1422 HEMODYNAMIC EFFECTS OF ALTERING PCO_2 DURING HYPERVENTILATION. Jeffrey A. Lindenberg, Boyd W. Goetzman, and Jay M. Milstein. School of Medicine, Dept of Pediatrics, University of California, Davis, CA

In order to assess the mechanism of hyperventilation induced pulmonary vasodilation, 8 newborn lambs were chronically instrumented for measuring pressures in the aorta (PAo), pulmonary artery (PPa), left atrium, and superior vena cava, and pulmonary blood flow (Qp). Two-five days following surgery, the lambs were paralyzed and ventilated with a hypoxic gas mixture in order to raise PPa. They were then mechanically hyperventilated. Without changing the ventilator settings, normocarbia was reproduced by adding CO_2 to the inspired gas.

Results are reported as means (ranges). Alveolar hypoxia increased pulmonary vascular resistance (PVR) by 78% (9-237%) and the pulmonary/systemic resistance ratio (PVR/SVR) by 67% (6-133%). During hyperventilation, $PaCO_2$ decreased by 15.5 torr (6-34 torr), and PPa fell by 5.6 mmHg (2-9 mmHg). Interestingly, the effects of hyperventilation on PAo, Qp, PVR, and PVR/SVR were variable, and both increases and decreases were seen. The addition of CO_2 to the inspired gas during the hypoxic hyperventilated state elevated $PaCO_2$ by 15.6 torr (7-24 torr), and elevated PAo by 10.8 mmHg (0-22 mmHg), PPa by 11 mmHg (8-17 mmHg), SVR by 20.7% (4-35%), PVR by 56% (14-170%), and PVR/SVR by 28% (9-102%). The effect on Qp was variable.

We conclude that the newborn's pulmonary bed is very sensitive to changes in $PaCO_2$, and that the reduction of hypoxia induced pulmonary hypertension in newborn lambs by hyperventilation is not due to a direct mechanical effect on the lung.

1423 GENTAMICIN IN PREMATURE NEONATES: A DOSAGE REGIMEN BASED ON MATURITY. Eduardo J. Lugo, Franklin R. Smith and James S. Rawlings. (Spon. by James W. Bass). Dept. of Pediatrics, Tripler Army Medical Center, Honolulu, HI.

Gentamicin toxicity and efficacy studies have indicated desired peak and trough serum concentrations of 4-12 mcg/ml and less than 2 mcg/ml, respectively. Choosing an appropriate dose and dosage interval for premature infants is complicated by decreasing glomerular function with decreasing gestational age. We tested a regimen in which 24 infants less than 7 days of age, who were born between 26 and 36 weeks of gestation, received 2.5 mg/kg of gentamicin intravascularly every 18 hours. Trough serum gentamicin concentrations exceeded 2 mcg/ml in 33%; peak serum concentrations exceeded 12 mcg/ml in none but were less than 4 mcg/ml in 12.5%. Regression analysis of the data revealed inverse linear correlations between peak and trough serum gentamicin concentrations and gestational age ($p<0.01$ and $p<0.05$, respectively). Using these relationships a mathematical model was derived for calculating optimal gentamicin dose and dosage interval based on gestational age (G, in weeks):

Initial dose (mg/kg) $\doteq 4.2 + 0.038\ G$

Subsequent doses (mg/kg) $\doteq 3.4 + 0.031\ G$

Dosage interval (hours) $\doteq 50 - 0.76\ G$

This regimen is designed to yield peak and trough serum concentrations of 8 mcg/ml and 1.5 mcg/ml, respectively. We conclude that the observed variations in gentamicin serum concentrations in premature neonates warrants the use of dosage regimens based on estimated gestational age. Additional clinical experience is needed to confirm the validity of these dosage recommendations.

†1424 INDOMETHACIN THERAPY ON THE FIRST DAY OF LIFE IN VERY-LOW-BIRTHWEIGHT INFANTS Lynn Mahony, Randall Caldwell, Donald Girod, Roger Hurwitz, Robert Jansen, James Lemons, Richard Schreiner, Indiana Univ., Dept. Pediatrics

It has recently been suggested that early treatment with indomethacin(indo) of premature infants with asymptomatic heart murmurs decreased morbidity since the majority of these infants develop hemodynamically important shunts(SH) through a patent ductus arteriosus(PDA). Others suggest that treatment be given earlier as some infants have "silent" PDA. To investigate the optimal timing for treatment with indo, we performed a double-blind, controlled trial of indo therapy on the first day of life in 110 infants weighing 700-1300g at birth. Infants were treated with indo or placebo at a mean age of 14.8hrs. The incidence of SH in the placebo group was 20% (11/56) and 73% (11/15) of these infants who had asymptomatic murmurs developed SH. Indo therapy was associated with a decreased incidence of SH (2/54, $p<.025$) and a trend towards decreased surgical ligations (1/54 vs. 6/56, $p<.1$). There were no differences in incidence of complications including NEC and IVH. There were trends towards improvement in long-term outcome variables including decreased days in oxygen, decreased days of endotracheal intubation and decreased incidence of RLF in the indo group. We conclude that while treatment with indo on the first day of life prevented SH, there was no significant decrease in overall morbidity, perhaps because of the low incidence of SH in our study group. Another approach would be to treat infants with asymptomatic murmurs, as the majority of them will develop SH. However, treatment with indo on the first day of life did not increase complications and is safe to investigate in populations of very-low-birthweight infants with a higher incidence of hemodynamically important PDA shunts.

