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LACK OF RELATIONSHIP BETWEEN UMBILICAL ARTERIAL CATHETER COMPLICATIONS AND NECROTIZING ENTEROCOLITIS
R. Kliegman, E. Stork, A. Panaroff. CWRU, Cleve, OH

To determine the effects of umbilical arterial catheter (UAC) position on UAC complications, we prospectively randomized 174 infants to high (T6-T10) and 167 to low (L3-L5) placement. The relationship of NEC to UAC position and complications was explored to test the hypothesis that NEC is a complication of UACs. 16 cases of NEC were identified, incidence 4.7%. These infants were significantly lighter BW 1.38 ± 0.5 vs non-NEC 2.17 ± 0.9 kg and less mature GA 30.6 ± 3.1 vs 33.0 ± 4.4 wks ($p < 0.01$). Catheter complications are tabulated:

	Total Population		p val	non-NEC	NEC	p val
UAC duration	$\leq 2d$	$> 2d$	-	5.2d	5.2d	NS
Hypertension	9%	24%	0.01	15%	0%	NS
Leg discolor	11%	30%	0.001	16%	12%	NS
Melena	16%	29%	0.01	-	-	-
Hematuria	20%	56%	0.001	32%	56%	NS
Clotted UAC	4%	27%	0.01	18%	12%	NS
NEC	5.4%	5.7%	NS	-	-	-
Sample size	147	88	-	325	16	-

The incidence of IUGR, PDA, anemia, polycythemia, birth asphyxia, indocin therapy and exchange transfusion was similar between NEC and non-NEC. Furthermore, UAC size (3.5Fr vs 5Fr), high vs low position and duration (mean 5.2 days) were similar in NEC and non-NEC patients. The prevalence of RDS was greater among NEC patients. The incidence of catheter complications in patients who develop NEC is thus no greater than observed in the total population of infants with UACs.

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MECHANICAL WORK OF BREATHING OF 7 INFANT VENTILATORS.
R. Kopotic, G. Friederichsen, F. Mannino. Department of Pediatrics, Neonatology Division, University of California, San Diego.

The mechanical work of breathing (WOB), can be determined from the simultaneous measurement of changes in volume displacement and pressure ($WOB = \Delta V \cdot \Delta P$). We designed a lung simulator device which typifies a breathing, intubated neonate in compliance, frequency, inspiratory flowrate, resistance and tidal volume ($2cc/cmH_2O$, 50/minute, 80cc/second, 3.0 ET tube, 10cc respectively). All measurements were at the airway opening via a calibrated transducer/recorder system with a frequency response flat to > 50 Hz.

We evaluated the performance of the BABYbird 1^R, BABYbird 2^R, Bear BP-200^R, Bear-2001 'Cub'^R, Healthdyne 105^R, Healthdyne 200^R and Sechrist IV-100B^R. All units were stock and represented a wide sampling of current continuous flow, pressure limited, time cycled neonatal ventilators. Excluding the exhalation valve, the ventilator circuits were identical (TYGON^R tubing, 0.3 cc/cmH₂O, compliance). The following settings were used during the test period: inspiratory time= 1.0 second, peak inspiratory pressure= 25 cmH₂O, and PEEP= 5 cmH₂O.

Mechanical WOB ranged from 140 to 240 cc·cmH₂O during the IMV breaths and 110 to 200 in the PEEP interval. The Healthdyne 105^R had the lowest WOB in both periods whereas the greatest WOB occurred with the Sechrist in IMV and Bear Cub in PEEP. We have used clinically all of the ventilators tested and have not noted any deleterious results secondary to the diversity in mechanical WOB. However, the WOB difference is broad and may have subtle and/or patient compensated effects on the spontaneously breathing infant being exposed to mechanical ventilation.

† 1431

PULMONARY FUNCTION AFTER IV INDOMETHACIN IN PRETERM INFANTS. A. Krauss, N. Fatica, B. Lewis, R. Cooper, J. O' Loughlin, A. Levin, M. Engle, P. Auld. Cornell U. Med. Coll., Dept. Pediatrics, New York, N. Y. 10021

In order to test the hypothesis that treatment with IV indomethacin to close the ductus arteriosus has beneficial effects on lung function in preterm infants with HMD, 9 preterm infants requiring ventilator support on day 3 (mean birthweight 1186±276 gm, gestational age 29±3 wk) were given 0.2mg/kg of indomethacin IV on day 3-4 of life. They were compared with 16 concurrent random controls with HMD on ventilators on day 3 (birthweight 1063±282 g, gestational age 28±2 wk) who did not receive indomethacin.

	IV indomethacin		Controls	
	pre Rx	post Rx	day 3	day 5
Art/Alveolar ratio	.42±.24	.44±.22	.42±.17	.47±.16
FiO ₂	.40±.19	.35±.25	.30±.13	.26±.10
compliance (cc/cm H ₂ O)	.75±.58	.83±.54	.77±.28	.97±.45
LA/AO ratio	1.7±.3	1.4±.3	1.4±.3	1.3±.1
% pts. on ventilator	100%	89%	100%	75%

The observed differences between treatment and control groups on day 3, and within groups (day 3 vs. day 5) are not statistically significant ($p > .05$). These data suggest that although IV indomethacin may significantly alter the patency of the ductus arteriosus, administration of this drug on day 3-4 of life is not associated with a significant improvement in preterm infants with HMD.

