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발생 중인 흰쥐 콩팥에서 NKCC2와 b-NOS의 발현

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Expression of NKCC2 and b-NOS in Developing Rat Kidney

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Purpose : At birth, loops of Henle of all nephrons are composed of primitive cuboidal epithelial cells i.e., the medulla is devoid of ascending thin limb. The present study was undertaken to explore the immunolocalization of NKCC2 and b-NOS in fetal stages of developing rat kidney.

Methods : To do this study, an affinity-purified rabbit polyclonal antibody to the bumetanide-sensitive Na-K-Cl cotransporter (BSC1 or NKCC2) and b-NOS was used. Kidneys from 16- to 20-day-old fetuses (F16-F20), 1- to 21-day-old pups (P1-P21), and adult rats were examined by immunohistochemical studies using a horseradish-peroxidase preembedding technique.

Results : NKCC2 appeared first in the distal anlage on F16. From F18 onward, NKCC2 was detected in cuboidal epithelial cells throughout the cortex and medulla, presumably representing the macula densa and TALs. During the prenatal period, TALs were present throughout the renal medulla down to the tip of the renal papilla. After birth, the NKCC2-positive TALs disappeared gradually from the tip of the renal papilla. By P21, no NKCC2-positive TALs were seen in the inner medulla. b-NOS was first expressed in the distal tubule anlage of F16 and in all epithelial cells of developing TAL as well as macula densa of F17 and F18. From F20 to P14 days after birth, b-NOS was expressed in the newly formed cortical TAL, which are located in the medullary ray, whereas in mature TAL of juxtamedullary nephrons, b-NOS immunolabeling gradually decreased in intensity and became restricted to the macula densa.

Conclusion : In conclusion, b-NOS is involved in the maturation of NKCC2-positive TAL in developing rat kidney.