1723 INCREASED VENTILATORY DRIVE AND IMPROVED LOAD COMPENSATION WITH CAFFEINE THERAPY. S. Abbasi, E.M. Sivieri, T.H. Shaffer, W.W. Fox. Univ. Pa. Sch. Med., Dept. Pediatrics, Pennsylvania Hospital, Temple Univ. Sch. Med., Dept. of Physiology, Children's Hospital of Philadelphia, Pa.

To evaluate the effect of caffeine therapy (CT) on ventilatory response of growing preterm infants to a combined inspiratory and expiratory resistive load (R), 6 infants were studied before and during CT. Mean ± SEM, BW=1730±58gm, GA=32.7±0.8 wks, study age =22.3±4.9 wks, study weight=2231±132gm, CT level=10.0±1.3 mg/dl. These infants had no lung disease at birth. Pulmonary mechanics (dynamic lung compliance, inspiratory and expiratory resistance, and total pulmonary resistance) were normal at the time of study. Pulmonary measurements: tidal volume (V_T), respiratory frequency (f), minute ventilation (MV), peak inspiratory flow ($\dot{V}_I$), peak expiratory flow ($\dot{V}_E$), inspiratory time/total respiratory time (T_I/T_T), and esophageal pressure (P_{es}) were obtained before and 60 sec after the application of R. A variable resistor was used to administer a separate load of 50 (R_1) and 100 (R_2) cm H_2O/L/sec. Mean ± SEM control values were V_T=7.6±0.9ml/kg, f=66.4±6.1 breaths/min, MV=491.7±65.2ml/min/kg, T_I/T_T=0.47±0.01, $\dot{V}_I$=3.10±0.57L/min, $\dot{V}_E$=2.61±0.52L/min, P_{es}=8.4 ± 1.2cm H_2O. Application of R_1 and R_2 resulted in an increase in P_{es} which is a measure of respiratory drive. This response was significantly greater ($p<.05$) during CT. Furthermore, there was no change in V_T during CT, which significantly decreased with application of R prior to therapy. These data demonstrate that CT is associated with increased ventilatory drive and improved load compensation.

1724 PENETRATION OF THERAPEUTIC AEROSOLS (TA) THROUGH ENDOTRACHEAL TUBES (ETT). Richard C. Ahrens, Rebecca A. Ries.(Spons. by Miles Weinberger) University of Iowa, Dept. of Pediatrics. Iowa City.

Because of observations of occasional toxicity from TA in intubated patients, we examined the site of deposition of TA delivered into 3.0, 6.0, and 9.0mm endotracheal tubes (ETT) using a constant flow in vitro model and 0.1% fluorescein as a tracer. A typical nebulizer (N) was used (aerodynamic mass median diameter of 4.1) and a range of clinically relevant inspiratory flow rates were studied. The N was connected to the ETT through a "T" piece and a 90 degree elbow. ETT was bent 90° with a radius of curvature of 5.25 cm. TA exiting the ETT was collected in 80 L polyethylene bags. Because preliminary experiments showed that much of the TA which originally deposited the ETT, ran to the end of the ETT and dripped into the collection bag, appropriately sized plexiglass models of the trachea, and mainstem bronchi (MB), were constructed and placed on the end of each ETT to collect this drippage. Results, expressed as percent of inspired trace in each location, follow:

size (mm):	3.0	3.0	3.0	6.0	6.0	6.0	9.0	9.0	9.0
Flow (L/Min):	7.5	10.0	22.5	10.0	22.5	50.0	10.0	22.5	50.0
"T" + Elbow:	12	11	23	17	20	37	15	18	35
ETT + model:	57	75	69	52	55	49	5	27	34
bag:	31	14	8	31	25	14	80	55	31

Penetration of aerosol beyond the mainstem bronchi is decreased with increasing flow rate and decreasing ETT diameter. The study was repeated with an alternative nebulizer delivering TA with an aerodynamic mass median diameter of .54. Aerosol penetration beyond the MB increased dramatically (to a range of 78-98%). Thus, a significant percentage of the TA delivered into the ETT during inspiration by usual nebulizers is deposited as a liquid bolus poured into the airway. This problem is nearly eliminated when a smaller particle size aerosol is used.

1725 ANESTHETIC COMPLICATIONS IN ADENO/TONSILLECTOMY (T+A) IN CHILDREN WITH/WITHOUT SLEEP DISTURBANCE (SD). Rajinder Arora, Robert C. Beckerman, Chitra Subaiya, Hollis T. Reed (Spon. by John E. Lewy). Tulane University School of Medicine, Departments of Pediatrics, Anesthesiology, and ENT, New Orleans.

A retrospective study was done to determine the incidence of intra/postoperative anesthetic complications in children undergoing T+A for adenotonsillar hypertrophy (ATH). Charts of 65 children were reviewed; four children were excluded from the study because of complicating systemic diseases. Sixteen (26.2%) of 61 children (mean age 8.5 years) had been referred primarily because of severe SD and underwent polysomnography. We compared this group with the remaining group (n=45) to determine any difference in incidence of complications due to anesthesia. In 50 patients (82%) inhalation anesthesia was used, and in 11 patients (18%) nitrous oxide was supplemented with I.V. pentothal/narcotics. In five patients (8.2%) there were minor complications which included laryngospasm (1), difficult intubation (2), postoperative upper airway obstruction (1), and lobar atelectasis (1). The incidence of complications was 4.4% in patients without severe SD and 18.75% in children with severe SD (P value=.11). All patients improved clinically post T+A. We conclude that general anesthesia for T+A in children with ATH with severe SD may present anesthetic and postoperative problems even when pre-medications are sparingly used.

