
Rats were nephrectomized (Nx) or sham-operated (S) at the age of 5, 12 and 40 days. One group of rats wasNx in utero 3-4 days before delivery. Light microscopy studies of renal structural development were done on postnatal C and Nx rats at the age of 6-26 days. Renal structural development followed the same pattern in Nx as in S rats. The formation of new nephrons was completed at the age of 6-7 days. There was no structural evidence of formation of new nephrons. Furthermore, glomerular counting showed the same number of glomeruli in Nx and S rats at the age of 60 days. The number of glomeruli in fetal nephrectomized rats was the same as in control animals from the same litter. GFR, SNGFR and kidney weight were estimated at 60 days of age in Nx and S rats. The compensatory increase in renal weight and GFR was most pronounced in rats Nx at the age of 5 days, i.e. just before the formation of nephrons was completed.

The quotient between the recorded SNGFR and GFR was the same in all groups studied, indicating a homogenous increase in SNGFR of the nephrons at all cortical levels.

Age-related differences in angiotensin II (A-II) in rat tissues. Baille, M.D., Wallace, K. B., and Oparil, S. Michigan State University, East Lansing, Michigan and University of Alabama, Birmingham, Alabama, USA.

In order to attempt to account for age-related differences in plasma angiotensin II concentration, the activity of angiotensinases in developing rat tissues was examined. The rate of degradation of A-II was determined in vitro during incubation of tissue homogenates with 125I-tyrosine labeled angiotensin II. Peptide fragments were separated electrophoretically and quantified by gamma scintillation counting. Peptide degradation rates in plasma or liver homogenates did not change with age. In contrast, the half-life in renal tissue homogenates decreased from 8.6 ± 1.2 minutes in two-week-old rats to 7.4 ± 0.7 minutes in eight-week-old rats and 2.8 ± 1.8 minutes in adults. This change in the rate of disappearance was accompanied by concomitant increase in the rate of appearance of labeled peptide fragments. Peptide mapping revealed that the principal metabolite of 125I-AII was tyrosine. The only other detectable metabolite of A-II was the aminoterminal tetrapeptide and the carboxy-terminus hexapeptide. The appearance of these fragments was highly variable, suggesting that endopeptidases did not constitute the ultimate cleavage of AII degradation. The increased rate of metabolism of angiotensin II during development is consistent with the age-related increases in the concentration of angiotensin II in plasma of developing rats as demonstrated by previous studies from our laboratory. (Supported by NIH Grants HD06259 and 412564)

Prostaglandins (PG) modulating renal blood flow (RBF) and plasma renin activity (PRA) during fetal life. Watson, J.R. and Robillard, J.E., Dept. Pediatrics, University of Iowa College of Medicine, Iowa City, Iowa, U.S.A.

The effect of PG synthesis inhibition by indomethacin (I) (5.7 ± 0.70 ng/kg fetal wt., i.v. bolus) on RBF and intracortical blood flow distribution was studied in 8 chronically catheterized fetal lambs (117-137 days gestation; term 145 days) using 15u microspheres. Following I urinary PGE and PGF decreased significantly (p<0.01) from 0.72±0.12 to 0.27±0.04 ng/min and from 0.93±0.16 to 0.36±0.09 ng/min respectively. Fetal blood pressure increased significantly from 40±1 to 45±2 mHg (p<0.01) and heart rate decreased significantly from 173±5 to 142±6 beats/min (p<0.05). Fetal arterial pH decreased, base excess fell, Na+ and K+ were not subject to substrate stimulation.

Allometric approach to postnatal renal growth—normal and compensatory. Hutton, J., DEPARTMENT OF SURGERY, ROYAL CHILDREN’S HOSPITAL, MELBOURNE, AUSTRALIA.

Normal renal growth in the mouse was determined by removal of kidneys in mice aged 50 days. The body weight was compared with body weight by plotting on a graph with logarithmic co-ordinates. Kidney weight was linearly related to body weight on the log-log plot. The slope of the regression line was steeper for neonatal and adolescent mice than for the opposite kidney when removed 15 days after birth. Kidneys were removed 30 or 45 days after neonatal nephrectomy. The kidney weight after compensatory growth was also linearly related to body weight, the regression line being parallel to that of the controls in females, and having a greater slope than that of the controls in males. The kidneys removed after a long interval were not statistically heavier than those after 15mg/kg. These considerations suggested that allometric compensatory growth. This experiment suggests that allometry is a useful technique to study compensatory growth, and the conclusions reached may be more meaningful in understanding compensatory renal growth.

The effect of chronic partial ureteral obstruction (CPUO) on renal tubular transport during maturation. Taki, M., Goldsmith, D.I. and Spitzer, A. Albert Einstein College of Medicine, Bronx, New York. These studies were designed to determine whether the effect of CPUO on the renal tubule is dependent upon the pattern of transport prevailing at various stages of development. Guinea pigs (n=78) underwent CPUO at birth, 1, 2, 3 or 4 wk of age and were studied 4 wk and 8 wk later (E). Sham operated littermates served as controls (C). The degree of CPUO, measured by the resistance to a constant flow of fluid, was similar in all groups. TRP averaged 87% in C, was slightly lower in the contralateral kidney (CK) of E (82%) and did not vary with age, whereas it increased with age in CPUO (p<0.001) but did not differ significantly at each age from those in the control group. I 125 uptake was significantly reduced by both Dinitrophenol (DNPH) and sodium azide, as well as by a 100% nitrogen atmosphere.

These results indicate that renal tubular transport of dipoxin in an age related energy dependent process, which probably is not subject to substrate stimulation.

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