1249 NEGATIVE PLEURAL PRESSURES AND PULMONARY EDEMA IN ACUTE CHILDHOOD ASTHMA. S. Alex Stalcup and Robert B. Mellins. College of Physicians and Surgeons, Columbia University, Department of Pediatrics, New York.

Edema of the lung is a prominent finding in children dying of asthma. Because large negative pleural pressures favor the development of pulmonary edema (Mellins, Circ Res 24:197,1969),we simultaneously measured air flow, lung volume and pleural pressure throughout the respiratory cycle in 10 children with acute asthma. Esophageal pressure was obtained with a balloon catheter and used as a measure of pleural pressure. Mean pleural pressure remained negative during inspiration and expiration and was minus 19 cm H_2O over the entire tidal respiratory cycle for all 10 patients. Pleural pressure became progressively more negative as the severity of asthma increased (2 cm H_2O decrease for each 10% decrease in vital capacity from predicted normal, r=0.9, $p<0.01$). These negative pleural pressures would be expected to 1) raise vascular pressures relative to pleural pressure by direct effect on ventricular function and 2) decrease perimicrovascular interstitial fluid pressures throughout the lung as the result of amplification by mechanical interdependence. Thus a gradient favoring fluid filtration into the pulmonary interstitium would be expected in acute asthma. These studies question the advisability of routinely administering large amounts of fluid to patients with acute asthma, since once deficits are replaced amounts in excess of maintenance requirements will further increase the gradient for filtration by raising vascular pressures and lowering colloid osmotic pressures.

1250 MAINTENANCE OF TIDAL VOLUME IN INFANTS ON CONTINUOUS DISTENDING AIRWAY PRESSURE (CDAP) BY INCREASED INSPIRATORY MUSCLE ACTIVITY. Ann R. Stark, Michael D. Goldman, Eugene N. Bruce, and Ivan D. Frantz (Spon. by Mary Ellen Avery). Harvard Medical School, Dept. of Pediatrics, and Harvard School of Public Health, Dept. of Physiology, Boston.

We have previously shown that tidal volume is unaffected and that respiratory system compliance decreases when CDAP is applied to healthy infants. To determine if changes in respiratory muscle activity cause tidal volume to remain constant, we measured electromyograms (EMG) in healthy infants. Seven full term infants were studied during the first four days of life while sleeping and enclosed below the neck in a negative pressure box. EMG were recorded using surface electrodes in the right sixth intercostal space and on the right lateral abdominal wall before and after application of five and ten cm H_2O continuous negative pressure to the box. Changes in thoraco-abdominal configuration were monitored with anterior-posterior magnetometers and showed that most of the lung volume increase was accounted for by rib cage expansion. Inspiratory EMG amplitude from the intercostal space increased in all infants on CDAP. The increase was greater with greater amounts of distending pressure. Small increases in abdominal muscle activity were observed in four of the infants on CDAP. The increase in EMG with CDAP may compensate for a small decrease in mechanical advantage of the inspiratory muscles to hold tidal volume constant, and may offset the decrease in compliance. This is consistent with a reflex mechanism that allows rapid compensation for changes in lung volume.

1251 EFFECT OF DURATION OF RUPTURE OF MEMBRANES (ROM) ON HYALINE MEMBRANE DISEASE (HMD) AND INFECTION (INF)

Dora A. Stinson, Alexander C. Allen, Hugh A. MacDonald Univ. of Pittsburgh, Magee-Womens Hosp. (MWH), Department of Pediatrics, Pittsburgh, Pa., and Dalhousie Univ., Grace Maternity Hosp., Department of Paediatrics, Halifax, N.S.

We tested the hypothesis that prolonged ROM over 24 hours (PROM) would result in a decreased incidence of HMD. We retrospectively reviewed 19,511 consecutive deliveries born during 1970-72 at MWH.

PROM was not associated with either 1) a decreased incidence of HMD or 2) a decreased mortality from HMD (See Table). Separate evaluation of vaginal and C-section deliveries did not alter this relationship. HMD was a major cause of death (COD) in infants 27-30 weeks (wk) gestation irrespective of duration of ROM. Among infants 31-34 wk gestation, the risk of death from HMD and from INF was similar. In infants 35-38 wk, the risk of death from INF exceeded that from HMD.

Gestation (wk)		27-30	31-34	35-38
Number Liveborn	< ROM 24 hr	60	221	3359
	> ROM 24 hr	26	64	140
% HMD	< ROM 24 hr	63%	29%	3%
	> ROM 24 hr	62%	30%	1%
% HMD COD	< ROM 24 hr	15%	2%	0
	> ROM 24 hr	19%	2%	0

1252 INCREASED PULMONARY BLOOD FLOW (PBF) DURING ACTH INFUSION IN FETAL LAMBS. Hakan Sundell, William Z. Catterton, Marilyn B. Escobedo, Ilya Kovar, Daniel P. Lindstrom, and Mildred T. Stahlman, Departments of Pediatrics and Radiology, Vanderbilt Medical School, Nashville, Tennessee.

