1730 RELATIVE CONTRIBUTION OF RIBCAGE AND ABDOMEN TO TIDAL VOLUME IN CHILDREN, E. Tabachnik, N. Muller, B. Toye and H. Levison, Dept. of Resp. Physiology, The Hosp. for Sick Children, Toronto.

The relative contribution of ribcage and abdomen to tidal volume provides useful information regarding inspiratory muscle function as well as the coupling characteristics between the diaphragm and ribcage. Normative data of this nature are essential in the identification and understanding of the abnormal chest wall mechanics that occurs with pulmonary and inspiratory muscle disease or during sleep. We analyzed the contribution of the ribcage and abdomen to tidal volume during quiet breathing in 20 healthy children aged 8-16 years (mean age 12 yrs) using a respiratory inductive plethysmograph (respitrace^{R}). The subjects were assessed in 5 body positions (standing, sitting, supine, prone and left lateral decubitus). In the standing and sitting positions ribcage contribution was predominant comprising 73±10% (M±SD) and 65±9% of tidal volume respectively. In the supine, prone and left lateral decubitus positions, abdominal contribution was predominant, the ribcage contributing 34±14%, 35±13% and 38±15% respectively. No significant difference in contribution was noted between the males and females in any of the 5 positions. The different ribcage excursions accompanying changes in body position are probably related to differences in the mechanical advantage of various inspiratory muscles and local compliance changes of the ribcage and abdomen.

1731 THE EFFECTS OF POSTNATAL MALNUTRITION ON RAT LUNG DEVELOPMENT. Donald W. Thibeault, Terri Fulghum, University of Missouri School of Medicine, The Children's Mercy Hospital, Kansas City, Missouri.

Newborn rats were malnourished by combining 18 rats with one nursing mother. Controls were kept in normal size litters. At weaning, 21 days(d), the rats were studied or fed normally until 60d. The rats were anesthetized and atelectasis produced by airway occlusion after oxygen breathing. With the thorax open static deflation air pressure volume(PV) curves from 30cm H_2O maximum pressure were done or saline PV curves from 10cm H_2O. At 17,21,40 and 60d, 106 control PV curves were obtained. 35 malnourished rats were studied at 21d and 15 rats at 60d. At 21 and 60d the control body wts. were 44.9gm and 281gm and the malnourished rats 27.4 and 200gm.

Deflation air PV curves expressed in percent of maximal lung volume(%MVL) were similar in normal and malnourished rats at 21 and 60d. The malnourished 21d rats did have a significant increase in maximal lung volume at 30cm H_2O per gm of dry lung wt (LV/gm) compared to 17 and 21d controls. This indicates more distensible lung units or larger alveoli, but after 40d of normal feeding the LV/gm lung wt was the same as controls. In contrast the deflation saline PV curves expressed as %MVL showed a left shift (less recoil pressure) in malnourished rats at both 21 and 60d. The saline curves suggest that malnourished rats at both 21 and 60d have an increased LV/gm dry lung wt. We conclude that severe malnourishment during growth results in an increased alveolar volume to tissue ratio at maximal lung inflation. The saline PV curves suggest that malnutrition causes connective tissue changes which may persist into adulthood.

1732 MECONIUM ASPIRATION SYNDROME AND CHANGES IN COLLOID OSMOTIC PRESSURE (COP). Vikram R. Udani, Paul Y.K. Wu, Bijan Siassi, Pedro H. Arce, Yvonne D'Sylva, and Harold A. Conrad. Univ. of So. Calif. Sch. Med., LA County-USC Med. Ctr., Dept. of Pediatrics, Los Angeles.

The Meconium Aspiration Syndrome (MAS) is associated with alternations in fluid dynamics between the capillary and interstitial spaces. The role of oncotically active material in these changes was studied with serial COP, echocardiogram, chest X-ray and blood gases determination during the first 3 postnatal days in 7 infants with MAS. Their mean ($\bar{X}$±SE) B.Wt. =3677 ± 181.8g and mean G.A. =40.7 ± 0.6 wks. Their results were compared to 7 healthy infants of similar B.Wt. and G.A. In the MAS infants the mean COP was 16.5 ± 0.5, 15.5 ± 0.6 and 16.8 ± 0.8 mmHg, and mean RPEP/RVET ratio was 0.58 ± 0.07, 0.39 ± 0.04 and 0.37 ± 0.05 for days 1,2, and 3 respectively. In healthy infants the mean COP was 16.8 ± 0.4, 18.6 ± 0.6 and 19.2 ± 0.7 mmHg while RPEP/RVET ratio was 0.35 ± 0.06, 0.32 ± 0.07 and 0.28 ±0.03 for the corresponding days. The initial fall and subsequent rise in COP with changes in RPEP/RVET ratio were concomitant with improvement in chest X-ray and FiO_2 requirements. These findings support the hypothesis that MAS is associated with increased pulmonary hypertension and pulmonary vascular resistance. This rise in capillary pressure in the presence of hypoxic endothelial damage causes a leakage of fluid and colloids into the pulmonary interstitial space. With fall in capillary pressure, fluid and colloids re-enter the intravascular space.

1733 HORMONAL FACTORS AFFECTING HUMAN FETAL LUNG (HFL) AND NEONATAL FIBROBLASTS. Maruthi Vadapalli, Latha Menon, Emile M. Scarpelli and Robert S. Bienkowski. Pediatric Pulmonary Division and Department of Medicine, Albert Einstein College of Medicine, Bronx, New York 10461.

