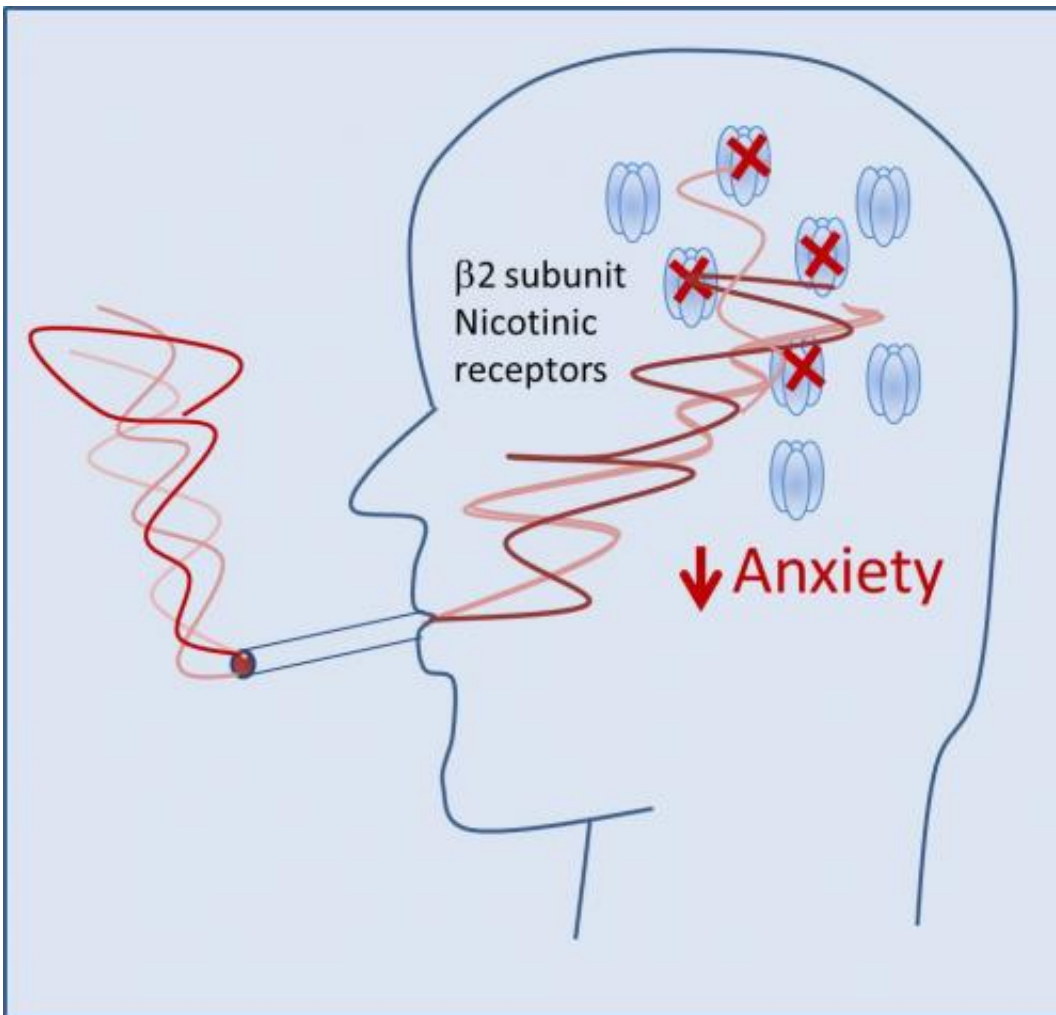


Researchers find why nicotine in cigarettes may relieve anxiety in smokers

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This image illustrates how nicotine in cigarette smoke may reduce anxiety by blocking the activity of the high affinity beta2 subunit containing nicotinic acetylcholine receptors. Credit: Image courtesy of Darlene Brunzell, Ph.D./VCU

Preclinical data suggests inactivation of a specific sub-class of nicotinic receptors may be an effective strategy to help smokers quit without feeling anxious, according to Virginia Commonwealth University researchers.

These findings could one day point researchers to the development of novel therapies to help smokers quit without feeling anxious.

Smokers use cigarettes for many reasons, but many report that they smoke to relieve anxiety, despite the health danger of cigarette smoking. Researchers are now working to understand the underlying neurochemical pathways that support smoking behavior.

In a study, published online this week in [PLoS ONE](#), researchers observed that low doses of nicotine and a nicotinic [receptor blocker](#) had similar effects to reduce anxiety-like behavior in an [animal model](#). They found that inactivation of beta2 subunit, a specific sub-class of [nicotinic receptors](#) that bind nicotine, appears to reduce anxiety. This is different from the mechanism that regulates nicotine reward and likely occurs in a separate brain area.

"This work is unique because it suggests that nicotine may be acting through inactivation, rather than activation, of the high affinity nicotinic receptors," said Darlene Brunzell, Ph.D., assistant professor in the Department of Pharmacology and Toxicology in the VCU School of Medicine.

"Nicotine acts like a key that unlocks nicotine receptors in the brain. Usually that key opens the receptor, but at other times nicotine is like a key that has gotten broken inside of the lock. Our findings suggest that low-dose nicotine may block a specific subtype of receptor from opening that is important for regulating anxiety behavior," she said, adding that anxiety is a major reason why people relapse to smoking.

Brunzell and colleagues are conducting ongoing studies that they hope will help to identify which [brain areas](#) regulate the anxiolytic effects of [nicotine](#). Using genetic strategies, they are attempting to determine the specific molecular make-up of the nicotinic receptors that regulate anxiety.

According to Brunzell, from a therapeutic perspective it will be important to discover if blocking beta2 subunit containing nicotinic receptors relieves anxiety in smokers.

"Understanding what other subunits combine with beta2 to form the critical receptors that regulate anxiety could lead to selective therapeutics with fewer side effects," she said.

More information: www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0048665

Provided by Virginia Commonwealth University

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