Osteopontin Expression in Rat Kidney

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Osteopontin (OPN), originally considered to be primarily a bone protein containing a cell-adehesion arginine-glycine-aspartate amino acid sequence, is now reported to be expressed in other tissues, notabley in kidney, in the tracts of gastrointestinal and urogenital systems and in the cells of vascular and immune systems. Although the function of OPN is not clear, it has been suggested that OPN may play a role in the processes of cell adhesion, renal stone formation, gene expression, and immune response. Recently anti-apoptotic role of OPN during renal development were reported. OPN has been demostrated in the kidney by northern & western analyses, immunohistochemistry and *in situ* hybridization, and there is evidence that renal OPN expression is increased under various pathologic conditions such lead to attempt to use OPN as marker for renal dysfunction. However, studies of the cellular distribution of OPN in the kidney, especially in normal condition, have given highly conflicting results. These maybe results from the fact that OPN expression in renal tubule is susceptible to microenvironment. To resolve these discrepancies, and to establish if OPN is associated with morphogenesis and apoptosis during renal tubule differentiation, we examined the renal OPN expression in the developing rat kidney from the fetal stage to adult.

Kidneys from 16-(E16), 18-(E18) and 20 day-old (E20) fetuses and 1-(P1), 3-(P3), 7-(P7), 14-(P14), 21-day-old(P21) pups and adult were studied by in situ hybridization using a digoxigenin-labeled riboprobe and by immunohistochemistry using a monoclonal antibody to osteopontin. OPN mRNA and protein were expressed in the thick ascending limb (TAL) at E18 and E20, but disappeared gradually after birth, before the deletion of TAL cells by apoptosis, In the collecting duct (CD) weak labeing appeared in a few cells at E20. After birth cells with strong labeling were scattered throughout the CD in the medulla and inner cortex at P1-P7 and in the outer cortex at P14. There was no OPN expression in the CD at P21. OPN mRNA and immunoreactivity apeared in the papillary surface epithelium (PSE) at E20 and in the descending thin limb (DTL) at P1. After birth OPN expression gradually increased to adult levels in the PSE. In the DTL, adult levels of expression were reached at P7-P14. Proximal tubules exhibited a punctate subapical OPN immunostaining from E18 with no hybridization signal, but little OPN expression after P21.

This results shows that OPN expression pattern at P21, the end stage of renal morphogenesis, were very same as that of adult, only expressed in the descending thin limb and papillary surface epithelium. The transient expression of OPN in the TAL and the observation that the disapperance of OPN precedes the apoptotic deletion of cells from the TAL are compatible with OPN having an anti-apoptotic role in the developing kidney.