**1183** EFFECT OF SYMPATHETIC STIMULATION ON PULMONARY SURFACTANT. Anthony J. Corbet, Phyllis K. Flax, and Arnold J. Rudolph (Spon. by Murdina M. Desmond). Department of Pediatrics, Baylor College of Medicine, Houston.

Pilocarpine (Pc) produces decreased surface tension in lungs of fetal rabbits at 27.5 days gestation, which effect is blocked with propranolol (Ped. Res. 10:459, 1976). Fetal rabbits of the same gestation were injected with Pc or saline, killed 3 hours later and the lungs lavaged. In Pc injected fetal rabbits recovered airspace phospholipid (PL) was 38µg per gram dry lung weight (± SE 3.4) compared with 23µg (± SE 2.7) in saline injected controls ($p<0.001$).

Isoxsuprine (Ix) but not phenylephrine injected 3 hours before delivery produced decreased surface tension in lungs of fetal rabbits at 27.5 days as shown by static pressure-volume curves. The lungs of Ix injected rabbits retained 47% total lung capacity at 5cm. water pressure compared with 25% in saline injected controls ($p<0.001$). This effect was blocked by propranolol, but not by phenoxybenzamine or atropine. The lungs of Ix injected fetal rabbits contained 83% water compared with 89% in saline controls ($p<0.001$), but an increased in PL could not be demonstrated, 25µg per gram dry lung weight compared with 23µg in saline controls. Decreased tension may result from increased concentration of surfactant at the surface. However at 26.5 days PL in lavage from Ix injected fetal rabbits was 25µg per gram dry lung weight compared with 14µg in controls ($p<0.001$). The data are taken as further evidence that the sympathetic nervous system controls the activity of pulmonary surfactant.

**1184** 100% $O_2$ BREATHING AND CEREBROSPINAL FLUID (CSF) CHANGES IN NEONATES. M. Davi, K. Sankaran, H. Rigatto. Univ. of Manitoba, Dept. of Ped., Winnipeg, Canada.

The inhalation of 100% $O_2$ for more than 30 sec increases minute ventilation ($\dot{V}_E$) in neonates. To discover whether this hyperventilation is due to cerebral vasoconstriction and brain ischemia we measured $\dot{V}_E$, alveolar $PCO_2$ ($P_ACO_2$) and CSF $PCO_2$, $PO_2$, pH and bicarbonate before and after the administration of 100% $O_2$. Subjects were 7 neonates (G.A.±S.E. 38±1.4 wks; B.W. 3,354±.370 gm; P.N.A. 3.8±1.9 days) who were being worked up for sepsis. $\dot{V}_E$ was measured with a nosepiece and a screen flowmeter. CSF samples were taken before and 7 min after continuous breathing of $O_2$. Results:

| | $\dot{V}_E$ L/min/kg | $P_ACO_2$ mm Hg | CSF $PCO_2$ mm Hg | CSF pH | CSF $HCO_3$ mEq/L | CSF $PO_2$ mm Hg |
|---|---|---|---|---|---|---|
| Before | .195±.014 | 42±2 | 51±2 | 7.31±.01 | 24±1 | 21±6 |
| After | .243±.009 | 37±2 | 45±2 | 7.33±.01 | 23±1 | 35±10 |
| p | <.025 | <.005 | <.025 | N.S. | N.S. | N.S. |

All values: Mean ± S.E.

These findings suggest that hyperventilation with 100% $O_2$ is associated with a decrease in alveolar and CSF $PCO_2$ and a tendency for CSF pH to increase. If central tissue ischemia were present, we would expect CSF $PCO_2$ to increase and pH to decrease. Because they change in the same direction as arterial $PCO_2$ and pH are known to change, the hypothesis that 100% $O_2$ stimulates breathing by producing central ischemia is untenable.

**1185** RELIABILITY OF IMPEDENCE AND PAD TRANSDUCER METHODS IN LONG TERM RESPIRATORY WAVE FORM RECORDINGS IN INFANTS. J.J. DeCamilla, Jr., R.A. Hoekelman, and R.S. Cooper, Dept. of Ped., Sch. of Med., Univ. of Rochester, Rochester, N.Y.

The two most widely used respiratory monitors are the Pad Transducer System (PTS) and the Direct Impedence System (DIS). This study was designed to determine the reliability of both methods of monitoring.

Ten newborn infants were monitored lying in 8 different positions with a 2 channel oscilloscope displaying the respiratory signals of both systems. These were documented through videotaping (with observer voice-over) and an Avionics 2 Channel tape recording. Simultaneous ECG recordings were made.

Throughout all recordings, shifts in amplitude, duration and general shape of the signal without change in the infant's position were observed. ECG override occurred in 56-100% of the PTS signals and in 38-88% of the DIS signals depending on the infant's position. Motion artifact and electrical interference causing false positive or false negative recordings occurred in 63-100% of both signals depending on the infant's position.

The reliability of each unit in monitoring apnea and in the study of the respiratory patterns of specific clinical entities in infants is placed in serious question.

