1206

FETAL LUNG PHOSPHOLIPID SYNTHESIS AND MATERNAL HYPERGLYCEMIA. T. Allen Merritt, Elsa Kirkpatrick, Louis Gluck, Univ. of Calif. San Diego, Dept. of Pediatrics, La Jolla, Ca.

Fetal rabbits at 29 days gestation were delivered both from does made hyperglycemic with IV streptozotocin (S) (75mg/kg) prior to conception & from control (C) does. Fasting maternal serum glucose levels at 29 days gestation were 153±43.7mg/dl in S does & 99.4±19.7mg/dl in C. Fetal glucose levels immediately after cesarean section were 84.8±10.3 S & 75.3±23.1 C. Lungs from both groups of fetuses were homogenized, an aliquot reserved for parenchymal phospholipid determinations, & microsomal fractions isolated from the remainder by density gradient centrifugation. Microsomal synthesis of phosphatidylcholine (PC) using ^{14}C choline chloride, phosphatidylinositol (PI) using ^{3}H myoinositol, & phosphatidylglycerol (PGL) from ^{14}C aglycerol-3-phosphate as substrates were determined in vitro & expressed as pmole/mg protein/min.

	PC	PI	PGL
Control	1422.5±67.2	736.5±50.2	55.7±21.2
Streptozotocin	1316.0±220.9	636.3±78.0	99.3±15.9

Fetal lung microsomal PC synthesis during maternal hyperglycemia was unchanged from control; however, synthesis of minor phospholipids showed a decrease in PI & an increase in PGL synthesis during maternal hyperglycemia. Our results differ from reports of decreased PC in increased glucose environment in lung tissue culture & from reports of decreased PGL synthesis in adult lung tissue from streptozotocin treated rabbits.

(Supported by HD-05292 and HD-04380)

1207

STRUCTURAL FEATURES OF CONTINUED HYPOXIA ON LARGE PULMONARY ARTERIES OF RAT. Barbara Meyrick and Lynne Reid (Spon. by Alexander Nadas) Harvard Medical School/Children's Hospital Medical Center, Department of Pathology, Boston, MA.

Hypoxia produces muscularization of the peripheral normally non-muscular regions of pulmonary artery. In addition, medial thickening is found in the large already muscular arteries and is known to be associated, in certain congenital heart diseases, with narrowing of internal lumen diameter.

The present study traces the development of increased wall thickness in the muscular pulmonary artery at the hilum, seen in rats with hypoxia-induced pulmonary hypertension. Hypertension was produced by exposure to half an atmosphere for 1-52 days. For this study, arteries and airways were distended and fixed with glutaraldehyde using a simultaneous injection technique. All coats of the pulmonary artery are affected. The first change is apparent from Day 3, hypertrophy of endothelial cells and adventitial fibroblasts with increased connective tissue, all leading to thickening of the coats. By Day 7, the medial coat also is increased, due at first to hypertrophy of smooth muscle cells and later to increased connective tissue. Uptake of ^{3}H-thymidine shows an early and marked increase in mitotic activity of fibroblasts and endothelial cells but smooth muscle cells show little increase. On removal from hypoxia, wall thickness decreases but lumen diameter does not increase.

1208

NITROGEN WASHOUT (NW) TECHNIQUE FOR THE TREATMENT OF PULMONARY INTERSTITIAL EMPHYSEMA (PIE) IN NEWBORN INFANTS. Stephen Minton, Michael Wyman, Peter Richardson. (Spon. by Lowell Glasgow) University of Utah Medical Center, Department of Pediatrics, Salt Lake City, Utah

We describe a nonsurgical treatment for severe hyperinflation of the lung due to PIE. PIE occurs frequently in mechanically ventilated newborn infants (NBI) with respiratory distress syndrome (RDS). There is a significant increase in morbidity and mortality associated with PIE. We have adapted a modification of the method of NW proposed by Chernick and by Rhodes to the treatment of PIE. The rationale is replacement ("washout") of trapped nitrogen by oxygen, which is then absorbed by blood. Inspired fraction of oxygen (F_IO_2) was raised .2-.5 while PEEP and peak inspiration pressure (PIP) were decreased. After a 2-6 hour treatment, the F_IO_2 was weaned to previous settings. 4 NBI were treated with this regimen.

PaO_2 improved in all patients, allowing a decreased F_IO_2 at both 4-6 hrs and 24 hrs post NW. A progressive improvement was seen in ventilation as estimated by $PaCO_2$ and ventilator settings so that by 24 hrs post NW all patients had lower arterial PCO_2, with unchanged or decreased ventilator support. Chest x-rays at 4-6 hrs and at 24 hrs improved over pre NW films in all cases.

	ΔF_IO_2	ΔpO_2	ΔpCO_2	ΔRR	ΔPIP	ΔPEEP
post 4-6 hrs	-5%	8	-2	+1.5	0	-1.5
post 24 hrs	-7.5%	0	-7	-6	-1.4	-1

Three of the infants survived. We have found NW to be a useful and, thus far, a safe method of treating PIE in NBI with RDS and PIE.

