

An immune regulator of addiction

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Drug addiction is often thought of as neuron-centric, but in a study published in the *Proceedings of the National Academy of Sciences*, M.D./Ph.D. student Daniel Kashima and his mentor, Brad Grueter, Ph.D., show that the immune system also plays a critical role.

They studied the consequence of lacking toll-like receptor 4 (TLR4) on drug-associated physiology and behavior. TLR4 is a pattern-recognition molecule of the innate immune system.

They found that TLR4 knockout mice exhibited a difference in the ability to dynamically change the strength of [neuronal connections](#) in the [nucleus accumbens](#) core (NAc), a key brain area that processes motivation and reward.

This was associated with a deficit in drug-reward learning. They further showed that microglia, one of the brain's [immune cells](#), are the primary cell type that expressed TLR4.

These results suggest that TLR4 is a novel regulator of NAc neuronal physiology and associated drug-reward learning.

More information: Daniel T. Kashima et al. Toll-like receptor 4 deficiency alters nucleus accumbens synaptic physiology and drug reward behavior, *Proceedings of the National Academy of Sciences* (2017). [DOI: 10.1073/pnas.1705974114](https://doi.org/10.1073/pnas.1705974114)

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