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ENDOTHELIN (ET-1), ENDOTHELIN 3 (ET-3) AND BIG ENDOTHELIN (BigET) LEVELS IN CSF AND ARTERIAL BLOOD DURING HYPER AND HYPOCAPNIA IN PIGLETS. P. Monin, J.V. Aranda, K. Beharry., A.Bairam., P. VERT
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To determine possible vascular mediators that might explain cerebrovascular paralysie associated with perinatal asphyxia, the levels of ET-1, ET-3 and BigET were studied in 6 lightly anesthetized ventilated 1-5 days old piglets at different PaCO2 levels in normoxia ; normocapnia (NC02, baseline BL1), hypercapnia, normocapnia (BL2), hypocapnia. At the same time, cerebral blood flow (CBF) was measured using radiolabeled microspheres. At BL1, ET-1 level was very low in the CSF and remained stable throughout the study. In arterial blood, ET-1 was low or undetectable. Et-3 was detected only during hypercapnia only (31.9 ±49 pg/ml) in CSF and remained stable in arterial blood. BigET levels were similar throughout the study and not affected by PaC02 either in CSF and arterial blood. CBF rose dramatically as expected during hypercapnia.

	NC02 (BL1)	HiC02	NC02 (BL2)	Low C02
CSF ET-1 (pg/ml)	5±12	5±12	5±14	9±24
CSF BigET (pg/ml)	79±70	114±40	68±43	116±66
Art BigET (pg/ml)	101±65	103±51	96±35	102±56
CBF (% of BL1) (Mean ± SD)	100	+147±97	+39±59	+9±65

These data show that hypercapnia or hypocapnia are not associated to any significant changes in ET-1 levels in CSF. The detection of ET-3 during hypercapnia might, however, suggest a production of ET-3. The role of ET-1 in the C02 cerebrovascular reactivity remains to be determined.

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PREVENTIVE EPO TREATMENT FOR THE ANEMIA OF PREMATURITY: IN WHICH NEONATES IS EFFECTIVE. Vasiliki Soubasi, George Kremenopoulos, Chaido Tsantali, Elisabeth Diamanti, Dimitris Tsakiris.
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To assess whether EPO treatment is safe and reduces the need for transfusion we randomized 34 preterm infants (BW: 1187±180g, GA: 28,7±1,8w) to an EPO and a comparable control group (CON). EPO 150 U/kg was given s.c. every third day for six weeks, early from the 1st week of life. Hematologic parameters, transfusion requirements and growth were followed during therapy and for six months thereafter. To better assess in which neonates EPO treatment was effective we classiffied the EPO and CON groups into uncomplicated neonates (A) and neonates requiring artificial ventilation (B). There were significant differences in reticulocytes between both uncomplicated and on ventilation neonates in the EPO group compared to respective control groups. However the need for transfusion was singificantly, less only in the uncomplicated EPO group, but not in the neonates on ventilation (Table).

		Reticulocytes 3wk		6wk		No of transfusion
EPO A	(n=6)	6±2,3	$p<0.05$	5,6±1,5	$p<0.01$	0,5±0,8
CON A	(n=6)	2,9±1,6		2,9±1		1,6±0,5 $p<0.05$
EPO B	(n=13)	3±2,5	$p<0.05$	4,7±2	$p<0.001$	8,15±5,4
CON B	(n=9)	0,7±0,8		0,7±0,3		7,7±2,3

In conclusion, early EPO administration reduces the need for transfusion in uncomplicated premature neonates. Although stimulation of erythropoiesis was apparent in both uncomplicated and complicated neonates the end-result of increased need for transfusion in complicated neonates was related to altered indication of transfusion. These infants probably require further or late EPO administration after weaning from ventilation and improvement of clinical condition.

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IRON ASSOCIATED ANTIOXIDANTS IN COMPLICATIONS OF PREMATURITY
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Low concentration of antioxidants are found in premature babies, increasing the risk of oxidant injury. Caeruloplasmin (CP) is a powerful plasma antioxidant and transferrin (TF) may be 100% saturated.

Serum ferritin, CP and TF in preterm babies (24-32 wks) were correlated with complications of prematurity.

CP on day 1 was 0.04 µmol/l (range 0.01-0.25). In 9 babies with ROP CP was 0.08 µmol/l (0.05-0.11) on day 7 and in 41 babies without ROP 0.10 µmol/l (0.02-0.17) ($p<0.02$). In 16 babies with BPD, the day 7 CP was 0.08 (0.02-0.18) and in 53 without BPD, 0.10 (0.02-0.17) ($p=0.06$).

Ferritin on day 7 was significantly higher in the BPD group (17) median 270 gm/l (139-> 500) vs 153 (45-> 500) ($p=0.001$) and higher in the ROP group (10) 216 (139-305) vs 164 (45-> 500) ($p> 0.1$). Transferrin was gestation dependent and was significantly lower on day 1 and 7 in babies with ROP and BPD.

Low concentrations of CP and TF are associated with ROP and BPD. Raised Ferritin could be due to greater availability of iron (blood transfusion or haemolysis). Detection of free iron would substantiate the hypothesis that ferrous iron promotes oxidant injury.

