

Australian and Manitoban Biomedical Researchers Team Up at Riverview to Focus on Early Detection of Alzheimer's Disease

Early and reliable detection of Alzheimer's disease, and distinguishing it from other diseases affecting the brain, are important goals of clinicians.

Early detection allows early intervention and slowing, or perhaps stopping, the progression of the disease. Accurate distinction from other brain diseases can help ensure that the most appropriate drugs are prescribed and negative side effects are minimized. As well, earlier detection might permit the exploration of non-pharmaceutical interventions.

This is the objective of an extensive research program that will be based at Riverview Health Centre under the direction of two biomedical engineers, Dr. Zahra Moussavi, from the Department of Electrical and Computer Engineering at the University of Manitoba, and Brian Lithgow, from the Department of Electrical Systems and Computer Engineering at Monash University and the Psychiatry Department of Alfred Hospital in Melbourne, Australia.

International Collaboration

The study is the most recent research project at Riverview involving international collaboration and the first involving biomedical engineering, says Dr. John Bond, Riverview's Manager of Research.

"There is excitement about partnering internationally. I am pleased that Dr. Moussavi has chosen Riverview as a home to develop part of her biomedical engineering research program and the clinical implications that are anticipated. Where it goes from here, who knows? There are just so many possibilities."

Moussavi is excited about the collaboration, too. She and Lithgow met professionally a number of years ago. In 2009 at a Neuro Engineering Conference in Turkey, they began comparing notes about their research into the detection of dementia, particularly Alzheimer's.

"We found a lot of overlap in our interests and realized that our research complements each other's," Moussavi explains.

Through his work at Monash University, Lithgow invented technology called EVestG, a method of recording electrical signals from the vestibular system by inserting a probe into the ear canal. The ear is a "window into the brain" and is close to the mood and emotion centre of the brain.

Lithgow says his initial research shows the technology can detect and distinguish two types of mood disorders - manic-depressive disorder and bipolar depression - in under an hour. He has done some initial research into whether the method can also be used to diagnose Alzheimer's disease.

Moussavi's research has involved studying humans' spatio-temporal perceptions - how our brain perceives time and orientation. She believes it is the orientation skill that deteriorates first by dementia and particularly in Alzheimer's disease. Her studies involve a series of computer games, played using a robotic arm, through which she objectively measures the temporal and spatial perceptions.

Lithgow asked Moussavi if she would conduct further research to validate his findings from his EVestG technology, and in a moment of inspiration, Moussavi asked Lithgow if he would like to come to Winnipeg so they could work together, as their work involves two parallel but independent approaches to the same problem.

Lithgow says he didn't hesitate to accept Moussavi's offer. She is, he said, "a very enthusiastic researcher with a well-established record" with which to conduct further research in the area of mental disorder detection.

Upon Moussavi and Lithgow's request for collaboration, Neural Diagnostics Ltd. Australia, which holds the intellectual property rights of the EVestG technology, has moved close to \$200,000 worth of equipment into the office converted to a lab at Riverview.

Lithgow is on a six-month sabbatical leave from Monash University and is an adjunct professor in the Department of Electrical and Computer



Biomedical engineers Brian Lithgow, from Monash University in Australia, and Dr. Zahra Moussavi, from the University of Manitoba, are collaborating in a research project being conducted at the Riverview Research Centre. The pair is working on using special technology for early detection of Alzheimer's disease.

Engineering at University of Manitoba until July 2013. He is working on either extending his stay to four years, or arranging to be in Winnipeg for six months of each year until 2015.

Moussavi and Lithgow have also started common projects on making the EVestG technology portable and faster. Currently they have two Ph.D. students and one M.Sc. student at the U of M who are working on projects related to EVestG.

The excitement is building around Lithgow's research, which has received a lot of media attention in Australia. If his technology is proven to accurately detect mental disorders, including Alzheimer's,

in under an hour, it will have far-reaching impact in terms of early diagnosis and proper treatment. Lithgow hopes that by using the combination of EVestG and the psychophysical experiments of Moussavi, they will be able to diagnose Alzheimer's disease and separate it from other types of dementia at early stages, as well as monitor the drug efficacy.

He says he's hoping the duo's five-year research project in Winnipeg will also be a chance to explore whether the technology can manipulate the brain so the full effects of Alzheimer's can be delayed and whether it can be used to identify hereditary links.

Dr. Zahra Moussavi's response to an invitation from Riverview's Manager of Research, Dr. John Bond, to come to Riverview to conduct research:

"At the Fort Garry campus lab, we have no space and besides, we need to test people with cognitive disorders - bringing them to the Engineering building would not be that easy. We need a large, calm, quiet friendly environment like Riverview."

About half of the subjects in the Alzheimer's research project conducted by Moussavi and her colleague Brian Lithgow will be residents and patients from Riverview.