# Researchers find early success in new treatment for stroke recovery

October 1 2013

(Medical Xpress)—Researchers at The University of Texas at Dallas have taken a step toward developing a new treatment to aid the recovery of limb function after strokes.

In a study published online in the journal *Neurobiology of Disease*, researchers report the full recovery of forelimb strength in animals receiving vagus nerve stimulation.

"Stroke is a leading cause of disability worldwide," said Dr. Navid Khodaparast, a postdoctoral researcher in the School of Behavioral and Brain Sciences and lead author of the study. "Every 40 seconds, someone in the U.S. has a stroke. Our results mark a major step in the development of a possible treatment."

Vagus nerve stimulation (VNS) is an FDA-approved method for treating various illnesses, such as depression and epilepsy. It involves sending a mild electric pulse through the vagus nerve, which relays information about the state of the body to the brain.

Khodaparast and his colleagues used vagus nerve stimulation precisely timed to coincide with rehabilitative movements in rats. Each of the animals had previously experienced a stroke that impaired their ability to pull a handle.

Stimulation of the vagus nerve causes the release of chemicals in the brain known to enhance learning and memory called neurotransmitters,

specifically acetylcholine and norepinephrine. Pairing this stimulation with rehabilitative training allowed Khodaparast and colleagues to improve recovery.

Many rehabilitative interventions try to enhance neuroplasticity (the brain's ability to change) in conjunction with physical rehabilitation to drive the recovery of lost functions, according to Khodaparast. Unfortunately, up to 70 percent of stroke patients still display long-term impairment in arm function after traditional rehabilitation.

"For years, the majority of stroke patients have received treatment with various drugs and/or physical rehabilitation," Khodaparast said. "Medications can have widespread effects in the brain and the effects can last for long periods of time. In some cases the side effects outweigh the benefits. Through the use of VNS, we are able to use the brain's natural way of changing its neural circuitry and provide specific and long lasting effects."

Khodaparast acknowledged the study has some limitations. For example, the animals were young and lacked some of the other illnesses that accompany an aged human population, such as diabetes or hypertension. But Khodaparast and his colleagues said they are optimistic about vagus nerve stimulation as a future tool. They will continue testing in chronically impaired animals with the hopes of translating the technique for stroke patients. Working with MicroTransponder Inc., a partner company in the current study, researchers at the University of Glasgow in Scotland have begun a small-scale trial in humans.

"There is strong evidence that VNS can be used safely in stroke patients because of its extensive use in the treatment of other neurological conditions," said Dr. Michael Kilgard, professor in neuroscience at UT Dallas and senior author of the study.

Kilgard is also conducting clinical trials using vagus nerve stimulation to treat tinnitus, the medical condition of unexplained ringing in the ears. Kilgard's lab first demonstrated the ability of vagus nerve stimulation to enhance brain adaptability in a 2011 *Nature* paper.

Provided by University of Texas at Dallas