1801 THE EFFECT OF CAFFEINE IN INFANTS MONITORED FOR PROLONGED APNEA. Harry Mondestin, Neal Mojica, I. Mark Hiatt, Thomas Hegyi, Division of Neonatology, Department of Pediatrics, UMDNJ-Rutgers Medical School, St. Peter's Medical Center, New Brunswick, N.J.

Caffeine therapy improved the pneumocardiogram(PCG) performance of nine infants monitored for prolonged apnea. The patients (BW 1.8+/-0.4 kg, GA 32+/-2 weeks), were examined with a twelve hour PCG at 6.5+/-9.0 weeks of age. Oral caffeine citrate was then started with a loading dose of 20 mg/kg, followed by a daily maintenance dose of 5/mg/kg. A second twelve hour PCG was obtained at 10.0+/-9.0 weeks. All PCG's were read by a computeri ized analyzer (Medical Graphics). The results of the comparison are shown below:

	PCG#1	PCG#2
Apneas 15 sec	31.4+/-25.1	6.2+/-10.2
15-20 sec	1.0+/-2.2	0.2+/-0.6
20 sec	0.2+/-0.6	0.1+/-0.3
Apnea density	1.2+/-1.0	0.3+/-0.3
Per. Breath, N	34.0+/-38	8.0+/-16
%	4.3+/-4.7	0.7+/-1.4

The PCG following caffeine administration showed fewer short (<15 sec) and long apneas (>15 sec), decreased apnea density, and decreased episodes and percent of PB. Caffeine did not influence number, length, or nadir of associated bradycardias. Caffeine therapy was effective in decreasing the severity of the documented abnormalities in ventilatory control in this group of infants.

1802 PULMONARY FUNCTION TESTS (PFTs) IN PRETERM BABOONS WITH HYALINE MEMBRANE DISEASE (HMD): PROGRESSION AND RECOVERY. Marisol Montes, Marilyn B. Escobedo, R.Lee Boyd, Ramiro Caballero, Cheryl Cipriani, Alejandro Gonzalez, T.J. Kuehl, Jacqueline L. Coalson, J. Guerra and Robert deLemos, (Spon. by John Mangos) Depts. of Ped. and Path., Univ. of Texas Health Sci. Ctr., Southwest Fd. for Biomed. Res., San Antonio and USAF, Wilford Hall Med. Ctr., Lackland City, TX.

Serial PFTs were performed in a baboon model to characterize changes during the course and recovery of HMD. Preterm baboons delivered abdominally at 140±2 days gestation were intubated at birth and stabilized. An esophageal balloon was inserted. The anesthetized, paralyzed animals were placed in a constant volume pressure plethysmograph for PFTs. Dynamic compliance (Cdyn) at 0.5 Hz, total lung resistance (R_L), inspiratory capacity (IC) at 30 cmH_2O pressure, static compliance (Cst) and functional residual capacity (FRC) by helium dilution were measured. Mean values (±SD) obtained were: (Paired t-test).

Day	n	FRC ml	IC ml	Cst ml/cmH_2O	$Cdyn_{30}$ ml/cmH_2O	R_L $cmH_2O/ml/sec$
0	6	3.9±1.65	9.7±5.36	1.0±0.53	0.6±0.34	0.3±0.24
1	6	5.5±2.1	8.3±5.45	1.1±0.56	0.4±0.41	0.2±0.17
3	6	11.8±3.77	13.5±6.34	2.6±1.26	0.8±0.49	0.1±0.17
7	6	10.9±2.88	12.0±4.57	2.1±0.90	0.9±0.46	0.1±0.19
9	6	11.1±1.90	15.1±5.85	2.1±1.00	0.9±0.61	0.1±0.08

Significant (P< 0.05) improvement occurs in FRC by day 1; IC, Cst and Cdyn by day 3; and R_L by day 9. Serial PFTs may serve as a basis for evaluating complications and therapy for HMD.

1803 PRETERM BABOONS DEMONSTRATE SIGNIFICANT IMPROVEMENT IN OPENING PRESSURES DURING PROGRESSION AND RECOVERY FROM HYALINE MEMBRANE DISEASE (HMD). Marisol Montes, Marilyn B. Escobedo, Ramiro Caballero, Alejandro Gonzalez, R. Lee Boyd, Cheryl Cipriani, T. J. Kuehl, Jacqueline L. Coalson, J. Guerra, and Robert deLemos, (Spon. by John Mangos) Depts. of Ped. and Path., Univ. of Texas Health Sci. Ctr., Southwest Fd. for Biomed. Res., San Antonio and USAF, Wilford Hall Med. Ctr., Lackland City, TX.

High opening pressures (OP) are characteristic of HMD; a reduction in OP may indicate improvement in alveolar stability. Animals were delivered abdominally, and ventilated with either conventional or high frequency ventilators. The anesthetized, paralyzed animals were tested in a constant volume pressure plethysmograph with an esophageal balloon in place. The inspiratory limb of the pressure-volume curve was analyzed for OP defined as the pressure at the point of departure from an isovolumetric transpulmonary change. Peak Pressure (PP) was defined as the highest pressure required for ventilation. Mean values (±SD) obtained were:

	Day 0	Day 1	Day 3	Day 7
n	6	6	6	6
OP (cmH_2O)	14.9±2.20	6.4± 5.76	5.5±1.65	6.4±3.24
PP (cmH_2O)	22.3±2.55	15.6± 5.14	20.1±5.57	14.5±4.82

Analysis by ANOVA for repeated measures revealed a significant (P<0.01) improvement in OP by day one. Further changes in OP and changes in PP were not significant. Change in OP may be an early, sensitive measure of improvement in HMD.

