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## Physician uses robot to measure impact of strokes

CALGARY – A robot is helping an Alberta Health Services doctor determine the complete and precise impact of strokes.

Dr. Sean Dukelow has been conducting research on objective stroke assessments for several years. Last summer he began using an Exoskeleton robot, called KINARM (Kinesiologic Instrument for Normal and Altered Reaching Movements), at the Foothills Medical Centre to assess stroke and brain-injury patients.

Dr. Dukelow, who is also an assistant professor in the Faculty of Medicine at the University of Calgary and member of the faculty's Hotchkiss Brain Institute, uses the robotics system to objectively measure and quantify the effects a stroke has on sensory and motor skills. Stroke deficits can affect how a person sees, moves, senses, thinks and processes language, and are usually measured in a subjective way through observing the patient performing different tasks.

"What we find is that the robot is more sensitive in picking the deficits up in terms of movement, and we hope this will give us new insight into developing treatments," says Dr. Dukelow.

He says determining a person's specific deficits has a significant impact on how well they recover following a stroke and how they function in their daily lives.

The \$140,000 robot, combined with an augmented reality system, creates a virtual environment where patients must perform tasks, such as directing a hand to a target, or blindly copying a movement. The robot tracks the patient's movement, providing support or resistance to their movements, and then identifies minute differences when compared to what "normal" responses would be.

Often stroke patients undergo lengthy and repeated clinical testing. Dr. Dukelow says the KINARM can test for the same deficits in a matter of minutes.

Sean Polischuk is a patient involved in Dr. Dukelow's research. After the 21-year-old university student experienced a stroke in February, his right side remains numb, his attention wanders, and moving his fingers, toes and ankles requires utmost concentration.

"The robot triggers your brain and makes you think quite a bit more about what you're doing," says Polischuk.

The robotic system helps to identify deficits that are sometimes difficult to pick up on a standard clinical exam, but are important for day to day function. In the next phase of his research, Dr. Dukelow will begin developing novel approaches towards helping patients recover from the effects of their stroke.

This groundbreaking research has recently earned Dr. Dukelow significant recognition from the Heart and Stroke Foundation of Alberta, NWT & Nunavut. In March 2010, he received a special Grant-In-Aid (GIA) for Patient-Centred Research, valued at \$90,000 annually for three years.

Dr. Dukelow believes objective assessments of stroke deficits could soon be used to tailor rehabilitation programs for each patient and give individuals like Polischuk their best chance to regain a pre-stroke level of function.

About 5,000 Albertans have a stroke every year. A stroke occurs when the flow of blood to the brain (ischemic stroke) is interrupted, or blood vessels in the brain are ruptured (hemorrhagic stroke). The interruption of blood flow or the rupture of blood vessels causes brain cells (neurons) in the affected area to die.

Alberta Health Services is the provincial health authority responsible for planning and delivering health supports and services for more than 3.5 million adults and children living in Alberta. Its mission is to provide a patient-focused, quality health system that is accessible and sustainable for all Albertans.

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For media inquiries, contact:

Dave Veitch  
AHS Communications  
403-943-1301



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The Hotchkiss Brain Institute at the University of Calgary consists of more than 100 physicians and scientists who are dedicated to advancing neurological and mental health research and education. The Institute's research strengths in foundational neuroscience (axon biology and regeneration, cerebral blood flow and metabolism, synaptic transmission and neural systems) are leading to new treatments for neurological and psychiatric disorders, aimed at improving quality of life and patient care. More information on the Hotchkiss Brain Institute can be found at [www.hbi.ucalgary.ca](http://www.hbi.ucalgary.ca)