=1837 TRIIODOTHYRONINE PRODUCES PARADOXIC EFFECTS ON ANTIOXIDANT ENZYMES AND SURFACTANT IN FETAL RAT LUNG. Ilene Sosenko and Lee Frank, Univ. Miami Sch. Med., Pulmonary Res., Dept. Medicine and Dept. Pediatrics, Miami, FL.

Triiodothyronine (T_3) has been reported to stimulate fetal lung disaturated phosphatidylcholine (DSPC) following maternal injection in the rat. Its effect on the antioxidant enzymes (AOE)(superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GP)) has not been explored. We postulated that T_3 would have a stimulatory effect on both DSPC and AOE, analogous to the accelerating effect of Dexamethasone on both DSPC and AOE (Ped. Res. 18:1771A, 1984). To examine this, we injected timed-pregnancy rats with T_3 (7 mg/kg) or diluent at 48 and 24 hours prior to delivery at days 19, 20, 21, and term. Results are expressed as mean values for T_3/C for DSPC; and % Δ (T_3 vs. C) for AOE (2 experiments/age, n=3-5 samples/group/experiment, *p<0.05).

GESTATION	DSPC(mg/gm dry wt)	SOD	CAT	GP(U/mg DNA)
19 days	1.84/1.64*	-4%	-3%	-11%
20 days	2.41/1.84*	-5%	-4%	-15%
21 days	3.58/3.17	-15%	-21%	-20%
22 days(term)	4.07/5.04	+6%	+4%	+1%

At days 19-21, T_3 injection produced a stimulatory effect on DSPC, but an unexpected and paradoxical trend toward reduction in all AOE activities. At birth, the opposite of these relationships was noted. These results indicate that, unlike glucocorticoids, thyroid hormone has disparate effects on the surfactant and AOE systems and that the molecular control mechanisms for these two important developmental systems may be separate and distinct.

†1838 METYRAPONE DELAYS MATURATION OF FETAL LUNG SURFACTANT AND ANTIOXIDANT ENZYMES: ARE BOTH UNDER ENDOGENOUS GLUCOCORTICOID CONTROL? Ilene Sosenko, Pamela Lewis and Lee Frank, Pulmonary Res. Labs., Depts. of Medicine and Pediatrics, Univ. Miami Sch. Med., Miami, FL.

Metyrapone (M), an 11-β-hydroxylase inhibitor, blocks the production of cortisol and corticosterone by the adrenals. Since both the surfactant (S) system and antioxidant enzyme (AOE) system can be stimulated by exogenous glucocorticoids (Ped. Res.18: 1771A,1984), we postulated that both systems might be under endogenous glucocorticoid control. Thus, maternal injection of metyrapone, which crosses the placenta, should produce a delay in maturation of disaturated phosphatidylcholine (DSPC) and AOE (superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GP)). Timed-pregnancy rats were injected twice daily with Metyrapone (45 mg/kg) 72, 48 and 24 hours before delivery at days 21 or term. Although evidence for adrenal blockade was not complete with every litter examined, most of the litters manifested the following:

DAY-GESTATION	DSPC	SOD	CAT	GP
21 days	-15%	-16%	-15%	-20%
22 days (term)	-16%	-21%	-17%	-17%

(% difference, M vs. control; 5 litters each group - 21 days; 3 litters each - 22 days; 3-5 pooled lung samples/litter). These results suggest that with adequate inhibition of endogenous glucocorticoids, parallel delays in maturation of both AOE and S systems become apparent. Thus, both of these important developmental systems in the fetal lung may be influenced by some of the same biochemical control mechanisms.

1839 COMPARISON OF RISK FACTORS ASSOCIATED WITH BRONCHOPULMONARY DYSPLASIA. Richard Sosulski and Margery A. Heneghan. (Spon. by L.I. Kleinman). SUNY at Stony Brook, Sch. of Med., Dept. of Pediatrics and Radiology, Stony Brook, NY.

Bronchopulmonary dysplasia (BPD) remains a significant complication associated with positive pressure mechanical ventilation of newborn infants. All NICU admissions during 1982 and 1983 were studied to compare the incidence of BPD and to identify differences with respect to recognized risk factors. In 1983 an effort was made to use lower peak inflation pressures (PIP) and less IV fluid in initial management. RDS was present in 77/355 infants in 1982 and 71/354 in 1983 with no difference in disease severity. In 1982, 15/77 (19.5%) of infants with RDS developed clinical BPD (requiring supplemental oxygen for >28d) compared with 5/71 (7%) in 1983 (p<.05). In the 20 infants with clinical BPD, there was no significant difference between 1982 and 1983 with respect to gestational age, radiographic severity of initial lung disease, presence of a clinically significant PDA, or maximum FI02. Mean PIP in 1982 and 28.6+11SEM cmH_20 vs 17.7+1.9cmH_20 for 1983 (p<.02). Weight loss/birth weight X 100 at days 3 and 10 were 9.19% and 10.02% (1982) vs 16.75% and 18.2% ((p<.03, p<.02). In summary, a lower incidence of BPD was associated with lower peak inflation pressure and greater weight loss in early life suggesting that judicious use of positive pressure ventilation and careful fluid management may reduce the occurrence of BPD.

