A ‘direct’ form of inhibitory control of spinal sensory input. J. Shreckengost, J. Quevedo*, J. Calvo*, & S. HOCHMAN. Emory University, Atlanta, GA, USA & CINVESTAV*, Mexico City, Mexico.

Somatosensory neurotransmission is the fundamental first step in the central processing of sensory events. It is controlled by pre- and post-synaptic inhibitory mechanisms. Presynaptic inhibition (**PSI**) is more powerful than postsynaptic inhibition in depressing the central excitatory actions of almost all primary afferent fibers. After spinal cord injury, sensory-evoked responses become greatly exaggerated, and a primary strategy for therapeutic control is to amplify presynaptic inhibitory actions.

A major mechanism producing PSI is via a counterintuitive $GABA_A$ receptor-mediated depolarization of primary afferent intraspinal terminals. This is measured experimentally as a dorsal root potential (**DRP**) and is associated with the afferents that encode touch and movement. It is assumed to be mediated by a trisynaptic pathway involving GABAergic interneurons. However, we tested the connectivity of 45 candidate interneurons and found no evidence of interneurons synaptically linked to these low-threshold primary afferents.

We then tested whether PAD can be generated via direct monosynaptic actions of primary afferent transmitter release. We observed that a component of the DRP remains after curtailing di- and poly-synaptic transmission with mephenesin (n = 5/5). In all cases, the remaining DRP is completely blocked by bicuculline, demonstrating that this ‘direct’ PAD is generated by $GABA_A$ receptors.

These results suggest that an unconventional form of synaptic transmission contributes to the generation of PAD in low-threshold afferents in the mammal. This may due to the existence of an unusual microcircuitry as suggested with related observations on pain afferents in the turtle (Russo et al 2000).

This data suggests that the decades-old view of PAD requires conceptual revision.

Supported by the Christopher and Dana Reeve Foundation