

**1807** THE USE OF DYNAMIC COMPLIANCE (CDYN) TO PREDICT SURVIVAL IN INFANTS WITH RESPIRATORY DISTRESS SYNDROME (RDS), Robert P Novo, Cathy Smith, Michael Graff, I. Mark Hiatt, Thomas Hegyi, Division of Neonatology, Department of Pediatrics, Monmouth Medical Center, Long Branch, N.J.

Cdyn measurements within the first three days of life accurately predicted survival in 57 preterm infants with RDS. In 43 survivors (BW 1310+/-630g, GA 30+/-3wks) Cdyn was measured on 2.4+/-1.4 day of life and in 14 nonsurvivors (BW 1200+/-660g, GA 28+/-4 wks) on 2.7+/-1.7 day. All nonsurvivors died from respiratory failure in the first two weeks of life. Cdyn of survivors was 0.83+/-0.37ml/cm and of nonsurvivors 0.45+/-0.25 ml/cm (p 0.01). With a Cdyn of 0.45ml/cm as a threshold for survival, 9/11 infants with Cdyn below this level died, and 41/46 with Cdyn above this survived for a specificity of 81% and a sensitivity of 89%.

Eight infants with pneumothorax (PT) had a Cdyn of 0.71+/-0.50ml/cm compared to 0.77+/-0.36ml/cm among 49 without PT. Four survivors with PT had a Cdyn of 1.08+/-0.48ml/cm compared to four nonsurvivors with PT whose Cdyn was 0.34+/-0.24ml/cm (p 0.05). A Cdyn of 0.45ml/cm predicted 3/3 deaths in infants with lower scores, and 4/5 survivals in those with higher measurements. In this subgroup specificity was 100% and sensitivity 80%.

Cdyn measurements during the first three days of life are useful in predicting outcome in infants with respiratory failure due to RDS.

**1808** ASSOCIATION BETWEEN GASTROESOPHAGEAL REFLUX (GER) LARYNGOMALACIA (LA) AND HYPERREACTIVE AIRWAYS (HRA), IN CHILDREN - A NEW TRIAD. Eliezer Nussbaum (Spon. by Houchang Modanlou). Pediatric Pulmonary Division, Miller Children Hospital of Long Beach and The Department of Pediatrics, University of California, Irvine.

Twenty seven of 77 (35%) children with laryngomalacia by flexible fiberoptic laryngoscopy had associated GER by combined continuous esophageal pH study, barium swallow and esophagoscopy. In addition, all 27 children had HRA by clinical and bronchoscopic criteria. Theophylline therapy was discontinued 24 hours prior to esophageal pH study achieving serum theophylline levels <5mg/cc. Four children underwent diagnostic bronchial lavage which was positive for lipid-laden-alveolar macrophages by oil-red-O-stain technique. All others had only bronchial wall edema, hyperemia and excessive bronchial secretions. There were 22 males (81.5%) and 5 females (18.5%), mean age of 8.8 month (range 2 months - 26 months). During the 5 year study we identified 225 children with various diagnoses of upper airway obstruction (UAO) utilizing the Olympus BF 3C4 pediatric flexible fiberoptic bronchoscope (PFFB). Therefore, the unique combination of GER, LA and HRA represents an incidence of 12% (27/225) among our patients with documented UAO. The results of our study suggest: (1) The complex of GER, LA and HRA may represent an altered balance of mechanical forces within the large airways which is vagally mediated by irritant-cough receptors and provoked by aspiration. (2) PFFB is a useful tool in documenting this relationship. (3) Lipid-laden-alveolar macrophages by PFFB may explain the direct relationship between GER and HRA in some children.

