Dopamine neurons do not respond to novelty

Kacper Kondrakiewicz*[1], Xander Temmerman[1], and Sebastian Haesler[1]

[1]NeuroElectronics Research Flanders (imec, KU Leuven VIB) – Belgique

Résumé

Midbrain dopaminergic neurons are activated by action initiation, rewards, reward cues, and other types of salient sensory stimuli. Despite considerable effort, it remains a challenge to explain such complicated response properties. In particular, it is not clear why dopamine system is activated by novel sensory stimuli.

To address this question, we exposed mice to multiple novel odorants, while recording the dopaminergic activity (with single-units or fiber photometry) simultaneously with the behavioral responses. We showed that neuronal activity was best explained by the animal behavior - most importantly, sniffing - and not by stimulus novelty. Importantly, we observed a robust correlation between the sniffing rate and dopaminergic activity even in absence of any sensory stimuli. The results indicate that dopaminergic neurons are not activated by stimulus novelty, but rather by initiation of actions that typically occur in response to novel stimuli. This finding is important for informing the theoretical models of dopamine function.

*Intervenant