

Studies: Chronic Pain Comes From the Brain

Brain Scan Tech Revealing Chronic Pain Can Even Lead to Loss of Gray Matter

By AMANDA ONION



Feb. 28, 2005 — Dial Lewis says she has seen nearly every kind of doctor and taken almost every kind of pill to try and ease her chronic back and hip pain, but it still hurts around the clock.

Ever since the La Porte, Texas, resident fell 15 years ago, no treatment has made a dent in the constant throbs she feels in her back.

"After tests, they say 'Oh, you're in chronic pain, so you're depressed, aren't you?'" she said. "So they send you to a psychiatrist and a sociologist and they give you antidepressants and painkillers. I spent close to 14 years being on everything — but nothing ever works."

About 10 percent of Americans suffer from chronic pain, according to studies. An April 2004 survey by the American Chronic Pain Association found that for more than half of chronic pain sufferers, their condition hinders their ability to work, while 45 percent say it damages their personal relationships.

Considering the toll that chronic pain can take on a person's life, being told that it is "all in your head," is not something most patients like to hear. But new research using the latest in brain scan technology is showing that some pain actually does originate in the brain. And it's not imagined — recent work has shown that chronic back pain can even cause brain tissues to shrink if it is prolonged.

"I think when people say pain is 'all in my head,' it suggests it's not real," said Catherine Bushnell, a researcher at McGill University's Center for Research on Pain in Montreal. "These studies don't say it's not real, they show that brain activity can create a situation that produces real pain."

Less Pain Through Distraction

Using brain imaging, Bushnell has shown that something as simple as being distracted has a real effect in decreasing the intensity of pain signals in the brain. She and her colleague, Chantal Villemure, subjected volunteers to slightly painful pulses of heat and, in other tests, they had them listen to different tones at the same time.

The subjects reported that their perception of pain diminished when they were listening to the tones — and brain scans backed up their word. The scans revealed that pain signals in their brain actually lessened as they listened to the tones.

"This means that things like having family around constantly asking how you feel can actually draw more attention to your pain and enhance it," she said.

Emotion can also enhance or decrease people's perception of pain, her studies show. Bushnell and Villemure demonstrated that subjecting people to pleasant and unpleasant odors influences how much they are bothered by pain. Pleasant odors eased the sensation of pain while unpleasant smells made the pain feel worse. Bushnell's and Villemure's work is published in a recent issue of the journal *Pain*.

Other recent studies have corroborated the notion that some pain appears to originate in the brain and not necessarily in the place where you feel it.

Researchers at University College London and University of Pittsburgh Medical Center found that volunteers who felt pain as a result of hypnotic suggestion showed strikingly similar brain activity to those subjected to physical pain from pulses of heat.

Bushnell points out that work like this might be helpful when it comes to thinking of new approaches to treating the problem.

"There may be a certain control over pain that we don't really realize we have," she said.

Controlling chronic pain is obviously the challenge, not only to ease suffering but also to limit possible damage to the brain.

Shrinking Brain Tissue

Vania Apkarian, an associate professor of physiology at Northwestern University Feinberg School of Medicine in Chicago, used magnetic resonance imaging technology to compare the brains of people with chronic back pain to those from matched normal subjects and found a striking difference. The brain tissue of those with chronic pain showed shrinkage equivalent to the amount of gray matter lost in 10 to 20 years of normal aging.

What's more, this shrinkage was evident in the prefrontal cortex and the thalamus — parts of the brain associated with cognitive thinking and problem solving.

"The longer the subject said they were in pain, the more their brain volume was decreased," he said. "It translated to about 1.5 cc's of brain volume loss for every year of chronic pain."

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Apkarian's work seems to agree with his earlier research showing a change in brain chemistry among those suffering from chronic pain and his studies that have demonstrated those who have had chronic pain take longer to solve mind puzzles than those who have been free of pain.

Other work has drawn a correlation between stress and brain tissue loss. Stafford Lightman of Bristol University in England reports that response to stress has been shown to decrease the number of brain cells and hinder memory. Is there a connection? Apkarian points out it could mean that the stress of chronic pain leads to brain shrinkage or that stress could be behind the chronic pain, which leads to brain shrinkage.

Stopping the Hurt

Either way, the brain suffers. For people like Lewis, the key question is, is there a way to stop the hurt? Both Apkarian and Bushnell are looking at ways of targeting pathways in the brain to halt pain signals from firing in the first place. "Targeting circuitry may be a new, more effective approach to treating chronic pain," said Apkarian.

Bushnell, meanwhile, believes her work also suggests that alternative cures, including hypnosis, acupuncture and relaxation techniques may be promising.

At this point, Lewis remains skeptical about any new treatments a doctor may subscribe for her pain. Currently, she is seeing a doctor who is treating her with regular injections of an energy molecule made up of adenine, ribose and a phosphate. Lewis says the treatments have had some positive effect. Meanwhile, she and her husband are selling their home, due to spiraling medical insurance and hospital costs.

Still, she is somewhat relieved that researchers are at least finding evidence of something she and others have said for years.

"My pain affects my ability to walk, stand, sit, take a shower — it's real," she said. "It has been hard to get doctors to believe me."