EPA-2 Role of vasopressin receptor (V1b) in the formation of neurites in PC12 cells

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Arginine vasopressin (AVP), a neuropeptide hormone, is known to influence the variety of brain functions. There are three AVP receptors subtypes, V1a, V1b, and V2, which all are expressed in various regions of brain. Although many studies have addressed the functional role of AVP in the brain, it is still unclear how different types of AVP receptors contribute to the functional role of AVP in the brain. In this study, we examined the role of V1b receptor in the formation of neurite outgrowth by using a rat pheochromocytoma cell line, PC12 cells. We firstly confirmed that PC12 cells express V1b receptor gene. Interestingly, we found that nerve growth factor (NGF) treatment decreased the gene expression of V1b receptor in a dose-dependent manner in PC12 cells. Since NGF treatment is well known to induce the formation of neurite outgrowth in PC12 cells, it is possible that NGF-induced suppression of V1b receptor expression might contributes to the formation of neurite outgrowth in PC12 cells. To address this possibility, we used V1b receptor antagonist and siRNA against V1b receptor to suppress the activity of V1b receptor in PC12 cells. We found that V1b receptor blocking or knock down accelerates NGF-induced formation of neurite outgrowth in PC12 cells, suggesting that V1b receptor, at least partially, regulates NGF-induced formation of neurite outgrowth in PC12 cells. Since V1b receptor antagonist have been proposed as a potential therapeutic agent for various psychiatric-disorders, our findings showing the role of V1b receptor on the structural formation of neuron will provide the valuable information for the future studies of V1b receptor in the therapeutic ways of psychiatric disorders.

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