1840 TRACHEOBRONCHOMALACIA - NEW CAUSES AND TREATMENT J. Sotomayor, R. Godinez, R. Wilmott. (Spons. by S. Douglas), Children's Hospital of Philadelphia, Department of Pediatrics; Philadelphia, PA 19104

We describe 7 infants (6 males, 1 female) seen over the last 3 yrs. initially diagnosed with bronchopulmonary dysplasia (BPD) or chronic lung disease and subsequently found to have tracheobronchomalacia (TBM). None had congenital anatomical abnormalities such as tracheoesophageal fistula or vascular rings. 5 were premature babies who had been ventilated for hyaline membrane disease, 2 presented with viral infections. All 7 had required intermittent ventilation, with 5/7 ventilated for most of their lives (9 mo.- 38 mo.). The diagnosis was suspected in all 7 because they had either cyanotic spells ("BPD" or "blue" spells) requiring manual ventilation, or wheezing unresponsive to usual therapy (bronchodilators, steroids). The diagnosis was confirmed by either bronchoscopy or fluoroscopy showing >75% collapse of the central airways during expiration or Valsalva. The mean time from onset of symptoms to diagnosis was 3-20 mos. Some associated factors include Pseudomonas sp. or Staphylococcus aureus tracheitis in 6/7, gastroesophageal reflux in 3/7, patent ductus in 4/7, and pneumothoraces in 4/7. Management was facilitated by finding optimal positive end-expiratory pressure (PEEP) during fluoroscopy. 6/7 require PEEP of at least 10-15cmH20 pressure for at least 3 mos., and 5/7 are still ventilated. All patients responded clinically with decreased cyanotic spells and improved ventilation. Bronchodilators, diuretics and sedation were all used with varying success. Tracheostomy without PEEP was not helpful. Thus TBM is a treatable, diffuse process which requires long term therapy, the incidence of TBM may be higher than suspected, and the therapy of choice is long term optimal distending PEEP.

1841 DEGREE OF PERIODIC BREATHING PER GESTATIONAL AGE: IS THERE A CORRELATION? J. L. Stefano, A.R. Spitzer, J.M. Davis, P. Juliano, K. Peeke, J. Beyers, W.W. Fox. Dept. of Peds., Univ. of Pa. Sch. of Med., & Children's Hosp. of Phila., Phila., PA.

Periodic breathing is a common pattern of respiration in premature infants. Home cardiorespiratory monitoring of premature infants with periodic breathing has been advocated to detect and prevent associated episodes of prolonged apnea. Since periodic breathing is thought to be related to maturity of the respiratory control center one might expect that percent of periodic breathing would decrease with increasing gestational age. The purpose of this study was to define the mean percent of periodic breathing per gestational age in premature infants. Pneumograms from 153 premature infants were reviewed. Infants were studied for suspected clincal apnea and/or bradycardia. All infants were studied prior to starting theophylline. Percent periodicity of breathing was obtained from the tracings by calculating the time of periodic breathing/sleep time. Periodic breathing was defined as three or more apneic pauses of greater than 3 seconds but less than 10 seconds within periods of normal respiration of 20 seconds or less.

RESULTS:							All pts.
Corrected GA (wks)	26-27	28-29	30-31	32-33	34-35	36-37	GA=31.7
Number of pts.	10	26	34	33	35	15	153
Mean % P.B.	5.6	11.5	4.6	11.4	5.3	9.3	7.93
SEM	3.4	3.0	0.8	2.6	1.1	3.7	.93
Range % P.B.	0-35	0-65	0-18	0-65	0-22	0-38	0-65

The above data indicate that there is no correlation with gestational age, specifically there is no trend of decreasing periodicity with increasing gestational age. We conclude that gestational age in preterm infants is not predictive of the percentage of periodic breathing.

1842 MEASUREMENT OF TIDAL VOLUMES (V_T) IN PREMATURE INFANTS USING THE INDUCTANCE PLETHYSMOGRAPH. J. L. Stefano, A.R. Spitzer, J. M. Davis, P. Juliano, K. Peeke, W.W. Fox. Dept. of Peds., Univ. of Pa. Sch. of Med., and The Children's Hosp. of Phila., Phila., PA.

The standard method of measuring V_T or V_E in infants has been to utilize a face mask with the pneumotachograph. This technique can change V_T or V_E through stimulatory affects of placing the mask upon the infant's face. Inductance plethysmography has been used to measure V_T and V_E in term infants with excellent correlation ($r \approx .98$). This technique has not previously been reported in premature infants. The purpose of this study was to correlate V_T measurements using inductance plethysmography to simultaneous measurements of V_T made by the pneumotachograph. Five premature infants were studied (mean B.W. 1.77 ± 0.14 kg SD; mean G.A. 36 ± 1.22 wk SD). The inductance plethysmograph was calibrated by using the two-position technique (supine and upright), with the rib cage belt placed just below the axilla and the abdominal belt above the iliac crest (belt size = 4.5 cm X 23 cm). A series of breaths were collected to insure a reversal of the predominance of either the abdominal or rib cage signal in the two positions. After calibration the infant remained supine and V_T measurements were made using both the inductance plethysmograph and the pneumotachograph. On the five premature infants, 296 breath-by-breath analyses (mean breath/pt. = 59 ± 19 SD) yielded a correlation coefficient of .90 with a slope of .92. The mean V_T (induct. pleth.) = 14.6 cc ± 4.1 SD, the mean V_T (pneumotach.) = 13.8 cc ± 3.3 SD, the mean V_T/kg (induct. pleth.) = 8.25 cc/kg, the mean V_T/kg (pneumotach.) = 7.8 cc/kg. We conclude that the inductance plethysmograph is an excellent method of non-invasive, low-stimulatory measurements of V_T in premature infants.