

## Regulatory Expression of Urea Transporters in Potassium-depleted Mouse Kidney

가톨릭대학교 의과대학 해부학교실, 내과학교실<sup>1</sup>, National Institutes of Health<sup>2</sup>,  
Emory University School of Medicine<sup>3</sup>, University of Florida<sup>4</sup>

정주영, 김완영, 한기환, 양철우<sup>1</sup>, 이 찬<sup>1</sup>, Mark A Knepper<sup>2</sup>  
Jeff M Sands<sup>3</sup>, Kirsten M Madsen<sup>4</sup>, 김 진

Urea transport in the kidney is mediated by a family of transporter proteins that includes the renal urea transporter (UT-A) and the erythrocyte urea transporter (UT-B). The purpose of this study was to determine the location of the urea transporter isoforms in the mouse kidney and to examine the effects of prolonged potassium depletion on the expression and distribution of these transporters, by ultrastructural immunocytochemistry. C57BL6 mice were fed a low-potassium diet for two weeks and control animals received normal chow. After two weeks on a low-potassium diet, urine volume increased and urine osmolality decreased (315 ± 20 vs. 2,322 ± 191 mOsm/kg H<sub>2</sub>O), as previously demonstrated. Kidneys were processed for immunocytochemistry with antibodies against UT-A1 (L446), UT-A1 and UT-A2 (L194), UT-A3 (Q2), and UT-B. In normal mice, UT-A1 and UT-A3 were expressed mainly in the cytoplasm of the terminal inner medullary collecting duct (IMCD). UT-A2 immunoreactivity was observed mainly on the basolateral membrane of the type 1 epithelium of the descending thin limb (DTL) of the short-looped nephron. The intensity of UT-A1 and UT-A3 immunoreactivity in the IMCD was markedly reduced in potassium-depleted mice. In contrast, there was a significant increase in UT-A2 immunoreactivity in the DTL. The intensity of UT-B immunoreactivity in the descending vasa recta (DVR) was reduced in potassium-depleted animals compared with controls. In control animals, UT-B immunoreactivity was predominantly observed in the plasma membrane, whereas in potassium-depleted mice, it was mainly observed in cytoplasmic granules in endothelial cells of the DVR. In summary, potassium depletion is associated with a reduced expression of UT-A1, UT-A3, and UT-B. We conclude that reduced expression of urea transporters may play a role in the impaired urine-concentrating ability associated with potassium deprivation.