

Abstract

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Effect of chronic administration of morphine on the gene expression level of sodium-dependent vitamin C transporters in rat hippocampus and lumbar spinal cord.

Zarebkohan A, Javan M, Satarian L, Ahmadiani A.

Department of Physiology, School of Medical Sciences, Tarbiat Modares University, Tehran, Iran, P.O. Box: 14115-331.

BACKGROUND: Chronic morphine leads to dependence, tolerance, and neural apoptosis. Vitamin C inhibits the withdrawal syndrome in morphine-dependent subjects and prevents apoptosis in experimental models. Sodium-dependent vitamin C transporter (SVCT) type-2 is the main transporter for carrying vitamin C into the brain and neural cells.

OBJECTIVE: The mechanism(s) by which vitamin C inhibits morphine dependence is not understood. SVCT activity determines the vitamin C availability within the nervous system. We have examined the alterations in the expression of SVCT1, SVCT2, and its splice variants in morphine-tolerant rats.

METHODS: Morphine (20 mg/kg) was injected twice/day to male rats for either 7 or 14 days. The development of analgesic tolerance was assessed using tail-flick test. Lumbar spinal cord and the hippocampus were isolated for RNA extraction. Semiquantitative reverse transcriptase-polymerase chain reaction method was used to assess the levels of gene expression.

RESULTS: Administration of morphine for 7 or 14 days reduced the expression level of SVCT2 in both hippocampus and dorsal lumbar spinal cord of rats. SVCT2 expression was reduced in vitamin C-, and vitamin C combined with morphine-treated animals. Results did not show SVCT2 splice variation. SVCT1 did not express in control or morphine-treated rats.

CONCLUSION: It seems that reduced expression level of SVCT2 might be involved in the development of morphine side effects such as tolerance and dependency.

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