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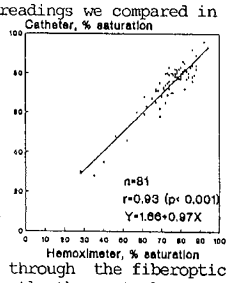
ACCURACY OF CENTRAL VENOUS OXYGEN SATURATION (cSvO2) MEASUREMENTS THROUGH A FIBEROPTIC CATHETER. Mark A. H. B. M. van der Hoeven, Pieter L. J. Degraeuwe, Wiel J. Maertzdorf, Carlos E. Blanco. University of Limburg, Dept. of Neonatology, Academic Hospital Maastricht, the Netherlands.

In adult intensive care and during ECMO in neonatal medicine cSvO2 is used as an indicator of tissue oxygenation. The usefullness of cSvO2 in sick newborn infants has not been proven yet. For this we used an oximeter system (Opticath, Abbott Laboratories, Chicago, IL), that allows continuous measurement of the oxygen saturation. This oximeter system includes a double lumen 4F catheter, which was placed in the right atrium via the umbilical vein. In order to determine the accuracy of the oximeter system readings we compared in 81 samples the cSvO2 readings with blood samples withdrawn through the catheter in 14 preterm and fullterm neonates. These were immediately analyzed with a Radiometer OSM 3 Hemoximeter.



Results: The cSvO2 measurements were significantly correlated with the simultaneously obtained catheter sample saturation: Correlation coefficient: r=0.93; ($p<0.001$); Regression equation: Y=1.66+0.97X; Standard Error of Estimate: 4.4; In vivo calibration was required only when the catheter values and the measurements differed more than 5%.

Conclusion: The reported values obtained through the fiberoptic catheter seem to represent reliably and accuratly the central venous saturation in the sick newborn infant.

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IN VITRO MODELS OF MICROCIRCULATION IN THE HUMAN FETUS, NEONATE AND ADULT. Otwin Linderkamp, Achim A. Stadler, Eugen P. Zilow. Division of Neonatology, University of Heidelberg, Germany.

Intravital studies on microcirculation in humans have been limited to superficial structures such as the skin or eye. We have used the lubrication theory to describe blood flow in capillaries with diameters of 3 to 6 µm. According to this model red blood cell (RBC) surface area and volume, plasma viscosity and capillary diameter determine the necessary driving pressure for a given RBC flow velocity, the intracapillary hematocrit and blood viscosity, and the critical capillary diameter for RBC passage. Plasma viscosity determines the friction in the gap between RBC and capillary wall ("lubrication"). Plasma viscosity (tube viscometer), surface area and volume of RBCs and the validity of the model (micropipette system) were studied using blood from 10 adults and cord blood from 10 fetuses (18-22 wk), 20 preterm (24-36 wk) and 10 full-term neonates.

Results. Plasma viscosity increased with increasing maturity due to rising plasma protein concentrations. Volume and surface area of RBCs increased with increasing maturity. The flow model lead to the following conclusions: If the cells are suspended in the same medium, fetal and neonatal RBCs require 27% (term neonates) to 100% (fetuses) higher driving pressures than adult RBCs to achieve the necessary elongation for passing through a 4.5-µm capillary. However, the different RBCs require similar driving pressures if the cells are suspended in the corresponding autologous plasma. This suggests that the disadvantage of the large size of neonatal RBCs is compensated for by the low plasma viscosity. Blood viscosity is 9% (term neonates) to 29% (fetuses) less than in adults. Below a critical vessel diameter (3.3 µm for adults, 3.6 µm for full-term neonates, 3.8 µm for preterm infants, and 4.1 µm for fetuses), the driving pressure and blood viscosity increase steeply as a result of rising friction between RBC and vessel wall. Direct microscopic observation of RBCs flowing in pipettes with diameters of 3.5 and 4 µm showed the validity of the model.

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EFFECTS OF NEONATAL POLYCYTHEMIA AND HEMODILUTION ON CAPILLARY PERFUSION. Mikael Norman, Bengt Fagrell* and Peter Herin. Dept. of Pediatrics, Karolinska and St. Göran's Hospitals and *Dept. of Medicine, Karolinska Hospital, Karolinska Institute, Stockholm, Sweden.

The effects of neonatal polycythemia (venous hematocrit ≥ 70 %) and hemodilution on nutritive capillary perfusion were studied by a videophotometric microscopy technique. The capillary blood flow velocity (CBV) in the nailfold was measured in 12 polycythemic neonates, before and after treatment with hemodilution to an expected hematocrit of 55 %, and in 13 healthy controls (hematocrit ≤ 65 %). During microscopic recordings, the infants were cot-clothed and slept in room temperature.

The CBV in the patients was 0.11 (0.02 — 0.34) mm/s and in the healthy controls 0.30 (0.17 — 0.44) mm/s ($p < 0.01$, median and range values). The degree of achieved hemodilution varied considerably. The CBV after hemodilution increased as a function of the decrease in venous and capillary hematocrit. The highest correlation was found between the absolute change in capillary hematocrit (range −20 — 0 %) and the relative change in CBV (range −14 — + 733 %) ($r = -0.98$, $p < 0.001$). The postnatal age (range 6 — 96 h) contributed significantly to the variation in results. The polycythemic neonates studied during the first day of life (n = 7) had a very slow skin capillary perfusion and responded to treatment with a more pronounced increase in CBV than did the older patients.

Conclusion: An insufficient capillary perfusion may be involved in the pathophysiology responsible for the morbidity associated with neonatal polycythemia.