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ORGAN SPECIFICITY OF COMPENSATORY GROWTH FOLLOWING PNEUMONECTOMY AND NEPHRECTOMY. I. Sosenko, A. Boyer, H. Zinman, B. Smith. Harvard Medical School, Dept. of Pediatrics, Boston, MA.

Pneumectomy produces compensatory growth in the contralateral lung. Nephrectomy stimulates compensatory growth of the unoperated kidney. The mediator of this compensatory growth is thought to be a somatomedin (Am. Rev. Resp. Dis. 121:701, 1980). To determine whether this compensatory growth is specific to the organ system undergoing surgical intervention, we performed the following surgeries on three groups of rats: left pneumectomy (11 rats), left nephrectomy (11 rats), and sham chest surgery (10 rats). Seven days following surgery rats were sacrificed and organ weights were measured:

GROUP	RT. LUNG (g)±SD	RT. KIDNEY (g)	LIVER (g)
L. Pneumectomy	1.016±0.166	1.080±0.224	10.381±1.90
p	<0.03	NS	NS
Sham	0.849±0.167	1.087±0.147	10.586±1.82
p	NS	<0.001	NS
L. Nephrectomy	0.845±0.148	1.322±0.119	10.623±1.15

Left pneumectomy produces significant compensatory growth of right lung without changing kidney or liver size. Left nephrectomy similarly results in compensatory growth of right kidney without effect on lung or liver weights. These observations suggest that the somatomedins mediating compensatory growth of lungs and kidney may be produced and act locally at the target organ site or may represent two distinct biological activities. SUPPORTED BY: N.I.H. 1R01HL 25907-01

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INTRA(U) AND EXTRAUTERINE(EU) DEVELOPMENT OF RENAL URIC ACID CLEARANCE(CUA) IN HUMAN NEONATES. F. Bruder Stapleton and Sheldon B. Korones. (Spon. by Billy S. Arant, Jr.) Dept. of Pediatrics, Univ. of Tenn. Ctr. for Health Sciences, Memphis, TN.

Transport of organic acids in the developing kidney has been studied extensively utilizing para-aminohippurate; however, relatively little is known about the renal handling of the endogenous organic acid, uric acid, during early development. IU levels of CUA were examined by clearance studies performed within 48 hrs of birth in 16 term and 22 stable infants 29-37 wks gestational age (GA). Creatinine clearance(CCr) $r=0.433$, CUA $r=0.326$ and filtered UA $r=0.365$ increased with GA. Fractional urate excretion(FEUA, %) declined with GA(x), $r=0.217$, $r^2=0.02$, $r=-0.5$, $P<0.01$. Serum urate(SUA) also declined with GA, $r=-0.456$. IU levels of FEUA were unrelated to SUA, FE Na or urine flow rate. IU values were: (*mean ± SE) GA, wks(n) 29-32(6) 33-34(12) 35-38(4) 40(16) CCr, ml/min 0.69±0.13* 1.35±0.25 1.38±0.16 2.73±0.39 CUA, ml/min 0.45±0.06 0.73±0.14 0.69±0.12 1.17±0.25 FEUA, % 0.66±0.04 0.51±0.04 0.42±0.05 0.43±0.03 SUA, mg/dl 7.94±1.07 6.38±0.66 5.93±1.51 5.03±0.41 EU maturation of CUA was examined in 33 clearance periods obtained at weekly intervals in 19 of these infants, GA 29-35 wks. FEUA was inversely related to conceptional age(CA=IU+EU), $y=1.05-0.021x$, $r=-0.42$, $P<0.01$. No relationship was observed between CA and CUA, $r=-0.04$ or SUA, $r=-0.26$. SUA reached a nadir by 1-2 wks EU age regardless of SUA at birth. We conclude that FEUA is extremely high during early development and factor(s) other than glomerular filtration or SUA result in the IU and EU decline in FEUA.

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EFFECTS OF ASPHYXIA ON REGIONAL BLOOD FLOW IN THE NEONATAL BRAIN. B.S. Stonestreet, A. Laptook, R. Schanler, and W. Oh. Brown Univ. Prog. in Med., Women & Infants Hosp., Dept. of Ped., Providence, RI

Regional brain blood flow (RBBF) was studied during and after asphyxia (Asph) using radio-nuclide microspheres in 20, 1-6 day old lambs. Preterm lambs (133 days of gestation) were delivered alive after a fetal injection of glucocorticoid. A dead space added to the airway produced acidosis, hypoxia, and hypercarbia. Control lambs (no dead space but studied similarly) showed no changes in RBBF. Baseline values and % increase in RBBF during (Asph) were (M±SEM):

Brain Region	PRETERM		TERM	
	Baseline (ml/min/100gm)	Asph. %Increase	Baseline (ml/min/100gm)	Asph. %Increase
Total Brain	70± 8	320± 80	71± 9	262± 87
Cortex	60± 7	272± 66	66± 8	200± 67
Cerebellum	92±12*	291± 84	82±10*	272± 81*
Brain Stem	82±10*	433±105*	64± 9	470±183
Medulla	94±12*	481±120*	77±14*	415±142*

*p<0.05 compared to cortex.

The data showed that in both term and preterm subjects regional distribution of blood flow to neonatal brain is characterized by a similar pattern as in the fetus with a higher flow to the subcortical areas. Asphyxial insults resulted in increments in blood flow to all regions of the brain but more so in the subcortical areas suggesting a preferential protection of the vital areas of the brain. Supported by the March of Dimes.

