59

ERYTHROCYTE SUPEROXIDE DISMUTASE ACTIVITY AND ZINC COPPER CONCENTRATIONS IN LOW BIRTHWEIGHT (LBW) AND FULL TERM INFANTS DURING THE FIRST SIX MONTHS

G.P.Donzelli, P.Galvan, G.Poggini, E.Scarano, M.Paparo, C.Vecchi

Department of Pediatrics, NICU University of Florence ITALY

During a longitudinal study erythrocyte superoxide dismutase activity (SOD) was spectrophotometrically measured in 65 full term AGA (mean birthweight 3080±235 g. and mean gestational age 39.0±0.9 weeks) and 65 LBW AGA (mean birthweight 1585±247 g. and mean gestational age 34.1±1.7 weeks) infants at different postnatal age. Red cells zinc and copper concentrations were also measured by atomic absorption in order to explore their relation to SOD activity. The results are reported in table I
(Groups I° = Full term; Groups II° = LBW)

AGE (Days)	SOD UI/100 µgHb		Zn µg/dl		Cu µg/dl	
	I°	II°	I°	II°	I°	II°
5	5.18±0.95	3.72±0.60	300±179	405±187	86±9.0	56±4.0
10	5.10±1.15	3.76±0.78	750±223	415±171	82±8.0	60±5.0
25	4.96±0.97	3.79±0.79	975±215	795±153	96±10	80±7.0
50	4.95±0.84	4.25±0.71	1087±187	847±167	102±11	85±7.0
100	5.12±0.93	4.75±0.80	1127±106	997±141	102±9.0	91±6.0
200	5.37±0.90	5.23±0.75	1201±98	1195±123	105±7.0	100±6.0

Erythrocyte SOD activity and Zn, Cu concentrations were lower in LBW than in full term infants ($p<0.05$). This difference was not present at 200 days of postnatal age. A significant correlation between SOD activity and trace elements levels was found only with Cu ($p<0.001$). SOD activity seems to be particularly influenced by Cu concentration. A different role of these two trace elements in activity of this enzyme is suggested.

60

AUDITORY EVOKED BRAIN-STEM RESPONSES IN ICTERIC NEWBORN : ALTERATIONS AFTER EXCHANGE TRANSFUSION.

J.L. Demarquez, Ph. Deliac, J.P. Barberot, Cl. Billeaud, J. Paty.

We report the changes in the auditory brain-stem responses (ABRs) in 5 term infants afterexchange transfusion (ET) for non conjugated hyperbilirubinemia, due to ABO incompatibility. The intra erythrocyte bilirubin level remained within normal limits. All infants were free of other risk factors known to alter ABRs. ABRs were studied sequentially before ET, and 1,24,48 hours after ET. Controls were realized at 1 and 12 months. ABRs were obtained with a Medelec MK III signal averager. Filtered clicks ($2500sec^{-1}$), at repetition rates of $10.sec^{-1}$, were presented for each ear at 80dbHL after estimating the click threshold. Before ET, we observed a R-L asymetry for interpeak interval I-V. In 3 patients, during the 48 hours following ET, we observed modifications of I-V intervals according to variations of bilirubin level (BL). In 2 patients, I-V decreased with a stability of BL after ET. The waves III and V were the most altered by BL changes. At 1 month, I-V intervals were higher than reference values for the same post-conceptional age, but were different for each ear. At 1 year, ABRs were normal. ABRs may provide a useful objective and non invasive method to evaluate the acute sensori-neural effects of acute hyperbilirubinemia. BL, even for acceptable increase, may have a deleterious influence on ABRs. But since our results suggest a reversible neurotoxicity it seems important to have later controls of ABRs.

Intensive care Unit for newborn and children. 168, cours de l'Argonne
33077 BORDEAUX CEDEX - FRANCE

61

PHOSPHOINOSITIDE CYCLE IN DIFFERENTIATION OF TYPE II ALVEOLAR CELLS.

Mikko Hallman, Kristiina Bry, Univ. Helsinki, Dept. Pediatrics, Helsinki, Finland

In the present study we have evaluated the role of phosphoinositide cycle and protein kinase C in signal transmission because INO accelerates maturation of the surfactant system (Ped Res 20:1228, 1986). Rabbit lung explants were grown in serum-free medium, and lung epithelial cells (80% of type II cells) cultured in the presence of serum from adult rabbit. - Lung explants from 22-day-old fetuses did not demonstrate surfactant synthesis in the presence of dexamethasone (1 uM) and thyroxine (1 uM). Phorbol ester or dioctylglycerol increased the synthesis of surfactant phosphatidylcholine (PC) by 470%, and increased secretion of PC from type II cells by 57%. In the presence of 1.5 mM INO, the hormones alone increased surfactant synthesis & secretion, whereas the activators of protein kinase C did not have a further effect. Addition of fibroblast-pneumonocyte factor into explants labeled with 1.5 mM ^{3}H-INO, transiently decreased di- and triphosphoinositide labeling. This was evident only when the medium contained high INO (1.5mM). - We propose that protein kinase C transmits signals into very immature alveolar cells and that high extracellular inositol is required for activation of the phosphoinositide cycle, and of protein kinase C.

