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Small brain biopsies can be used to grow large numbers of patient's own brain cells

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A group of really brainy scientists have moved closer to growing "therapeutic" brain cells in the laboratory that can be re-integrated back into patients' brains to treat a wide range of neurological conditions. According to new research published online in *The FASEB Journal*, brain cells from a small biopsy can be used to grow large numbers of new personalized cells that are not only "healthy," but also possess powerful attributes to preserve and protect the brain from future injury, toxins and diseases. Scientists are hopeful that ultimately these cells could be transformed in the laboratory to yield specific cell types needed for a particular treatment, or to cross the "blood-brain barrier" by expressing specific therapeutic agents that are released directly into the brain.

"This work is an example of how integrating basic science and clinical care may reveal privileged opportunities for biomedical research," said Matthew O. Hebb, M.D., Ph.D., FRCSC, a researcher involved in the work from the Departments of Clinical Neurological Sciences (Neurosurgery), Oncology and Otolaryngology at the University of Western Ontario in Ontario, Canada. "It is our hope that the results of this study provide a footing for further advancement of personalized, cell-based treatments for currently incurable and devastating neurological disorders."

Scientists enrolled patients with Parkinson's disease who were scheduled to have deep brain stimulation (DBS) surgery, a commonly used procedure that involves placing electrodes into the brain. Before the

electrodes were implanted, small biopsies were removed near the surface of the brain and multiplied in culture to generate millions of patient-specific cells that were then subjected to genetic analysis. These cells were complex in their make-up, but exhibited regeneration and characteristics of a fundamental class of brain cells, called glia. They expressed a broad array of natural and potent protective agents, called neurotrophic factors.

"From an extremely small amount of brain tissue, we will one day be able to do very big things," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*. "For centuries, treating the brain effectively and safely has been elusive. This advance opens the doors to not only new therapies for a myriad of brain diseases, but new ways of delivering therapies as well."

More information: Hu Xu, Louiza Belkacemi, Mandar Jog, Andrew Parrent, and Matthew O. Hebb. Neurotrophic factor expression in expandable cell populations from brain samples in living patients with Parkinson's disease. *FASEB J* October 2013 27:4157-4168; DOI: 10.1096/fj.12-226555