

Opioid Receptor Subtype-specific Regulation of Orofacial Movements and Drug-induced Side Effects

February 24

Tuesday, 12:30 pm

Billings Building—Rosedale Room

SPEAKER:



Nicole Mercer Lindsay, Ph.D.

Director, Laboratory of Systems Neuroscience of Pain
Burke Neurological Institute

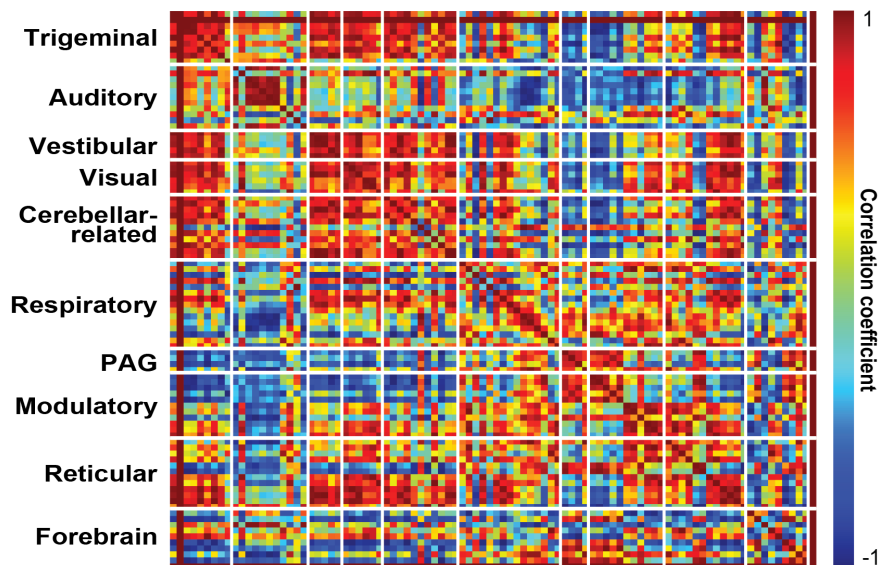
For more information contact

Darlene White

daw9085@med.cornell.edu

Abstract

Opioids produce profound and diverse effects on physiology and behavior, many of which arise from neuromodulation of brainstem circuits controlling orofacial movements and respiration. However, the precise organization of distinct opioid receptors within these circuits, and their differential impact on behavior, remains poorly understood. Here we map the expression of μ , δ , and κ opioid receptors (MOR, DOR, and KOR) across brainstem somatosensory and motor nuclei for the face and respiratory muscles, revealing receptor-specific, largely non-overlapping “salt-and-pepper” distributions across excitatory and inhibitory cell types. We then combine systemic and nucleus-targeted pharmacological manipulations with quantitative readouts of orofacial kinematics and breathing to show that MOR, DOR, and KOR differentially modulate movement rates, microstructure, and the coordination between orofacial and respiratory rhythms. Together, these results define a receptor-specific architecture for opioid control of orofacial–respiratory brainstem circuits and provide a mechanistic framework for understanding how distinct opioid receptors shape subcortical motor behavior.



Publications

N. Mercer Lindsay*, N. F. Hug*, W. M. McCallum, J. Bryan, K. L. Huang, N. E. Ochandarena, A. Tassou, and G. Scherrer. (2022) Opioid receptor architecture for the modulation of brainstem functions. *bioRxiv*. 2022.12.24.521865. *These authors contributed equally

N. Ochandarena, C. Chen, J. Niehaus, N. Mercer Lindsay, R. Picken, and G. Scherrer. (2025) Molecular identity, anatomic position and corticothalamic connectivity differentiate prefrontal and sensory cortex opioid-sensitive neurons. Under revision at *Current Biology*.

N. Mercer Lindsay, P. M. Knutsen, A. F. Lozada, H. J. Karten, and D. Kleinfeld. (2019) Orofacial movements involve parallel corticobulbar projections from motor cortex to trigeminal premotor nuclei. *Neuron*. 104:1-16.