1081 PLASMA RENIN ACTIVITY (PRA) IN THE ASSESSMENT OF PERSISTENT HYPERTENSION (HT) OF RENAL ALLOGRAFT RECIPIENTS. A. Hsu, J. Balfe, P. Olley, B. Kidd, G. Arbus, B. Churchill. The Hospital for Sick Children, Toronto Ontario. (Spon. by Donald Fraser).

To differentiate medically treatable causes of hypertension from those requiring surgical intervention, 9 renal transplant recipients (aged 15-19 yrs) fulfilling the following criteria were investigated: a) at least 3 months after transplantation, b) original diseased kidneys removed, c) no evidence of rejection d) steroid dosage at low levels. According to sitting diastolic BP and response to antihypertensive drugs the patients were divided into 3 groups (I) severe, (II) moderate and (III) no HT (3 patients in each). All patients in groups I and II demonstrated allograft renal artery stenosis (RAS) by arteriography, the % luminal occlusion being more pronounced in the group I (>50%).

Group	HT	Arteriogram	mean peripheral PRA (ng/ml/hr) Normal Na^+	Low Na^+	Diuretic
I	Severe	RAS definite	9.36	19.16	33.92
II	Moderate	RAS mild or kink	3.44	5.69	7.97
III	Normal	No RAS	1.97	3.29	9.91

The excessive peripheral PRA easily distinguished the group with unmistakably severe RAS from the others. After a diuretic the differences were even more exaggerated. The bromide space was reduced in 6/9 patients, mean 93.8%, when compared to normals by Cheek. Allograft RAS did not act like a single kidney Goldblatt model. PRA can help select those post-transplant HT patients who require arteriography and subsequent surgery.

1082 RENAL OSTEODYSTROPHY IN CHILDREN UNDER 5 YEARS OF AGE Anthony C. Hsu, SangWhay Kooh, Donald Fraser, William A. Cumming, Victor Fornasier
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The incidence, course and time of onset of skeletal abnormalities caused by chronic renal failure (CRF) are not clear in rapidly growing young children. To study these features we investigated the skeletal status of 12 children under 5 years of age (mean age 2.5 yrs) who had mild to moderate degrees of CRF (serum creatinine (S.Cr) 0.9 - 5.5 mg/dl). Seven patients had low growth velocity; 4 had obvious skeletal deformities. Major osseous derangements were detected on radiographs in 7 patients, and were present in the iliac crest bone biopsy specimens in all 12 patients. Radiographic evidence of rickets appeared early (within 1.9 yrs after detection of CRF, mean S.Cr 2.4 mg/dl). Normal plasma 25-OH vitamin D levels ruled out vitamin D deficiency. In contrast, X-ray signs of secondary hyperparathyroidism appeared later (mean duration of CRF 3.2 yrs, mean S.Cr 3.5 mg/dl). Rickets responded readily to vitamin D therapy (1600-5000 IU/day) but secondary hyperparathyroid lesions were refractory to conventional dietary and medical management, including large doses of vitamin D (up to 20,000 IU/day). Progressive bone disease constituted the reason for admitting 3 of our patients to the transplant program. We conclude that renal osteodystrophy is an unexpectedly common occurrence in very young children and may represent a major complication even before CRF becomes advanced.

1083 GLOMERULAR PERMEABILITY IN AUTOLOGOUS IMMUNE COMPLEX (AIC) NEPHRITIS. Ingelfinger, Julie R., Schneeberger Eveline E. and Grupe, Warren E., Dept of Peds, Children's Hospital Medical Center, Boston, Massachusetts.

Glomerular permeability to neutral polydisperse polyvinylpyrrolidone ^{125}I (PVP) was studied in Foreman rats with and without autologous immune complex glomerulonephritis (AIC). The Foreman rat generally develops milder disease than other strains. However, all AIC rats studied were nephrotic with proteinuria in excess of 50mg/24 hrs. PVP clearance (MW 8000-85000) was determined by column chromatography and compared to simultaneous inulin clearance (C_{in}). Particle diameter (Å) was calculated by deriving R_s, radius of equivalent sphere, for each PVP fraction. Clearances were performed without volume expansion, using isovolemic replacement of blood samples.

C_{in} was the same in AIC and controls. Mean permeability to molecules > 40Å was only slightly increased in AIC ($p > .5$). In contrast, permeability to molecules < 40Å was decreased, as previously reported with PVP in idiopathic nephrotic syndrome (INS)[1] and with dextran in nephrotoxic serum nephritis.[2] C_{PVP} < 25Å approached 100% C_{in} in controls, whereas this occurred in AIC only at < 15Å ($p < .05$); i.e. passage of low MW PVP particles in AIC was restricted but not as much as in INS, where C_{PVP} never approached that of C_{in}. Permeability changes associated with the presence of immune complexes in AIC may obscure the restriction of small MW PVP found when there is foot-process disease alone.

