† 1774 STATIC VS DYNAMIC AIRWAY PRESSURE AND REGIONAL LUNG BLOOD FLOW. B. P. Fuhrman, J. C. Ring, D. L. Smith-Wright, J. E. Lock, R. K. Schutjer and S. Einzig. Pediatric Critical Care, Univ. of Minn., Mpls., Minn. 55455

To compare pulmonary vascular effects of static(S) and dynamic (D) airway pressure(AP), 21 intact, two to four week lambs with L atrial(LA) lines were given chloralose and pancuronium, positioned supine, and ventilated (12-16cc/kg, 25 breaths/min.) R atrium(RA), pulmonary artery and aorta were cathererized. Apneic SAP (2 and 15 cmH_2O), and DAP (ventilation with 2 and 15 cmH_2O end-expiratory pressure) were studied by recording vascular and airway pressures and by RA injection of 15μ radioactive microspheres. After experiments, upper(U) and lower(L) lung segments were sampled for scintillation counting. Pulmonary blood flow(PBF), U and L regional PBF, pulmonary vascular resistance(PVR) and mean airway pressure (MAP) were calculated. 5 successful studies (group 1) were obtained at low $\overline{LA}$ (4 cmH_2O), and 6 (group 2) at LA=14. Within each group, 2 and 15 cmH_2O AP trials were compared using Student's paired t test. At low LA, both SAP and DAP with 15 cmH_2O reduced PBF(40%*,32%*), and elevated PVR(55%,116%). SAP and DAP reduced both UPBF(40%,49%*) and LPBF(36%*,29%*). At high LA, PVR was increased by both SAP and by DAP(9%,72%*), but significantly more so by DAP†. Furthermore, DAP reduced both UPBF and LPBF (17%, 29%), but SAP of comparable MAP(15 vs 19 cmH_2O) reduced only UPBF (17%), and not LPBF. High LA, which should blunt Starling resistor effects of AP on LPBF, ablated the decrease in LPBF due to SAP, but not that due to DAP. This is compatible with a non-Starling, perhaps arteriolar effect of DAP on PVR.

* $p<.05$, 15 vs 2 cmH_2O † $p<.05$ SAP vs DAP

1777 POST-OPERATIVE EPIDURAL MORPHINE IN CHILDREN AND ADOLESCENTS. James A. Glenski, Brian Dawson, Bruce Kaufman, Mark A. Warner, (Spon. by Gerald S. Gilchrist), Mayo Clinic and Foundation, Departments of Anesthesiology and Surgery, Rochester, Minnesota.

Following 15 major surgical procedures in 9 patients, epidural morphine was used for postoperative analgesia. The patients included a 9 yr old status-post (S/P) thoracotomy for bronchiectasis, a 4 yr old S/P thoracotomy for metastasis of a rhabdomyosarcoma, six adolescents S/P thoracotomy for metastasis of osteogenic sarcoma (OGS) and a 14 yr old with cystic fibrosis S/P abdominal surgery.

The average dose of morphine was 0.12 ± 0.03 mg/kg of body weight (range: 0.06-0.18) or 0.03 ± 0.01 mg/cm of body height (range: 0.01-0.045). Mean duration of analgesia was 10.8 ± 4 hrs (range: 5-23). Catheters remained in place for 50 ± 16 hrs (range: 20-74). Quality of pain relief was judged to be excellent by the patients, parents and care providers. Following 10 of 74 epidural morphine injections mild pruritis occurred. Other side effects included nausea (3/74) and urinary retention requiring a catheter in 4 patients. No respiratory depression or hypotension was encountered.

Improved quality of pain relief, improved pulmonary function and earlier ambulation are potential benefits of epidural narcotics. Children prone to respiratory difficulties or those likely to be subjected to multiple major surgeries may particularly benefit from epidural narcotics postoperatively. In conclusion, epidural morphine can provide reliable postoperative pain relief in children and adolescents.

