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Monitoring Oprm1 Expression in the Parabrachial Nucleus Throughout the Induction of Opioid Dependence and Withdrawal

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Background: The neural circuits involved in aversive states and how they change throughout the opioid-use cycle may provide valuable insights into novel mechanisms to break the cycle of addiction. The parabrachial nucleus (PBN) serves as a central hub for processing information related to aversive states. However, the involvement of opioid receptors, particularly the μ-opioid receptor (Oprm1), in the neurophysiological and molecular adaptations of PBN neurons during opioid withdrawal remains poorly understood. Investigating Oprm1 signaling and neuroplastic changes in the PBN could identify targets to alleviate opioid withdrawal symptoms.

Rationale/ Significance: The PBN may play a key role in processing the aversive states linked to opioid use disorders (OUDs). Understanding how the PBN is modified throughout the OUD cycle could provide new insights into the progression of the disorder.

Hypothesis: We hypothesize that the PBN plays a role in the aversive states associated with opioid withdrawal through adaptations in opioid receptor expression and function.

Results: To investigate the expression of Oprm1 in the PBN throughout the induction of opioid dependence and withdrawal, we used RNAscope to detect and quantify Oprm1 expression in conjunction with other markers, such as cFos and Calca. By co-localizing these markers with Oprm1 in the same cells, we were able to assess the correlation between Oprm1 expression and cellular activation, as well as the neurophysiological changes that occur during opioid dependence and withdrawal.

Discussion: We have observed neurophysiological and molecular adaptations in the PBN at various stages of the opioid-use cycle.