† 1432

31-PHOSPHORUS NUCLEAR MAGNETIC RESONANCE (NMR) SPECTROSCOPY IN SMALL FOR GESTATIONAL AGE (SGA) INFANTS. Savitri P. Kumar, Ronnie Guillet, Linda Gradwell, Britton Chance, and Maria Delivoria-Papadopoulos.

Univ. of PA. School of Medicine, Depts. of Pediatrics, Physiology, Biochemistry and Biophysics, Phila., PA.

31-Phosphorus nuclear magnetic resonance (NMR) spectroscopy was used to sequentially study cortical metabolism in nonasphyxiated, premature SGA infants, with a mean birth weight of 1325 gm (range 1260-1360 gm) and mean gestational age of 33.8 wks (range 32-35 wks). Studies were obtained beginning after 2 wks of age. Phosphocreatine (PCr)/inorganic phosphate (Pi), a measure of bioenergetic reserve, phosphodiester (PD)/beta adenosine triphosphate (ATP), and phosphomonesters (PME)/ATP, a precursor of membrane lipids, were obtained in premature SGA infants and compared with those in appropriate-for-gestational-age (AGA) infants of similar gestational age and with term infants:

	Premature, SGA mean (range)	Premature, AGA mean (range)	Term infants, AGA mean (range)
Pcr/Pi	0.79 (.59-1.35)	1.05 (.83-1.41)	1.02 (.76-1.38)
PD/ATP	2.52 (1.88-2.95)	2.47 (1.44-3.98)	1.92 (0.65-2.57)
PME/ATP	1.79 (1.24-2.36)	1.76 (1.22-2.50)	1.67 (1.04-2.46)

The lower bioenergetic reserve noted in premature SGA infants may be due to decreased substrate availability or increased utilization, secondary to chronic intrauterine deprivation. As PD/ATP and PME/ATP do not appear to be affected by growth retardation, they may be promising markers of gestational maturity.

† 1433

THE INFLUENCE OF SYMPATHO-ADRENAL ACTIVITY ON TRANSCUTANEOUS PO₂-MONITORING. Hugo Lagercrantz, E. Nilsson, and Ingrid Redham. Karolinska Hospital, Department of Pediatrics and Clinical Physiology, Stockholm, Sweden. (Sponsored by Hakan Sundell)

Transcutaneous PO₂ (tcPO₂) has been demonstrated to correlate excellently with arterial PO₂ (PaO₂) in non-diseased or moderately diseased preterm and fullterm infants providing the electrode temperature is set at 44°C or above. However, in many neonatal wards the electrode has substituted blood gas determinations even in very sick infants and the electrode temperature is set below 44°C, due to burns at 44°C. The aim of this study was to correlate tcPO₂ in infants during various degrees of distress. TcPO₂ was monitored with a Radiometer electrode with the temperature set at 43.5° or 44°C according to the instructions provided by the manufacturer. PaO₂ was monitored with an intraarterial electrode (Roche) inserted through an umbilical arterial catheter. Blood samples were taken from the catheter during various conditions for determination of blood gases and catecholamines (CA). Nor-adrenaline and adrenaline were determined with high performance liquid chromatography. Fourteen infants with a gestational age of 32-40 weeks were studied. The correlation coefficient between tcPO₂ and PaO₂ was found to be 0.92 (126 observation points) when the plasma CA concentration was below 5 nmol/l. Above that level the correlation was much poorer ($r = 0.14$, $n = 139$). Falsely low tcPO₂ values were commonly found during crying special care nursing, blood sampling and feeding when the CA levels usually were high. We conclude that when the sympatho-adrenal activity is believed to be increased one cannot rely on the tcPO₂-values solely.

† 1434

NURSERY ACQUIRED CMV (NACMV) INFECTION IN TRANSFUSED NEONATES. H. Lamberson, J. McMillan, L. Weiner, M. Williams, D. Clark, C. McMahon, E. Lentz, A. Patti. SUNY, Upstate Medical Center, Dept. of Peds. and American Red Cross, Syracuse, NY (Spon. R. Spitzer).

In a prospective study of NACMV infection in a 35 bed neonatal ICU initial results suggested an association between the transfusion of CMV-IgM(+) blood products (BP) and NACMV. During a 14 month period 165 seropositive (S+) neonates and 386 seronegative (S-) neonates were monitored for CMV infection by weekly viral culture (VC). VC(+) infections occurred in 13/165 S+ neonates and 7/386 S- neonates. All 7 S- neonates with NACMV received blood from one or more S+ donors and one or more CMV-IgM(+) donors ($X^2 = 7.94$ $p < 0.005$). No CMV infections were detected in 79 S- infants who received exclusively S- blood, or in 76 S- infants who received CMV ELISA(+), IFA-IgM(-) blood.

During the next 9 months we prospectively evaluated the degree to which transfusion related CMV can be reduced by the exclusive use of CMV-IgM(-) blood. Eighty-one S+ and 117 S- neonates have been followed. Three of these 81 S+ babies and none of 117 S- neonates, including 64 who were transfused with IgM(-) blood became VC(+). The incidence of CMV infections in S+ neonates (16/246) was approximately 4 fold greater than in S- neonates (7/503). We conclude that the incidence of NACMV in S- neonates can be reduced by interdicting CMV S+ BP. While screening with an IgM-IFA was effective in this study, other assays which detect total antibody are more readily performed and should be considered pending further evaluation of alternative assays for the detection of infectious BP.