62

DEVELOPMENTAL OUTCOME OF INFANTS TREATED WITH HUMAN SURFACTANT

Anna-Liisa Järvenpää, Mikko Hallman, Univ. Helsinki, Dept. Pediatrics, Helsinki, Finland

Altogether 58 infants who weighed between 600 and 1600 grams (mean 1035 grams) at birth were enrolled in randomized trials of surfactant supplementation in the University Central Hospital, Helsinki. There were 31 surfactant treated infants of whom 8 died during neonatal period and 28 placebo treated ones, of whom 16 died. The surviving infants were followed up prospectively for neurodevelopmental outcome as described previously (Duodecim 98:848,1982). The follow-up team was not aware of the treatment allocation. The mean follow-up time was 20 months (range 9 to 27 months). The results of the neurodevelopmental outcome were classified as: 1. normal, 2. possibly normal, 3. minor abnormality, 4. major abnormality. Group A had no serious infections in infancy, group B had recurrent hospitalization due to infections and chronic lung disease. The results were as follows:

Developmental "score"	1.	2.	3.	4.	A.	B.
Surfactant	14/23	4/23	2/23	2/23	9/23	4/23
Placebo	5/12	3/12	1/12	3/12	2/12	6/12

Surfactant substitution did not result in increased survival of "abnormal" small preterm infants. The study continues.

63

END-TIDAL VERSUS TRANSCUTANEOUS CO2 MEASUREMENT IN THE CRITICALLY ILL NEONATE.

BAB McEvedy, ME McLeod, J Lerman, M Munini, H Kirpalani. Departments of Anaesthesia & Neonatology, and the Research Institute, The Hospital for Sick Children, University of Toronto, Toronto, Canada.

Both end-tidal (PetCO2) and transcutaneous (PtcCO2) estimates of PaCO2 have limitations in the critically ill neonate. To determine whether the site of PetCO2 sampling is important, 47 measurements of distal and proximal PetCO2, PtcCO2 and PaCO2 were compared. Twenty-eight intubated neonates, 35±4 wks post-conceptual age with a mean weight of 2.32±0.9 kg were studied. Distal and proximal PetCO2 were measured at the tip and connector of the endotracheal tube using a Puritan-Bennett capnometer. Distal PetCO2 was significantly greater than proximal measurements in all patients ($p<0.001$) and more accurately estimated PaCO2. The correlation coefficient, r, for PtcCO2 and PaCO2 was 0.86 and for distal PetCO2 and PaCO2 was 0.63. The response time of this capnometer limits its accuracy at respiratory rates >75/min, and PetCO2 is known to be inaccurate in severe lung disease (FiO2>0.7). Excluding these neonates, the r value for distal PetCO2 and PaCO2 was .83. Both PtcCO2 and distal PetCO2 provide accurate estimates of PaCO2 in neonates although PtcCO2 is superior in severe lung disease. Distal sampling of PetCO2 increases the accuracy of end-tidal measurement.

64

STATE DEPENDENT FLUCTUATIONS OF CENTRAL MEAN BLOOD FLÓW VELOCITY OF ANTERIOR CEREBRAL ARTERY (Vmax-ACA) IN NEONATES.

Jorch G, Huster T. Department of Pediatrics, University of Muenster, FRG.

Neonatal cerebral blood flow (CBF) is higher during active sleep (AS) than quiet sleep (QS) as shown by jugular venous plethysmographic investigations (JVP). State dependency of Vmax-ACA studied by Doppler measurements (DM) remains to get evaluated precisely. During polygraphic studies (duration at least 90 min) registering EEG, ECG, respiration, oscillometric mean blood pressure (MABP), $tcpCO_2$, and $tcpO_2$ in 2 term and 10 preterm neonates (gestational age 30-40wk, birth weight 1040-2990g) DM (ATL Mk 500) of Vmax-ACA were performed at least every 15 minutes. Values per state were calculated. Results (mean ±SD):

	MABP(mmHg)	tcpCO2(mmHg)	tcpO2(mmHg)	Vmax(cm/s)
AS	56 +/- 8	42 +/- 5	64 +/- 13	21 +/- 7
QS	54 +/- 8	43 +/- 5	67 +/- 14	16 +/- 6

Conclusion: Vmax-ACA is higher in AS than in QS (Wilcoxon-test, $p<0,05$). Like CBF measured by JVP Vmax-ACA by DM increases by 30 % with change from AS to QS. Performing DM actual state has to be considered.