

Revolutionary technology allows brain surgery without breaking the skin

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Zelma Kiss, University of Calgary neurosurgeon and professor, right, with patient Elias Pharaon. The 85-year-old suffers from a movement disorder called essential tremor, and has benefited from technology that allows surgeons to access the brain using magnetic resonance guided focused ultrasound. Kiss is part of the team that developed this new form of brain surgery. Credit: Riley Brandt, University of Calgary

Elias Pharaon is 85 years old and can sign his name for the first time in five years thanks to a new way to do brain surgery. Performed by a team of University of Calgary physicians and researchers with the Hotchkiss

Brain Institute, magnetic resonance guided focused ultrasound (MRgFUS) is a new technology that allows surgeons to access the brain without cutting the skin or drilling into the skull.

"We are able to see the [brain](#) with real-time imaging and target a beam of high intensity ultrasound to the brain region responsible for tremor," says Dr. Zelma Kiss, neurosurgeon and professor in the departments of Clinical Neurosciences and Psychiatry at the Cumming School of Medicine (CSM). "The patient is awake the whole time and the results are immediate."

Pharaon came from B.C. for the treatment at Foothills Medical Centre, and volunteered to undergo the procedure and participate in the research project. The CSM MRgFUS system is the only one in Western Canada.

"I couldn't believe the tremor in my right hand was gone. I didn't feel anything during the procedure," says Pharaon. "I was so happy. It's changed my life. I feel like I can go out in public again." Essential tremor is the most common type of [movement disorder](#), and is usually treated with medication. For some, like Pharaon, the medication doesn't work and the tremors become so severe people can no longer dress or feed themselves.

"The condition occurs because different parts of the brain are not talking to each other properly, and the abnormal network function causes the tremor to appear," says Dr. Davide Martino, movement disorder specialist and associate professor in the Department of Clinical Neurosciences at CSM. Martino will identify patients who qualify for treatment and conduct all the followup work for the research study, which will include brain scans, clinical evaluations, cognitive and functional testing, and motor and sensory abilities over time.



Bruce Pike, professor of radiology and clinical neurosciences, says, "The idea of neurosurgery in an awake patient without breaking the skin is revolutionary."

"This is the beginning of a much larger research platform," says Bruce Pike, PhD, professor in the departments of Radiology and Clinical Neurosciences at CSM. "The idea of neurosurgery in an awake patient without breaking the skin is revolutionary. With the use of this technology we are looking at different treatment options for a number of devastating brain diseases such as Parkinson's disease, dementia, epilepsy and brain tumours."

"This is a wonderful example of precision health research" says Dr. Jon Meddings, dean, CSM. "The future of health is accurately diagnosing and providing individualized treatments to our patients. The remarkable results of the MRgFUS program show how new technologies can make precision health a reality."

The research study is being done in collaboration with Alberta Health Services and with funding from Canada Foundation for Innovation, and private donors, including significant donations from the Rob McAlpine

Legacy Initiative and the Cumming Medical Research Fund. At this point, only patients with severe medication resistant [essential tremor](#) are being treated with MRgFUS.

Provided by University of Calgary

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