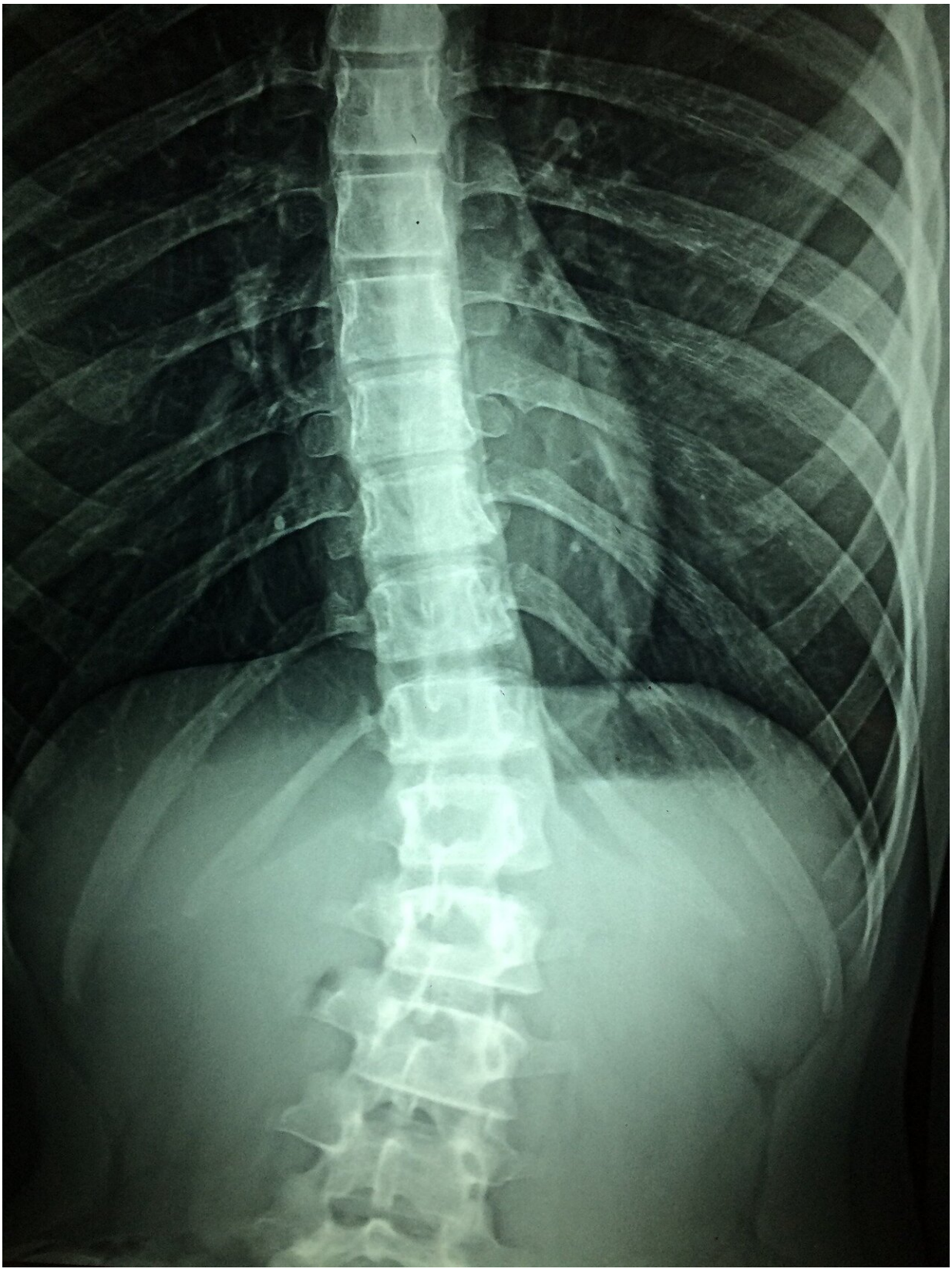
Research finds blood pressure can be controlled without drugs after spinal cord injury

January 27 2021



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Dr. Richi Gill, MD, is back at work, able to enjoy time with his family in the evening and get a good night's sleep, thanks to research. Three years ago, Gill broke his neck in a boogie board accident while on vacation with his young family. Getting mobile again with the use of a wheelchair is the first thing, Gill says, most people notice. However, for those with a spinal cord injury (SCI), what is happening inside the body also severely affects their quality of life.

"What many people don't realize is that a spinal cord injury prevents some systems within the body from regulating automatically," says the 41-year-old. "My blood pressure would drop drastically, leaving me fatigued, dizzy, and unable to focus. The condition can be life threatening, requiring medication for life."

Dr. Aaron Phillips, Ph.D., at the University of Calgary's Cumming School of Medicine (CSM) and Grégoire Courtine, Ph.D., at Swiss Federal Institute of Technology (EPFL) , co-led an international study which has shown that spinal cord stimulators can bridge the body's autonomous regulation system, controlling blood pressure without medication. Findings are published in *Nature*.

For people with SCI, the discovery is life changing, "The spinal cord acts as a communication line allowing the brain to send signals to tell the body such as when and how to move, as well as how to control vital functions, including blood pressure," says Phillips, co-principal investigator and assistant professor at the CSM. "This communication line is broken after a spinal cord injury. We created the first platform to understand the mechanisms underlying blood pressure instability after spinal cord injury, which allowed us to develop a new cutting-edge

solution."

Gill is the first study participant in a series of clinical trials planned for Calgary and Switzerland. "We are going to collaborate with a company called Onward to develop a neurostimulation system dedicated to the management of blood pressure in people with spinal cord injury," says Courtine, co-principal investigator and professor at the EPFL.

In the study, targeted epidural electrical stimulation (EES) of the spinal cord was used to stabilize hemodynamics (blood flow throughout the body) allowing for vital organs to maintain an appropriate supply of blood. The researchers discovered the exact placement on the spine for their stimulator, and the circuitry of the sympathetic nervous system underlying blood pressure control. This new knowledge allowed for the development of a neuroprosthetic closed-loop communication system, to replace lost hemodynamic control.

"We are really excited that people with spinal cord injury are able to stop their blood pressure medication and get back to enjoying a full daily routine with improved blood flow to their brain and organs," says Dr. Sean Dukelow, MD, Ph.D., clinician scientist at the CSM and author on the study. "People feel more alert, are able to be upright and in their wheelchair without losing consciousness, and over the long-term we think this will reduce the risk of heart disease and stroke."

"It's exciting to see the science help push things forward," says Gill. "I'm excited that Calgary will be one of the sites for a clinical trial. Research made a positive effect on my life and I'm glad others will benefit, too."

Gill continues to work as part of the Calgary Adult Bariatric Surgery Clinic and is now the Director of the Alberta Obesity Centre.

More information: Jordan W. Squair et al, Neuroprosthetic baroreflex

controls haemodynamics after spinal cord injury, *Nature* (2021). DOI: 10.1038/s41586-020-03180-w