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OSTEOMALACIA OF THE MOTHER AND INTRAUTERINE GROWTH. Leif Brunvand and Egil Haug. Department of Pediatrics, Ullevål Hospital; Hormone laboratory, Aker Hospital, University of Oslo, Oslo, Norway.

It has been suggested that vitamin D deficiency in pregnancy may affect fetal growth (BrMedJ1980;280:751-4).

In the present study we measured crown-heel length of the newborn, and free calcium, phosphorous, calcidiol, calcitriol, osteocalcin and intact parathyroid hormone (PTH) in venous cord blood and in serum from 30 Pakistani and 23 Norwegian women just after delivery.

Results: The Pakistani mothers had lower calcidiol levels (mean ± SD) than the Norwegians (p<0,0001); 15,1 ±8,6 and 43,1 ±21,3 nmol/l, respectively. There were also lower osteocalcin values in venous cord blood obtained from the Pakistanis (p=0,0005).

None of the Norwegian mothers had intact PTH>5,5 pmol/l, while 43% (13/30) of the Pakistanis had. The crown-heel length of the Pakistani infants in this group were redused (p=0,01) and their mothers had lower free calcium (p=0,003), than the other Pakistani mothers.

Conclusion: Biochemical signs of depressed bone mineralisation were observed in fetuses of Pakistani mothers with vitamin D deficiency. Redused intrauterine growth were observed when the mothers had both vitamin D deficiency and elevated PTH.

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1,25 DIHYDROXYVITAMIN D (1,25D) LYMPHOCYTE RECEPTORS REFLECT CHANGES IN VDR TARGET TISSUES INDUCED BY PHENORBARBITAL (PB) IN RATS. M. Moya, I. Ballester, MJ Campello, E. Cortés and F. Galán. Ped. Dep. Hospital S. Juan. University of Alicante. Alicante. Spain.

Peripheral lymphocytes are not a classical target for 1,25D, but they may constitude a very accesible tissue for vitamin D receptor (VDR) study when activated. Lymphocyte VDR (LVDR) is indistinguishable from classical VDR (50 KDa; encoded by identical mRNA) being upregulated too. Chronic administration of PB increases DBP and VDR in a target tissue as can be the kidney, but does it affect LVDR levels?. Four groups of seven rats, control, PB, PB+D and vitamin D, were treated for 4 weeks. After that time all groups showed normal levels for blood Ca, Pi, Mg and Alk-pase. Receptor studies and plasma values of 25 and 1,25D were:

	Control	PB	PB+D	D
1,25 ng/mL	171(53)	270(59)	136(32)	163(45)
DBP*	20(7)	51(13)	28(18)	5(3)
LVDR**	26(10)	52, 63	20, 19	12, 14
Kidney VDR**	78(9)	134(62)	-	-

m(SD); *pmol/mg prot; kd = 3.7×10^{-10} M; **fmol/mg prot; kd = 2.6×10^{9} M

The blood volume of the rat only give opportunity to assess LVDR in two animals of each treated group. LVDR showed a clear upregulation by 1,25D higher blood levels, and reflect the changes operated in the kidney. In conclusion, VDR in activated peripheral lymphocytes may behave as that of classical target tissues. CAICYT pm: 89-0018.

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OSTEOPENIA: THE LINK BETWEEN PREMATURITY AND MYOPIA. Frank Pohlandt and Christiane Terpeluk. Department of Pediatrics, Ulm University, Ulm, Germany.

Children who were born preterm with very low birth weight more often develop flattened heads and later myopia than children born at term. The dolichocephaly of many VLBW infants is often associated with a high arched palate and protruded eyeballs. Until now, the link has not been established between myopia and low birth weight.