**1186** EFFECTS OF CRYING ON INTRATHORACIC PRESSURE AND ARTERIAL BLOOD PRESSURE IN INFANTS RECOVERING FROM RESPIRATORY DISTRESS SYNDROME (RDS). Robert Dinwiddie, William W. Fox, Jacob G. Schwartz, Bakulesh D. Patel, Thomas H. Shaffer, (Spon. by Jean A. Cortner), Univ. of Pa. Sch. of Med., Depts. of Peds. & Physiol. and The Children's Hospital of Philadelphia, Philadelphia, PA.

Although crying vital capacity has been recorded in infants recovering from RDS, little is known about physiological effects of vigorous crying at this stage of the illness. Detailed analysis of intraesophageal pressure (Pes) and abdominal aortic blood pressure (B.P.) tracings were made on 15 patients recovering from RDS. Mean birth weight 2.04 kg (range 1.28-3.08), mean gestation 34 weeks (range 29-40) and mean age studied 63 hours (range 22-137). During crying maximum Pes ranged from -18.0 to -30.5 cm $H_2O$ during inspiration and from +6.2 to +34.3 during expiration. Pes remained positive during 66% of the respiratory cycle (range 54 to 85%) and mean Pes during inspiration was -12.3 cm $H_2O$, during expiration mean Pes was +11.2 cm $H_2O$. Heart rate rose significantly, mean increase 15 beats per minute (S.E.+3), $P<0.01$ and this was accompanied by a rise in B.P., mean systolic increase 5 mm Hg (S.E.+3), mean diastolic increase 9 mm Hg (S.E.+2) $P<0.01$. Beat to beat variation in B.P. during expiration resembled that seen in adults performing the Valsalva maneuver with sequential narrowing of the pulse pressure during successive heart beats. This study demonstrates the extreme range of intrapleural pressure generated and shows the significant effects of heart rate and blood pressure as a result of crying in patients recovering from RDS.

**1187** EVIDENCE FOR AMELIORATION OF BRONCHOPULMONARY DYSPLASIA (BPD) FOLLOWING VITAMIN E ADMINISTRATION. Richard A. Ehrenkranz, Bedford W. Bonta, Ronald C. Ablow and Joseph B. Warshaw, Yale University School of Medicine, Depts. of Pediatrics and Diagnostic Radiology, New Haven, Conn.

BPD is a major cause of morbidity and mortality in infants treated for the respiratory distress syndrome (RDS). We have investigated the effect of Vitamin E (E) (Roche E Injectable) in modifying the development of BPD in infants with RDS. Alternate infants received 20 mg E/kg/day while requiring an $F_iO_2 > 0.40$. E treated and control infants matched with respect to wt, gest. age, Apgar score and severity of RDS. Patients living less than 10 days were excluded. E levels were below 0.30 mg% in controls and in treated infants were 0.96 mg% and 2.15 mg% at 24 and 48 hr, respectively. Treated infants received an average of 3 doses (range 1-7). Ten of 16 controls required $O_2$ (> 20%) + positive pressure respiratory support longer than 250 hr as compared with 5 of 14 in the E group ($x^2$, $p < .05$). Of the 10 controls in $O_2$ longer than 250 hr, 5 had x-ray changes consistent with BPD during the first month of life and 3 of those 5 died. However, x-rays in the 5 treated patients in $O_2$ longer than 250 hr returned to normal or revealed mild abnormalities not typical of BPD; all of this group survived. X-rays were read without knowledge of E treatment. E treated or controls requiring $O_2$ less than 250 hr did not have x-ray changes typical of BPD. Although the numbers are small, these preliminary data suggest that E administration during the acute phase of therapy for RDS may modify the development of BPD.

**1188** THE USE OF CONSTANT NEGATIVE DISTENDING PRESSURE (CNDP) IN THE TREATMENT OF PULMONARY INTERSTITIAL EMPHYSEMA (PIE). William Fawcett, Louis Gluck, and Ronald Coen. University of Calif., San Diego, Dept. of Ped. La Jolla.

Pulmonary interstitial emphysema (PIE) is an occasional complication in infants with severe hyaline membrane disease on assisted ventilation (IPPB), most commonly in infants weighing <1500 gm. It is frequently followed by pneumothorax, subcutaneous emphysema and bronchopulmonary dysplasia. Treatment has consisted of differential intubation (unilateral), open thoracotomy with splaying of the lung, and chest tubes to rupture larger bullae.

Five newborns weighing 1500 gm or less with bilateral PIE on x-ray were treated with constant negative distending pressure (CNDP). Three had significant bilateral PIE with subsequent pneumothoraces and elevation of pCO2 to 60-100 mmHg. The infants were placed in a negative pressure chamber with CNDP -3 to -6 cm $H_2O$. IPPB was continued but without positive end expiratory pressure (PEEP). As the infant's clinical condition improved, the peak inspiratory pressure (PIP) was decreased. Over the next 12 to 24 hours the PIP were lowered significantly. There was no progression of PIE, and a gradual resolution over the next few days. The infants' pCO2 gradually dropped from the 60's to normal range of 40-50. We conclude that where mechanical ventilation is necessary with PIE, CNDP should replace PEEP which allows lower PIP to ventilate the infant adequately and prevents further complications.