Parkinson’s disease: how could stem cells help?

What do we know?

Tremors, muscle rigidity and other symptoms of Parkinson’s disease (PD) are caused by the death of dopamine-producing neurons in the brain. Dopamine producing neurons throughout the brain are affected, but the ‘substantia nigra’ is the primary brain region where neurons are lost.

People affected by PD often develop abnormal protein clumps in their brain called Lewy bodies. These clumps are made of a protein called alpha-synuclein.

Levodopa (L-DOPA) is the primary drug used to treat PD. Levodopa is converted into dopamine when in the body, which compensates for lost dopamine-producing neurons.

What are researchers investigating?

Five per cent of people with PD have inheritable gene mutations linked to PD. Researchers are investigating what causes PD in the other 95% of patients.

Transplantation of young brain cells from human foetuses into PD patients has shown promising results. The current TRANSEURO study is re-examining this treatment method with the aim of minimising side effects and measuring efficacy.

Scientists can now make dopamine-producing neurons from induced pluripotent stem cells (iPSCs) and embryonic stem cells (ESCs). Neurons made from ESCs survive and function after transplantation into mice and monkeys.

What are the challenges?

Alpha-synuclein and many other proteins coded by genes linked to PD are still poorly understood. This makes it very difficult to understand the precise causes of PD.

Stem cell treatments are still not ready or approved for human treatment. Before they can be used, studies must clearly show that lab-grown neurons are safe, effective and similar enough to the original nigral neurons.

To use stem cells, procedures must be developed to create the relatively large numbers of cells needed for a transplant. The cells must also be all the same to avoid causing other medical problems, such as cancer.

For more information visit: www.eurostemcell.org/parkinsons