The effects of dopamine on the synaptic transmission in the rhomboid nucleus of the bed nucleus of the stria terminalis

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The rhomboid nucleus of the bed nucleus of the stria terminalis (BSTrh) are activated by aggressive behaviors toward conspecific young. BSTrh is densely innervated by tyrosine hydroxylase (TH)-positive fibers. In this study, we addressed the function of TH-positive fibers on the synaptic transmission in the BSTrh. We performed in vivo microdialysis experiments from BSTrh and we observed a robust peak of dopamine but the least level peak of noradrenaline. Retrograde tracing analysis revealed that the ventral tegmental area and dorsal raphe nucleus provided dopamine to the BSTrh. Next, we performed whole cell patch clamp recordings from BSTrh neurons and applied 10 micro mol dopamine during the recording of postsynaptic currents evoked by electrical stimulation of the stria terminalis. While the amplitude of evoked inhibitory postsynaptic currents (eIPSCs) was not significantly changed, the amplitude of evoked excitatory postsynaptic currents (eEPSCs) was significantly decreased by dopamine. Detail analysis showed that sag negative BSTrh neurons were sensitive to dopamine but sag positive BSTrh neurons were not affected. Paired pulse ratios of eEPSCs in sag negative BSTrh neurons were significantly changed, suggesting that release probability of glutamate was decreased by dopamine. The inhibitory effects of dopamine on BSTrh neurotransmission were blocked by an alpha2 adrenoceptor antagonist yohimbine, and clonidine, an alpha2 adrenoceptor agonist, mimicked the effects of dopamine in BSTrh. These results suggest that dopamine may contribute to the modulation of behavioral pattern toward infants by the cell-specific modulation of neurotransmission in BSTrh.