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“Love hormone” may also cause emotional pain

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Courtesy of Northwestern University
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The love and trust hormone, oxytocin, seems to be two-faced, researchers are reporting.

Oxytocin has long been known as the warm, fuzzy hormone that promotes feelings of love, social bonding and well-being. It's even being tested as an anti-anxiety drug. But new research indicates oxytocin also can cause emotional pain.

Oxytocin appears to be the reason stressful social situations, perhaps being bullied at school or tormented by a boss, reverberate long past the event and can trigger fear and anxiety in the future, scientists say. That's because the hormone actually strengthens social memory in one specific region of the brain, they add.

If a social experience is negative or stressful, the hormone activates a part of the brain that intensifies the memory, the researchers explained, and it boosts susceptibility to feeling fearful and anxious during future stress.

Presumably, oxytocin also intensifies positive social memories and, thereby, increases feelings of well being, but that research is ongoing, the investigators said.

The findings are important because chronic social stress is one of the leading causes of anxiety and depression, while positive social interactions enhance emotional health. The research, which was done in mice, is particularly relevant because oxytocin currently is being tested as an anti-anxiety drug in several clinical trials.

“By understanding the oxytocin system's dual role in triggering or reducing anxiety, depending on the social context, we can optimize oxytocin treatments that improve well-being instead of triggering negative reactions,” said Jelena Radulovic, the senior author of the study at Northwestern University.

The paper was published July 21 in the journal *Nature Neuroscience*.

This is the first study to link oxytocin to social stress and its ability to increase anxiety and fear in response to future stress, Radulovic said. The scientists also identified a brain region responsible for these effects—the lateral septum—and the pathway or route oxytocin uses in this area to amplify fear and anxiety.

The scientists discovered that oxytocin strengthens negative social memory and future anxiety by triggering a signaling molecule that becomes activated for six hours after a negative social experience. That enhances fear, Radulovic believes, by stimulating the brain's fear pathways, many of which pass through the lateral septum. The region is involved in emotional and stress responses.

The findings surprised the researchers, who were expecting oxytocin to modulate positive emo-

tions in memory, based on its long association with love and social bonding.

“Oxytocin is usually considered a stress-reducing agent based on decades of research,” said Yomayra Guzman, a doctoral student in Radulovic’s lab and the study’s lead author. “We showed how it enhances fear rather than reducing it and where the molecular changes are occurring in our central nervous system.’

The new research follows three recent human studies with oxytocin, all of which are beginning to offer a more complicated view of the hormone’s role in emotions, according to the investigators.