1209

BRONCHIAL HYPERREACTIVITY IN PATIENTS WITH CYSTIC FIBROSIS AND ASTHMA. Ian Mitchell, Roland Woenne, Henry Levison. Research Institute, Department of Pediatrics, Hospital for Sick Children, Toronto, Ontario, Canada.

Wheezing is a common feature of cystic fibrosis (CF). CF patients also have an increased incidence of allergic rhinitis & positive skin tests. It is important to assess how much these contribute to the wheezing in CF. We used a non-allergenic bronchial challenge (methacholine - MCh) in 113 CF patients and 50 asthmatic children to define the relationship between CF & asthma. A positive response to MCh was obtained in 51% of the CF patients and 98% of the asthmatics. MCh response occurred with all degrees of severity of CF, but the mean FEV_1 & MMEF were significantly lower in the responders, compared with the non-responders ($p<0.001$). MCh response was not related to age or sex. MCh response was more likely in CF patients with a history of wheezing ($p<0.001$) and infantile eczema ($p<0.05$). The existence of allergic rhinitis, multiple positive skin tests, nasal polyps & early chest infection was not related to the response to MCh challenge. In the CF responders the dose of MCh was higher ($p<0.001$), the rate of fall of FEV_1 after response was slower ($p<0.001$), spontaneous recovery took longer ($p<0.001$) and the response to bronchodilator after challenge was poorer than in the asthmatics. Patients with CF thus have a high incidence of bronchial hyperreactivity which can be quantitatively differentiated from the hyperreactivity of asthma by the response to MCh.

1210

IMMUNOTYPING AND OPSONIZATION OF MUCOID STRAINS OF PSEUDOMONAS, Michael J. Mitchell and Robert S. Baltimore (Spon. by Howard Pearson), Yale U. Sch. of Med., Depts. of Ped. and Epid., New Haven, Ct.

In order to study the typing and immunologic specificity of mucoid strains of Pseudomonas aeruginosa (mPa), 56 mPa were collected from the sputa of 27 patients with cystic fibrosis. mPa isolates were not typeable by agglutination with antisera to the seven Parke-Davis immunotypes ("protective antigens"). All mPa became non-mucoid (nmPa) by serial passage on agar. 47 of these 56 nmPa (84%) agglutinated with one or more of the antisera. For analysis of immunotype prevalence, only the first typeable isolate from each patient was studied. Only 5 (19%) were agglutinated by a single antiserum (4 type 1 and 1 type 2), but 20 strains agglutinated more strongly with one than the others. Of these 25 strains, there were 9 type 1, 1 type 2, 1 type 3, 8 type 4, 0 type 5, 6 type 6 and 0 type 7.

Since the immunotype antigen confers opsonic specificity, 16 of the strains were tested for opsonization with the homologous immunotype antisera. 15/16 nmPa were opsonized with antiserum (as) plus complement (c) or c alone and one was resistant. Of mPa variants of the same strains, 7/16 could not be opsonized by as + c; 4 were opsonized by c alone; and 5/16 were opsonized by as + c (but 3 of these required a higher concentration of as than the corresponding nmPa). These data suggest that along with colonial morphologic transformation from mPa to nmPa, there is an exposure of the immunotype antigen to agglutination and opsonization by specific antiserum.

1211

RELATIONSHIP BETWEEN RESPIRATOR WAVEFORM AND OXYGENATION-VENTILATION IN RESPIRATORY DISTRESS SYNDROME (RDS) H.Modanlou & P.Nelson (Spon. by D. Sperling). Division of Neonatology, Miller Children's Hosp., Long Beach, CA.

Because of high airway resistance and low lung compliance in severe RDS, it has been suggested that a respirator able to produce a square pressure waveform may provide better oxygenation & ventilation. To test this hypothesis we made a study of 15 neonates with severe RDS. Two most commonly used infant respirators, one a time-cycled, continuous flow, generating modified sine wave with slow ascending inspiratory limb and slow descending expiratory limb (I), and a second, generating a square wave with rapid inspiratory and expiratory limb (II) were used. Neonates were stabilized for a period of 6-8 hrs on respirator I when pH, PaO_2 and $PaCO_2$ were determined before switching to respirator II. Respirators were matched for FiO_2, Peak Inspiratory Pressure, End Expiratory Pressure, I:E ratio and Duration of Positive Pressure (DPP) or the area under the curve of respiratory waveform. After 20 minutes on respirator II pH and blood gases were done before switching back to respirator I, and again, after 20 min, pH and blood gases were obtained. Values were compared for the two variables of equal DPP and equal area under the curve. Statistically significant differences were found for PaO_2 (71±16vs62±16 Torr, $p<0.05$ for equal DPP; and 71±16vs52±14 Torr, $p<0.005$ for equal area under the curve) but not for pH or $PaCO_2$ for either variable. This study reveals that respirators generating modified sine wave respiratory waveform provide better oxygenation in severe RDS. This may be due to an increase in alveolar recruitment when low compliant lungs are gradually inflated and deflated.