1425 BILATERAL RENAL ARTERY AND TOTAL AORTIC THROMBOSIS: SUCCESSUL NON-SURGICAL MANAGEMENT. S.W. Malin, S. Baumgart, J. Foreman. (Spon. by W.W. Fox). Dept. of Peds., Univ. of PA Sch. Med., and Div. of Neonatology & Nephrology, Children's Hospital of Phila., Phila., PA.

Thrombosis and renovascular hypertension are complications of umbilical artery catheters (UAC). There are no reported cases of resolution of bilateral renal artery thromobosis leading to complete renal failure. We report an infant with complete aortic occlusion. A 1.3 kg 30 week gestation male infant was delivered via cesearean section for pre-eclampsia. UAC and umbilical venous catheter (UVC) were placed. Respiratory distress was managed with CPAP and oxygen therapy. UAC was removed on day 5. Complete renal failure (max: BUN 40, Creat 4.2) and hypertension (systolic BP >110 mmHg) presented on day 8; UVC was removed. Renal scan showed no perfusion; abdominal ultrasound demonstrated complete aortic thrombosis from the superior mesenteric artery to the iliac arteries and including both renal arteries. Renal failure was managed with peritoneal dialysis without complications. Hypertension was controlled with hydralazine (max. 4.6 mg/kg/24 hr), propranolol (max. 0.5 mg/kg/24 hr), alphamethyldopa (35 mg/kg/24 hr), and intermittent diazoxide (2.5 mg/kg/dose). Urine production resumed (0.6 cc/kg/hr) on day 22 and increased progressively without surgical or thrombolytic therapy. Renal function was markedly improved (BUN 3, Creat 1.4) at three months. Previous reports of management of renovascular hypertension have suggested revascularization, thrombectomy or thrombolysis. Management with invasive therapy must be carefully considered as supportive management of this infant resulted in resolution of arterial obstruction and return of reasonable renal function.

1426 PERINATAL DEATH: COMPARISON OF CLINICAL AND PATHOLOGICAL ANALYSES. D. Manchester, P. Meier, M. Stewart, W. Clewell and R. Shikes, Univ. of Colorado School of Medicine, University Hospital, Depts. of Pediatrics, Pathology and Obstetrics, Denver, 80262.

The value of autopsies following perinatal death is debated by both pathologists and perinatologists. In order to determine the extent to which autopsies contribute to understanding fetal and neonatal deaths, we prospectively compared information gained by a specific autopsy protocol (Manchester and Shikes, Clinical Obstet. and Gynecol. 23: 1125, 1980) with that gained by review of clinical data by perinatal specialists. Our results document that perinatal autopsies provide important information not otherwise obtainable. Furthermore, they do so at a rate twice that reported for autopsies in adults.

For a 2 year period, all perinatal deaths (N=172, 75 fetal >20 weeks and 95 neonatal) at University Hospital were reviewed by a team of obstetric and pediatric specialists. Autopsies were performed in 139 cases (81%) by the general pathology service. Both clinicians and pathologists were asked to provide objective evidence for cause of death, if possible, and to indicate any need for genetic counseling. Clinical review alone established cause of death in 59 autopsied cases (42%). Autopsies established cause of death in 95 cases (68%) $p<0.01$. Despite extensive clinical review, autopsy alone was the only means by which cause of death could be determined in 36 cases. Among these, congenital malformations (15) were the most common objective findings. In addition, autopsy provided the only basis for genetic counseling in 30 of 62 cases where such followup was indicated.

1427 A WARMING MATTRESS FOR PREMATURE INFANTS. Keith H. Marks, Peter D. Calder, Elizabeth E. Nardis, James S. Ultman*. Penn State Univ Col of Med/Eng*, M. S. Hershey Med Ctr, Dept of Peds/Chem Eng*, Hershey/Univ Park, PA.

We measured temperatures and metabolic rate of healthy infants (gestational age 28-33 wks and postnatal age 2-26 days) in contact with a heated water mattress. Infants were randomized with/without the mattress ≥8 hrs in a single wall forced convection incubator, unrestrained, diapered and supine. $T_{mattress}$ (35.2±.1°C) was regulated by continuous circulation of H_2O through a thermostatically controlled bath. Mid-inc air temp (T_a) was within the thermoneutral range. No humidity was added to inc. Heating effects measured q half hrly: skin temp at 6 sites → mean skin temp ($\bar{T}_s$), esophageal temp (T_e), heart rate (HR), resp rate (RR) and O_2 consumption ($\dot{V}O_2$) at the end of each period. N=10 patients. Results(mean±SD): No mattress vs mattress p value by paired t-test: T_a (°C) 32.4±1.3 vs 31.6±0.9 $p<0.05$; $\bar{T}_s$ (°C) 35.3±0.3 vs 36.3±0.3 $p<0.01$; T_e (°C) 36.5±0.3 vs 37.2±0.4 $p<0.01$; HR (beats/min) 155±8 vs 161±10 $p<0.01$; RR (breaths/min) 41±6 vs 48±8 $p<0.01$; $\dot{V}O_2$ (ml/kg/min) STPD 5.33±1.4 vs 4.94±1.55 NS. Results indicate that heat storage occurred due to alteration of balance between body heat production and losses. To determine the rate of dry (sensible) heat exchange we used a metabolic simulator, an electrically-heated 10 cm diam sphere. At a representative incubator T_a of 31.5°C and simulator $\bar{T}_s$ of 35°C, the dry heat loss was reduced from 60 W/m^2 to 35 W/m^2 on the heated pad. This was brought about by a combination of heat conduction to the simulator and decreased radiation losses from the simulator to the surrounding mattress.