

Characterisation of the inhibitory GABA/glycine projections of rostral ventromedial medulla neurons to the superficial dorsal horn of the spinal cord

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Abstract

Descending projections from neurons in the rostral ventromedial medulla (RVM) make synapses within the superficial dorsal horn (SDH) of the spinal cord that are involved in the modulation of acute nociception and the development of chronic pain and itch. This projection is believed to be primarily inhibitory but the relative contribution of GABA and glycine transmission is unknown and there is limited knowledge about the spinal targets of RVM-SDH projections.

We address this using *ex vivo* optogenetic stimulation of RVM descending fibres in conjunction with whole-cell patch-clamp recordings from SDH neurons in spinal cord slices. We demonstrate that SDH target neurons have diverse morphological and electrical properties and that RVM inputs onto these neurons are mediated by two inhibitory neurotransmitters, GABA and glycine. Interestingly, one type of SDH target neuron received glycine dominant inputs.

These findings confirm that descending RVM synaptic inputs to spinal pain pathway neurons are largely inhibitory show that they involve not only GABAergic but also glycinergic systems. The present study records descending RVM inputs to SDH in isolation and provides mechanistic information about the neurotransmitter systems this input uses to control spinal pain/itch pathways.

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