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Increased Renal Expression of NBC1 and NHE3 in Glycerol-induced Experimental Rhabdomyolysis

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Background : Rhabdomyolysis is characterized by disturbances of sodium and water balance, along with metabolic acidosis. The present study was aimed to examine whether these disturbances are associated with an altered regulation of tubular sodium transporters and water channels in the kidney.

Methods : Male Sprague-Dawley rats were deprived of water intake for 24 hours, and injected with 50% glycerol in normal saline (10 mL/kg, i.m.). Control rats were injected with normal saline. Twenty-four hours thereafter, rats were killed by decapitation. The protein expression of type 1 sodium-bicarbonate cotransporter (NBC1), type 3 sodium- hydrogen exchanger (NHE3), α1 subunit of Na, K-ATPase, and aquaporin (AQP)-1 was determined in the cortex of the kidney by immunoblotting and immunohistochemistry.

Results : In the experimental group, creatinine clearance was significantly decreased. Plasma concentrations of bicarbonate were decreased, and anion gap was increased. The protein expression and immunoreactivities of α 1 subunit of Na, K-ATPase and AQP1 were decreased significantly. On the contrary, the expression of NBC1 and that of NHE3 were significantly increased. Immunohistochemistry also revealed increased labeling of NBC1 and NHE3.

Conclusion : An increased expression of NBC1 and NHE3 may in part play an adaptive role against metabolic acidosis in rhabdomyolysis.