

Long-term regulation of urea transporter expression by vasopressin in Brattleboro rats.

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Abstract

Regulation of urea concentration in the renal medullary interstitium is important for maintenance of hypertonicity and therefore the osmotic driving force for water reabsorption. Studies in Sprague-Dawley rats showed that restriction of water intake for 3 days results in upregulation of urea transporter (UT) mRNA in the inner stripe of outer medulla of the kidney (2.9-kb UT2) but not in the inner medulla (4.0-kb UT1). The present study was performed to investigate the role of vasopressin in long-term regulation of UT1 and UT2 in neurogenic diabetes insipidus (Brattleboro) rats treated with a 7-day continuous infusion of [Arg(8)]-vasopressin (AVP), [deamino-Cys(1), D-Arg(8)]-vasopressin (dDAVP) or vehicle. Northern analysis showed that water restriction alone had no effect on the level of UT2 mRNA in vehicle-treated Brattleboro rats but UT2 mRNA markedly increased and UT1 mRNA modestly decreased after treatment with dDAVP. In situ hybridization further demonstrated that the UT2 signal is upregulated and spread along the descending thin limbs of loops of Henle and that UT1 signal is downregulated in the inner medullary collecting ducts in vasopressin-treated rats, with a greater response for dDAVP compared with the AVP-treated group. Immunocytochemistry studies revealed that the UT1 and UT2 proteins are also modified in the same pattern as the transcript changes. Our studies reveal the role of vasopressin in long-term regulation of UT1 and UT2 expression during water restriction.