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5 YEAR EXPERIENCE WITH INFANTS REFERRED FOR APNEA/  
CYANOSIS. Ronald L. Ariagno, Christian Guilleminault,  
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The recognition that apnea may be a possible mechanism for sudden infant death syndrome (SIDS) has led to increasing concern regarding the evaluation and management of infants who present with a history of "apnea." Apnea has recently been defined as a respiratory pause lasting for 20 sec or longer or a shorter episode leading to cyanosis and bradycardia. The presenting event is most often witnessed by only the parents. Over the past 5 years, we have had 308 infants referred for respiratory related problems during the 1st year of life. The most frequent referral diagnosis was unexplained apnea and/or cyanosis. After extensive medical evaluation there was no diagnosis to explain the event and 173 infants (25% preterms and 75% terms) were considered "near miss for SIDS." In 10% of these infants, a potential cause was found to explain the presenting event. In 67% of the patients there was a second event within 8 wks of the presenting episode. Thirty-one percent of patients had a documented recurrence of apnea in the hospital. In 142 patients (83%) a home apnea/cardiac monitor was recommended. The duration of home monitoring was from 1-18 mos. with a mean of 5 mos. The most common criterium for discontinuing monitoring was an apnea-free period of 1-2 mos. as reported by the parents. In the past 5 years, we have had 1 mortality and this infant was never managed on a monitor. Infants who present for evaluation of apnea are a heterogeneous group and home apnea/cardiac monitoring is helpful in the management of these patients.

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COLLOID ONCOTIC PRESSURE (COP) IN HMD. Rama Bhat,  
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Since COP plays a vital role in fluid shifts and in the outcome, we studied the sequential changes in COP and total protein (TP) in 33 sick infants with severe HMD. Their birth weight and gest. age ranged from 0.55 to 2.5 kgs and 24 to 36 weeks respectively. COP was measured from 0.3 ml of heparinized arterial blood on day 1, 3 & 5 using Wescor colloid osmometer. TP was measured using TS meter. In addition COP of healthy preterm infants were measured for comparison. Their mean COP was 15.36±0.56. On day 1 COP in sick infants with severe HMD was significantly lower than the healthy preterm and infants with mild HMD. 8/33 infants died by day 3. COP in these infants decreased from 11.45±0.67 on day 1 to 8.8±0.8 (p<.05) prior to death inspite of colloid administration. Among survivors COP steadily increased reaching normal levels by day 5 (see table).

B.Wt. (kg)	n	Day 1		Day 3		Day 5	
		COP (mmHg)	TP (G%)	COP	COP (mmHg)	TP (G%)	
<1.0	13	11.27±0.42	3.69±0.2	12.93±0.5	13.93±0.65	4.6±0.25	
1.0-1.5	14	11.48±0.45	4.11±0.11	12.30±0.67	14.00±0.7	4.58±0.30	
1.5-2.5	6	12.0±0.43	4.48±0.16	13.0±0.6	14.0±0.90	5.3±0.12	

All infants received standard amount of fluids according to weight. COP did not correlate with G.Age or B.Wt. These data (1) demonstrate that a dropping COP is a poor prognostic indicator (2) Low COP contributes to increased transcapillary exudation (3) Gradual increase in COP among survivors suggests a decreased leakage of fluid 2<sup>0</sup> to stabilization of alveoli.

**1625**

THE ACCURATE MEASUREMENT OF PLEURAL PRESSURE IN NEONATES. M. Innes Asher, Allan L. Coates, Judith M. Collinge and Joseph Milic-Emili (Spon. by Harvey Guyda) McGill Univ.-Montreal Children's Hospital Research Institute and Meakins Christie Labs., McGill Univ., Montreal, Canada.

In the study of neonatal lung disease, pleural pressure is obtained indirectly from measurements of esophageal pressure (Pes) with either a water-filled catheter or an air-filled catheter-balloon system. The purpose of this investigation was to assess the validity of these two methods by comparing the simultaneous changes in Pes and mouth pressure (Pm) during occluded respiratory efforts. Equal changes in Pes and Pm under this condition indicate that Pes is a valid measurement of pleural pressure. In 6 healthy unsedated term neonates (aged 1 to 3 days) we measured Pes in the lowest third of the esophagus with both an air-filled (0.6 ml) balloon and a water-filled system, using an identical catheter of 8 French gauge (FG) which has a 2 mm internal diameter (i.d.). The narrower 5FG (1 mm i.d.) was unsuitable for use because of an inadequate frequency response at rapid respiratory rates. With the water-filled system, changes during occlusions in Pes and Pm were identical in magnitude and timing in all babies in each position studied (supine, prone, right lateral). However with the balloon, changes in Pes were smaller than changes in Pm by 16±11% (mean±1SD), accompanied by a phase lag of 14±4° in 4 neonates. We conclude that the water-filled esophageal catheter gives an accurate measurement of pleural pressure changes and is recommended for use in neonates.

**1628**

REMOVAL OF LIQUID FROM THE LUNGS OF LAMBS BEFORE AND AFTER BIRTH. R. Bland, T. Hansen, C. Haberkern, and M. Bressack. Cardiovascular Research Institute, Department of Pediatrics, University of California, San Francisco.