●1726 PROGRESSION OF CYSTIC FIBROSIS LUNG DISEASE IS DECREASED BY PREDNISONE IN A 4 YEAR CONTROLLED TRIAL. H. Auerbach, M. Williams, H.R. Colten. Harvard Medical School, Boston, Ma. 02115

A randomized double-blinded study was initiated to examine the effects of the anti-inflammatory agent, prednisone, on the progression of lung disease in CF. A total of 43 patients with CF were given either 2 mg/kg prednisone every other day, or placebo. At the onset of the study, patients were between one and 12 years of age and were minimally affected as judged by pulmonary function studies, chest x-ray scores, and serological parameters. The two groups did not statistically differ (Mann-Whitney analysis) according to all values measured. After 4 years, the group receiving prednisone demonstrated a statistically significant advantage over the group receiving placebo, in height ($p=<0.005$), weight ($p=<0.01$), %vital capacity ($p=<0.025$), %forced expiratory volume in one second ($p=<0.005$), peak flow rate ($p=<0.005$), and IgG ($p=<0.025$). Moreover, the prednisone-treated group required a total of ten admissions to hospital for CF related pulmonary disease vs. twenty-eight admissions for the placebo group. No patients receiving prednisone developed cataracts, elevations of HbA_1C, or other steriod-induced side effects. Despite the relatively small number of patients involved and the limited period of time of this study, these data indicate a significant effect of prednisone on progression of CF pulmonary disease and provide the basis for a study of the long-term effects of anti-inflammatory agents in CF and the frequency of steriod side effects.

●1727 DIFFUSE PROTEIN LEAK IN PREMATURE LAMB LUNGS DOES NOT CORRELATE WITH VENTILATION. David D. Berry, Alan H. Jobe, Machiko Ikegami, UCLA School of Medicine, Harbor-UCLA Medical Center, Dept. of Pediatrics, Torrance, CA.

Premature lambs with RDS have an increased leak of intravascular protein into their lungs. We studied 12 lambs to determine the relationship between this protein leak and ventilation. A balloon catheter within a major bronchus was used to protect an area of lung from ventilation since birth in 6 lambs (G1) and after 2 hrs of ventilation in 6 lambs (G2). The lambs were ventilated to maintain normal pCO_2 values. At 3 hrs, ^{125}I-albumin was injected intraarterially to measure the protein leak, and at 2 and 4 hrs radiolabeled microspheres were injected into the right ventricle to assess pulmonary blood flow (PBF) distribution. Three min prior to sacrifice ^{131}I-albumin was injected and used to correct for intravascular blood within the lung pieces. At 4 hrs the lambs were sacrificed, the balloon protected areas were separated from the remaining aerated lung, and the lungs were divided into ∿ 60 1 g pieces. The results for the balloon protected areas as % of the total lung are:

	Weight	Protein Leak	PBF-2 h	PBF-4 h
G1	27.7±2.8%	25.1±3.2%	9.4±1.9%	5.6±2.3%
G2	21.4±3.6%	24.3±4.3%	22.9±4.1%	10.2±3.6%

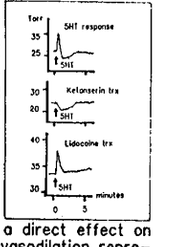
An area of lung protected since birth from inflation or barotrauma had the same magnitude of protein leak as lung that was subjected to ventilation, despite a reduction in blood flow to the protected area. We postulate that circulating vasoactive agents, and not barotrauma, may be a major cause of the increased protein leak seen in RDS.

●1728 SEROTONIN (5HT) PULMONARY VASCULAR RESPONSES IN THE NEWBORN PIG: VASOCONSTRICTION AND REFLEX VASODILATION ARE INDEPENDENT PROCESSES. Rex Bickers, Randy Miller, Nancy Hansen and James Menke. (Spon. by Philip Walson) Department of Pediatrics, Children's Hospital, Ohio State University, Columbus.

We have previously reported two-receptor mediation of 5HT pulmonary vasoconstriction and differences in the dose-response curves of acutely instrumented animals versus awake chronic preparations.

To further characterize 5HT pulmonary vascular responses, we investigated 5HT action in 0-5 day old pigs (n=12). In each experiment, animals underwent instrumentation for measurement of aortic pressure (peripheral cannula), pulmonary artery (PA) pressure and PA flow (via thoracotomy). For dose-response curves, 5HT was infused as a series of rapid bolus doses, ranging from 1-100 mcg/kg. Pharmacologic mediation of the response was investigated by repeating 5HT infusions after treatment with ketanserin (a 5HT-2 blocker) or lidocaine (an endothelial uptake blocker).

The PA pressure response to 5HT was qualitatively consistent, but its magnitude exhibited a wide range of variation. The PA tracing was always biphasic, consisting of a rapid increase (2-10 torr) in PA pressure over 30-40 seconds, followed by reflex vasodilation (1-4 torr below baseline), which was slower in onset (1-2 min) and in time to recovery (4-6 min). The active dose range and peak vasoconstriction response were inversely related to baseline pressure (partly a function of age). Ketanserin blocked vasoconstriction completely at doses of 0.03-0.30 mg/kg, but the "reflex" vasodilation was unaffected. Lidocaine produced no blockade of vasoconstriction, but ablated the vasodilation phase.



We speculate that 5HT pulmonary vasoconstriction is a direct effect on vascular smooth muscle, while the accompanying reflex vasodilation represents release of a second mediator in response to endothelial 5HT uptake.