**1809** LUNG TISSUE PHOSPHATIDYL CHOLINE(PC)AND DISATURATED PC(DSPC)IN HYPERGLYCEMIC FETAL RABBITS IN VIVO.

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The pathophysiology for increased incidence of hyaline membrane disease seen in infants of diabetic mothers is controversial. The effects of hyperglycemia on lung tissue PC and DSPC content was studied using rabbits. The femoral vein was catheterized in pregnant rabbits on 26th day of gestation. Hyperglycemia was induced by continuous infusion of D<sub>30</sub> 0.3% saline (Gr1) over a 46-48 hour period. The two control groups consisted of 0.9% saline infusion (Gr2) and Sham operated (Gr3). On 28th day of gestation C-hysterectomy was performed. Lungs were removed and analysed for total phospholipid (TPL), PC and DSPC content. Serum insulin and glucose were determined on doe's and fetal blood. Data on 10 rabbit does in Gr1, 7 rabbit does in Gr2 and 9 rabbit does in Gr3 are available. Both serum glucose and insulin were higher in does and fetuses in Gr1 compared to Gr2 and Gr3. As a % of TPL, PC and DSPC were not different in any of the 3 groups. There was no difference between male (M) and female (F) fetuses in relation to the different treatment groups.

Mean±SD	Group 1		Group 2		Group 3	
	M	F	M	F	M	F
PC%TPL	44.3±7.0	46.6±8.0	49.3±3.0	52.1±4.0	44.1±9.0	44.8±9.0
DSPC%TPL	24.2±5.0	22.9±4.1	21.3±4.0	21.6±4.3	19.6±3.2	20.9±3.2

These data suggest that hyperglycemia induced by the infusion of high concentration of dextrose for about 6% of gestational time does not alter lung tissue PC and DSPC content in fetal rabbit in vivo at 26-28 days of gestation.

**1810** LUNG TISSUE PHOSPHATIDYL GLYCEROL(PGL)IN HYPERGLYCEMIC FETAL RABBITS IN VIVO. Daksha M. Patel, Philip G. Rhodes, Cyril D'Cruz and Edward F. Meydrech (Spon. by Blair E. Batson) Univ. of Mississippi Med. Ctr., Departments of Pediatrics, Pathology and Biostatistics, Jackson, MS.

To further understand pathophysiology for increased incidence of hyaline membrane disease seen in infants of diabetic women, a rabbit model was chosen to determine lung tissue PGL in hyperglycemic fetal rabbits in vivo. Hyperglycemia was induced by continuous infusion of D<sub>30</sub> 0.3% saline (Gr1) via a catheter introduced in femoral vein of a pregnant doe on the 26th day of gestation. After 46-48 hours of infusion C-hysterectomy was performed. Lungs were removed and analysed for total phospholipids and PGL. Serum insulin and glucose levels were determined on doe's and fetal blood. The data on 7 rabbit does in Gr1, 6 rabbit does in Gr2 and 7 rabbit does in Gr3 are available. Both serum glucose and insulin were higher at delivery in does and fetuses in Gr1 compared to Gr2 and Gr3. As a % of TPL, PGL data were divided into <2% or >2% groups. There was no difference detected in any of the groups. There was no difference between Male (M) and Female (F) fetuses in relation to the different groups.

PGL % TPL	Group 1	Group 2	Group 3
Male <2%	1	2	0
>2%	6	4	6
Female <2%	1	2	1
>2%	6	4	5

These data suggest that hyperglycemia of about 6% of gestational time duration induced by infusion of highly concentrated dextrose solution, does not alter lung tissue PGL in fetal rabbit in vivo at 26 to 28 days of gestation.

**1811** EFFECT OF GROUP B STREPTOCOCCUS (GBS) ON PULMONARY VASCULAR PERMEABILITY. Keith J. Peevy, Ronald C. Allison, Erwin M. Hernandez, Stephen A. Chartrand, and Robert C. Boerth, University of South Alabama, College of Medicine, Depts. of Peds., Pharm., and Medicine, Mobile, AL.

