

1177 THE RELATION OF FLUORESCENCE POLARIZATION VALUES TO LECITHIN SPHINGOMYELIN RATIOS (L/S) IN AMNIOTIC FLUID (AF). Thomas A. Blumenfeld, Raymond I. Stark, Inge Dyrenfurth, Vincent J. Freda, L. Stanley James, Div. of Perinatal Med., Coll. of P & S, Columbia Univ., N. Y.

Fluorescence polarization (FP) measures the microviscosity of phospholipid micelles. The technique has been evaluated in both artificial solutions and in AF and its usefulness in determining gestational age and lung maturity examined.

We have shown that in lipid dispersions of known composition and in amniotic fluid the FP value correlates directly with the L/S ratio. Gestational age was studied in 97 serial samples from 19 isoimmunized pregnancies. There was a significant change in slope of FP values vs. gestational age occurring between 29 to 35 weeks (mean = 31.5 wks). In single samples from 120 pregnancies a significant correlation was also found between FP and L/S.

	Mature FP (< 352)	Immature FP (>352)
Mature L/S (> 2)	88	0
Immature L/S (< 2)	9 (7.5%)	23

Thus FP values correlate well with both gestational age and lung maturity. The determination of fluorescent polarization is precise with a coefficient variation of 0.48%. It can be performed rapidly (45 min) and is technically easy. This physical method therefore offers a great advantage over the currently available chemical methods. (Supported by NHLI HL-14218)

1178 A COMPARISON OF MORTALITY AND MORBIDITY ASSOCIATED WITH PRESSURE-LIMITED AND VOLUME-LIMITED INFANT VENTILATORS IN THE TREATMENT OF SEVERE HYALINE MEMBRANE DISEASE - Stephen J. Boros, Children's Hospital, St. Paul, and Department of Pediatrics, University of Minnesota, Minneapolis, MN (Spon. by Edward L. Kaplan)

The effect of pressure-limited (PL) and volume-limited (VL) infant ventilators on mortality and morbidity in severe hyaline membrane disease was examined in a prospective controlled study. Criteria for mechanical ventilation were CPAP failure (PaO₂ <50 mm. Hg. at FiO₂ >0.8 and CPAP >8 cm. H₂O or PaCO₂ >70 mm. Hg.) or severe perinatal asphyxia. Consecutive patients were alternately assigned to either PL or VL infant ventilators. 22 infants (900-2600 gms; 27-36 wks. gest.) were ventilated with PL machines using low peak inspiratory pressures (mean Pmax = 29 cm. H₂O), relatively low PEEP (mean = 5.4 cm. H₂O) and prolonged inspiratory times. 20 additional infants (600-3350 gms; 26-42 wks. gest.) were ventilated with VL machines using essentially unlimited peak inspiratory pressures (mean Pmax = 62 cm. H₂O), PEEP (mean = 8.1 cm. H₂O) and prolonged expiratory times. There were no significant differences in mortality (PL=37%; VL=40%), or in the incidence of pneumothoraces (PL=32%; VL=45%), or bronchopulmonary dysplasia (PL=4.6%; VL=10%). Intraventricular hemorrhages and pulmonary hemorrhages occurred with equal frequency in both groups. These data fail to demonstrate any significant advantage of one ventilator system over the other, and fail to confirm the impression that limiting peak inspiratory pressures to <35 cm. H₂O significantly reduces the incidence of bronchopulmonary dysplasia.

1179 BACTERIOLOGY OF ASPIRATION PNEUMONIA IN CHILDREN. I. Brook and S.M. Finegold. Fairview State Hospital, Costa Mesa; Wadsworth V.A. Hospital; and UCLA Medical Center, Los Angeles, Ca. (Spon. by J.D. Cherry)

The bacteriology of aspiration pneumonia in institutionalized children and adults was determined by transtracheal aspiration. Forty-three patients were studied, including 10 adults and 33 children ranging from 2 months to 18 years in age (average 8.5 years). Ignoring *Staphylococcus epidermidis*, the 43 aspirates yielded 85 aerobic and 86 anaerobic isolates, demonstrating the polybacterial etiology of the infection. Anaerobic bacteria were isolated from 30 children (91%) and from 9 of 10 adults. The predominant anaerobes were *Bacteroides melaninogenicus* (18 isolates), *Fusobacterium* sp. (10), and anaerobic and microaerophilic gram-positive cocci (21); there were 8 isolates of *B. fragilis*. These organisms were proportionately distributed between children and adults except for relatively more *B. melaninogenicus* in children and more *B. fragilis* in adults. Pneumococci (10 isolates), group A streptococci (8) and *Haemophilus influenzae* (2) were recovered only from children and among 11 *Escherichia coli* isolates, 10 were from children (mostly under 6 years of age). The *Klebsiella-Enterobacter-Serratia* group, *Proteus*, *Pseudomonas* and alpha-hemolytic streptococci were proportionately more common in adults than in children. All subjects recovered with appropriate therapy. Anaerobic bacteria clearly play a role in aspiration pneumonia in children as well as in adults. The differences in aerobic bacteriology cited require different therapeutic approaches.

