

New scientific study shows brain injuries can be unbroken by innovative neuro-technologies

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Capt. Trevor Greene continues his recovery from brain injury using innovative brain technologies Credit: Mark Yuen

A recently published scientific study led by the Centre for Neurology Studies at HealthTech Connex and a research team from Simon Fraser University (SFU), reports the latest breakthroughs from Project Iron Soldier. Captain (retired) Trevor Greene, who was attacked with an axe to the head while serving in Afghanistan, continues to push conventional limits in brain health recovery.

The research study published in *Frontiers of Human Neuroscience* is led by neuroscientist Dr. Ryan D'Arcy, and involves tracking Capt. Greene's neuroplasticity and his physical, cognitive and PTSD improvements as he rewires his [brain](#) using the latest and most advanced brain technologies.

Capt. Greene and Dr. D'Arcy recounted their remarkable progress and showcased their mission to lead scientific breakthroughs in neuroplasticity through a recent TEDx talk.

In 2006, retired Canadian soldier Capt. Greene

survived a severe brain injury when he was attacked with an axe to the head, during his combat tour in Afghanistan. He spent years in various therapies and rehabilitation, and in 2009, he started working with Dr. D'Arcy. In 2015, the B.C. and Yukon Command of the Royal Canadian Legion helped outfit Trevor with a robotic exoskeleton, which helped him continue re-learning to walk. Called Project Iron Soldier, this exciting initiative was the inspiration to develop the Legion Veterans Village, a \$312M Centre of Excellence for PTSD, mental health and rehabilitation dedicated to veterans and first responders (currently under construction in Surrey).



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Capt. Greene and the Project Iron Soldier research team have continued with intensive daily rehabilitation, but the team experienced an extended plateau in progress using conventional therapy alone.

To breakthrough the plateau, the Centre for Neurology Studies launched an intensive 14-week trial using the Portable Neuromodulation Stimulator (or PoNS). The PoNS is a neurostimulation technology that sends a series of small electrical impulses to the brain through the tongue (known as

translingual neurostimulation) to safely facilitate neuroplasticity. The team tracked improvements in brain vital sign improvements using NeuroCatch Platform (or NeuroCatch). NeuroCatch is a rapid objective measure of cognitive brain function.

"When Trevor experienced a plateau in his rehabilitation, we tried intensive conventional treatment approaches, but to no avail," says Dr. Ryan D'Arcy, co-founder of HealthTech Connex, which operates the Centre for Neurology Studies, and an SFU professor. "It was only after combining in the PoNS with this rehabilitation therapy that we could break through these latest barriers and demonstrate significant improvements in his brain vital sign measurements."

Results of the study: The newly published results in *Frontiers in Human Neuroscience* demonstrate that PoNS neurostimulation, paired with intensive rehabilitation, may stimulate neuroplasticity to overcome an extended recovery plateau as objectively measured by NeuroCatch and other brain scanning technologies. The main findings were:

- Capt. Greene showed significant gains in clinical outcome measures for physical therapy, even after 14 years since the axe attack. Capt. Greene and his wife Debbie Greene also reported notable and lasting improvements in cognition and PTSD symptoms.
- Capt. Greene showed significant brain vital sign improvements in cognitive function, particularly in auditory sensation (as measured by the N100 response), basic attention (as measured by P300 response), and cognitive processing (as measured by N400 response).

Says Capt. Greene, "I first saw the power of neuroplasticity in the early days when Ryan showed me MRI images of my brain showing healthy brain tissue taking over for the damaged bits. Later on, I saw the full power of the PoNS device when I got demonstrably stronger, steadier and more coordinated after using it regularly for just a few weeks. It's really been a game changer for me and my family."

"Trevor's amazing progress is no doubt pushing the frontiers of medical science by overcoming perceived limits of brain recovery," says Dr. Shaun Fickling, the study's lead author who completed his Ph.D. at Simon Fraser University. "These brain imaging results provide valuable insight into the importance of unleashing the power of neuroplasticity to inspire countless people impacted by brain and mental health conditions."

Dr. D'Arcy concludes, "These neuro-technology breakthroughs have considerable impacts to inspire many of us to push beyond conventional limits in neurological and mental health recovery."

More information: Shaun D. Fickling et al, Brain Vital Signs Detect Cognitive Improvements During Combined Physical Therapy and Neuromodulation in Rehabilitation From Severe Traumatic Brain Injury: A Case Report, *Frontiers in Human Neuroscience* (2020). [DOI: 10.3389/fnhum.2020.00347](https://doi.org/10.3389/fnhum.2020.00347)

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