated with healthy adult cells had typically recovered 54 per cent of their motor function, compared with 42 per cent in four macaques that were given cells from Parkinson's patients and 10 per cent in three that received a placebo.

Crucially, the transplanted brain cells appeared to persist and thrive in their new setting without causing any tumours. The treatment is also about as effective as levodopa, a medicine that involves feeding dopamine precursors into the brain, but has the additional benefit of giving patients their own native source of the chemical.

The experiment raises the prospect that doctors could give patients an unlimited source of new dopamine-producing neurons without any recourse to scavenging the cells from foetuses.

Experts welcomed the findings but said they would need to be repeated in further studies. Frank Edenhofer, of the regenerative medicine research group at the University of Innsbruck in Austria, said: "The results represent an important milestone in the development of new cell therapy methods."