ACTH, when given to fetal lambs, will promote pulmonary epithelial maturation and protect the preterm lamb from developing hyaline membrane disease (HMD). To investigate the possibility that ACTH also acts on pulmonary perfusion, PBF was measured in 7 ACTH treated twin lambs at a gestational age (GA) of 130 d. and in 19 control lambs at 115-142 d. using radioactive microspheres. PBF, expressed as percent of right ventricular output, was 3-20% in the control lambs, with no tendency for increase with advancing GA. ACTH was given for 5 days as a continuous fetal infusion of 0.1 mg per d. Mean PBF was 10.3% before infusion,7.5% on 1 d., 12% on 3 d., and 31.5% on 4 and 5 d. This increase in PBF did not correlate with fetal plasma cortisol conc. but coincided with increased fetal plasma estradiol conc. Prenatal stress in the form of decreased uterine blood flow secondary to induced maternal hypotension on the 4 d. of ACTH infusion produced fetal hypoxemia, acidemia and lowered PBF to 18.7%. PBF decreased from 6.3% to 4.2% in control lambs during maternal hypotension. These results indicate that fetal PBF may be increased threefold with ACTH treatment and does not fall below control levels during periods of decreased uterine blood flow. This effect of ACTH on the fetal pulmonary circulation might contribute to the protection of the fetal lung from HMD by preserving sufficient pulmonary perfusion during episodes of fetal asphyxia.

1253 CLINICAL IMPLICATIONS OF BACTERIAL DIFFERENCES IN PSEUDOMONAS ISOLATES FROM CYSTIC FIBROSIS PATIENTS. Mary Jane Thomassen, Bernard Boxerbaum, Catherine A. Demko (Spon. by Carl F. Doershuk). Case Western Reserve University, University Hospitals, Department of Pediatrics, Cleveland.

Pseudomonas pulmonary infection is a major factor in the morbidity and mortality in cystic fibrosis (CF). Of the 450 patients in this center, 80% are colonized with Pseudomonas. Isolates are classified morphologically in our laboratory into mucoid, rough, classic, dwarf, gelatinous or enterobacter varieties. Approximately 70% of the patients have 2 or more morphologic varieties. Morphologically different Pseudomonas from the same patient have different antibiotic sensitivity 28% of the time. Both morphological variety and antibiotic sensitivity appear to be unstable because they change rapidly upon subculture. Recently, Zierdt compared the serotypes of Pseudomonas isolated from patients of seven CF centers, and found 60% to be Homma serotype 8. Subsequently, we serotyped isolates from our center and 50% were found to be serotype 8. Although more than one morphological variety was found in an individual patient, the serotypes of each variety were always identical. This was true with 4 other serotypes in addition to type 8. Serologic typing was found to be stable after repeated subculture. A CF patient may have only one Pseudomonas which is capable of expressing many variant characteristics and this suggests the possibility that some interference prevents the establishment of more than one Pseudomonas serotype. An understanding of the basic biology of Pseudomonas in the CF respiratory tract is crucial to achieve control of infections.

1254 ENZYMATIC PATHWAYS OF PHOSPHATIDYLCHOLINE (PC) BIOSYNTHESIS IN DEVELOPING PRIMATE LUNG. Rodney E. Ulane and Philip M. Farrell, NICHD, Bethesda, MD. 20014.

Respiratory distress syndrome has been associated with inadequate amounts of PC, the level of which increases in fetal lung during the last 10% of gestation. Enzymes exist for the synthesis of PC by two pathways: the "choline pathway" (I) and the "methylation pathway" (II). In studying the control of PC biosynthesis, we have discovered that lung from newborn and adult Rhesus monkeys contains only one enzyme for the first step of both pathways. This is a dual substrate specificity enzyme with choline kinase (CK) and ethanolamine kinase (EK) activity. The ratio of EK to CK is 0.3 in lung tissues from these sources. This ratio remains constant from the dialyzed, 40,000 xg supernatant fluid of lung homogenates to a 300-fold purified fraction. Furthermore, this ratio remains constant at 0.3 in lung tissue from Rhesus monkey fetuses of 111 to 159 days gestation. Other organs of newborn and adult Rhesus monkeys showed similar EK/CK ratios, except for liver, which had a ratio of 0.6. The higher ratio of EK to CK in liver was shown to be caused by the existence of an additional enzyme in this tissue, totally absent in lung, for the phosphorylation of ethanolamine. This liver enzyme was insensitive to inhibition by choline, while the lung EK activity was inhibited 50% by concentrations of choline as low as 0.005 mM. These findings lead us to conclude that increased PC synthesis in fetal lung tissue cannot be caused by an increase of EK activity in pathway II. These data also provide further support for the predominance of pathway I in developing primate lung.