1180 CARDIOVASCULAR EFFECTS OF PROLONGED INSPIRATORY TIMES WITH CONTINUOUS POSITIVE PRESSURE VENTILATION (CPPV). David L. Brown, Philip J. Lipsitz, Joy S. Hugelberg, Norman Gootman, SUNY at Stony Brook, Health Sciences Center, Long Island Jewish-Hillside Medical Center, Division of Neonatology, New Hyde Park, New York.

The use of prolonged inspiratory time with CPPV has been recommended for the management of infants with the Respiratory Distress Syndrome. The cardiovascular effects of such inspiratory to expiratory (I:E) ratios were investigated in 5 piglets, (age 6 to 10 days), under 0.25% halothane anesthesia and decamethonium paralysis. Heart rate (HR), aortic blood pressure (AoP), renal (RF), femoral (FF), and carotid (CF) blood flows were measured at three I:E ratios (1:2, 2:1, and 3:1), at each of three levels of positive end expiratory pressure (PEEP), (2.5 and 10 cm H₂O). The cardiovascular parameters at the 2:1 and 3:1 ratios were compared to those of the control of 1:2 while PEEP, peak pressure, respiratory rate, and ventilation remained constant.

HR increased at both I:E ratios. Mean AoP exhibited variable changes at the 2:1 ratio, while at 3:1 there was a consistent decrease in AoP with maximum decrease of 17.8% at 10 cm PEEP. At the 3:1 ratio both RF and FF decreased at 5 and 10 cm PEEP. At the 2:1 ratio with 5 and 10 cm PEEP there was a decrease in CF ranging from 4.5% to 22.0%. CF decreased at 3:1 with all levels of PEEP with a mean decrease of 11.3% ± 1.6 at 5 cm and 13.3% ± 2.8 at 10 cm PEEP. These preliminary results indicate that adverse cardiovascular effects occur with the addition of prolonged inspiratory times to CPPV.

1181 ARTERIAL OXYGEN TENSION (PaO₂) MEASUREMENTS-SAFETY AND ACCURACY OF A NEW CATHETER SENSOR. Edwin G. Brown, Chung C. Liu, Francis E. McDonnell, Avron Y. Sweet and Sidney K. Wolfson. Dept. of Pediatrics, Mt. Sinai School of Med., New York, and Dept. of Surgery and Chemical Engineering, University of Pittsburgh, Pittsburgh.

Measuring PaO₂ in newborn infants receiving oxygen therapy is routine. The most reliable method requires intermittent sampling from an umbilical artery catheter or from a peripheral artery for analysis with a micro blood gas analyzer. Methods to continuously measure PaO₂ using indwelling catheters have been developed but many of them receive limited use because of inaccuracy, tissue injury, clotting and interference with the function for which catheters are intended. Oxygen measuring sensors which can be applied to the skin have been developed by others. This technique measures PaO₂ indirectly and can thereby serve only as a supplement for an accurate direct measuring method. We have devised a polarographic catheter electrode which is simply designed and made of materials with minimal thrombogenic activity. It does not interfere with blood pressure measurement or blood sampling through an end hole lumen. Our sensor is easily calibrated, accurate, and requires recalibration at 6-12 hour intervals. Micro clot analysis, aortic angiography, scanning electron microscopy of sensors and vessels, and haptoglobin determinations in baboons have shown minimal thrombus formation and red cell injury. The sensor responds rapidly and accurately to changes in PaO₂ in newborn infants and adults. It reveals clinically inapparent changes of PaO₂ caused by manipulation of the patient or respiratory equipment. A technique for continuously measuring PaO₂ has been developed which can complement and may substitute for laboratory techniques.

1182 THE RELATIONSHIP BETWEEN THE CHEST RADIOGRAPH, REGIONAL LUNG FUNCTION USING ¹³N₂, EXERCISE TOLERANCE AND CLINICAL CONDITION IN CHILDREN WITH CYSTIC FIBROSIS.

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We evaluated the role of the chest radiograph interpretation in children with cystic fibrosis in delineating localized abnormalities of ventilation and perfusion as well as the overall severity in relation to maximal mid expiratory flow rate (MEF), alveolar-arterial oxygen gradient, exercise tolerance (bicycle ergometer), and clinical severity. The upper and lower region of each chest radiograph was scored separately and compared with regional lung function tests (RLF) using the arrival and disappearance of boluses of radioactive nitrogen (¹³N₂) given by inhalation and infusion. Whilst the worse areas on the chest radiograph were found to correlate with similar regions on the RLF, (r=0.58) errors occurred in half of the cases when the radiograph alone was used to judge regional physiological derangement. Despite this, the total radiographic score correlated well with the total regional function, r = 0.62, p < 0.01. Of the other parameters, the radiographic score correlated well with the MEF, (r = 0.69, p < .01), maximum work expected, (r = 0.64, p < .01) and clinical grading, (r = 0.79, p < .001), but not with the (A-a) O₂ gradient. From this, we have concluded that the chest radiograph, whilst not an accurate index of local physiological abnormalities, does reflect the overall severity of the lung disease, exercise tolerance and clinical condition in cystic fibrosis.