† 1775 TRACHEAL LAVAGE(TLFN) AND PLASMA(PFN) FIBRONECTIN(FN): RELATIONSHIP TO RESPIRATORY DISTRESS SYNDROME(RDS) AND DEVELOPMENT OF BRONCHOPULMONARY DYSPLASIA(BPD). J.S. Gerdes, M. Paul, M.C. Yoder, S.D. Douglas, M.C. Harris, R.A. Polin. Dept. of Peds., Univ. of Pa. Sch.of Med., and Children's Hospital of Phila., Phila., PA.

Fibronectin, a multifunctional glycoprotein, is found on cell surfaces and in extracellular fluids, and modulates cellular adhesion and vascular permeability. Lung FN produced by alveolar macrophages acts as a chemoattractant for fibroblasts and stimulates their replication. PFN samples were obtained from 39 neonates with RDS ($\overline{BW}$ 1853 ± 110 gm; $\overline{GA}$ 32 wk), 6 of whom developed BPD ($\overline{BW}$ 1160 ± 48 gm; $\overline{GA}$ 28.8 wk). TLFN and albumin(AL) concentrations were measured in a subgroup of 15 RDS and 4 BPD infants. Control(C) PFN values were obtained from 20 healthy premature infants on days 1-3 of life ($\overline{BW}$ 1750 ± 110 gm; $\overline{GA}$ 31.2 wk). Control TLFN and AL were measured in 7 neonates intubated for non-pulmonary indications. PFN (mcg/ml); TLFN (ngFN/mcgAl).

Results	Control	Day 1	3	5	7-10	14-30
PFN-RDS	163	118*	124*	113*	128	189
PFN-BPD		82*	95*	85*	87*	138
TLFN-RDS	72	34**	34**	39	58	----
TLFN-BPD		61	64	55	48	159***

*p<.01, vs. C; **p<.05 RDS vs. C; ***p<.01 BPD 14-30 vs. RDS 1-10.

Conclusions: PFN and TLFN are significantly decreased in infants with RDS vs. controls. Infants who develop BPD demonstrate a significant increase in TLFN (days 14-30) vs. infants with RDS (days 1-10).

Speculation: 1) Low TLFN and PFN early in RDS may contribute to pulmonary capillary leak. 2) High TLFN may foster development of pulmonary fibrosis in BPD.

1778 CONTROLLING ALVEOLAR OVERDISTENTION (AO) DURING RAPID RATE VENTILATION (RRV). Felipe Gonzalez, and Peter Richardson, (Spon. by P. Bray), Department of Pediatrics, University of Utah Medical Center, Salt Lake City, UT.

RRV has been used to reduce $PaCO_2$ in infants with persistent fetal circulation. RRV produces AO in the rabbit lung (time constant (τ) similar to infants). We hypothesized that AO could be reduced if the PEEP in the trachea ($PEEP_T$) was controlled during RRV. We studied 10 rabbits measuring tracheal airway pressure, functional residual capacity (FRC) PaO_2 and $PaCO_2$ at ventilator (Baby Bird®) rates of 30, 60, 90 and 120 BPM while: 1) controlling ventilator PEEP ($PEEP_V$) at 2 cm H_2O then 2) controlling $PEEP_T$ at 2 cm H_2O. Peak inspiratory pressure was held constant (15 cm H_2O) as was inspiratory:expiratory time (1:2) at rates of 60, 90 and 120 BPM. To control $PEEP_T$ we lowered $PEEP_V$ to 1.2, 1.1 and 0.5 cm H_2O. As rates were increased, controlling $PEEP_T$ resulted in significant decreases in mean airway pressure ($\bar{P}aw$) (by 0.0±.0(SE), 0.4±.1, 0.5±.1 and 1.0±.2 cm H_2O) and FRC (14±1, 15±1, 17±2, 21±2 ml/kg when $PEEP_V$ was 2 cm H_2O vs. 14±1, 14±1, 15±1, 16±2 ml/kg when $PEEP_T$ was 2 cm H_2O) ($p\leq0.01$). When rate was increased from 30 to 60 BPM, PaO_2 increased significantly from 68±4 to 78±5 mm Hg when $PEEP_V$ was 2 cm H_2O, then increased to 79±6 mm Hg when $PEEP_T$ was 2 cm H_2O; $PaCO_2$ decreased from 26±2 to 20±2 mm Hg when $PEEP_V$ was 2 cm H_2O then decreased to 18±2 mm Hg when $PEEP_T$ was 2 cm H_2O. Further increases in rate did not lead to significant changes in PaO_2 or $PaCO_2$ in either part of the study. We conclude: controlling $PEEP_T$ during RRV of lungs with normal τ results in decreased $\bar{P}aw$, eliminates AO and blood gases comparable to those obtained when $PEEP_V$ is controlled.