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INSULIN RECEPTORS IN THE DEVELOPING FETAL LUNG. R.E. Ulane*, J.E. Graeber*, J.W. Hansen*, L. Liccini*, and M. Cornblath. NICHD, NIH, Bethesda, MD 20205.

Insulin affects metabolism through a receptor mediated mechanism. Since insulin has been associated with pulmonary metabolism, insulin receptor concentrations and binding affinities were studied in fetal lung development. Lung membrane preparations from fetal rats 15 to 21 days gestation were incubated with porcine 125 I-insulin. Binding equilibrium was reached at 5 hours at 4°C; maximum binding was achieved at pH 7.8. Insulin binding capacities and affinities were calculated by the method of least squares, assuming 1 ligand binds to 2 sites (Feldman, H.A., Anal. Biochem. 48: 317, 1972). The binding data exhibited a biphasic curve when analyzed by Scatchard analysis. The binding capacities of the membranes increased linearly from 175 ± 20 fmoles insulin bound/mg membrane protein at 15 days gestation to 517 ± 42 fmoles insulin bound/mg protein at 21 days gestation. This increase was even greater when expressed per mg DNA (105 ± 9 fmoles insulin bound/mg DNA at 15 days gestation vs. 465 ± 42 fmoles bound/mg DNA at 21 days gestation). In contrast, both the high and low association constants remained unchanged from 15 days (high affinity = $1.9 \pm .4$ nM $^{-1}$; low affinity = $0.03 \pm .01$ nM $^{-1}$) to 21 days gestational age (high affinity $1.5 \pm .5$ nM $^{-1}$; low affinity = $0.02 \pm .01$ nM $^{-1}$). Thus, the developing fetal lung has an increased capacity to bind insulin as it matures, and this increase is a function of receptor number, not a change in receptor affinity.

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EFFECT OF INTRAUTERINE GROWTH RETARDATION (IUGR) ON FATTY ACID SYNTHESIS. Rita A. Vileisis, John N. Fain, William Oh, Brown Univ. Program in Medicine, Women and Infants Hospital, Dept. of Ped., Providence, RI

The effects of IUGR on fetal triacylglycerol fatty acid (FA) synthesis was studied in 26 pregnant rats by 3 H $_2$ O injection. IUGR was induced by uterine artery ligation on one horn and litters from the opposite horn served as controls. The specific activity of FA at 19 days of gestation in the liver was lower in the IUGR fetus, as compared to controls, 44.6 ± 13 vs. 87.9 ± 10 cpm/ μ mole FA, ($p<0.05$). At 21 days of gestation, the specific activity of FA remains lower in the IUGR group, 40.6 ± 7.8 vs. 75.8 ± 9.8 cpm/ μ mole ($p<0.05$). In lung, the specific activity of FA was 25.7 ± 5.4 cpm/ μ mole in IUGR fetuses as compared to 46.6 ± 9 cpm/ μ mole in controls at 19 days ($p<0.05$). This difference persisted at 21 days (32.2 ± 2.4 vs. 42.6 ± 3.0 cpm/ μ mole in IUGR and controls, respectively, $p<0.05$).

The total fatty acid content per organ for both liver and lung was also reduced in the IUGR group. However, when expressed per unit organ weight, (gram) the IUGR fetuses have a significantly higher FA content at 21 days than the controls. This observation is probably related to a proportionally greater reduction in the accretion rates of substrates other than fat during growth. The data indicates that fetal growth retardation induced by placental vascular insufficiency is associated with reduced fat synthesis probably on the basis of reduced placental transfer of precursors for fatty acid synthesis. Similar phenomenon may be present in human IUGR infant.

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REGIONAL GLUCOSE UTILIZATION IN DEVELOPING RAT BRAIN. Donnal C. Walter, Masami Takayama and Stanley R. Nelson. (Spon. by Cheng T. Cho). University of Kansas

College of Health Sciences and Hospital, Depts. Pediatrics and Pharmacology, and Ralph L. Smith Research Center, Kansas City, KS Regional variation in the rate of glucose utilization (RGU) was determined in fetal and neonatal rat brains using 2-deoxy-D-[3 C]glucose (2DG) autoradiography. 2DG was administered to pregnant dams (I.V.) on gestational day (GD) 17 or GD 20, and to newborn pups (I.P.) at 1 or 10 days of age. On GD 17 RGU was highest in the entire periventricular germinal layer (PVGL), especially in the telencephalon. There was increased RGU in olfactory bulb, diencephalon and developing striatum. On GD 20, the density was more uniform, but increased RGU was still apparent in the PVGL. At both prenatal ages, RGU was very high in the optic cup. Outside the CNS, a high RGU was demonstrated in the developing skeleton, particularly the base of the skull. In placentas a heterogeneous pattern was observed with the highest RGU along the maternal surface. On the day after birth the greatest RGU was in the hippocampal allocortex. Stratification of the neocortex was apparent, and the PVGL was no longer visible. The rest of the brain had a fairly uniform density. By day 10 of life, the density pattern of the hippocampus was similar to that of an adult, and structures such as the medial geniculate body and mammillary body showed a modest increase in RGU. The highest RGU at this age was in vestibular nuclei, and increased RGU was found in cerebellar cortex layers. The regional variation in RGU may indicate areas of the CNS which are especially susceptible to metabolic stresses during development.