Effects of Calcitriol on vasogenic brain edema formation and blood–brain barrier disruption in experimental model of transient focal cerebral ischemia in rats

Abstract

Background & objective: *Vasogenic brain edema is an important complication of ischemic stroke that exacerbate primary outcome of this disease. Oxidative stress is most important pathophysiological mechanisms in development of brain edema via blood - brain destruction. Calcitriol as the active form of the vitamin D has powerful antioxidant effects and showed protective effects against CNS neurodegenerative diseases. In this study we examined the effects of post-ischemic treatment with calcitriol on cerebral infarction, sensorimotor deficits, vasogenic edema formation and blood - brain disruption in a rat model of ischemic stroke.*

Materials and methods*: Male Sprague-Dawley rats were divided into three main groups (n=16), sham, control ischemic, calcitriol treated (12 μg/kg) ischemic groups. Transient focal cerebral ischemia was induced by 60-min-long occlusion of the left middle cerebral artery followed by 24-h-long reperfusion. Sensorimotor deficits were evaluated at the end of the reperfusion period. Thereafter, the animals were randomly used for measurement of the infarct volumes and investigation of ischemic brain edema formation using a wet/dry method. Blood – brain barrier permeability was assessed by Evans blue extravasation technique.*

Results: *Induction of cerebral ischemia in the control group produced considerable brain infarction in conjunction with severe brain edema formation. Treatment with calcitriol significantly reduced the infarct volume and improved sensorimotor disabilities. Additionally, calcitriol significantly lowered the brain edema formation and protected BBB integrity in the ischemic lesioned hemisphere.*

Conclusion: *Post – ischemic treatment with calcitriol can noticeably decrease cerebral infarct volume, improve sensorimotor deficits and attenuate edema formation through protecting BBB integrity.*

Keywords: *Stroke, vasogenic brain edema, BBB, Calcitriol, rat*.