論 文 要 旨

Oxytocin but not vasopressin rescue decreased KCC2 expression after oral bacteria LPS treatment in PC-12 and rat primary cells

Sayuri Taira

Abstract

Inflammation, especially neuroinflammation, which is caused by stress, leads to central nervous system (CNS) dysfunction. Because lipopolysaccharides (LPSs) cause neuroinflammation, we investigated the effect of LPSs to CNS. In PC-12 cells, LPSs derived from oral bacteria reduced the expression of KCC2, a Cl^-transporter. LPS derived from P. gingivalis (P. g) administered to rat primary cultured cells also reduced the KCC2 expression. However, LPSs derived from E. coli did not reduce the KCC2 expression. LPS treatment activated TLR4, IL-1β, and REST gene expressions, which led to KCC2 inactivation in PC-12 cells. The mechanism of KCC2has been shown to play an important role in brain maturation, function (such as the GABA switch), and behavioral problems, we investigated the GABA function. We found that the GABA function was changed from inhibitory to excitatory by the LPS derived from P. g treatment. We demonstrated that the GSK3β also involved in the KCC2 reduction by LPS treatment. We show that oxytocin rescued the reduction in KCC2 expression caused by LPSs by inhibiting GSK3β signaling but vasopressin could not.

Considered together, our results indicate that the LPSs from oral bacteria but not the LPS from E. coli increase the risk for brain disorders and oxytocin might be a candidate to overcome the abnormal behavior caused by brain disorders such as psychiatric disorders.