THE NORMAL ASPIRATION OF AMNIOTIC FLUID BY THE CONCEPTUS. Lily Yuan, Anita Perricelli and David Gitlin. Children's Hospital of Pittsburgh.

At first doubted, then attributed to abnormal stimulation and finally only recently confirmed, fetal breathing movements apparently do occur normally in utero. There is general agreement, however, that these movements are not expansive enough to clear the respiratory dead space. In the present study, ^{125}I-labeled human albumin, ^{51}Cr-labeled rabbit erythrocytes and ^{85}Sr-labeled polystyrene microspheres 15 mμ in diameter were injected either singly or in combination into the amniotic fluid of rabbit fetuses near term. The injections were done via hysterotomy incisions under xylocaine spinal anesthesia. Three to 24 hours later, the fetuses were delivered by hysterotokotomy. All fetal organs were assayed for radioactivity, and where appropriate, sectioned for light microscopy. Each of the labeled materials was found regularly in the fetal lungs and gastrointestinal tract, the microspheres being visualized in alveolar ducts and alveoli and in the intestinal lumen. Radiolabeled albumin injected into the amniotic fluid of 3 human conceptuses at 13 to 15 weeks of gestation was also found in fetal lungs and gastrointestinal tract when delivered by therapeutic hysterotokotomy 5 hours later. Interestingly, the human fetus at 3 to 4 months of gestation swallows approximately half of the amniotic fluid volume per day. The data suggest a normal penetration of amniotic fluid into the pulmonary passages as far as the alveolar ducts and alveoli.

RESPONSE OF THE DEVELOPING KIDNEY TO RENAL PARENCHYMAL LOSS. Lorenzo C. Aschinberg, Olli Koskimies, Jay Bernstein, Martin A. Nash, Chester M. Edelmann, Jr., and Adrian Spitzer, Albert Einstein College of Medicine, Bronx, N.Y.

It has been suggested that morphologic and functional adaptations to renal parenchymal loss are partially dependent on the intrinsic capacity for growth. This implies that maximal changes should be observed in the kidney of the newborn, particularly in the superficial cortex which has the greatest growth potential. Seven mongrel puppies underwent a 75% reduction in renal mass during the first 48 hrs. of life. Four sham operated littermates served as controls. All puppies were studied 6 wks. later. Renal mass increased by at least 10-fold in the experimental animals (E) and by 5-fold in controls (C). GFR/g of kidney was .71 ± .07 (SE) ml/min in E and .55 ± .13 in C. As a consequence of hypertrophy and functional adaptation, E animals achieved a mean GFR of 79.8 ± 8 ml/min/m^2 BSA which was not statistically different from 92.1 ± 13 observed in C. C_{PAH} was 129 ± 18 ml/min/m^2 BSA in E and 130 ± 26 in C. Measurements of intrarenal distribution of blood flow (IDBF) with ^{85}Sr labeled microspheres disclosed a significantly lower percent of flow going to the superficial cortex of the E (43%) than of the C (66%). It appears, therefore, that newborn animals achieve a degree of renal functional compensation (~90%) which exceeds by far that observed by others in adult animals (~50%). The difference in IDBF between E and C is probably the consequence of a disproportionally higher increase in the tubular mass of the rapidly growing nephrons.

NEPHROLOGY

BODY COMPOSITION IN UREMIC RATS. Raymond D. Adelman, Jean Harrah and Malcolm A. Holliday, Dept. of Ped., Univ. of California, Davis and San Francisco.

Body composition has been studied in uremia to assess state of nutrition and hydration. However, compositional data, chiefly gathered by measurement of fluid compartments, has not been collated with actual organ weights. This was studied in young, growing male Sprague-Dawley rats made uremic (average BUN 100mg%) by partial nephrectomy. Extracellular fluid volume (ECV), determined by Br^{82} and total body water (TBW), determined by H_2O, were measured and animals sacrificed for removal of adrenals, brains, hearts, kidneys, livers, and right paravertebral muscles. Uremic rats weighed less than control rats (279gm vs 311gm*). ECF and heart size were relatively greater in uremic animals (25.2% vs 22.6%**; 0.0816gm 0.0687gm**+), probably indicating an effect on the cardiovascular system of uremia even when moderate. Absolute intracellular fluid volume (TBW-ECV) (133cc vs 144cc), liver (2.98gm vs 3.60gm*), muscle mass as reflected by 24 hr urine creatinine (8.26mgm vs 9.70mgm *), and total body solids (82.5gm vs 104.1gm**) were reduced in uremic rats either more than, or in proportion to, reduction in body weight. Absolute brain size was equal.