Labor decreases lung water in fetal rabbits (Bland et al, Am J Obstet Gynec 135:364, 1979). To see if labor would have the same effect in lambs, we measured the amount of blood and extravascular water in the lungs of 15 late-term lambs (term=147d) killed either without prior labor (n=6), late in labor (n=4), or 6 h after spontaneous vaginal birth (n=5). Summary (X±s<sub>x</sub>):

Lambs	Body Wgt kg	Dry Lung Wgt g	Gestation d	Lung Blood ml	Lung Water g/g dry lung
Fetal-no labor	3.4±.4	10.2±1.2	135±2	1.5±.2	10.8±.5
Fetal-in labor	2.9±.5	6.6±.8	138±3	2.3±.3	6.9±.2
Newborn-6h old	2.7±.1	8.8±.3	139±3	2.2±.5	4.3±.2

Labor was associated with a 53% increase in lung blood and a 36% decrease in extravascular lung water. These results indicate that the lungs shed 11.6±1.5 ml water/kg body weight before birth, and 6.0±0.5 ml water/kg body weight after birth. In the 5 lambs killed after birth, we measured lung lymph flow before and during labor, and for 6 h after breathing began. Lymph flow was unaffected by labor, but increased transiently after birth, as liquid entered the interstitium from air spaces. The post-natal increase in lymph flow accounted for 13-18% of the liquid removed from the lungs after birth. We conclude that in lambs (1) lung blood increases and lung water decreases before birth, and (2) the pulmonary circulation directly absorbs more than 80% of the liquid expelled from the lungs after birth.

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PHYSIOLOGICAL CORRELATES OF INTERSTITIAL LUNG DISEASE (ILD) IN CHILDREN: OXYGEN DESATURATION (DeSaO<sub>2</sub>) DURING EXERCISE. R. Beckerman, F. Mather, M. Bose, J. Colombo, R. Hopkins, M. Wegmann, W. Waring, (Spon. by J. Lewy), Dept. of Pediatrics, Tulane Univ. School of Medicine, New Orleans.

Young children with ILD may be uncooperative or too ill to perform meaningful tests of pulmonary function. We have evaluated children with ILD using pre, during (DUR), and post exercise (EX) stress ear oximetry (SaO<sub>2</sub>) and other more routine tests of pulmonary function. Responses in children with ILD, healthy children (CON), those with bronchial asthma (BA), and cystic fibrosis (CF) were compared. (Table)\*

Group	N	Age (Yrs)	PFT FVC	(% Predicted)		SaO <sub>2</sub> /EX (%)		ΔSaO <sub>2</sub> (%)	SEM**	P
				FEV <sub>1</sub>	DlCO	PRE	DUR			
ILD	9	10.6	61	88	69	94	82	12	4.2	<.05
BA	10	11.2	90	76	117	96	95	1	0.7	NS
CF	13	14.5	83	70	103	95	92	3	0.7	<.01
CON	10	11.9	102	87	96	97	96	1	0.3	<.05

\* all values represent averages \*\* standard error of the mean Exercise produced significant DeSaO<sub>2</sub> (PRE-DUR) in the ILD, CF, and control groups. The control group DeSaO<sub>2</sub> response was minimal. The ILD group exhibited the greatest changes. The alterations in the CF subjects were intermediate in degree. Desaturation responses during exercise clearly separated the ILD group from the others and correlated well with low FVC (R<sup>2</sup>=.60). Post EX SaO<sub>2</sub> values promptly returned to near baseline in most children. We have found DeSaO<sub>2</sub> during exercise to be a sensitive, and reproducible test of ILD in children.

**1629**

LOWEST VENTILATOR FLOW RATE DECREASES BAROTRAUMA Richard Blutstein, Robert A. Darnall, John Kattwinkel University of Virginia Medical Center, Department of Pediatrics, Charlottesville.

Barotrauma from artificial ventilation may be one of the causes of bronchopulmonary dysplasia (BPD). We measured non-elastic work of ventilation (NEWV) as an index of barotrauma. Four infants on time-cycled pressure limited ventilators were studied after insertion of a pneumotach and esophageal balloon. We varied flow rate and adjusted peak airway pressure to keep tidal volume (V<sub>T</sub>) constant. Rate, inspiratory time and PEEP were maintained at pre-study values. NEWV was determined for each flow rate from the area of the hysteresis loop of the pressure-volume curve.

	Flow Rate		NEWV		MAP	
	(L/min. ± SD)	(ml·cmH <sub>2</sub> O/breath)	(ml·cmH <sub>2</sub> O/breath)	(cmH <sub>2</sub> O)		
1 x MFR	3.2 ± .3	33.1	10.7	10.9		
2 x MFR	6.4 ± .7	46.3	12.1	12.1		
3 x MFR	9.5 ± 1.0	59.2	12.6	12.6		
S*	-----	8.6	.2	.2		

\*S=SQR(Interaction Mean Square) from 2 way ANOVA NEWV and mean airway pressure (MAP) were both lowest at the minimum flow rate (MFR) required to maintain V<sub>T</sub>. The linear regression of NEWV or MAP with flow rate was highly significant (p<.005). There were no significant changes in P<sub>O<sub>2</sub></sub> or P<sub>C<sub>O<sub>2</sub></sub></sub>. Since the use of the lowest flow rate to deliver a given tidal volume at a given rate causes the lowest NEWV and the lowest MAP, the use of a minimum flow rate setting may decrease barotrauma and the incidence of BPD in ventilated newborns.