

# IGSN - SYMPOSIUM

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## Catecholaminergic control of hippocampal function, tau pathology and cortex

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### A New Look at an Old Concept: Optogenetic Investigations of Brain Stem-Driven Pupil-Linked Arousal

Changes in central arousal state shape cortical computations underlying perception, thought, and action. Variations in arousal are accompanied by fluctuations in pupil size. In turn, pupil dynamics are often used as a marker of noradrenaline release from neurons of the locus coeruleus. The serotonergic system of the dorsal raphe also contributes to the brainstem control of arousal states. However, little is known about its relationship to noradrenergic activity and pupil dynamics. Here, I will present a study that investigated various strategies to genetically access noradrenergic neurons of the locus coeruleus. In a second study we combined a promoter based approach with a transgenic mouse line to access both the serotonergic and noradrenergic system in awake mice and to unraveled their functional links. Serotonergic and noradrenergic systems co-fluctuated, and serotonergic dorsal raphe neurons affected pupil size partly via noradrenergic populations in the locus coeruleus. Yet, part of the serotonergic control of pupil dynamics was independent of the locus coeruleus. Our findings challenge common assumptions about the neuromodulatory control of pupil dynamics and illuminate the interplay between distinct neurochemical systems within the arousal network of the brainstem.

**Host:**

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