

Predicting chronic pain in whiplash injuries

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While most people should expect to fully recover from whiplash injuries within the first few months, about 25 percent have long-term pain and disability that lasts many months or years.

Using special MRI imaging, Northwestern Medicine scientists have identified, within the first one and two weeks of the injury, which patients will go on to develop chronic pain, disability and post-traumatic stress disorder (PTSD). This is the earliest these patients have ever been identified, according to the scientists.

The ability to identify these patients so early will enable faster and more specialized treatment, which could be particularly beneficial for the PTSD.

After one to two weeks of the injury, Northwestern scientists found unusual muscular changes in the chronic pain group using a sophisticated MRI that measures the fat/water ratio in the muscles. The imaging revealed large amounts of fat infiltrating the patients' neck muscles, indicating rapid atrophy.

The presence of fat in the muscle does not appear to be related to a person's body size or shape.

"We believe this represents an injury that is more severe than what might be expected from a typical low-speed car crash," said lead investigator James Elliott, assistant professor of physical therapy and human movement sciences at Northwestern University Feinberg school

of Medicine. The study was published March 17 in the journal *Spine*.

"This opens up a new door for research on [whiplash](#)," Elliott said. "For a long time whiplash has been treated as a homogenous condition. Our study has shown these patients are not all the same; they have different clinical signs and symptoms."

Whiplash-associated disorders from motor vehicle collisions affect more than 4 million Americans annually, harming their quality of life and costing an estimated \$30 billion for medical/rehabilitative care per year.

The finding builds on previous research Elliott did as a post-doctoral fellow at the University of Queensland, Brisbane, Australia. That study, which used standard MRI imaging, also found a large amount of fat in [neck muscles](#) of whiplash patients at one and three months post injury. Those patients went on to develop chronic pain and disability.

Not everyone needs a MRI scan after a [whiplash injury](#) from a motor vehicle collision. However, these findings help physicians understand water/fat MRI, in tandem with other clinical signs/symptoms can be used to identify who is likely to develop post-traumatic stress disorder. This then could be used to justify the referral of the patient to a psychiatrist or psychologist, Elliott said. PTSD is a disorder caused by experiencing or witnessing a traumatic event.

"These patients have shown to not respond well to traditional rehabilitation such as physical therapy," Elliott said. "It appears that they may require a more concerted effort for pain management from their physician and help from a psychologist." Emerging, yet preliminary evidence suggests this to be a reasonable strategy.

The findings may indicate the importance of changing standard imaging protocols to identify these individuals early and start accelerated

treatment. Routine imaging does not reveal this fat infiltration in individuals with whiplash injuries.

A small preliminary study previously done by Elliott and Northwestern colleagues shows whiplash victims with chronic pain also have a high level of muscle fat in their lower legs, indicating muscle atrophy.

Elliott hypothesizes these [patients](#) may have partially damaged their spinal cord. They reported feeling fatigued and clumsy when walking and weakness in their legs, with difficulty pushing hard on the gas pedal of a car or standing on their tiptoes.

"We haven't found an effective treatment for these folks with chronic whiplash, and I think it's because we haven't really figured out what's wrong with them," Elliott said.

The finding helps to demystify the condition and let individuals know their chronic pain is not all in their heads. A basic exam will not consistently show a fracture, herniated disc or ligament tear.

"If you're a whiplash patient with ongoing [chronic pain](#), but no objective imaging finds anything wrong, people are frequently informed that nothing is wrong with them," Elliott said. "It's been a huge problem."

"That fat appears to be a response to an injury," Elliott said. "What has actually been injured remains for us to find out. But now we know to look more deeply into the problem."

Provided by Northwestern University

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