Researchers advance therapy for Parkinson's, other diseases

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(PhysOrg.com) -- By miniaturizing a device that monitors the delivery of healthy cells, researchers at Department of Energy's Oak Ridge National Laboratory are developing a powerful instrument for physicians to use in treating patients with Parkinson's syndrome, brain tumors and other diseases.

While cell replacement therapies can be effective, the challenge is to deliver a sufficient quantity of healthy cells, said Boyd Evans III of the lab's Measurement Science and Systems Engineering Division.

"Regardless of the source of cells and the location of delivery, there is a great need to improve cell viability after the cells are transplanted," Evans said. "The vast majority of transplanted cells do not survive more than 24 hours regardless of their source."

Studies have shown that merely implanting more cells does not necessarily increase the number that survive and differentiate into dopamine-producing, or viable, cells in Parkinson's models. The key is being able to deliver precise quantities of healthy cells to a targeted location. This requires the ability to determine if the cells are viable upon delivery and the ability to make meaningful measurements. ORNL's proprietary instrumented cell delivery catheter allows physicians to do just that.

"Our approach consists of monitoring cells that are implanted using a catheter equipped with a fiber optic probe to perform fluorescence-

based cytometric measurements on cells as they exit the port at the catheter tip," Evans said. These measurements confirm that the cell is alive and provide indications of the cell's health.

"What we have done is taken the function of a laboratory instrument and put it on the tip of a catheter that can make measurements inside the brain," Evans said.

Results from several studies underscore the value of delivering a highly controlled amount of tissue into the host brain, and understanding cell viability at the delivery point is critical for meaningful comparison of experimental results, according to Evans.

The instrumented catheter is part of a larger effort to develop a complete system for collecting healthy tissue from an individual who is both the donor and recipient, expanding this tissue in vitro and implanting the tissue under monitored conditions. Joining Boyd in this effort are other researchers from ORNL, George Gillies of the University of Virginia, and neurosurgeon William Broaddus and neuroscientist Helen Fillmore of Virginia Commonwealth University.

Funding provided through ORNL's Laboratory Directed Research and Development program was used to develop a prototype device and demonstrate its functionality for characterizing cell flows of cell.

Following completion of the LDRD funded project, NexGen Medical Systems and Kopf Family Foundation at the University of Virginia, and the Cullather, Hord and Hafner Funds at Virginia Commonwealth University worked on other issues associated with flows of slurries of cells, such as cell delivery, cell selection and culturing technique.

Provided by Oak Ridge National Laboratory (news : web)