Paraventricular nucleus-central amygdala oxytocinergic projection modulates pain-induced anxiety-like behaviours in mice

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Abstract

Background and Purpose: Anxiety disorders associated with pain are a common health problem. However, the underlying mechanisms remain poorly understood. We aimed to investigate the role of paraventricular nucleus (PVN)-central nucleus of the amygdala (CeA) oxytocinergic projections in anxiety-like behaviours induced by inflammatory pain. Experimental Approach: Complete Freund's adjuvant (CFA)-induced inflammatory pain model was used to induce the anxiety-like behaviours. Chemogenetic, optogenetic and fibre photometry recordings were used to modulate and record the activity of the oxytocinergic projections of the PVN-CeA. Key Results: Inflammatory pain induced anxiety-like behaviours in mice accompanied by decreased activity of PVN oxytocin neurons. Chemogenetic activation of PVN oxytocin neurons prevented pain-related anxiety-like behaviours, whereas inhibition of PVN oxytocin neurons induced anxiety-like behaviours in naive mice. PVN oxytocin neurons projected directly to the CeA, and microinjection of oxytocin into the CeA blocked anxiety-like behaviours. Inflammatory pain also decreased the activity of CeA neurons, and optogenetic activation of PVNoxytocin -CeA circuits prevented anxiety-like behaviour in response to inflammatory pain. Conclusion and Implications: Our study suggests that oxytocin has anti-anxiety effects and provides novel insights into the role of PVN-CeA oxytocin projections in the regulation of anxiety-like behaviours induced by inflammatory pain.

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