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## **Chronic Pain Is in the Brain, not in the Injury**

### *Treating the emotions of the pain*

Chronic pain can make your life miserable long after your injuries have actually healed. Standard analgesic drugs, like aspirin and morphines, are largely ineffective. Vania Apkarian, professor of physiology and of anesthesiology, at Northwestern's Feinberg School of Medicine, revealed that chronic pains can be old memory remains stuck in the prefrontal cortex, linked to emotion and learning: the brain still remembers the injury as if it were fresh and can't erase it. Apkarian has found a drug that works on the part of the brain which is linked to the emotional suffering of pain. D-Cycloserine has been used against phobic behavior in the last 10 years and animal trials showed that D-Cycloserine significantly decreased the emotional suffering from pain but also sensitivity of the formerly injured site and nerve pain resulting from chemotherapy. The drug has a long-term effect, over 30 days. "In some ways, you can think of chronic pain as the inability to turn off the memory of the pain. What's exciting is that we now may be relieving what has clinically been the most difficult to treat—the suffering or the emotional component of pain." Apkarian said. "Scientists have always tried to understand pain from the viewpoint of sensation. To control it, they tried to stop the sensory input to the brain. We are saying there's a cognitive memory and emotional component in the brain that seems abnormal. Easing that may have a bigger effect on suffering." he added. Sensory abnormalities in people with chronic pain seem to be behind this memory abnormality. Roughly 10 % of the US population experiences chronic pain, mostly back pain. Working with rats that had chronic pain from a healed limb injury, Apkarian found that the animals' emotional suffering dropped completely while their physical pain just by 30 %. Rats are nocturnal beings that prefer the dark to bright light. Researchers placed the rats in a two-compartment chamber: one side having light, the other being dark. The team stimulated their sensitive limbs while they were in the dark side. The rats disliked that and retreated into the bright chamber. When treated with D-Cycloserine, the rats remained in the dark chamber. "Their aversive reaction to the stimulation disappeared. Based on the animal results, the next step will be to test the drug in clinical trials," Apkarian said. "When we do this in a clinical trial, we expect people to say I still have the pain, but it's not bothering me anymore. We think they will have a physical awareness of the pain, but its emotional consequences will have decreased. The drug potentially may lower the amount of standard analgesics people have to use." said Apkarian. In 2006, Apkarian showed that chronic pains activate the prefrontal cortex, such as the discomfort of burning your finger, for example, the thalamus. The longer a person has been suffering from chronic pain, the more activity will be seen in the prefrontal cortex. "It's cumulative memory. I can predict with 90 % accuracy how many years they have been living in that pain without even asking them the question." said Apkarian.