1. Robson, A.M., et al: JCI 54:1190, 11/74.
2. Chang, R.L.S., et al: JCI 57:1272, 5/76.

1084 GLOMERULAR CAPILLARY VOLUME AND SURFACE AREA DURING ONTOGENY. Eunice John, David I. Goldsmith, Chester M. Edelmann, Jr. and Adrian Spitzer. Albert Einstein College of Medicine, Department of Pediatrics, Bronx, New York.

The apparent discrepancy between functional glomerulotubular balance and morphologic glomerular preponderance prompted us to develop a new technique to examine if the currently accepted estimates of glomerular tuft volume (GTV) derived from measurements of diameter bear a constant relationship to glomerular capillary volume (GCV) and capillary surface area (GCA). Kidneys of puppies were fixed in vivo and injected with silastic. GTV was calculated from measurements of the distance between filled capillary loops located at opposite poles. Counts of the neutron activated chromium contained in the silastic served for calculation of GCV. GCA = 2 GCV/r, where r = mean capillary radius. The results are expressed as mean ± SE in $mm^3 \cdot 10^{-5}$ or $mm^2 \cdot 10^{-5}$ (n=4 in each age group; 50 superficial (S) and 50 juxtamedullary (J) were measured in each animal).

Age (wks)	SGTV	SGCV	SGSA	JGTV	JGCV	JGSA
1		7.3±2.0	2.7±0.8	220±28	18.5±4.7	5.4±1.4
3	40.5±6.1	4.2±0.6	1.6±0.2	170± 8	9.1±1.4	3.1±0.5
6	71.1±1.0	30.2±2.0	9.7±0.6	100±10	32.2±1.4	11.3±0.5

Only the values observed in 6 week old animals are significantly different ($p < .05$) from the other age groups. In summary, GCV occupies a significantly smaller part of GTV in the newborn than in the 6 week old puppy suggesting that the so called glomerular preponderance might be artifactual.

1085 THE EFFECTS OF LEAD-EXPOSURE ON RENAL FUNCTION OF YOUNG RATS. Dale R. Johnson and Leonard I. Kleinman, Depts. of Environmental Health & Pediatrics, Univ. of Cincinnati Medical Center, Cincinnati, Ohio 45267.

Renal function was studied in 30-50 day old rats exposed to Pb from birth. Dam's diet contained 4% lead carbonate until Day 16, and 0.4% thereafter. Post weaning pups were fed 0.4% lead carbonate. Lead fed pups had blood lead levels of 96 ± 24 µg Pb/100 ml whole blood compared to pair fed controls of 7 ± 1 µg Pb%*. As shown in the table certain indices of renal function were not affected by lead exposure.

	Kidney wt/ Body wt (%)	GFR (ml/min/gkw)	RPF (ml/min/gkw)	E_{PAH} (%)
Control	1.21 ± 0.01	1.65 ± 0.14	5.93 ± 0.46	81.5 ± 3.9
Pb-Exposed	1.29 ± 0.01	1.60 ± 0.10	5.26 ± 0.77	80.4 ± 5.7

However, when challenged with 24-hour water restriction, Pb-fed rats had urine volumes of 5.05 ± 0.36 ml/24 hrs and urine osmolalities of 1216 ± 160 mOsmols/l compared to 1.90 ± .33* and 1967 ± 93*, respectively, for controls. In addition, following extracellular volume expansion with saline, fractional Na excretion was greater in Pb fed animals (.091 ± .01) than in controls (.039 ± .006*). Thus, Pb exposure to newborn rats results in altered tubular function that limits the ability of the animal to respond to changes in water and Na intake. (Supported by NIH grants ES00972 and ES00159.)

*$p < .01$

1086 DIAGNOSIS OF RENAL FAILURE IN THE NEWBORN. Alan S. Jones, Ted D. Groshong, Harold E. Bland, and Elizabeth J. James. (Spon. by Calvin Woodruff). Department of Child Health, University of Missouri School of Medicine, Columbia, Missouri.

Diagnosis of renal failure in newborn infants is difficult due to immaturity of the kidney and technical factors. Utilization of urine to plasma ratios of urea (U/P U), creatinine (U/P Cr), sodium (U/P Na), and fractional sodium excretion (FE/Na) obviate the use of timed urine collections. FE/Na is calculated as:

$$\frac{\text{U/P Na}}{\text{U/P Cr or U/P urea}}$$

Measurement of U/P Na, U/P Cr or U/P U and FE/Na were performed in 11 premature and full term infants with demonstratable renal failure, and in 9 infants of various gestational ages with prerenal oliguria.

Results:	Renal Failure	Pre-Renal	Significance
U/P U or U/P Cr	5.1 (1.1*)	18.5 (4.0*)	$p < .05$
FE/Na	22.9 (12.1*)	1.8 (0.3*)	$p < .01$

*SEM

One patient with renal failure had FE/Na values below 3.5, and no infant with pre-renal oliguria had values above 3.5. However, 2 infants with renal failure had U/P U values above 11 and 4 infants with oliguria had values less than 11. FE/Na appears to be a useful adjunct to diagnosis of renal failure in the newborn and appears to be better than U/P U alone.