

A socio-sensory mechanism buffering drug choice

Authors: Kimberly M. Papastrat¹, Cody A. Lis^{1,2}, Adam C. Puche¹, Marco Venniro^{1,2}

Affiliations: ¹Department of Anatomy & Neurobiology, University of Maryland School of Medicine, Baltimore, MD, USA; ²Program in Neuroscience, University of Maryland School of Medicine, Baltimore, MD, USA

Background: Communication during social interactions is critical for human addiction. Animals actively react to the affective state of others during social interactions and share the information about the surrounding environment. Here, we study the role of rats' communication via olfactory sensory system during volitional social interactions and cocaine versus social interaction choices.

Methods: First, we tested the role of olfactory sensory system in either acquisition or maintenance of volitional social interaction. Using our volitional social reward self-administration rat model, we trained male and female rats for either food (2-h/d, 5-d) or social self-administration (2-h/d, 10/12-d). We removed the olfactory bulbs (bulbectomy – or sham surgery) either before or after acquisition of operant social reward. Next, we tested the role of the olfactory sensory system in social choice-induced inhibition of drug self-administration. After training bulbectomized or sham rats for social (2-h/d, 10-d) and cocaine (6-h/d, 12-d) self-administration, we introduce a choice between social interaction and cocaine.

Results: Independent of sex, bulbectomy selectively prevented acquisition and maintenance of volitional social interaction while maintaining reliable food and cocaine self-administration. Rats with intact olfactory system showed strong social preference over cocaine whereas cocaine self-administration resumed in rats with impaired sensory communication.

Conclusion: We identified the olfactory system as a new socio-sensory communication mechanism mediating volitional social interaction and the protective effect of social reward on drug choice. From a translational perspective, these findings highlight the need to identify critical sensory cues during nonverbal peers' communication for implementation of social-based addiction treatments.

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