Hypothesis: This molding of head shape 1) is caused by bone mineral deficiency together with gravity and 2) deforms the eyeball into an ellipsoid resulting in a too long optical axis, i. e. myopia. **Method:** We did head shape measurements and refractiometry in two groups of children born with VLBW. *Group I:* 14 children who were born before 1982 and had not received calcium/phosphorus supplements during the neonatal period (birth weight median 1.300 g, range 940 - 1.490 g; age at refractiometry, median 11 years, range 10 - 12 years). *Group II:* 23 children who were born between 1983 and 1986 and who had received calcium/phosphorus supplements during the neonatal period in order to attain the intrauterine bone mineralization rate (birth weight 1.120 g, 650 - 1.500 g, age at retractiometry 6 y, 4 - 8 y). **Results:** Myopia was found at a significant lower rate (2 of 23 children, 8.7 %) in group II than in group I (5 of 14 children, 35.7 %) (p = 0.028, one tailed exact Fisher-test). In group I, the ratio fronto occipital/biorbital diameter was smaller (median 1.89) in the myopic than in the emmetropic children (1.65).

Conclusion: Calcium and phosphorus supplementation in VLBW infants is associated with a reduced rate of myopia in later childhood. This finding is consistent with our hypothesis and indicates that myopia associated with prematurity can be significantly reduced by calcium/phosphorus supplementation during the neonatal period.

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DIVERGENT RENAL EXCRETION OF INORGANIC SULFATE, PHOSPHATE, AND CALCIUM IN ARTIFICIALLY FED NEWBORN PIGLETS. Frank R. Greer, Aaron L. Friedman, Norlin J. Benevenga, David E. Cole, Dept. of Ped., Meat and Animal Sciences, Univ. of Wis. Madison and Dept. of Ped., Dalhousie University, Halifax

We have previously documented a direct relationship between protein intake and renal excretion of inorganic sulfate (iSO_4) and Ca in the newborn piglet. In humans these relationships are hypothesized to contribute to osteopenia of prematurity and adult osteoporosis. There is little information about urinary iSO_4 in the newborn, which originates from sulfur amino acid metabolism. In this study we compared renal excretion of iSO_4 to that of Ca and PO_4, hypothesizing renal handling of iSO_4 would parallel that of PO_4. 6 piglets (weight 1401±79g) were placed in a metabolic unit at 24 hours of age with unlimited access to a liquid diet (4.8 g/dl bovine protein, 126 mg/dl of Ca, 96 mg/dl of P) beginning at 48 hrs. of life. Formula intakes ranged from 533±124 on day 2 to 856+278 on day 8, protein intakes averaging 24.9±5.8 g/day and 40.1±13 g/day respectively. Ca intakes increased from 671±157 mg/day to 1079±350 mg/day and P intake from 511 mg/day to 821 mg/day. GFR (estimated from creatinine clearance) ranged from 1.96±0.36 ml/min on day 1 to 2.49±0.63 ml/min on day 8. Plasma iSO_4 concentration increased from 23.93±3.45 mM/ml day 1 to 30.6±1.91 mM/ml day 8. Renal iSO_4 excretion correlated directly with protein intake (r=.98) ranging from 50.62±17.89 mM on day 1 to 525±105 mM on day 8. Fractional excretion of iSO_4 ($FeiSO_4$) ranged from 0.08±0.03 on day 1 to 0.54±0.19 on day 8. Total PO_4 excretion (33.8±27.6 mg day 1, 192±73.0 mg day 8) and $FePO_4$ (0.11±.04 day 1, 0.62±0.15 day 7) also increased with increasing PO_4 intake (r=0.70). This was in contrast to the minimal increases in urinary total Ca excretion (10.16±2.34 mg day 1, 34.54±18.14 mg day 8) and FeCa (0.04±.00 day 1, 0.07±.02 day 8) which did not correlate with increasing Ca intake (r=0.10) and increasing GFR. We conclude that renal excretion of PO_4 and iSO_4 (total and fractional) increases with increasing intake and GFR in the newborn pig. This is in contrast to Ca excretion which increases minimally in the newborn despite increasing GFR and Ca intake.

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CHANGES IN THE PURINE METABOLISM IN PIGLETS SUBJECTED TO INTERMITTENT OR CONTINOUS HYPOXEMIA. Lauritz Stoltenberg, Terje Rootwelt, Torleiv O Rognum, Ola D Saugstad. Institute of Forensic Medicine, Institute of Surgical Research, Institute of Pediatric Research, University of Oslo, The National Hospital, N-0027 Oslo 1, Norway.

