

Abstract

Mirror image pain (MIP) is a type of extraterritorial pain that results in contralateral pain or allodynia. Glutamate transporter-1 (GLT-1) is expressed in astrocytes and plays a role in maintaining low glutamate levels in the synaptic cleft. Previous studies have shown that GLT-1 dysfunction induces neuropathic pain. Our previous study revealed bilateral GLT-1 downregulation in the spinal cord of a spared nerve injury (SNI) rat. We hypothesized that spinal GLT-1 is involved in the mechanism of MIP. We also previously demonstrated noradrenergic GLT-1 regulation. Therefore, this study aimed to investigate the effect of an $\alpha 1$ adrenergic antagonist on the development of MIP. Rats were subjected to SNI. Changes in pain behavior and GLT-1 protein levels in the SNI rat spinal cords were then examined by intrathecal administration of the $\alpha 1$ adrenergic antagonist phentolamine, followed by von Frey test and western blotting. SNI resulted in the development of MIP and bilateral downregulation of GLT-1 protein in the rat spinal cord. Intrathecal phentolamine increased contralateral GLT-1 protein levels and partially ameliorated the 50% paw withdrawal threshold in the contralateral hind paw. Spinal GLT-1 upregulation by intrathecal phentolamine ameliorates MIP. GLT-1 plays a role in the development of MIPs.