Parkinson's Disease Scrambles Brain's Switchboard

Researcher says change may be irreversible

By Serena Gordon
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THURSDAY, Sept. 12 (HealthDayNews) -- One of the hallmarks of Parkinson's disease is slow movement, and a researcher from Rutgers University believes he's discovered why this occurs.

By studying rats with chemically induced Parkinson's, the researcher was able to see that the disease caused connections in the brain to reorganize and send signals to different parts of the body than they were originally programmed to control. Results of the study appear in the October issue of *The Journal of Comparative Neurology*.

The researcher, Mark West, a behavioral neuroscientist at Rutgers, likens this area of the brain to a switchboard, and says Parkinson's disease changes the switchboard wires around.

"If the wires are switched, information isn't getting to the right area," he explains, which makes it difficult for the body to respond.

The bad news, he says, is it's not likely that medications would ever be able to reverse these new connections.

However, neurologist Dr. Christina Drafta, of New York University Medical Center, points out that slow movement is only one symptom of Parkinson's, and there are still many other aspects of the disease that may eventually be more treatable. "I don't think there is no hope," she adds.

Parkinson's disease affects as many as 1.5 million Americans, according to the Parkinson's Disease Foundation. The main symptoms include rigidity, tremor, slow movement, poor balance and problems walking. The exact cause of Parkinson's remains a mystery, but researchers do know that many of the symptoms occur because of a severe shortage of a brain chemical known as dopamine. There is no cure for the disease, but there are medications that can help control some of the symptoms.

For this study, West and his colleagues chemically induced Parkinson's disease in rats on one side of their brain so they could compare the changes to the normal side of the brain.

They then concentrated their study on the part of the brain affected by Parkinson's -- the basal ganglia. In a normal brain, neurons -- the cells that conduct electrical messages -- cluster together by body type. For example, several clusters might correspond to an arm and other clusters are responsible for a leg.

In the Parkinson's brain, these clusters are smaller because the neurons on the edges of the clusters have broken away, West says. When these neurons break away, they change their function and start responding to different input. So, a cluster that originally was programmed to respond to a touch on the arm might learn to react to a poke in the back. Interestingly, West says these renegade neurons can actually learn to respond to more than one area of the body, which normal neurons don't do.
The problem is, the connections in the body parts don't change. So, when the neuron that has broken off from the arm now responds to a touch on the leg, it fires off its message to respond, but the leg doesn't "hear" that message; the arm does.

West says his findings explain why the commonly used treatment, a dopamine-replacement drug, doesn't help with slow movement. Once these new connections are made, he says, they can't be "taken back."

He says more research should be done on prevention so these changes don't have the chance to occur.

Drafta says patients shouldn't be discouraged by these findings. It's important to remember that these results come from a study of rats that did not get Parkinson's naturally, she explains. While that doesn't mean the results are not valuable, it does mean it's not necessarily what happens in the human brain, Drafta says.

Also, these findings don't explain the other symptoms of Parkinson's, Drafta adds.

"There are still a lot of ifs here," she says.

What To Do

For more information on Parkinson's disease, go to the Parkinson's Disease Foundation or to the Parkinson's Disease Society.

SOURCES: Mark West, Ph.D., behavioral neuroscientist, and professor, psychology, Rutgers University, New Brunswick, N.J.; Christina Drafta, M.D., neurologist specializing in Parkinson's movement disorder, New York University Medical Center, New York City; Oct. 7, 2002, The Journal of Comparative Neurology

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Last updated 9/12/2002.

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