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PGE₁ AND NEONATAL CEREBRAL BLOOD FLOW. S. Chemtob, K. Beharry, J. Rex, N. Laudignon, J.V. Aranda. Depts. of Peds. and Pharmacology, McGill Univ - Montreal Child Hosp, Montreal, Canada.

Alterations in regional cerebral blood flow (rCBF) may be critical in the genesis of intra-ventricular hemorrhage and hypoxic-ischemia encephalopathy. rCBF regulation is mediated via several factors including prostaglandins (PG). The effect of PGE₁, the most commonly used PG in the newborn period, on rCBF was evaluated in 6 piglets, 1-3 d.o. Aorta, inferior vena cava, left ventricle and sagittal vein were catheterized to monitor blood gas, glucose and pressure. PGE₁ was administered in the left internal carotid artery in successive increasing doses of 10⁻⁷, 10⁻⁶, and 10⁻⁵ g/kg/bolus \bar{q} 20 mins, to awake piglets. rCBF was measured by radio-labelled microspheres (¹⁴¹Ce, ⁴⁶Sr, ⁸⁵Nb, ⁹⁵Sc) 45 sec post bolus.

Organ	0 dose g/kg	10 ⁻⁷ dose g/kg	10 ⁻⁶ dose g/kg	10 ⁻⁵ dose g/kg
Cerebrum	121.49±48.27	77.83±29.49*	109.34±47.48	117.14±66.91
Brain stem	124.50±54.69	78.13±29.49*	108.83±43.31	127.44±64.74
Total brain	120.56±47.83	77.28±28.13*	108.45±45.02	118.73±66.39

Values are rCBF \bar{x} ± S.D. (ml/min/100g); *p<0.05 compared to t=0. PGE₁ doses of 10⁻⁷ g/kg produced a 40% decrease in rCBF. In contrast, no effect was observed at higher doses. Blood pressure and gases remained constant during the study. There was no correlation between blood pressure and rCBF at all doses of PGE₁. However, there was a positive correlation between cerebral resistance and aortic pressure and a negative one between sagittal P_{O2} and rCBF only at the dose of 10⁻⁷ g/kg PGE₁. This implies that physiological concentrations of PGE₁ (<10⁻⁷g/kg) as found in adult cerebral vessels, may contribute to neonatal rCBF autoregulation.

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PROTECTIVE ROLE OF BETAMETHASONE (B) ON RLF IN NEWBORNS WITH BIRTH WEIGHT OF <1000GMS. S. Chemtob, I. Kunos, A. Papageorgiou. McGill University, The SMD Jewish General Hospital Perinatal Unit, Montreal, Que., Canada.

Antenatal B has been shown to decrease the incidence and severity of RDS. Among low birth weight infants RLF remains the most common serious complication after intraventricular hemorrhage. Steroids have been used postnatally in an attempt to treat RLF, without success. However, the possible protective role of steroids has not been evaluated. In view of the extensive use of B in our center, we have assessed by multivariate analysis its effect on RLF. Among 204 infants in the 1000-1500gms category, no statistically significant difference was found between those who received B and those who did not. However, among the 51 infants weighing <1000gms B had significantly lowered the incidence of all grades of RLF from 40% to 17.9% (P<0.05). Moreover the relative risk for cicatricial RLF which occurred only in 5 male infants was 5.8 times lower in infants who received B (44.4% vs 7.7%). Although this difference, because of the very small number of infants reached only borderline statistical significance (P=0.06), it is noteworthy that 4 out of 5 infants who developed cicatricial RLF had not received B. In addition, the annual incidence of RLF in infants weighing <1000gms prior to 1978 (when extensive use of B was introduced) was 63.6%. It fell to 16.6% after 1978 (P<0.001). Discriminant analysis of the various risk factors revealed B to be a significant independent variable for infants weighing <1000gms. Therefore B appears to play a role in reducing the incidence and possibly the severity of RLF in this extremely high risk group of premature infants.

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SURFACTANT APOPROTEINS IN INFANTS WITH RESPIRATORY DISTRESS SYNDROME (RDS). S. Chida, H.W. Taeusch, D.S. Phelps, I. Frantze. Depts. of Pediatrics, Iwate and Harvard Medical Schools, Morioka, Japan and Boston, MA.

We have measured levels of pulmonary apoprotein (Apo) in tracheal aspirates (TA) of infants with RDS during the course of their treatment. This was done with an ELISA capable of detecting concentrations as low as 10 µg/ml in samples as small as 50 µl. The assay employs an affinity-purified rabbit IgG raised against human apoproteins. A similar assay was established to measure albumin (Alb) in the same samples. Determinations were also made on amniotic fluid (AF) of full-term infants and infants subsequently developing RDS. TA samples from infants with RDS were obtained within six hours of birth and then daily while intubated. Values shown below are from TA's soon after birth, and 3-4 days of age when the infants were recovering from RDS.

