

# Oxytocin nose-drop brings marmoset partners closer

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Breeding pair of common marmosets, *Callithrix jacchus*. Credit: Tina Gunhold-de Oliveira /wolfscience.at

Researchers from the University of Nebraska at Omaha, show for the first time that common marmosets—*Callithrix jacchus*, a species of New

World monkey—that receive oxytocin in nose-drops attract more social interaction from their mates. Oxytocin is a hormone released naturally in the blood and brains of humans and other mammals, during social and sexual behaviors. Previous studies showed that individuals who receive an oxytocin boost show greater sociability, through increased cooperation, altruism and communication with members of the same social group. However, much less is known about how others interact with those treated with oxytocin.

"We are the first to show that marmosets treated with oxytocin receive more social attention from their long-term mate," says first author Jon Cavanaugh, a graduate student at the Callitrichid Research Center in the Department of Psychology, at the University of Nebraska at Omaha. Cavanaugh and colleagues further observed differences between males and females: males that received oxytocin attracted more physical proximity from their female partners, while females treated with oxytocin attracted more grooming from their male partners.

Interestingly, such enhanced bonding occurs without the oxytocin-treated individual soliciting more interaction from their mates or making more sexual displays towards them. "We found that untreated marmosets displayed greater interest in interacting with their long-term mate when their mate received oxytocin than when their mate received a placebo, potentially indicating an increase in perceived social attractiveness. The changes induced by oxytocin seem exceptionally subtle, since we did not observe any obvious difference in the solicitation behavior of the oxytocin-treated marmoset," says Cavanaugh.

Like humans, marmosets are highly social, form long-term male-female relationships, and care for infants as a couple. Asked about the study's relevance for humans, Cavanaugh says that "oxytocin changes social motivation towards others and, according to our study, it also increases the social attractiveness of individuals treated with oxytocin. Persons

with social deficit disorders, including autism spectrum disorders and social anxiety, typically have reduced rates of initiating and maintaining normative social interactions. Thus, oxytocin treatment could enhance sociality in individuals with social deficit disorders, both by increasing their motivation to interact with others and by increasing their attractiveness as a social partner."

The results were obtained after the scientists observed social interactions across several days in 6 couples of adult marmosets, after 8 weeks of common housing and long-term bond formation. Each observation session lasted 20 minutes, starting 30 minutes after one of the individuals received an oxytocin boost, an oxytocin damper, or a placebo treatment. The boost was given through nose-drops with oxytocin, and the damper was an oxytocin antagonist drug hidden in their food. These are relatively non-invasive methods to deliver the substances to the central nervous system, where they are known to change social and emotional behaviors.

The researchers point to the need for future research, particularly on the long-term effects of oxytocin treatment. "Intranasal oxytocin has gained growing support as a therapeutic agent and is currently the subject of multiple clinical trials. There are few safety concerns associated with acute administration of oxytocin in adulthood. However, relatively little is known about the long-term effects of chronic exposure to intranasal oxytocin, particularly in regard to exposure during and across development. Thus, it is clear that animal studies examining sex differences, dose, duration of treatment, and developmental timing are vital to inform human treatment options for social deficit disorders", says Cavanaugh.

The rapidly growing field of oxytocin and sociality is leading to the conclusion that oxytocin does not simply enhance social behaviour universally. "In addition to enhancing prosocial behaviour, oxytocin

treatment has also been associated with enhanced outgroup discrimination and enhanced sensitivity to negative social contexts" says Professor Jeffrey French, Professor of Neuroscience at the University of Nebraska at Omaha and Director of the Callitrichid Research Center, an expert on the hormonal basis of social behavior. "Further exploration of how [oxytocin](#) may modify the attractiveness of social partners could identify another mechanism by which this molecule can help with disorders that have social dysfunction as a prominent feature", added French.

**More information:** Cavanaugh J, Huffman MC, Harnisch AM and French JA (2015). Marmosets treated with oxytocin are more socially attractive to their long-term mate. *Front. Behav. Neurosci.* 9:251 [DOI: 10.3389/fnbeh.2015.00251](#)

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