1776 LONG-TERM STUDY OF PULMONARY FUNCTION IN INFANTS SURVIVING WITH CHRONIC LUNG DISEASE (CLD). Tilo Gerhardt, Dorothy Hehre, Rosalyn Feller, Eduardo Bancalari. University of Miami, Jackson Memorial Hospital, Department of Pediatrics, Miami, Florida.

Lung function was determined serially in 37 preterm infants with CLD (BW 1180±430g, GA 30.4±2.5 wks) during the first 24 mo. of life. All infants were mechanically ventilated after birth because of HMD, asphyxia, or pneumonia. CLD was diagnosed when the need for supplemental O2 and haziness with prominent interstitial markings on the chest radiograph persisted for >4 weeks. Tidal volume was measured by pneumotachography, esophageal pressure through a water filled feeding tube, and FRC by N2 washout.

No. studied,(age mo.)	35(1)	37(6)	33(12)	14(24)
Wt (kg)	1.3±0.4	5.1±1.3	7.9±1.3	11.0±1.5
VT/kg (ml/kg)	6.9±1.3	5.9±1.1	7.3±1.7	8.0±1.8
FRC/kg (ml/kg)	14.8±2.4	15.1±3.5	17.6±3.4	20.4±4.6
CL/kg (ml/kg/cmH2O)	0.74±0.24	0.78±0.25	1.06±0.26	1.17±0.39
SCL (ml/cmH20/LFRC)	48±13	54±19	61±15	59±13
RL (cmH20/l/sec)	127±50	91±28	61±16	48±9
SGL (L/sec/cmH20/lFRC)	0.47±0.19	0.17±0.08	0.14±0.06	0.10±0.02

At 1 mo. of age FRC and lung compliance (CL) were lower than normal and pulmonary resistance (RL) was increased. During the following 23 months, FRC and CL increased faster than weight, suggesting catch up alveolar growth. Specific compliance (SCL) became normal. RL did not fall in proportion to the increase in weight and FRC and, therefore, specific conductance (SGL) decreased progressively. These results suggest an exaggerated dysanaptic lung growth in infants with CLD.

1779 DO EGF AND GLUCOCORTICOIDS ACT AT THE SAME METABOLIC SITES IN FETAL RAT LUNG? Ian Gross, Diane W. Dynia, Yale Sch of Med, Dept of Ped, New Haven, CT.

EGF enhances the morphological and physiological maturation of fetal lung in vivo and it has been suggested that it mediates T_4 action on developing mouse skin. We examined the effects of EGF on the biochemical development of explants of 18 day fetal rat lung, maintained in a serum free organ culture system for 48h, in order to compare the effects of this peptide to those of T_3 and dexamethasone (dex). EGF stimulated choline incorporation into phosphatidylcholine (PC) in a dose dependent fashion with half the maximal effect occurring at 1.0±0.1 nM (6 ng/ml). The effect of EGF on choline incorporation decreased with increasing gestational age whereas stimulation of thymidine incorporation into DNA increased, suggesting that EGF accelerates maturation of undifferentiated cells, but enhances multiplication of differentiated cells. EGF and dex significantly increased the distribution of radioactivity from acetate into the phosphatidylglycerol fraction, but T_3 did not (PG as a % of total phospholipid: control, 1.8±0.2%; EGF, 4.4±0.4%; dex, 6.1±0.4%; T_3, 2.0±0.4%). In mixing experiments using optimal concentrations, EGF (10 nM) produced 35% stimulation of choline incorporation; dex (100 nM), 47%; T_3 (100 nM), 34%; EGF + T_3, 75%; and EGF + dex, 43%. The fact that EGF + dex did not produce a greater effect than dex alone suggests that these 2 agents, but not T_3, act at the same metabolic sites. We speculate that EGF may partially mediate the effects of dex on fetal lung maturation.