1804 FETAL BREATHING MOVEMENTS TRANSIENTLY INCREASE LUNG FLUID VOLUMES IN SHEEP Daniel T Murai, Linda D Wallen Chu-Ching H Lee, Joseph A Kitterman, Univ of Texas Health Sci Ctr, San Antonio & Univ of Calif, San Francisco and Cardiovasc Res Inst, Dept of Ped, San Antonio & San Francisco.

Fetal breathing movements (FBM) stimulate fetal lung growth. Since lung distension has been associated with fetal lung growth, we postulated that FBM transiently increase the total volume of fluid (TVF) in the potential airways and air spaces. In 6 chronically catheterized fetal sheep (121-137 days) we cannulated the trachea with 2 small catheters (6F balloon-tipped, 6F end-hole); the trachea remained patent. FBM (by tracheal catheter) were recorded continuously after surgery. On alternate days after ≥9 minutes of either FBM or no FBM we inflated the balloon-tipped catheter to occlude the trachea. Then we aspirated fluid from the lungs until ≤0.4 ml/min was obtained. In 3 fetuses we measured by inulin dilution the TVF in the lungs to determine the completeness of the aspiration. The TVF after FBM were 49.0 and 51.5 ml/kg; TVF after no FBM was 43.6 ml/kg. The volume that remained after aspiration was 19.6±0.9 ml/kg (mean±SD). The daily incidence of FBM was similar on both study days for each fetus. In every fetus, the volume aspirated after FBM (69.9±18.1 ml) was greater than that after no FBM (40.8±21.4 ml)($p<0.01$). When expressed as volume/body weight, the volume after FBM (26.0±3.7 ml/kg) was greater than after no FBM (20.5±2.4 ml/kg)($p<0.01$). We conclude that in the fetus with a patent trachea, FBM increase the volume of fluid that can be aspirated from the lungs. This suggests that the TVF in the airways and air spaces may also increase and may stimulate lung growth. (USPHS HL-27356 and IRG UTHSCSA)

1805 PNEUMOTHORAX IN MECHANICALLY VENTILATED INFANTS: ASSOCIATION WITH BRAND OF SUCTION CATHETER.

Saul Z. Newman, Jeffrey J. Pomerance, Sharyn Brown, UCLA School of Medicine, Cedars-Sinai Medical Center, Department of Pediatrics, Los Angeles, California.

Pneumothorax (PT) remains a major source of morbidity and mortality in mechanically ventilated infants. After a number of infants sustained PT on unusually low (8-20 cm H_2O) peak-inspiratory pressure (PIP) during year I, the brand of suction catheter was changed from Pharmaseal to Bard-Parker. Ventilated infants were then followed in the ensuing year (year II). General policy regarding ventilator management was similar in both years.

Excluding infants with hypoplastic lungs, PT occurred in 22 of 128 (17%) ventilated infants in year I and in 7 of 89 (7.9%) in year II ($p<0.05$). In low-birthweight (LBW) infants (<1250 gm), 19 of 53 (36%) sustained PT in year I and 6 of 39 (15%) in year II ($p<0.03$). In year I, 9 of 53 (17%) LBW infants sustained PT while on PIP of 20 cm H_2O or less (range 8-20, $\bar{x}=15$). Three of these infants later died. In year II only one of 39 (2.5%) LBW infants sustained PT while on PIP of 20 cm H_2O or less ($p=0.04$).

We speculate that stiffer suction catheters, which pass more easily through the endotracheal tube (and are therefore frequently selected over more pliable brands) place the infant at increased risk of transbronchial puncture, possibly even more so in smaller infants. Routine monitoring of the incidence of pneumothorax, and the circumstances under which they occur may decrease the risk of equipment-related PT.

●1806 PROTEIN KINASES (PK) AND ENDOGENOUS PROTEIN PHOSPHORYLATION IN PULMONARY ENDOTHELIAL CELLS (PEC). Akihiko Noguchi, Robert Wysolmerski, Jayne Gorup, and David Lagunoff. St. Louis University, School of Medicine, Departments of Pediatrics and Pathology, St. Louis, MO.

PEC produces prostacyclin thereby altering pulmonary blood flow and permeability. cAMP, Ca, calmodulin (CM) play roles in the regulation of prostacyclin production. Protein phosphorylation catalysed by cAMP or Ca dependent PK is an important physiologic effector mediating hormonal action. However little is known about PK in PEC. Bovine PEC is grown in cell culture to confluence and Ca dependent phosphatidylserine (PS) regulated PK (PK-C) and cAMP dependent PK (PK-A) activities were measured using exogenous histone as substrate.

	Cytosol	Particulate
PK-C	204±62	35± 7
PK-A	420±51	110± 8

pmol Pi incorporated/min/mg protein, n = 4 each

Cytosol was also incubated with Ca, Ca & CM, Ca & PS, or cAMP in the presence of $\{^{32}P\}$-ATP and subjected to SDS-polyacrylamide gel electrophoresis and autoradiography. 82 K dalton protein phosphorylation was stimulated by Ca and inhibited by EGTA, CM inhibitor trifluoperazine, but not by PK-C inhibitor polymyxin B. 40 K protein phosphorylation was weakly stimulated by cAMP which is inhibited by PK-A inhibitor. Thus we identified PK in PEC and conclude that in bovine PEC 1) Major PK-A and PK-C activities are in cytosol fraction 2) 82 K and 40 K proteins are phosphorylated by Ca & CM dependent PK, PK-A respectively, and speculate that PK and substrate proteins play roles in metabolism of PEC.