Albany Med seeks way to harness brain waves

By By: Kathryn Caggianelli

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ALBANY - A team of researchers at Albany Medical College is poised to expand research in the field of Brain-Computer Interface technology, courtesy of a $1.36 million grant from the U.S. Department of Defense.

Among other things, the research could make it possible for people stricken with severe paralysis and such muscle-debilitating ailments as Lou Gehrig's Disease to use word-processing programs, send e-mails, surf the Internet or operate wheelchairs, robotic devices and prosthetic limbs.

The team is being led by Gerwin Schalk, Ph.D., associate professor of neurology at AMC and a research scientist at the Wadsworth Center of the state Department of Health, and by Dr. Anthony Ritaccio, the J. Spencer Standish professor of neurology and neurosurgery and director of the Epilepsy and Human Brain Mapping program at Albany Medical Center.

Brain Computer Interface technology enables a human or animal brain to make a direct connection to an external device for the purpose of communication or to control a patient's environment. The technology has nothing to do with mind-reading and everything to do with precisely identifying and harnessing signals from the brain to activate a devise that controls movement, intended movement and speech, according to 37-year-old Schalk of Glenmont.

Applications of the technology, which has advanced in recent years, would benefit people who have lost the ability to communicate through speech or other methods that require muscle control or limbs.

"My colleagues at the Wadsworth Center are already using this technology for patients with ALS (amyotrophic lateral sclerosis or Lou Gehrig's Disease) to do simple communication. We plan on using the grant to improve on these technologies," he said.

During Schalk's tenure at Wadsworth, he has led an international effort to develop software for BCIs and brain monitoring, which has reportedly become the standard platform used in labs doing similar research around the world.

Ritaccio, 50, of New Scotland said it was humbling to be part of the cutting-edge research, adding that grants from DOD are extremely competitive and that this round's playing field boasted "stunning competitors."

"Receiving this grant is the culmination of my career. This project is a unique marriage of two different interests that

are going to further advance a field (in its infancy)," he said.

Ritaccio has established an epilepsy center at Albany Medical Center with a national following. His research has included the use of electrode grids to locate seizure activity and map important brain functions, including language.

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"First and foremost, I'm an epilepsy specialist. I've been involved with treating epilepsy patients throughout my medical career. Where I come in is that epilepsy patients make the perfect subjects for working out the early stages of this research," Ritaccio said.

"With their permission, we try to use their brainwaves to control such things as movement and language."

Ritaccio's epilepsy patients who are eligible for surgical treatment of that condition undergo a brain-mapping procedure as a diagnostic tool to identify areas of the brain that are short-circuiting, or causing the seizures.

Those areas are removed surgically to cure the epilepsy.

Meanwhile, their brain activity can further be monitored to assist the Brain-Computer Interface research.

"The brain is an electrical organ and it is extraordinarily complex. ... Some of the mappings we do are so exquisitely detailed that we can ask a person to think about saying a vowel and to not tell us what it is, and then the device will convey which vowel it is," he said.

BCI technology uses recorded brain signals and translates them into useful outputs. Because the technology uses brain signals rather than muscles for communication and control, it can be operated by people suffering from severe cerebral palsy, brainstem strokes, paralysis and other devastating disorders.

The grant from the Department of Defense was awarded under the federal Multidisciplinary University Research Initiative program, which supports basic research in areas that overlap more than one traditional science and engineering discipline.

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