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SEX DIFFERENCE IN CEREBRAL BLOOD FLOW (CBF) OF PREMATURE INFANTS

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Sex differences in CBF-values have been demonstrated in adults. The purpose of our study was to evaluate the effect of sex on the resting cerebral blood flow in premature neonates.

Methods: Sixty-eight premature babies with a gestational age of less than 34 weeks and a birth weight of less than 1500g were studied. No difference in regard of blood pressure, arterial CO_2- and O_2-partial pressures, and hematocrit between the sexes were observed. CBF was measured with the non-ivasive intravenous ^{133}Xenon method three times under resting conditions. Depending on the time of the CBF-study we classified our measurements into three groups: Group 1; Measurement 2-36 hours after birth (N=46). Group 2; 36-108 hours (N=39). Group 3; 108-240 hours (N=41).

Results: Average CBF in group 1 (12.5 ± 3.5 ml/100g/min) was significantly lower ($p<0.05$) then in group 2 (14.6 ± 3.8 ml/100g/min) and in group 3 (14.2 ± 3.3 ml/100g/ min). No significant difference between groups 2 and 3 was found. CBF-values, grouped by sex, are shown in the table.

Age	0 - 36 hours	36 - 108 hours	108 - 240 hours
Girls	11.5 ± 2.7 (27)	13.4 ± 2.9 (22)	12.9 ± 3.2 (19)
Boys	14.1 ± 4.1* (19)	16.3 ± 4.3* (17)	15.3 ± 3.2* (22)

CBF expressed as ml/100g brain tissue/min ± standard deviation (number of patients). * Sign. difference, $p < 0.05$ in Student's t-tests

Discussion: Girls had significantly lower cerebral blood flows than boys in all three age groups. From adult studies we know that under resting conditions men have a lower blood flow than women. It is not surprising that differences seen in adults can also be demonstrated in newborns. However the reasons for the reversed laterality effects are unclear since the neurophysiological mechanisms involved are not known. We conclude that in preterm neonates the cerebral blood flow is substantially influenced by sex.

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EFFECT OF Sn- PROTOPORPHYRIN IN RATS WITH HYPERILURUBINEMIA

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Sn-protoporphyrin is a synthetic metalloporphyrin that potently inhibits heme oxygenase, the rate limiting enzyme for heme degradation to bile pigment. Bile duct ligation producing cholestatis results in a marked increase in hepatic microsomal heme oxygenase.

The **aim** of this study was to determine the effect of Sn-protoporphyrin on plasma bilurubin levels in adult rats with cholestasis after bile duct ligation.

Methods: Twentyfive male rats weighing between 170 and 200g were used in these experiments. Cholestasis was produced by ligation of common bile duct under ether anestesia. Fifteen animals were subcutaneously injected twice with Sn-protoporphyrin and ten received saline solution. Plasma bilurubin levels were measured at 24th and 96th hours after surgery.

Results: Sn-protoporphyrin administration to bile ligated animals inhibited by 35 percent elevations in plasma bilurubin levels as compared with controls. In rats treated with Sn-protoporphyrin mean plasma bilurubin level was significantly reduced than controls ($p<0.01$).

Conclusion: Hyperbilurubinemia is substantially reduced by Sn-protoporphyrin in rats. It is considered that it can be used as a therapeutic agent in hyperbilurubinemia.

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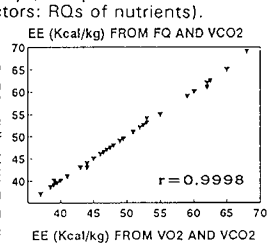
THE CALCULATION OF ENERGY EXPENDITURE (EE) FROM CO_2-PRODUCTION. (VCO_2) IN PRETERM INFANTS (PI) IS IMPROVED BY ESTIMATING RESPIRATORY QUOTIENT (RQ) FROM NUTRITIONAL INTAKE (FOOD QUOTIENT FQ). Karl Bauer, Andrea Dieckmann, Hans Versmold. Dept of Pediatrics, Klinikum Steglitz, University of Berlin, Germany

In studies of EE with doubly labelled water or with respiratory gas exchange analysis during high FiO_2 only VCO_2 can be measured and EE is calculated from VCO_2 and an estimated RQ. For PI a fixed RQ of 0.87 has previously been used. Does using FQ, an estimate of individual RQ from nutritional intake, improve the accuracy of the EE calculation? METHODS. We did 32 measurements of VCO_2 and VO_2 in 17 PI (BW 1450±365 g, GA 30±2wks) breathing room air with a DELTATRAC II. FQ was calculated from intake on the same day ($FQ = p*0.81 + f*0.71 + c*1$; p,f,c: protein, fat, carbohydrate intake, factors: RQs of nutrients).

RESULTS. EE from VCO_2 and FQ agreed well with EE from VO_2 and VCO_2 (Fig). Median error was 0.13% (range -0.4 to 0.7%), which was considerably less than the error from a fixed RQ-estimate of 0.87 (median -0.3 % (range -5.9 to 9.5%). The error was not influenced by the amount of weight gain ($p = 0.809$) or by the amount of energy intake in excess of EE ($p = 0.345$). CONCLUSION. EE in preterm infants can be precisely calculated from VCO_2 and FQ even when they grow or are in positive energy balance.



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METABOLIC RESPONSE TO MODERATE EXERCISE IN LAMBS WITH AN AORTOPULMONARY SHUNT. Gertie C.M. Beaufort-Krol, Janny Takens, Gioia B. Smid, Willem G. Zijlstra, Jaap R.G. Kuipers. Div. of Pediatric Cardiology, Beatrix Children's Hospital, Groningen, The Netherlands.

