

α -Lipoic Acid Prevents Ischemia-Induced Dysregulation of Aquaporins and Sodium Transporters in Rat Kidneys

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Purpose : An ischemic insult may result in downregulation of aquaporins (AQP) and sodium transporters in the kidney. The present study was aimed to examine whether α -lipoic acid (α -LA), an antioxidant, preserves renal AQPs and sodium transporters despite an ischemic insult.

Methods : An ischemic insult was induced by clamping the both renal pedicles for 40 minutes in male Sprague-Dawley rats, in which one group was treated with α -LA (50 mg/kg, IP) immediately after the injury and the other was not. After 2 days, the expression of AQP, sodium transporters and NF- κ B was determined in the kidney by western blot analysis and immunohistochemistry. The activity of adenylyl cyclase was determined by the stimulated generation of cAMP.

Results : The ischemic insult resulted in increased urinary water and sodium excretion. Accordingly, immunoblotting and immunocytochemistry revealed downregulation of AQP1-3, Na, K-ATPase, NHE3, NKCC2 and NCC. cAMP generation in response to arginine vasopressin, forskolin or sodium fluoride was decreased significantly. α -LA treatment attenuated the degree of dysregulation of AQP and sodium transporters, in parallel with improved urinary concentrating capability and adenylyl cyclase activity. The expression of p65 subunit of NF- κ B in nuclear fraction was increased, which was also prevented by α -LA treatment.

Conclusion : α -LA treatment may prevent an ischemia-induced dysregulation of AQPs and sodium transporters, in which deactivation of NF- κ B may in part play a role.