HEALTH

Nervous system remembers pain: research

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Remember the pain from that broken bone, that arthritic joint, that migraine that knocked you off your feet for days?

Your nervous system does, too, and now researchers at McGill University in Montreal say they've discovered how those neuronal memories can be erased. The findings could offer solutions on how to ease chronic pain, a condition that one in five Canadians is living with — sometimes as a result of trauma or illness, and sometimes for no obvious reason at all.

The research, published in its final form this month in the journal *Molecular Pain*, was led by McGill neuroscientist Terence Coderre.

It offers the first pharmacological way to go after a pain memory trace.

"It basically gives you the opportunity to target that aspect of what's underlying chronic pain," Coderre said Tuesday.

"Since this neural trace, we think, is involved in all chronic pains, it could theoretically have an impact for any chronic pain."

There's already evidence that any pain that lasts more than a few minutes will leave a trace in the nervous system, Coderre said, and these traces or neuronal memories are imperative to the development of chronic pain. In some cases, even after the original cause of that pain is gone — whether it was an injury or a pathological process such as changes within the brain that may have led to a migraine — the pain remains due to these memory traces. Many people with chronic pain also develop a hypersensitivity to additional pain or to touch as a result of these neuronal memories.

"Your nervous system is remembering the fact that you've had that injury, has a trace in the nervous system, which then means the next time you get a stimulation — when you're touched — now it feels as if its painful," Coderre said.

"In a sense you're getting more bang for your buck.

"The same stimulus that would normally just be felt as touch is being felt as painful."

It's important to note that neuronal memories are not cognitive memories, or what a person recalls of the pain.

While the occurrence of these neuronal pain memories was already known, the chemicals and proteins involved in keeping those memories there were not.

"We knew what triggered it, but we didn't know what held it there," Coderre said.

Using research rats, Coderre and his team showed that protein kinase PKMzeta increases persistently in the central nervous system after painful stimulation. The rats also displayed pain hypersensitivity for some time after the painful stimulus was stopped.

The researchers then found that, by blocking the activity of PKMzeta at the neuronal level, they could reverse the hypersensitivity and persistent pain. This showed that PKMzeta was involved in maintaining the neuronal memory trace of the pain.

"We were basically able to erase it after the fact," Coderre said.

The researchers foresee medications that target the memory trace as a way to reduce pain hypersensitivity.