143 SERUM IMMUNOREACTIVE ERYTHROPOIETIN (Ep) CORRELATES WITH HEMOGLOBIN (Hb) LEVEL AND RATE OF GROWTH DURING INFANCY.

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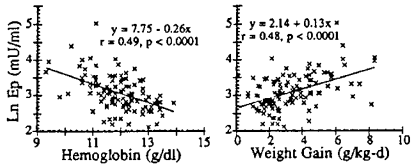
Ep is thought to be the major factor controlling erythropoiesis throughout development. Its production is stimulated by tissue hypoxemia. Because there are no data on the relationship of Ep and Hb in healthy term infants during the period of physiologic anemia, we measured monthly Ep (by RIA) and Hb levels in 25 normal formula-fed infants during months 2-7 of life. In addition, since rate of growth has been correlated with Ep levels in neonatal animals, we examined the relationship of Ep with growth rate. We observed that Ep correlated indirectly with hemoglobin (r = -0.49, p <0.0001, Fig), and directly with rate of growth in weight (r = 0.48, p < 0.0001, Fig) and in length (r = 0.35, p < 0.0001). When Ep was examined as the dependent variable using multiple regression, both Hb and rate of weight gain were significantly associated with Ep (multiple R = 0.55, p <0.0001). Thus in addition to the anticipated negative feedback effect of oxygen delivery on Ep production, we speculate that rapid growth and/or growth factors may also influence serum Ep levels in normal infants during the first months of life.



144 ENERGY EXPENDITURE OF PRETERM INFANTS AS DETERMINED BY SIMULTANEOUS DIRECT AND INDIRECT CALORIMETRY.

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We measured the energy expenditure of 15 healthy, growing preterm infants (mean weight 1.55 kg, range 1.21 - 1.74 kg) simultaneously by continuous direct (gradient layer) and indirect (open circuit) calorimetry in two body positions, supine and prone, after consecutive feedings. Each measurement began 1 hour after feeding and continued for 2 hours. The results are shown below as mean (and SD) in watts/kg.

	Supine	Prone	Total
Direct	3.31 (0.42)	3.01 (0.36)	3.15 (0.37)
Indirect	3.39 (0.55)	3.07 (0.54)	3.23 (0.48)

The energy expenditure values determined by direct and indirect calorimetry were not significantly different.

Energy expenditure was 9% lower in the prone position than in the supine position, whether measured by direct or indirect calorimetry (p<0.02). This observation confirms similar findings by Masterson et al (Pediatrics 1987;80:689) and Glatzl-Hawlik and Simbruner (Pediatr Res 1989;26:523) and indicates that energy conservation can be enhanced by increasing the time that preterm infants are kept in the prone position. We speculate that this effect is explained by reduced exposed surface area for heat loss and by lower physical activity while in the prone position.

145 ENERGY EXPENDITURE AND BODY COMPOSITION OF BREAST-FED AND FORMULA-FED INFANTS.

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Breast-fed infants consume less energy than formula-fed infants, but grow at almost the same rate. We hypothesized that breast-fed infants spend less energy and/or store less energy. To test these hypotheses, full term infants were studied at 42 and 84 days of age. Eight infants (4 ♀, 4 ♂) were breast-fed (BF) and 10 infants (6 ♀, 4 ♂) were fed a soy-based formula (FF). 24-Hour energy expenditure (EE) was determined by heart beat counting with calibration of heart rate against indirect calorimetry. Total body water (TBW) was estimated by deuterium dilution (0.5g/kg D_2O orally, D in urine by NMR). Fat-free body weight was calculated assuming a water content of 80.4% at 42 days and 80.0% at 84 days of age. Body fat = body wt minus fat-free wt. Results (mean (SD)) are shown for 6 BF and 9 FF infants who have to date completed the study:

	Body wt(g)		EE(kcal/kg/d)		TBW(%)		Fat(%)		Wt gain 42-84d	
Age	42d	84d	42d	84d	42d	84d	42d	84d	g/d	%fat
BF	5078	6194	61.5	65.6	66.7	61.3	16.4	23.4	26.3	54.2
	(296)	(586)	(7.3)	(6.3)	(1.7)	(2.5)	(1.8)	(3.1)	(7.3)	(19.5)
FF	4861	6137	68.0	66.8	66.0	60.3	18.5	25.7	31.3	55.5
	(644)	(846)	(6.5)	(3.6)	(4.5)	(1.7)	(5.2)	(4.6)	(7.9)	(23.1)

At 42 d BF infants spent significantly (p< .048, 1-tailed t-test) less energy than FF infants, but at 84 d EE was similar. Body fat was slightly lower in BF infants at both ages. Overall wt gain was somewhat less in BF infants, but composition of gain was similar.

146 RENAL HEMODYNAMIC CHANGES DURING BLOOD SAMPLING (BS) AND FLUSH INJECTION (FI) BY UMBILICAL ARTERY CATHETER (UAC) IN PRETERM INFANTS.

