Expression of urea transporter-A in the developing loop of Henle in mouse kidney

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It has been demonstrated that UT-A is expressed in the inner medullary collecting duct (IMCD) and terminal portion of the short-loop descending thin limb (DTL) and weakly in long-loop DTL in the inner most part of inner stripe of outer medulla (ISOM). Urea transport in the kidney is critical importance for the urinary concentration process and the regulation of water excretion. Because newborn rodents including mouse are unable to produce a concentrated urine, we examined the time of expression and the distribution of UT-A in the developing mouse kidney by immunohistochemistry. Kidneys from 13-, 15-, 16-, and 19-day-old fetuses, 1-, 4-, 7-, 14-, 21-day-old pups, and adult animals were studied. By 15 days of gestation, there was no UT-A immunoreactivity in the developing uriniferous tubules, including collecting ducts. UT-A immunoreactivity appeared first in a few DTL and in the terminal part of medullary collecting ducts (MCD) at 16 days and 19 days of gestation, respectively. The intensity of UT-A immunolabeling in the terminal IMCD gradually increased during development. Before and at the time of birth, all loops of Henle had the structural configuration of the short-looped nephrons of the adult kidney. In fetal kidneys, UT-A immunolabeling was observed in the terminal part of DTL of these differentiating loops of Henle, which were present at various levels in the renal medulla. In 1- and 7-day-old pups, UT-A immunoreactivity was present in the DTL at the border between the outer and inner medulla. In 14- and 21-day-old pups, strong UT-A immunostaining was observed in the terminal part of the short-loop DTL in the middle part of ISOM, and weak labeling remained in long-loop DTL descending into the inner most part of ISOM. We conclude that the expression of UT-A in DTL and IMCD coincides with

the development of the ability to produce concentrated urine.

Fig. 1. Light micrographs of 50 ㎛ thick vibratome section of the mouse adult kidney illustrating single immunostaining for UT-A.
Arrows and open arrow indicate UT-A2 positive short-loop and intermediate-loop of descending thin limb, respectively. Arrowhead indicates UT-A1 positive inner medulla collecting duct. Bar = 0.05 mm

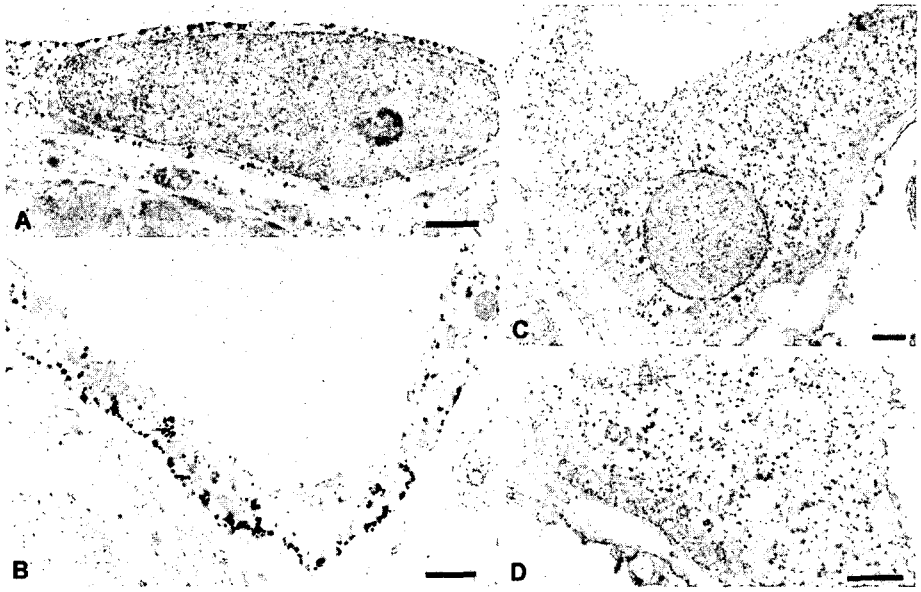

Fig. 2. Transmission electron microscopic localization of UT-A in the descending thin limb (DTL) cells of the terminal part of the short-loop DTL in the inner part of inner stripe of outer medulla (**A** & **B**) and in the inner meduallry collecting duct (IMCD) cells of the middle part of IMCD (**C** & **D**) using immunogold method. Note UT-A is localized predominantly on the plasma membrane especially on the basolateral plasma membrane of short-loop DTL (**B**) and diffusely in the cytoplasm of IMCD (**C** & **D**). There is no UT-A labeling on the plasma membrane including apical plasma membrane of IMCD cell. Bar = 1 ㎛.