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# Type 1 cannabinoid receptor (CB1)-containing axons innervate magnocellular vasopressin-synthesizing neurons in the hypothalamic paraventricular nucleus in mice

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The magnocellular vasopressin-synthesizing neurons of the hypothalamic paraventricular nucleus (PVN) play critical role in the regulation of fluid balance and blood pressure. Recently, the retrograde signaling endocannabinoid system has been shown to exert inhibitory effects on magnocellular neurons via type 1 cannabinoid receptor (CB1). To understand the anatomical basis for this regulatory mechanism, we determined whether CB1 is contained in axons innervating vasopressin-immunoreactive (IR) neurons.At the light microscopic level dense CB1-IR axon network was observed in the PVN. The CB1-IR innervation had punctuated appearance and was the densest in the posterior part of the PVN. In the compact part, at the mid level of the nucleus, where the vasopressin neurons reside, the density of the innervation was relatively lower. However, in double-labeled preparations, CB1-IR varicosities were observed in juxtaposition to the majority of the magnocellular vasopressin neurons. At the electron microscopic level, CB1-immunoreactivity was observed in the pre-terminal portion of axons establishing both symmetric and asymmetric synaptic specializations with the perikaryon and dendrites of vasopressin-IR neurons in the PVN. These data demonstrate that CB1 is abundantly present in both the excitatory and inhibitory axons that are in synaptic association with vasopressin-IR neurons indicating that these neurons can regulate their own input through the endocannabinoid system.

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