Description	Source	Apo µg/ml	Alb mg/ml	Apo/Alb µg/mg
Term infants	AF(n=24)	9.38	3.17	3.8
RDS infants	AF(n=12)	0.47	2.99	0.2
Infants-no RDS (<24h)	TA(n=18)	3.47	0.11	52.1
RDS infants (6h)	TA(n=13)	0.37	1.27	0.03
RDS infants (3-4d)	TA(n=6)	7.97	0.35	55.0

We conclude that this measure will be useful not only for prediction of RDS, but also for postnatal diagnosis and assessment of clinical course.

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FLUID RESPONSE TO OSMOTIC AGENTS IN THE RABBIT INTESTINAL LOOP. David A. Clark, Harry S. Dweck, West. Co. Medical Center, NYMC, Valhalla, New York.

High intraluminal osmolarity has been postulated in the pathogenesis of neonatal necrotizing enterocolitis (NEC). We examined the intestinal fluid response (volume of fluid per length of intestine) in seven weanling rabbits by injecting one ml. of various solutions into isolated intestinal loops. The solutions were 50% dextrose, vitamin E liquid, placebo for vitamin E, 100 nanograms of cholera toxin, normal saline, 10% calcium gluconate and sterile water. The osmolarity of each solution was determined prior to its injection and at four hours from loops with an adequate fluid response. The dextrose and cholera toxin provoked a significant intestinal fluid response. Although the osmolarity of the vitamin E solution and placebo were high, no fluid response was measured. Calcium gluconate provoked a fluid response although it is approximately isomolar. We conclude that osmolarity alone does not determine the intestinal fluid response. Intraluminal calcium may predispose the intestine to distention and may be involved in the etiology of NEC.

	Osmo - (Mosm/L)		Response (ml/cm)	P by ANOVA
	Pre	Post		
50% Dextrose	3000	381-566	1.16	< .01
Vitamin E	1110	-	.04	
Placebo	990	-	.09	
Cholera Toxin	305	300-318	1.12	< .01
Saline	300	-	.02	
Ca Gluconate	285	299-340	.81	< .01
Sterile Water	0	-	.03	

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THYROID HORMONES AND THE DUCTUS ARTERIOSUS. Ronald I. Clyman, Jeff Breall, Patrick Maher, Donnie Campbell, Francoise Mauray, CVRI and Dept. of Pediatrics, University of California - San Francisco and Mt. Zion Hospital, San Francisco, CA

We found that the incidence of PDA in 283 preterm infants was increased in those with serum T₄ < 6 µg/dl (day 6 value) versus those with T₄ > 6 µg/dl (< 1000 g:63 vs 33%; 1000-1250 g:27 vs 0%; 1251-1500 g:13 vs 5%, p < 0.02). To examine the role of thyroid hormones on the ductus arteriosus we used preterm lamb fetuses (118d, term is 147d) and infused them with T₃ or saline for 4d (plasma T₃ = 303 ± 215 ng/dl, ± SD vs. 18 ± 9 ng/dl; plasma T₃ in 1-7 d full term newborn lambs = 400-600 ng/dl). Following the infusion, we studied the ductus arteriosus from 13 fetuses prenatally and 14 fetuses postnatally (following C-section and ventilation for 4.5 h). The ductus was studied in vitro. There were no differences between prenatal ductuses from T₃ infused and control fetuses in their contractile response to O₂ and indomethacin or relaxation with PGE₂. Ductuses studied postnatally from T₃ infused premature lambs had a significantly decreased ability to contract and relax versus control lambs. Postnatal ductuses from T₃ infused premature lambs behaved like ductuses from postnatal full term lambs, i.e., there was a decreased ability to relax or contract in vitro. The persistence of ductus responsiveness in postnatal premature lambs (with low T₃) may account for the increased incidence of PDA in preterm human infants who have low neonatal T₃ and T₄ concentrations.

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POSTNATAL MOBILIZATION OF THE NEONATAL TISSUE WATER RESERVOIR: CONTRASTS BETWEEN RABBITS AND RATS. David M. Coulter and Timothy R. LaPine, Dept of Ped. Primary Children's Med Ctr, Univ of Utah, Salt Lake City, Utah

We measured total body H₂O content (ml/gm fat free dry weight) in neonatal rats from birth to 72 hours of age and compared these data with our earlier measurements in rabbits. At birth, H₂O (in rats) was inversely correlated with birth weight (BW) (r=-0.408, p=.007) and it fell significantly between birth and 24 h (p<10⁻¹¹) and 24-48 h (p<10⁻⁶) but remained constant thereafter. H₂O content at 24 and 48 hours was inversely related to weight gain.

The relationship between BW and H₂O is similar in both species. The inverse relationship between H₂O and weight gain at 24 and 48 h in rats is similar to that in rabbits at 72 h. However, reservoir water loss is essentially complete by 48 h in rats, while it continues until at least 72 h in rabbits.

This difference probably reflects different feeding patterns. Newborn rabbits feed once daily and their intakes vary substantially. In contrast rats feed almost continuously and their intakes are less variable.

These data suggest that the factors which establish the tissue H₂O reservoir are similar in these two species and that regulation of reservoir loss is also similar. The differences in rate of reservoir loss probably reflect different availability of milk.

(Spon. by G. Chan)