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Poster Sessions

Activation of spinal dorsal horn astrocytes by noxious stimulus involves descending noradrenergic signaling

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Astrocytes have become increasingly recognized as critical elements for regulating neuronal development and function in the central nervous system. Recently, we have identified a population of astrocytes (genetically defined by the transcription factor *Hes5*) in the spinal dorsal horn (SDH) and shown that these astrocytes respond to intraplantar injection of capsaicin (a noxious stimulus) via α_{1A} -adrenoceptors (α_{1A} -ARs) activated by locus coeruleus descending noradrenergic (LC-NAergic) signals (*Nat. Neurosci.*, 2020). In this study, to determine whether the activation of SDH astrocytes through α_{1A} -AR-mediated descending LC-NAergic signals is commonly observed by other noxious stimuli, we examined astrocytic Ca^{2+} responses in the SDH after intraplantar injection of formalin using two-photon microscopy. We found that intraplantar formalin induced Ca^{2+} responses in SDH astrocytes and that the astrocytic Ca^{2+} responses were suppressed by intrathecal pretreatment with an α_{1A} -AR antagonist. Furthermore, mice lacking α_{1A} -ARs in *Hes5*⁺ astrocytes failed to induce astrocytic Ca^{2+} responses in the SDH. Therefore, our findings suggest that activation of SDH astrocytes by noxious stimuli is commonly mediated by activation of α_{1A} -AR through descending LC-NAergic signals.