Neurobiological basis of reward and aversion: a focus on the nucleus accumbens circuitry

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The nucleus accumbens (NAc) is a key player in reward/aversion and motivated behaviors. The NAc is mainly composed of medium spiny neurons (MSNs), segregated into those that express dopamine receptor D1 or D2. D1-MSNs have been associated with positive reinforcement and reward, whereas D2-MSNs neurons are associated with negative reinforcement and aversion. However, recent evidence from our team and others challenged this view of functional opposition.

In this seminar, we will show that by differentially controlling the activation pattern of either type of nucleus accumbens MSNs, one can trigger both reward and aversion. We will further show that even for the same type of MSN, distinct subpopulations exist that respond differently to different stages of reward-related behaviors.

The complexity of the findings suggest that we need to revise the proposed model of striatal functional opposition of MSNs, and that additional studies are needed to unravel the role of each type in behavior.