New technique for Parkinson's stem cell brain repair brings promise for patients

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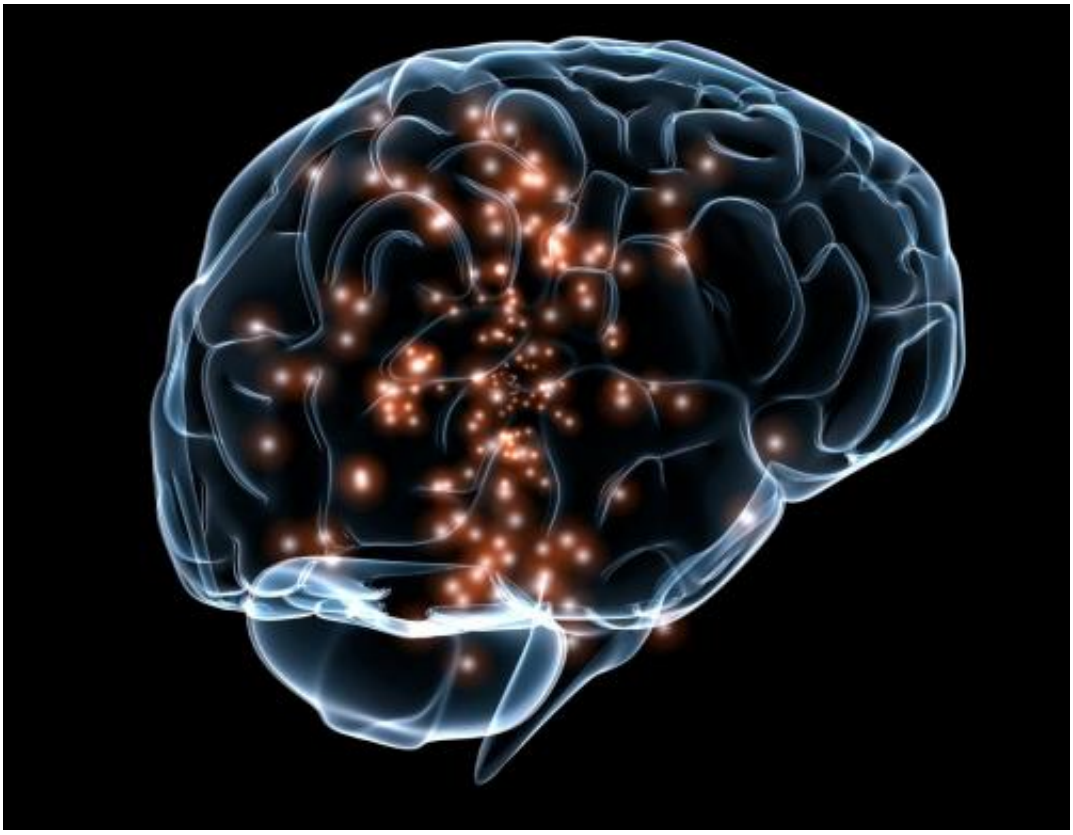

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Neuroscientists at the University of Galway have made an exciting discovery that could revolutionize stem cell-based brain repair therapy for Parkinson's disease.

Parkinson's is a neurodegenerative condition in which brain cells slowly degenerate and die, leading to a progressive deterioration in a person's ability to control movement. It is estimated that there are 8.5 million people living with the condition worldwide and 12,000 people in Ireland alone.

Brain repair for Parkinson's involves replacing the dead cells by transplanting healthy brain cells back into the brain. With recent advancements in regenerative medicine and stem cell technology, "induced stem cells" can now be used as a source of healthy cells.

Induced stem cells are reprogrammed from adult cells, such as skin cells, and can be converted in the laboratory into the appropriate type of brain cell required for repairing Parkinson's brain.

However, these skin cells-turned brain cells need to be transplanted into the brain at a very early stage in their conversion, and the vast majority of the cells do not continue to convert -once in the brain—into the mature cells that are required for the therapy to work.

In work published in the *Journal of Neural Engineering*, the team in the College of Medicine, Nursing and Health Sciences at the University of Galway have shown that transplanting the immature cells in a collagen hydrogel dramatically improves both their survival and maturation in the brain.

Commenting on the research finding, the lead neuroscientist on the project, Professor Eilís Dowd, said, "Our hydrogel nurtures, supports, and protects the cells after they are transplanted into the brain, and this dramatically improves their maturation and reparative ability. Ultimately, we hope that continued development of this promising gel will lead to a significant improvement in brain repair approaches for people living with Parkinson's."

The new research aims to understand how the immune system in the brain reacts when cells are transplanted alone versus when they are transplanted in combination with the hydrogel.

The research will continue to be led by Professor Dowd in collaboration with colleagues from CÚRAM—the Science Foundation Ireland Research Centre for Medical Devices based at the University of Galway, the University of Edinburgh, and the University of Melbourne.

More information: Giulia Comini et al, Survival and maturation of human induced pluripotent stem cell-derived dopaminergic progenitors in the Parkinsonian rat brain is enhanced by transplantation in a neurotrophin-enriched hydrogel, *Journal of Neural Engineering* (2024). DOI: 10.1088/1741-2552/ad33b2

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