MedicalXpress

Neural stem cells reduce Parkinson's symptoms in monkeys

June 12 2007

New Haven, Conn.—Primates with severe Parkinson's disease were able to walk, move, and eat better, and had diminished tremors after being injected with human neural stem cells, a research team from Yale, Harvard, the University of Colorado, and the Burnham Institute report today in *Proceedings of the National Academy of Sciences*.

These results are promising, but it will be years before it is known whether a similar procedure would have therapeutic value for humans, said the lead author, D. Eugene Redmond Jr., professor of psychiatry and neurosurgery at Yale.

"Not only are stem cells a potential source of replacement cells, they also seem to have a whole variety of effects that normalize other abnormalities," Redmond said. "The human neural stem cells implanted into the primates survived, migrated, and had a functional impact. It's an important step, but there are a number of studies that need to be done before determining if this would be of any value in clinical settings."

Parkinson's disease is caused by a degeneration of dopamine neurons in an area of the midbrain known as the substantia nigra, which is responsible for dopamine production. Reduced production of dopamine in late stage Parkinson's causes symptoms such as severe difficulty in walking, fewer movements, delays in moving, lack of appetite, difficulty eating, periods of remaining motionless known as "freezing," and head and limb tremors.

In this study five of eight monkeys with advanced Parkinson's were injected with human neural stem cells and three received sham injections. The monkeys were observed four months before and four months after surgery. Those injected with human neural stem cells improved progressively for the entire post-treatment period and were significantly different from the monkeys that received sham injections. Twenty-one additional monkeys were studied for up to eight months for other biological effects of the stem cells. No tumors or toxic effects were found.

Redmond said a small number of the human neural stem cell progeny differentiated into neurons that contained tyrosine hydroxylase and dopamine transporter. Cell progeny containing these markers suggest that the microenvironment within and around the brain lesions still permits development of a dopamine phenotype by responsive progenitor cells. The stem cells also made a growth factor that has been shown to improve dopamine function.

The neural stem cells are derived from fetal brain and are not embryonic stem cells. Monkeys with "chimeric" human neural cell-bearing brain regions showed no indication of behaviors that were not typical of the species.

Source: Yale University