Forty % of sudden infant death syndrome (SIDS) babies have higher hypoxanthine (Hx) conc. in their vitreous humor than respiratory distress syndrome (RDS) babies (unpublished data). To investigate this, the consentrations of Hx and xanthine (X) in plasma, cerebrospinal fluid, urine and vitreous humor were measured in two groups of pigs. One group (n=10) were subjected to intermittent hypoxameia (IH) at intervals: 5 min. FiO_2=0.21 and 10 min. FiO_2=0.08, while one group (n=9) were subjected to continous hypoxaemia (CH), inspired oxygen FiO_2=0.08.

Comparison of Hx-increases after 60 min. of hypoxaemia.

Hx	CSF*	Plasma*
IH	24.0 (±9.5) - 44.0 (±16.0)	31.5 (±7.5) - 89.0 (±27.5)
CH	23.0 (±8.0) - 51.0 (±19.5)	27.5 (±6.0) - 81.0 (±22.5)

Hx	Vitreous humor*	Urine**
IH	18.0 (±5.5) - 44.5 (±17.0)	12.5 (±4.0)
CH	13.0 (±7.0) - 22.5 (±12.0)	4.0 (±2.0) p<0.04

*mikromol/l. **nmol/kg/min.

These findings may support our suggestion that SIDS babies experience a stepwise/intermittent type of respiratory failure prior to death rather then the continous type seen in most RDS-cases.

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ALLOPURINOL MAY ALTER INTRACELLULAR CEREBRAL METABOLISM DURING HYPOXIA IN NEWBORN PIGLETS. Jan M. Goplerud, Peter J. Marro, and Jane E. DiGiacomo. University of Pennsylvania, School of Medicine, Departments of Pediatrics and Physiology, Philadelphia, PA.

Allopurinol is a xanthine oxidase inhibitor and free radical scavenger potentially protective in hypoxic tissue injury. The present studies compare 5 allopurinol-treated, anesthetized, mechanically ventilated newborn piglets to 5 non-treated piglets during normoxia and after 25 min (HYP 1) and 50 min (HYP 2) of hypoxia by $1FiO_2$. The allopurinol group received 5 mg/kg IV 30 min prior to hypoxia. Cerebral cortical O_2 delivery and O_2 consumption were calculated using microsphere determined blood flows. To assess brain cortical oxygenation, phosphocreatine to inorganic phosphate ratio (PCr/Pi) and intracellular pH (pHi) were determined concurrently by 31-P NMR spectroscopy. Sagittal sinus lactate levels and arterial blood gases were also measured. Brain O_2 delivery, O_2 consumption, and PCr/Pi were the same for the allopurinol treated and non-treated groups during normoxia, HYP 1, and HYP 2. However, arterial pH was significantly lower in the allopurinol treated vs non-treated piglets during both HYP 1 (7.16±0.06 vs 7.30±0.04) and HYP 2 (6.93±0.14 vs 7.11±0.10) despite comparable PCO_2 (36±8 vs 39±8), PO_2 (24±2 vs 26±6), and baseline pH (7.40±0.10 vs 7.40±0.03). Similarly, cerebral cortical pHi was lower in the allopurinol treated piglets during hypoxia: HYP 1 (6.77±0.21 vs 6.93±0.39) and HYP 2 (6.43±0.22 vs 6.71±0.39) and the increase in sagittal sinus lactate levels during hypoxia was greater for the allopurinol vs non-treated piglets: HYP 1 (9.5±2.5 vs 5.4±2.5) and HYP 2 (14±3.4 vs 6.71±5.7). The data suggest an alteration in the metabolic response to hypoxia of the allopurinol treated group. If allopurinol interferes with hypoxia-induced cerebral cellular adaptation, accelerating brain tissue lactic acidosis, it may contribute to hypoxic tissue damage despite reducing free radical injury by other mechanisms. (NIH #20337).