It is now clear that a number of hormones may influence pulmonary maturation before birth and thus survival at birth. It has also become apparent that pulmonary mesenchyme is a major factor controlling maturation. We have therefore studied the effects of thyroxine (TH), hydrocortisone (HC), insulin (IN), glucagon (GG) and glucose (G) on growth of HFL fibroblasts in culture. HFL fibroblasts were plated at 0.8 x 10^4 cells/cm^2 in minimum essential medium (MEM) + 10% fetal bovine serum (FBS). After 24 h the medium was changed to MEM + 2% FBS + 1 g G + the test hormone: TH (10^{-5}, 10^{-4} and 10^{-3} U/ml, in separate trials); HC (5 µM); IN (12.5, 25 and 50 µU/ml) and GG (100, 200 and 300 picog). IN and GG were studied in 3 g as well as 1 g G. After 48 h, the cells were harvested and counted. Fibroblast growth was enhanced significantly by TH (10^{-4} and 10^{-3} U/ml), HC, and IN (12.5 and 25 µU/ml, 1 g G), whereas TH (10^{-5} U/ml), IN (50 µU/ml), and GG had no positive effect on growth. We also studied TH and HC with 1491 term neonatal lung fibroblasts and found no effect of these hormones on growth. We conclude that (1) the action of TH and HC is effective in the fetal but not the neonatal state; (2) physiological concentrations of IN have a direct effect on growth of HFL fibroblasts; (3) high IN levels do not inhibit growth of HFL fibroblasts; (4) GG itself has no effect; and (5) high G levels do not alter the effects of IN significantly. (Supported in part by NIH HL 07060).

1734 CYTOLOGY OF ENDOTRACHEAL ASPIRATES IN NEONATES WITH RESPIRATORY DISTRESS. Roger Wall, Michael Glant, Richard L. Schreiner, Jill Caudill, Kimberley Crall. (Spon. by Jerry Bergstein), Indiana University School of Medicine, Indiana University Hospitals, Department of Pediatrics, Indianapolis.

The purpose of this study was to evaluate cytologic changes in neonates with respiratory distress who develop bronchopulmonary dysplasia (BPD). 141 tracheal aspirates were obtained from 37 intubated neonates. 25 neonates had HMD. The GA ranged from 25-43 wks and B.W. from 680-4522 gms. All intubated infants developed reactive cellular changes including sheets of orderly columnar cells with round nuclei exhibiting a fine chromatin pattern with discreet nucleoli, predominance of columnar cells in various stages of degeneration and few mature squamous cells. Early changes of BPD (4 of 37 infants) was characterized by small sheets of normal immature metaplastic cells. As BPD progressed, nuclear atypia became evident. With severe BPD, there was a predominance of mature squamous epithelium,, only occasional columnar cells and isolated atypical metaplastic cells.

Cytologic screening of infants with respiratory distress may be useful not only to diagnose pneumonia, but also for diagnostic and prognostic purposes in terms of the development of BPD. Cytology may also be useful to evaluate new preventive treatment regimens of BPD.

1735 INFLUENCE OF MATURATION AND HYPEROXIA ON SURFACTANT PHOSPHOLIPIDS AND PULMONARY COMPLIANCE IN THE PREMATURE AND TERM RABBIT. Jill A. Ward and Robert J. Roberts, Depts. Pediatrics and Pharmacology, Univ. Iowa College of Medicine, Iowa City, IA 52242. Premature (29 days gestation) or term (31 days) rabbits were delivered via C-section and immediately exposed to 90%+O_2 or air for 6, 48, or 96 hrs. (Baseline determinations were made on animals sacrificed on delivery prior to air breathing). After exposure, animals were sacrificed with pentobarbital in 100% O_2 to degas the lungs. For statistical analysis of O_2 effect, comparisons were made between litter mates paired by body weight. Total lung lavage phospholipids (PL) (µg/gm body wt.) were found to increase with time in both premature and term animals, although the magnitude of increase differed between the two groups:

Time:	0	6 hrs.	48 hrs.	96 hrs.	
29-day	6.5 ± 0.7	14.2 ± 0.6	56.8 ± 5.0	100.2 ± 7.3	
31-day	13.5 ± 1.5*	31.3 ± 5.6*	54.9 ± 6.4	101.3 ± 20.9	(*P<.01)

Although variable, O_2 treatment resulted in lower total PL levels at 6, 48, and 96 hrs. in the term as well as premature pups. The reduction was greatest at 6 hrs. in the term group (66.1 ± 9.8%) with levels recovering to >84% of air controls by 96 hrs. O_2-induced deficits in PL in the premature remained reduced to 96 hrs. (<75%). Specific phospholipids were determined and expressed as % of total PL. The relative amounts of each (PC, PS + PI, PE, PG) did not markedly change with oxygen exposure. Pressure volume determinations indicated a decreased lung compliance with O_2 for both age groups at 6 hrs. This effect was not apparent at later times in the term group, which is in agreement with the pattern of change in surfactant. In conclusion, hyperoxia decreases total PL and compliance, and these effects are most evident in the premature animal. Supported by Proctor and Gamble Predoctoral Fellowship and NIGMS 12675.