

PROJECT FACT SHEET

Using Brainwaves to Help Brain-Injured Patients

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Brain injury can happen to anyone: last year it happened to more than 2,000 Nova Scotians. Most traumatic brain injuries occur to young people between 16 and 24 years of age, while acquired brain injuries, such as those caused by strokes and aneurysms, can affect people of any age. Even minor brain injury can be life-altering leaving victims with reduced physical, behavioural, psychological, and cognitive abilities.

To provide appropriate treatment and rehabilitation, it is critical to determine a brain-injured patient's level of cognitive ability. This can be difficult to assess, however, since such injuries often affect the patient's speech, hearing and motor skills. If a patient can't speak or move, how can they be adequately tested?

New research by a team from the Cognitive/Clinical Neuroscience Unit at Dalhousie University's Department of Psychology may lead to the development of an innovative assessment tool for neurotrauma patients who suffer from communication impairments.

Graduate student Celeste Lefebvre is measuring the brainwaves (or *event-related brain potentials, ERPs*) of these patients to see if they could provide an alternate diagnostic tool. Under the supervision of Dr. John Connolly, Director, Cognitive/Clinical Neuroscience Unit, Dalhousie University, she looked at participants' brainwave activity while they performed a memory task.

"Tasks such as counting backwards test a patient's attention level and working memory," explains Lefebvre whose team adapted a standard task, which they call the *ERP-Digits Backwards task* (or the *ERP-DB task*). The goal was first to assess the working memory capabilities of healthy participants. Using those results to further refine the computerized task, the team then tested patients who had acquired a brain injury.

“We found that participants' performances on the *ERP-DB task* were comparable to their performances on traditionally administered versions”, says Ms. Lefebvre. “The brainwave patterns elicited by correct and incorrect test responses were different from one another, and that patterns present when tasks were within a participant's range of ability disappeared once the task became too challenging and exceeded their working memory capacity.”

The results of this study suggest that *ERP* patterns do reflect a person's working memory capacity and can reliably predict performance on standardized tests. The findings set the stage for more research into whether the *ERP-DB task* could be used as routine practice for assessing the working memories of neurotrauma patients.

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