



#ResearchersMatter

Dr. Derek Rutherford, Joint Action Research Laboratory

Confidence In Motion

More than 4.6 million Canadian adults report having arthritis – with approximately 1 in 10 people diagnosed with osteoarthritis, a debilitating joint condition which is one of the most prevalent chronic health conditions in the country and a leading cause of disability. Although so many Canadians are affected by this condition, there is a lack of knowledge existing on the proper treatment.

“People have to respond to challenges all time when they walk”

Dr. Derek Rutherford, an assistant professor in the School of Physiotherapy at Dalhousie University, cross-appointed to the Schools of Health and Human Performance and Biomedical Engineering and an Affiliate Scientist at the Nova Scotia Health Authority, is examining if stress tests can aid in understanding what treatment is needed to reduce the pain associated with osteoarthritis.

Most people are aware of the concept of a stress test. If you go to the doctor complaining of pain in your chest, they will order a cardiac stress test – but surprisingly this same concept is yet to be applied as it relates to lower body pain. Derek is bridging this gap, by conducting these stress tests to research how a person living with osteoarthritis in their hips and knees responds to challenging situations while walking.



“People have to respond to challenges all the time when they walk,” says Derek. “People with arthritis in their hips or knees don’t necessarily have the confidence that they can respond to these challenges, particularly if their joint has given out on them or they have fallen before.”



This lack of confidence can create a cycle of inactivity that can cause the joints to stiffen up, but Derek is attempting to measure how people respond to these challenges at the Joint Action Research Lab (JAR), which boasts eight high-performance motion capture cameras, equipment that measures muscle activity, and a state-of-the-art dual belt treadmill that has an interesting trick.

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“People get on the treadmill and everything is working as normal, but we can change the sway and pitch of the treadmill to give people challenging situations that they are not expecting,” says Derek.

“We don’t tell them how the treadmill moves and they are surprised at how well they can handle it.”

The JAR Lab is undoubtedly impressive, but **why is it important?** When a person visits their general practitioner with pain in their knees or hips, they are usually given a treatment plan that consists of pain management solutions. It’s only when the problem becomes worse that a different course of action is considered – most often a total replacement of the knee or hip.



By learning more about how people respond to challenges while walking, Derek is discovering the potential for earlier treatments that will prolong the need for a total replacement and help people stay or remain physically active. “We can’t say you’re never going to need a total joint replacement,” says Derek, “but we don’t want to be routinely replacing joints in people with osteoarthritis who are 50 or 55.”

The JAR lab system is unique, as it provides Dr. Rutherford with the capability to program the treadmill to respond, either through swaying side to side, pitching up and down or changing belt speeds based on specific events during a walking cycle – a technology that Derek first encountered during a trip to Amsterdam in 2012, funded by the NSHRF.



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This trip provided Derek with the information needed to understand the equipment, expertise and connections he would need to move beyond the standard Gait assessment (study of human motion) that was being used at the time. Derek has gone on to receive a [Development / Innovative \(DI\) Award](#), as well as an [Establishment Grant](#) from NSHRF to further his research.

“The NSHRF has been integral in the development of myself as a researcher here during the last four years,” says Derek. “They have helped us understand that we could put something like this lab together here in Canada and Nova Scotia and helped get it up and running with funding for grad students, clinicians and even engineering support.”

“The lab is ready to go, we just need the people.”

The impact that this research can have on Nova Scotians is great, but the challenge is creating awareness about the possibility to treat arthritis earlier – with the common thought process currently being that pain management and total replacements are the only course of action. Derek wants to change this way of thinking. “We are always saying in our grant applications that there are millions of people that will eventually need knee replacements, we are just having a hard time finding them,” says Derek. “The lab is ready to go, we just need the people.”

If you are interested in learning more about the JAR Lab, Dr. Rutherford’s research or participating in a study. Please visit <https://rutherfordnews.wordpress.com> for more information.



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