

Discovery sheds new light on marijuana's anxiety relief effects

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An international group led by Vanderbilt University researchers has found cannabinoid receptors, through which marijuana exerts its effects, in a key emotional hub in the brain involved in regulating anxiety and the flight-or-fight response.

This is the first time [cannabinoid receptors](#) have been identified in the central nucleus of the amygdala in a mouse model, they report in the current issue of the journal *Neuron*.

The discovery may help explain why [marijuana](#) users say they take the drug mainly to reduce [anxiety](#), said Sachin Patel, M.D., Ph.D., the paper's senior author and professor of Psychiatry and of Molecular Physiology and Biophysics.

Led by first author Teniel Ramikie, a graduate student in Patel's lab, the researchers also showed for the first time how nerve cells in this part of the brain make and release their own natural "endocannabinoids."

The study "could be highly important for understanding how *cannabis* exerts its behavioral effects," Patel said. As the legalization of marijuana spreads across the country, more people—and especially young people whose brains are still developing—are being exposed to the drug.

Previous studies at Vanderbilt and elsewhere, Patel said, have suggested the following:

- The natural endocannabinoid system regulates anxiety and the response to stress by dampening excitatory signals that involve the neurotransmitter glutamate.
- Chronic stress or acute, severe emotional trauma can cause a reduction in both the production of endocannabinoids and the responsiveness of the receptors. Without their "buffering" effect, anxiety goes up.
- While marijuana's "exogenous" cannabinoids also can reduce anxiety, chronic use of the drug down-regulates the receptors, paradoxically increasing anxiety. This can trigger "a vicious cycle" of increasing marijuana use that in some cases leads to addiction.

In the current study, the researchers used high-affinity antibodies to "label" the cannabinoid receptors so they could be seen using various microscopy techniques, including electron microscopy, which allowed very detailed visualization at individual synapses, or gaps between [nerve cells](#).

"We know where the [receptors](#) are, we know their function, we know how these neurons make their own cannabinoids," Patel said. "Now can we see how that system is affected by ... stress and chronic (marijuana) use? It might fundamentally change our understanding of cellular communication in the amygdala."

Provided by Vanderbilt University Medical Center

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