1724 PULMONARY HEMORRHAGE IN PREVIOUSLY WELL INFANTS: TIME COURSE OF HEMOSIDERIN PRODUCTION. James M. Sherman, Glenna B. Winnie, Thomas F. Boat, Mary Jane Thomassen; Case Western Reserve University College of Medicine, Rainbow Babies and Childrens Hospital, Dept. of Pediatrics. Cleveland, Ohio.

Three previously healthy infants, 4-13 weeks old, presented with blood in the upper airway secondary to an acute pulmonary hemorrhage. Respiratory insufficiency developed, requiring an FiO_2 of 1.0 in all patients, and ventilatory assistance in 2 of 3. Thorough investigation revealed no definite etiology of the hemorrhage, although one infant grew CMV from a nasopharyngeal aspirate. Hemosiderin laden macrophages (HLM) in tracheobronchial secretions were not present initially but appeared after 50 hours in one patient, and after 5 days in another. All initial episodes resolved rapidly following institution of corticosteroids. Steroids were withdrawn from one infant, who died 2 weeks later at home. Autopsy revealed an acute intraalveolar and interstitial hemorrhage without HLM. The other two patients received alternate day prednisone for 6 months and have remained well. Because no information was available regarding the time course of hemosiderin formation in the human lung, we investigated pulmonary alveolar macrophages (PAM) lavaged from normal volunteers and maintained in vitro. PAM exposed to heat treated (65°C for 4 hours) homologous RBC for 3 hours stained faintly for hemosiderin after 48 hours; the degree of staining continued to increase until 144 hours after RBC exposure. No HLM were observed in control cultures. The absence of HLM in airway secretions of children who have blood in their upper airway does not exclude the lower respiratory tract as the source of the bleeding. The appearance of HLM suggests the presence of blood in the lungs for more than 48 hours.

1725 CARDIORESPIRATORY EFFECTS OF CHANGES IN THE DURATION OF POSITIVE PRESSURE IN THE NEWBORN INFANT ON MECHANICAL VENTILATORS. Bijan Siassi, Pedro H. Arce, Luis A. Cabal, Joan E. Hodgman. Univ. of So. Calif. Sch. of Med. LAC/USC Medical Center, Dept. of Peds. Los Angeles. California.

In order to evaluate the cardiorespiratory effects of changes in the duration of the positive-pressure (DPP) on the neonates requiring mechanical ventilation, 6 infants (2 with meconium aspiration and 4 with bronchopulmonary dysplasia) were studied. Their (mean ± S.E.) B.wt.= 1985 ± 352 gms. and GA =33 ± 1.8 wks. Arterial blood pressure (ABP), central venous pressure (CVP), blood gases and M-mode echocardiograms were obtained prior to and 10 minutes after changing DPP by 200 milliseconds while maintaining the same mean airway pressure. This was achieved by adjusting the respirator rate and the peak inspiratory pressure. There were no significant changes in ABP, CVP, PaO_2, pH, LA/AA, LVIDd and LPEP/LVET, whereas, the RPEP/RVET increased in every instance after an increase in DPP (0.31 ± 0.04 versus 0.37 ± 0.05. $P < 0.01$). This implicates an increase in pulmonary arterial pressure as a direct result of longer DPP. The results of this study indicate a relatively shorter DPP and faster ventilator rate is the more appropriate setting in order to avoid worsening of an existing pulmonary hypertension in term infants with meconium aspiration and premature infants after the acute stage of HMD.

1726 TOTAL RESPIRATORY RESISTANCE IN CHILDREN WITH A HISTORY OF BRONCHIOLITIS: Gerald L. Strope, Russell L. Pimmel, James M. Fulton, Albert M. Collier, and Wallace A. Clyde, Jr. Univ. of N. C., Dept. of Pediat., Chapel Hill, N. C.

Children with a history of hospitalization for bronchiolitis (Br) as infants are reported to have decrements in lung function during later childhood; however, the effect of mild Br on lung function is not known. We measured the total respiratory resistance (Rrs) using the forced random noise technique in 32 children from a day care center who had their respiratory illness status monitored prospectively from birth. Nineteen children were observed to have had at least one episode of mild Br, while 13 had none. The mean height (Ht) ± SEM, mean Rrs ± SEM, and mean Rrs normalized for Ht (nl-Rrs) ± SEM are:

	n	Ht (cm)	Rrs ($cmH_2O \cdot l^{-1} \cdot s$)	nl-Rrs
No Br	13	131±4.7	5.35±0.42	118±4.5
Br	19	124±4.1	6.52±0.31*	138±6.2*

*p less than 0.025

The children with a history of Br have a significantly higher Rrs even when normalized for height than those without such a history. These data suggest that even mild Br early in life may be an antecedant of lung dysfunction later in life.

1727 POST-MECHANICAL VENTILATION PULMONARY ATELECTASIS. Shyan Sun, Anita Baldomero, Anne Koons, Kamtorn Vangvanichyakorn(Spon by Robert Levine) CMDNJ-NJ Med School, Dept. Neonatology, Newark, N.J.