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To assess hemodynamic effect of BS (1 ml) and FI (1 ml) through an UAC, contrast sonography of the abdominal aorta (1 ml saline) and pulsed Doppler measurement of renal artery blood flow velocity (RBFV) were made in 10 preterm neonates with normal hemodynamic conditions, a median gest. age of 27 (24-33)wks and a weight of 900 (570-2900)g. Radiologic position of the UAC tip was at vertebral body L 3-4 in all infants. Sonographic distance of UAC tip and origin of renal artery was at weight 570-1010g (n=7): 14 (10-16)mm, at 1930-2900g (n=3): 30 (24-30)mm. During contrast sonography a reverse flow in the aorta reached the origin of renal arteries in all infants ≤ 1010g. Results (570-1010g): During BS mean RBFV decreased in 2 infants (31 and 47%), no change in 5. During FI mean RBFV increased by 33 (30-80)% in all 7 infants. In the infants of 1930-2900g no change of RBFV was detectable. One of the infants (720 g) was also studied with left to right shunting PDA: RBFV decreased (-69 %) during FI, cerebral BFV (median cerebral artery), also measured in this infant, did not change. After ductal closure RBFV (+31 %) and cerebral BFV (+30 %) increased during FI. Conclusion: In VLBW infants renal perfusion may be changed by BS and FI through an UAC with radiologic position at L 3-4. These hemodynamic changes are different during LR-shunting PDA. Our findings may have clinical importance, e.g. if an UAC is used for exchange transfusion.

147 SELENIUM AND GLUTATHIONE PEROXIDASE ACTIVITY IN PRETERM AND FULLTERM INFANTS

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Glutathione peroxidase (GSH-Px) is a selenium-based enzyme, which catalyzes the chemical reaction in detoxifying peroxides, preventing damage to cell membranes.During a longitudinal study, erythrocyte GSH-Px activity was spectrometrically detected in 30 preterm AGA (mean b.w. 1685 ± 207 g; mean g.a. 35 ± 1.2 wks) and 30 fullterm AGA (mean b.w. 3000 ± 205 g mean g.a. 39 ± 0.5 wks) infants. By atomic absorption spectrophotometry, red cell selenium concentrations were also measured. The results are reported in the table.

	FULL TERM AGA INFANTS			PRETERM AGA INFANTS		
Days	Se (µg/l)	GSH-Px (U/dl)	Se/GSH-Px	Se (µg/l)	GSH-Px (U/dl)	Se/GSH-Px
10	369	764	$4.83x10^{-1}$	275	661	$4.16x10^{-1}$
20	387	796	$4.86x10^{-1}$	291	684	$4.25x10^{-1}$
30	427	814	$5.24x10^{-1}$	327	698	$4.68x10^{-1}$
40	498	824	$6.04x10^{-1}$	374	759	$4.93x10^{-1}$
50	517	831	$6.20x10^{-1}$	413	824	$5.01x10^{-1}$
60	518	837	$6.20x10^{-1}$	436	831	$5.25x10^{-1}$

GSH-Px activity was lower in preterm vs fullterm infants up to 50 days of postnatal life and directly proportional to selenium blood levels (p<0.001). Our study suggests that preterm infants could require selenium supplementation in order to increase GSH-Px activity and enhance defenses against oxidative damage.

148 ACTIVATION OF THE PLASMA KALLIKREIN-KININ SYSTEM IN RDS IS NOT INFLUENCED BY TREATMENT WITH NATURAL SURFACTANT

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Components of the plasma kallikrein (KK)-kinin and fibrinolytic systems were determined by chromogenic substrates the first 4-6 d post partum in 12 babies with RDS and six controls. Six of the RDS babies were treated with natural surfactant (Curosurf®). Birth weights and gestational ages were identical in all groups ranging between 795-1600 g and 25-32 weeks respectively. There was no differences between the groups concerning plasminogen (Plg), plasmin (Pl) and antiplasmin (Ap) values. The prekallikrein (PK) and antikallikrein (KKI) values were significantly lower in RDS babies than in controls. Surfactant treatment did not influence the values measured throughout the study period. The table gives values (mean and SD) 24-32 hours post partum. * p<.05, ** p<.01.

Patients	PK%	KK U/L	KKI%	Pl%	Pl U/L	Ap%
RDS+SURF	20 (5)**	6 (2)	56 (10)*	31 (6)	15 (9)	67 (10)
RDS	21 (6)**	9 (8)	57 (14)*	31 (9)	21 (16)	43 (26)*
CONTROLS	37 (8)	9 (6)	74 (14)	39 (13)	25 (17)	80 (14)

The low PK and KKI values in RDS indicate that the plasma kallikrein-kinin system is activated in RDS.Although there was a steady increase in the values the first days of life, treatment with natural surfactant does not influence such an activation.