●1795 DISTENDING PRESSURE DETERMINES POSTNATAL GROWTH OF LUNG PARENCHYMA IN THE CAT. Anthony L. Mansell, Jose V. Rojas, Elaine M. Sillos, Charles J. Stolar, Margaret H. Collins and S. Jaime Rozovski. Columbia University College of Physicians and Surgeons, Babies Hospital, Departments of Pediatrics, Surgery, Pathology and Institute for Human Nutrition, New York.

To test the hypothesis that distending pressure produced by the respiratory muscles determines postnatal growth of lung parenchyma, we studied unilateral diaphragmatic paralysis in kittens. Twelve 10-12 week old kittens underwent left thoracotomy. In 6, unilateral phrenectomy was done via the thoracotomy; the other 6 served as controls. Five to 7 weeks later, body weight had increased by 49% in the phrenectomized group and by 47% in the controls (NS). However functional residual capacity by helium dilution under ketamine hydrochloride anaesthesia was lower in the phrenectomized group (35 ± 4 ml versus 58 ± 9 ml in the controls, $P < .001$). As measured by bilateral pleural balloons, mean transpulmonary pressure ipsilateral to the phrenectomy was lower than mean transpulmonary pressure contralateral to the phrenectomy ($P < .05$). In postmortem studies, growth of contralateral lungs relative to ipsilateral lungs was greater in the phrenectomized animals than in the controls, as shown by ratios of contralateral/ipsilateral wet lung weight (1.44 versus 1.34, $P < .005$), maximum inflation volume (1.53 versus 1.33, $P < .005$) and total protein content (1.45 versus 1.26, $P < .002$). Ratios of total protein/DNA and RNA/DNA were unchanged. We conclude that postnatal growth of lung parenchyma by cell proliferation in the cat depends on pulmonary distending pressure.

1796 FUNCTIONAL RESIDUAL CAPACITY (FRC), DYNAMIC AND SPECIFIC LUNG COMPLIANCE IN INFANTS. Francois Marchal, P. Gross, and J.P. Crance. (Sponsored by Hakan Sundell) University of Nancy, Children's Hospital, Dept. of Physiology and Pediatrics, Nancy, France.

This study was designed to obtain normative data for FRC, dynamic (CLd) and specific lung compliance (CLs) during the first years of life. Thirteen boys and 9 girls free of respiratory disease were studied. Age, height, weight and ventilatory rate respectively ranged from 2 - 52 months, 55 - 96 cm, 4.9 - 16 Kg and 22 - 55/min. Studies were performed during chloral hydrate induced sleep. Infants breathed through a mouth piece or a face mask. FRC was determined by the closed circuit helium dilution technique using a 2.2 l water sealed spirograph. Added dead space was subtracted from the measured volume and values were converted to BTPS. Measurement of tidal flow and volume through a heated pneumotachograph and of esophageal pressure with an air filled balloon catheter allowed for calculation of CLd as $\Delta V/\Delta P$ at zero flow. FRC, CLd and CLs respectively ranged from 110 - 430 ml, 8.1 - 34.7 ml/cm H_2O and .051 - .110 ml/cm H_2O/ml FRC. FRC and CLd were significantly correlated with height, age, weight and ventilatory rate while CLs was not. CLd was also significantly correlate with FRC. Multiple linear regression analysis showed that: 1- the only significant predictive variable for FRC was height: FRC = 6.2 x height - 200 (r=.83); 2- CLd was best predicted from FRC and age: CLd = .05 x FRC + .24 x age + 2.24 (r=.84); 3- CLs (.073 ± .004*) was independent of growth parameters. CLs would thus appear useful for evaluation of lung elastic properties in infancy. *(Mean ± SEM)

1797 AUGMENTED BREATHS (SIGHS): CHANGES IN THE RELATIVE CONTRIBUTION OF THE CHEST WALL AND ABDOMEN IN INFANCY. Oommen P. Mathew, Maria H. Pronske and Mark L. Clark (Spon. by D.K. Rassin), Department of Pediatrics, University of Texas Medical Branch, Galveston, Texas.

Electromyographic studies in animals suggest that the activation of the inspiratory intercostal muscles during augmented breaths is weaker in newborn animals compared to adults when simultaneous activation of diaphragm is compared. Since the relative contribution of these muscles during augmented breaths in neonates and children are not known, the present study was designed to determine the changes in abdominal and chest wall contribution during augmented breaths in newborn and in older infants. The abdominal and chest wall respiratory movements of ten newborn infants (<10 days) and 9 older infants (>6 weeks) were monitored by respiratory inductive plethysmograph bands. Spontaneous augmented breaths (sighs) in quiet sleep were analyzed. The control values were obtained from the mean of 3 breaths immediately preceding the augmented breath and the augmented breaths were expressed as percent of their controls. The increase in chest wall movement was smaller in newborn infants when compared to the increase in abdominal movement (173 vs 297%) whereas the increase in chest wall movement was greater in the older infants (426 vs 268%). These results suggest that the proprioceptive control of the chest wall muscles is immature in the neonatal period. This may result in poor compensation to added respiratory loads during the neonatal period.
Supported by grants from the NIH (HL-01156) and the March of Dimes (5-426).