The effect of GBS sepsis on pulmonary vascular permeability has not been well-defined. To study this phenomenon, the left lower lobes of canine lungs were removed and cannulated for perfusion with heparinized autologous blood, in the presence of zone III airway pressures. Two indices of permeability, filtration coefficient (Kf) and isogravimetric capillary pressure (Pci), as well as pulmonary vascular resistance (R), were determined in a baseline period and 1, 2, and 3 hours after the infusion of heat-killed GBS (10<sup>9</sup> cells/ml of blood). Values for Kf (gm/min/cmH<sub>2</sub>O/100gm lung) at each time period in GBS-infused (Group I) and control (Group II) lobes are listed below.

Group I (N=6)	Kf (gm/min/cmH <sub>2</sub> O/100gm lung)	BASELINE			
		1 Hr.	2 Hr.	3 Hr.	
Group I (N=6)	Kf	.216±.02	.286±.03	.339±.04	*.460±.13
Group II (N=5)	Kf	.237±.02	.219±.05	.235±.05	.228±.04

Comparison of values between Groups I and II for Kf, Pci (cmH<sub>2</sub>O) and R (cmH<sub>2</sub>O/L/min/100gm lung) showed no significant differences at any time period. However, Kf in GBS-infused lungs (Group I) was increased over baseline values at each time period and was significantly different at 3 Hr. We conclude that GBS induces a significant increase in pulmonary vascular permeability which is subtle and evolves slowly.

**1812** PULMONARY MECHANICS DURING CONVENTIONAL MECHANICAL VENTILATION AT RAPID RATES IN RABBITS WITH SALINE-LAVAGED LUNGS. Julio Perez Fontan, Barbara Turner, Gregory P. Heldt, George A. Gregory, University of California in San Francisco, Cardiovascular Research Institute, San Francisco.

Rapid ventilatory rates are commonly used during conventional mechanical ventilation of infants with respiratory distress syndrome to improve pulmonary gas exchange while supposedly reducing barotrauma to the lungs. To understand the effects of this method of ventilation on pulmonary mechanics, we measured inspiratory (R<sub>I</sub>) and expiratory (R<sub>E</sub>) airway resistance; pulmonary compliance (C<sub>L</sub>); tidal volume (V<sub>T</sub>); and functional residual capacity (FRC) at ventilatory rates of 30, 60, and 90 breaths/min in anesthetized and paralyzed rabbits whose lungs had been saline-lavaged with 40 ml/kg of normal saline. The rabbits were ventilated with tracheal pressures of 30/6 cm H<sub>2</sub>O (mean = 11.2), and had a P<sub>O</sub><sub>2</sub> and P<sub>CO</sub><sub>2</sub> of 40-60 torr and 35-45 torr respectively (F<sub>I</sub>O<sub>2</sub>=1). I:E ratio was kept constant at 1:3. We found that R<sub>E</sub> was approximately 50% lower than R<sub>I</sub> (P=0.01). R<sub>I</sub> decreased at higher ventilatory rates (0.046±0.019 vs. 0.019 ±0.008 at rates of 30 and 90 breaths/min, P=0.05). C<sub>L</sub> did not change with ventilatory rate (0.30±0.10 vs. 0.28±0.15 ml/cmH<sub>2</sub>O/kg at rates of 30 and 90 breaths/min). V<sub>T</sub> and FRC were also rate-independent (6.3±2.7 and 12.4±4.4 ml/kg at a rate of 30 vs. 5.1±0.5 and 11.9±3.5 ml/kg at a rate of 90, respectively). These results demonstrate a rate-independent behavior of the saline-lavaged lung, except for the decrease in R<sub>E</sub>. The decrease in R<sub>E</sub> suggests dynamic dilatation of the conducting airways during inspiration at rapid ventilatory rates. Dynamic dilatation of the airways may represent a potential mechanism of barotrauma, reducing the benefit derived from the lower tracheal pressures needed to achieve adequate gas exchange at rapid ventilatory rates. R<sub>E</sub> may be a sensitive measurement of this effect.