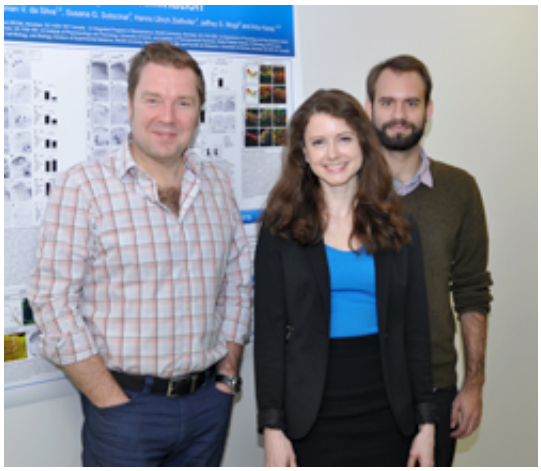
New discovery could impact the study of chronic pain conditions

22 April 2015



Left to right: Artur Kania, Nora Szabo, Ronan V. da Silva

Researchers at the IRCM led by Artur Kania, PhD, uncovered the critical role in pain processing of a gene associated with a rare disease. Their breakthrough, published in *The Journal of Neuroscience*, paves the way for a better understanding of chronic pain conditions.

Dr. Kania's team studies the way neural circuits transform harmful stimuli (such as cold, heat, and pinch) into the perception of pain. More precisely, they examined the gene Lmx1b and its involvement in pain processing. Mutations in this gene also cause a rare human disease called the Nail-patella syndrome (NPS), which is characterized by limb and kidney malformations. More importantly, NPS patients show reduced pain responses.

"By studying mouse models, we first showed this gene is essential for the survival of neurons and the development of the spinal cord," explains Dr. Kania, Director of the Neural Circuit Development research unit at the IRCM. "We then uncovered that removing the gene only in the spinal cord allows the mice to survive. However, it also results in reduced sensitivity to harmful mechanical (crushing, pinching) and thermal (heat, cold) stimulation."

"We also discovered the missing gene leads to missing neurons, which, in turn, affects the proper development and circuitry of the entire nervous system," says Nora Szabo, PhD, postdoctoral fellow in Dr. Kania's laboratory and first author of the study. "In fact, we observed a disruption in the connection between the spinal cord and specific brain centres, which prevents information from being transmitted correctly."

"Our team was the first to study this gene specifically in the spinal cord," adds Ronan V. da Silva, PhD student in the same laboratory and co-author of the article. "Our results demonstrate the critical role of Lmx1b for mechanical and thermal pain processing."

"Seeing as little is currently known about the pain pathways in the nervous system, this breakthrough will help advance our understanding of pain sensation," states Dr. Kania. "Our work also provides invaluable knowledge for the study of chronic pain and other pain conditions."

More information: The *Journal of Neuroscience*: www.jneurosci.org/content/35/13/5233.short

Provided by Institut de recherches cliniques de Montreal