*P<.05 **P<.01 +dry organ weights reported

GLOMERULAR SIALIC ACID IN PROTEIN OVERLOAD PROTEINURIA Edward B. Blau and Rebecca L. Felt, Univ. of Pittsburgh School of Med., Children's Hosp. of Pittsburgh, Dept. of Ped., Pittsburgh

Sialic acid on the foot processes of the glomerular epithelial cell may be essential to maintain the gel filtration properties of the glomerular capillary filter. A decrease in glomerular sialic acid has been found in rats with experimental nephrotic syndrome and in children with nephrotic syndrome. Protein overload with heterologous albumin induces a degree of proteinuria similar to that found in aminonucleoside nephrosis but without the generalized epithelial cell foot process fusion found in aminonucleoside nephrosis. If the proteinuria induced by heterologous albumin overload was not associated with a significant decrease in glomerular sialic acid, it could be more safely assumed that the decreased concentration of glomerular sialic acid found in experimental and human nephrosis was a primary cause of proteinuria. Proteinuria greater than the range of control rats (25) was induced in 45 of 54, 100g, male rats by 4, daily intraperitoneal injections of 750 mg of bovine serum albumin. Glomerular sialic acid was determined histochemically by the colloidal iron reaction. The intensity of the glomerular colloidal iron stain in coded slides did not differ between control rats and the experimental, suggesting that proteinuria alone does not cause a decrease in glomerular sialic acid and that the decreases in glomerular sialic acid previously reported are significant in the pathogenesis of proteinuria.

SALT WASTING NEPHROPATHY OR "PSEUDOHYPOALDOSTERONISM" IN TWINS. Marcos N. Alvarez, Nicholas D. Barnes, and Gunnar B. Stickler. Mayo Clinic and Mayo Foundation, Rochester, MN.

At 1 month of age, dizygotic twins presented with failure to thrive, hyponatremic dehydration, and hyperkalemia. Renal function and glucocorticoid production were normal. Routine fluid and electrolyte replacement failed to correct the dehydration, and the administration of desoxycorticosterone gave no response. Urinary aldosterone levels were consistently elevated, and urinary excretion of sodium was disproportionately high. The patients responded to a daily supplementary intake of 3 g of sodium chloride, with correction of the hyponatremia and dehydration and return of serum potassium concentrations to normal. Salt supplementation was discontinued after 15 months. The twins continued to thrive on regular diet and maintained normal levels of serum sodium and potassium, yet their urinary and plasma aldosterone levels remained high. The observations suggest that the defect (1) may be familial and genetic, (2) may be caused by failure of the renal tubules to respond to aldosterone, and (3) is correctable by increased intake of sodium chloride.

THE UTILITY OF SINGLE INJECTION CLEARANCES OF CHEMICAL INULIN AND PAH IN CHILDREN WITH OBSTRUCTIVE UROPATHY. Frank G. Boineau, Brigitta Peterson, Alfred Scherzer, and John E.Lewy. Cornell Univ. Med. Col.-N.Y. Hosp., Dept. of Ped., New York.

Children with obstructive uropathy present difficult problems in the measurement of renal function due to their retention of urine within the urinary tract. The single injection (SI) of isotopically labelled markers for the estimation of glomerular filtration rate(GFR) and renal plasma flow(RPF)has been shown to be accurate when compared with constant infusion (CI) methods. The use of chemical inulin and PAH offers the further advantage of avoiding the injection of radioisotopes in children. We have compared CI and SI clearances using chemical inulin and PAH in eight children aged 4-11 yrs.,with obstructive uropathy due to meningomyelocele. All had neurogenic bladders with poor emptying or ileal conduits but normal upper tracts on IVP. Urine was collected during CI clearance periods by an indwelling catheter in the patient's bladder or ileal conduit.

Inulin clearance was 128.4± 8.5 (SEM) when estimated by SI and 129.4±13.3 ml/min/1.73 M^2 when estimated by CI (r=0.809). PAH clearance was 615.0±74.6 by SI and 506.4±59.7 ml/min/1.73 M^2 when estimated by CI (r=0.920). The SI of chemical inulin is thus comparable to CI of inulin as a method for estimating GFR in patients with obstructive uropathy. PAH clearances on the other hand were consistently higher when measured by SI than by CI techniques and did not provide a comparable estimate of RPF.