368 Newborn infants who were mechanically ventilated (IMV) within a 2½ year period (Jan. 1978-June, 1980) were carefully reviewed (chart & x-rays) to find out when, where & how atelectasis occured after extubation & the possibility of preventing it. 259 Infants (70.4%) survived mechanical ventilation. 45 of the survivals (12.2%) developed atelectasis. 91% of atelectasis occured within 5 days of removal of ET tube, 70% within 3 days & 52% in the first 2 days. Atelectasis occured most often at right upper lobe (50.8%), the order of frequency being RUL 50.8%, RLL 27%, RML 22%, right whole lung 10.2%, LUL 8.5%, LLL 6.8%, RUL+RLL 5.1% The longer the duration of IMV, the more frequently atelectasis occurs. 9.8% of infants developed atelectasis after 1-2 days of IMV. 23.3% after 3-10 days. 37.5% after 11-20 days & 34.8% after more than 21 days of IMV. During the period of the above study, patients were extubated after 24 hours of ET tube CPAP and directly placed in oxyhood. After July 1980, patients were given additional 48 hrs of nasal CPAP after extubation & before placing in oxyhood. Since then 34 patients have survived IMV+nasal CPAP & only 1 developed RUL atelectasis (2.9%). This is statistically significant ($p = 0.05$) compared to the incidence of atelectasis of previous years (12.2%). We believed a 2 day period of nasal CPAP following ET tube extubation served to reduce the frequency of post extubation atelectasis. The study is being continued to collect more data to further confirm our hypothesis.

● **1728** LUNG WATER AND VASCULAR PERMEABILITY-SURFACE AREA IN LAMBS WITH HYALINE MEMBRANE DISEASE (HMD). Hakan Sundell, Kenneth Brigham, Robert Green, Thomas Harris, Daniel Lindstrom, Jorge Rojas, Mildred Stahlman, Dept. of Ped. and Med., Vanderbilt Univ., Nashville, TN.

HMD is associated with increased intrapulmonary shunting and clinical evidence of increased vascular permeability. Multiple-tracer methods were used to measure vascular permeability-surface area (PS) for ^{14}C-urea using the integral extraction method in premature newborn lambs delivered by cesarean section (CS). Fourteen studies were performed during the first 7 hours after birth in 7 HMD lambs delivered at 127-133 days of gestation using ^{51}Cr-erythrocytes, ^{125}I-albumin and ^{14}C-urea. Pulmonary blood flow was corrected for extra-pulmonary shunts using a flowcuff and microspheres. Extravascular lung water content (ELW) was measured post mortem with a ^{51}Cr-erythrocyte method. The results were compared with those from 12 identical studies in 5 lambs without HMD delivered by CS around 140 days. Normalized to dry lung weight, the data expressed as mean ± S.E.M. were as follows:

	Lambs with HMD	Lambs without HMD
Lung Blood Flow (ml/sec x g)	0.71 ± 0.16*	1.40 ± 0.20
Lung ^{14}C-urea PS (ml/sec x g)	0.07 ± 0.02*	0.33 ± 0.04
ELW, post mortem (g/g)	7.11 ± 0.10*	6.12 ± 0.28

Normalized this way, lung water was significantly greater in the HMD lambs. PS values were significantly lower in the HMD lambs and showed a significant* decrease with postnatal age. PS was inversely correlated to pulmonary vascular resistance (r=0.67*). These data indicate that pulmonary edema and derecruitment occurs in HMD resulting in decreased surface area for exchange. *$p < 0.05$

● **1729** NON-INVASIVE MEASUREMENT OF VENTILATION IN CHILDREN USING THE RESPIRATORY INDUCTIVE PLETHYSMOGRAPH (RIP), E. Tabachnik, N. Muller, B. Toye and H. Levison, Dept. of Resp. Physiology, The Hosp. for Sick Children, Toronto.

Conventional methods of measuring ventilation in children involving mouthpiece and noseclip are inadequate because both the amount and pattern of breathing are altered by this methodology. In order to obtain the true physiological pattern and magnitude of ventilation, a non-invasive technique such as the RIP (Respitrace^R) is required. The RIP consists of 2 wire coils (transducers) placed over the ribcage and abdomen. Volume changes within the coils cause proportional changes in their inductances and voltage output. The sum of the voltage signals are calibrated against a known volume so as to represent tidal volume. To evaluate the accuracy of the RIP, the tidal volumes of 20 healthy children (8-16 yrs) were measured in 5 different body positions, and compared with tidal volumes measured simultaneously with a pneumotachograph. Comparison of these two techniques showed mean correlation coefficients of greater than 0.96, mean slopes between 0.95 and 1.10, and mean % SEE of less than 8% in all 5 body positions over a range of tidal volumes, thus demonstrating that the RIP can be accurately calibrated and that calibration is maintained regardless of body position. The addition of mouthpiece and noseclip altered ventilation significantly. The breathing pattern became much more regular, while mean tidal volume increased by 35% ($p < .01$). We conclude that the RIP provides an accurate means of measuring ventilation non-invasively in children and that it avoids the artifacts caused by breathing through a mouthpiece.