The normal metabolic response to moderate exercise consists of a slight increase in glucose (gluc) and a considerable increase in free fatty acids (FFA) in blood. In earlier studies we have demonstrated that at rest, after an overnight fast, lambs with an aortopulmonary shunt (SH) had lower concentrations of gluc and FFA than control (C) lambs. We wondered, whether SH lambs with low gluc and FFA were able to increase their arterial concentrations during exercise just like C lambs. Therefore, we studied 6 7-week-old SH lambs and 6 C lambs of the same age after an overnight fast at rest and during moderate exercise (tredmill; 50 % of Vo_2-max; 30 min). At rest as well as during exercise, 3 blood samples were taken at intervals of 10 min. At rest, mean arterial concentrations (mmol/l) of gluc (SH: 3.37 ± 0.21 vs. C: 4.48 ± 0.53, mean ± SD, $p < 0.05$) and FFA (SH: 0.57 ± 0.17 vs. C: 0.80 ± 0.20, $p < 0.05$) were lower in SH than in C lambs. During exercise, gluc (SH: 3.59 ± 0.19 vs. C: 5.15 ± 0.80, $p < 0.05$) and FFA (SH: 0.79 ± 0.32 vs. C: 1.23 ± 0.43, $p < 0.05$) increased significantly in SH and C lambs ($p < 0.05$). However, the relative increment of gluc during exercise was lower in SH than in C lambs (7 ± 5 % vs. 15 ± 7 %, $p < 0.05$). The relative increment of FFA was not different (SH: 38 ± 37 % vs. C: 56 ± 47 %, $p = 0.48$). We conclude that, despite lower gluc and FFA at rest, SH lambs demonstrate a metabolic response of increment of gluc and FFA during moderate exercise like C lambs. However, the relative increment for gluc was lower in SH lambs. We speculate that this is due to an earlier glycogen depleted state in SH lambs.

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DIFFERENT DOSES OF RECOMBINANT HUMAN ERYTHROPOIEITIN (R-HUEPO) AND DIFFERENT PROTEIN SOURCES IN THE TREATMENT OF ANAEMIA OF PREMATURITY(AOP). Bechensteen Anne G, Oslo Epo group. Department of Paediatrics, Ullevål University Hospital, 0407 Oslo, Norway.

R-HuEpo is effective in preventing AOP. Low r-HuEpo doses (30 IU/kg), however, has not been effective. We speculate that the nourishment given during r-HuEpo treatment is essential for the actual haematological response.

In an ongoing open randomised study we have injected r-HuEpo to healthy preterm infants (ga < 31 weeks and bw < 1400) in doses of 100IU/kg and 50IU/kg thrice weekly from the age of three till the age of 7 weeks. All infants were fed human milk as base for their nourishment, in addition half of the infants in each dose group was given cow's milk protein (CMP or PRESEMP), the other half was given an equal amount of human milk protein (HMP), both groups to yield a protein intake of about 3.0 g/kg/day from week 3 untill week 8.

Preliminary data from 31 infants are reported: The four groups were similar regarding bw, ga, weight and haematological parameters at study entry (week 3).

group	bw	ga	Hb week 3	Hb nadir	retics week 3	retics week 5	weight week 3	weight week 8
HMP+100IU	1131g	28.7w	13.1	12.3	3.1%	6.7%	1375g	2241g
CMP+100IU	1098g	28.8w	12.9	11.6	2.1%	7.9%	1328g	2265g
HMP+50 IU	1103g	28.7w	12.1	10.9	2.4%	6.0%	1237g	2121g
CMP+50 IU	1188g	28.7w	12.0	11.0	2.8%	6.1%	1361g	2222g

The present data indicates that even 50IU/kg thice weekly prevents AOP in well nourished preterm infants. The source of protein (HMP or CMP) seems not to influence growth or the r-HuEpo induced haematological response.

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RECOMBINANT ERYTHROPOIETIN IN ACUTE CHEMOTHERAPY-INDUCED ANEMIA OF CHILDREN WITH CANCER. Maja Nenadov Beck, Daniel A. Beck.
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Chemotherapy-induced anemia in children with cancer is usually of acute onset. To investigate an alternate treatment to transfusion (Tx), we undertook a phase I-II clinical trial of daily administrations of recombinant erythropoietin (rHuEPO). Patients with a hemoglobin (Hgb) value < 75g/l were treated for 14 days in cohorts of 3 at escalating daily doses of 25, 50, 70, 80, 90 and 100 U/kg respectively. The maximum-tolerated dose was not encountered. Of 18 courses given to 15 children aged 0.5 to 18 years, 7 (39%) were associated with increased or stable Hgb levels (courses without Tx), while 11 (61%) were terminated by a Tx, without evidence of a dose-response relationship. Changes in mean Hgb levels and absolute reticulocyte counts were paralleled by those of mean white blood cell, platelet and absolute neutrophil counts during the first 7 days and when the end-points of the study were reached. Numbers of circulating burst-forming units-erythroid remained low throughout courses without Tx. No cumulative increase of serially determined serum EPO levels was observed and serum ferritin levels were elevated in both groups of courses. We conclude that daily administrations of rHuEPO were safe but ineffective in our trial. Recovery of chemotherapy-induced myelosuppression appeared to be the rate-limiting factor for the outcome, without evidence of an enhanced stimulation of erythropoiesis. The lack of a proliferative response of specific progenitor cells suggested a mechanism of transient primary resistance to rHuEPO.