The contribution of the NMDA receptors in the bed nucleus of the stria terminalis for the induction of depressive-like behaviors in mice

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The synaptic plasticity in the bed nucleus of stria terminalis (BNST) is induced by the activation of α_1 and β-adrenergic receptors, and/or NMDA receptors. We previously reported the possibility that the synaptic plasticity in BNST contributes to the induction of depressive-like behavior, because the α_1 and β-receptors in BNST regulated the learned despairs in mice. However, neither α_1 nor β-receptors in BNST affected the lipopolysaccharide (LPS)-induced behavioral despair in mice. Therefore, we investigated whether the NMDA receptors in BNST contribute to the induction of LPS-induced behavioral despair. The bilateral intra-BNST pretreatment of MK-801, a NMDA receptor antagonist, 30 min prior to LPS injection, decreased the immobility time during tail suspension test (TST) 24 hours after the LPS challenging. In consistent, bilateral intra-BNST injection of NMDA (24 mg/125 nl/side) slightly shortened the immobility time during TST. However, bilateral intra-BNST co-injection of muscimol (75 ng/125 nl/side), a $GABA_A$ receptor agonist, with NMDA potently decreased the immobility time during TST. Because this dose of muscimol alone did not affect the immobility time of TST, in the present study, we suggest that the activation of NMDA receptors with $GABA_A$ receptors in BNST is important for the induction of depressive-like behavior.