1798 HIGH DOSE PIPERACILLIN THERAPY IN CHILDREN WITH CYSTIC FIBROSIS. James M. McCarty, Samuel J. Tilden, Philip G. Black, Jeffrey L. Blummer, William W. Waring, J C. Craft, Neal A. Halsey. (Spon. by John E. Lewy) Department of Pediatrics and Tropical Medicine, Tulane Univ., New Orleans, Louisiana.

Piperacillin 600 mg/kg/day IV q 4 hrs was administered to fifteen children with cystic fibrosis over ten to fourteen days. Seven of these children also received tobramycin (8-13 mg/kg/day). The sputum titers of pseudomonas isolates from children treated with piperacillin plus tobramycin decreased significantly ($p<.01$) more than children treated with piperacillin alone. Six of the twenty-one isolates from children treated with piperacillin alone decreased $>10^2$ cfu/ml vs 13 of 19 isolates in patients treated with piperacillin and tobramycin ($p=0.025$). All isolates had MICs to piperacillin of ≤128 mcg/ml prior to therapy. Development of resistance to piperacillin during therapy was not seen.

The mean peak serum piperacillin concentration 15 minutes after a 30 minute infusion was 238 mcg/ml. The mean area under the curve was 250-300 micrograms/liter-hour. The mean volume of distribution (400-500 ml/kg) was larger and the t1/2 (0.60 hrs) shorter than reported for normal adults. Toxicity was minimal but included fever in one child and rash on one child.

High-dose piperacillin therapy is well tolerated by cystic fibrosis patients. Although piperacillin has enhanced anti-pseudomonas activity, therapy for children with cystic fibrosis should include an aminoglycoside.

1799 THE EFFECT OF NALOXONE ON APNEA OF PREMATURITY. Neal Mojica, Harry Mondestin, I. Mark Hiatt, Thomas Hegyi, Division of Neonatology, Department of Pediatrics, UMDNJ-Rutgers Medical School, St. Peter's Medical Center, New Brunswick, N.J.

Naloxone therapy improved the pneumocardiogram (PCG) results of seven preterm infants suffering from apnea of prematurity. The patients (BW 1.5+/-0.2 kg, GA 32+/-2 weeks), were evaluated with a six hour PCG at 1.0+/-0.7 weeks of age. A single intravenous dose of naloxone, 0.01mg/kg, was administered, and then followed by a second six hour PCG. All PCG's were read by a computerized analyzer (Medical Graphics). The results of the comparison are shown below:

	PCG#1	PCG#2
Short apneas	23.2+/-23.7	10.8+/-11.8
Long apneas	1.0+/-1.2	0
Apnea density	2.6+/-2.7	1.0+/-1.2
Per. Breath (%)	7.4+/-9.0	3.9+/-5.6

The PCG following naloxone administration had fewer short (< 15 sec) and long apneas (> 15 sec), decreased apnea density and percent periodic breathing. Naloxone did not influence number, length, or nadir of associated bradycardias. Naloxone therapy was effective in decreasing the severity of clinical apnea in this group of infants.

1800 THE VENTILATORY RESPONSE TO CARBON DIOXIDE IN HIGH RISK INFANTS. Harry Mondestin, Neal Mojica, Mujahid Anwar, I. Mark Hiatt, Thomas Hegyi, Division of Neonatology, Department of Pediatrics, UMDNJ-Rutgers Medical School, St. Peter's Medical Center, New Brunswick, N.J.

We examined the ventilatory response to CO_2 in 123 infants tested with a computerized CO_2 waveform analyzer measuring breath by breath responses. Seven SIDS siblings (BW 3.43+/-1.04 kg) were tested at 49.1+/-15.3 weeks post-conceptual age, 19 near-miss infants (2.84+/-0.88 kg) at 60.1+/-14.9 wks, 21 term infants with cyanosis (3.43+/-0.66 kg) at 41.0+/-1.2 wks, 43 preterm infants with apnea (1.56+/-0.31 kg) at 41.9+/-5.0 wks, 18 infants with IVH (1.16+/-0.3 kg) at 46.5+/-12.9 wks, 8 with BPD (1.4+/-0.9 kg) at 48.8+/-12.6 wks, 5 with reflux (2.43+/-0.6 kg) at 43.0+/-7.0 wks, and 5 controls (3.8+/-0.8 kg) at 39.0+/-1.0 wks.

The slope of the CO_2 response curve was 19.4+/-7.6 among siblings, 25.5+/-17.4 among near-miss, 30.2+/-16.4 among cyanotic, 33.0+/-19.0 in the apneic, 31.5+/-16.8 in the IVH, 28.3+/-19.2 in the BPD, 19.9+/-11.7 in the reflux, and 26.0+/-17.0 mm/kg/min/mmHg BTPS in the control group. The highest proportion of abnormal slopes (< 20 mm/kg/min/mmHg BTPS) were in the reflux (71%), near miss (44%), and sibling (40%) groups. The sibling and reflux groups also showed the lowest increase in minute ventilation (50-55%) compared to the other groups (90-140%) from baseline to 6% CO_2. The sibling, near-miss, and reflux groups demonstrated blunted responses to CO_2 and are deemed to be at highest risk by this test.