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INITIAL EXPERIENCES OF MAGNETIC RESONANCE IMAGING AND SPECTROSCOPY OF THE NEWBORN BRAIN AT 4.7 TESLA

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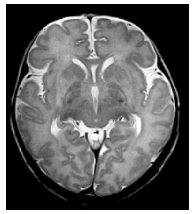
Background. The potential benefits of high-field magnetic resonance (MR) include increased signal, contrast, and spectral/spatial resolution, however there are specific safety and cost implications.

Aims. (i) To explore the feasibility of MR imaging (MRI) and proton (1H) MR spectroscopy (MRS) at 4.7T of the newborn brain; (ii) to assess specific advantages and disadvantages of 4.7T versus low-field MR.

Methods. Informed parental consent and ethical approval were obtained. Nine ventilated infants were studied at a median corrected gestational age 41+4 weeks using a whole-body 4.7T MR system with continuous monitoring (skin temperature, pulse oximetry, ECG). Acoustic noise was attenuated with incubator-lining, ear-plugs and mini-muffs. MRI included: T1- and T2-weighted single and multi-echo spin-echo, and 3D gradient-echo. Quantitative T1 and T2 maps were calculated where possible. A modified PRESS sequence was used for 1H-MRS localised to an 8mm^3 thalamic voxel (echo times 144 and 288ms). Sequences were programmed to keep RF heating at less than half the recommended adult maximum levels.

Results. Physiological indices were stable and no adverse events occurred. As expected, brain water T1 was higher and T2 lower at 4.7T versus lower fields. The T1-weighted images displayed poor contrast, however high spatial resolution T2-weighted imaging with a 4.7T-optimised fast spin-echo technique delivered remarkable contrast and structure differentiation (figure). 1H-MRS detected brain metabolites including lactate.

Conclusions. Safety considerations at high-field limit sequence flexibility and rapidity of data acquisition. Nevertheless our initial experience demonstrates the feasibility of scanning sick newborn infants at 4.7T: the quality of T2-weighted images was significantly improved, whilst T1-weighted images and 1H-MRS were not superior at high vs low-field. Further research on the application of high-field MR to the developing brain is imperative as exploitation of specific features and use of dedicated coils may improve the diagnostic and prognostic accuracy of MR techniques.



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ANTHROPOMETRIC INDICES INDICATIVE OF OBESITY ARE POSITIVELY RELATED TO N-6 LONG-CHAIN POLYUNSATURATED FATTY ACIDS IN PLASMA LIPIDS OF OBESE CHILDREN

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Introduction: Controversial data were reported in studies on fatty acid composition of plasma lipids in obese subjects (cf. Decsi et al, Lipids 31: 305–311, 1996 and 35: 1179–1184, 2000 to Phinney et al, Am J Clin Nutr 53: 831–838, 1993). The equivocal data obtained in different studies may be related to differences in anthropometric characteristics of the study populations.

Subjects and methods: Obese children (n = 114, age: 13 [3.1] years, body weight (BW): 76.6 [20.7] kg, relative body weight (RBW): 165.8 [22.7] %, body mass index (BMI): 41.3 [4.1] kg/m2, body fat (BF): 38.7 [4.0] %, waist/hip ratio: 0.85 [0.07]), mean [SD]) were investigated. Fatty acid composition of plasma lipid classes was determined by high-resolution capillary gas-liquid chromatography.

Results: The contribution of n-6 PUFA to the fatty acid composition of plasma sterol esters were as follows: linoleic acid (C18:2n-6, LA): 53.40 [6.19], dihomo-gamma-linolenic acid (C20:3n-6, DHGLA): 0.86 [0.26], arachidonic acid (C20:4n-6, AA): 8.10 [2.83], ratio of gamma-linolenic acid (C18:3n-6, GLA) plus DHGLA to LA: 0.03 [0.01], data are % weight/weight, median [IQR]. Values of LA showed significant and inverse correlation with RBW. In contrast, values of DHGLA showed significant and positive correlations with RBW and BMI, and AA values exhibited significant and positive correlations with BW, BMI and BF (Table). The product/substrate ratios for the delta-6-desaturase enzyme ([GLA+DHGLA]/LA) were significantly and positively related to RBW and to the waist/hip ratio (Table). Table: Spearman rank correlation coefficients between anthropometric characteristics and plasma sterol ester fatty acids in 114 obese children. *P < 0.05; **P < 0.001

Fatty acids	BW	RBW	BMI	BF	Waist/hip
C18:2n-6	0.02	-0.19*	-0.02	0.06	-0.13
C20:3n-6	0.18	0.29**	0.22*	0.16	0.1
C20:4n-6	0.20*	0.12	0.22*	0.27**	0.02
(GLA+DHGLA)/LA	0.07	0.36**	0.02	-0.01	0.21*

Conclusions: 1. In the present study, various anthropometric indices indicative of obesity were significantly and positively related to n-6 long-chain polyunsaturated fatty acids in plasma lipids of obese children. 2. The product/substrates ratios for the delta-6 desaturase enzyme indicated enhanced conversion rate with more pronounced obesity. 3. Extent of obesity should be taken into account in studies on fatty acid metabolism in obese subjects.

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PROTEIN C CONCENTRATE FOR SEPSIS-INDUCED COAGULOPATHY IN NEWBORN

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Sepsis results in pronounced hypercoagulability due to the strong activation of coagulation, depletion of anticoagulant factors and impairment of normal fibrynolitic response. Protein C (PC) is a natural anticoagulant and also has important anti-inflammatory activity. We reports the effects of substitution with a human, virus- inactivated protein C concentrate (Ceprotin®) in neonatal sepsis. Design:case series. Setting: open-label, non randomized study conducted in 6 neonatal care units. Objectives: to perform a preliminary analysis of the clinical and laboratory effects of PC concentrate as an adjunt to conventional therapy in the treatment of sepsis-induced coagulopathy. Patients: 11 neonates with a median gestational age of 31 week (range: 26 to 40W) 4F/7M, median birth weight of 1034 g (range: 586 to 3350) received an initial intravenous bolus of 100 IU/kg followed by 50 IU/kg six time per day. All patients presented with low plasma PC acitivity prior treatment (median: 18,1%, range 10% to 25%). Results: a rise in plasma PC activity levels to within normal limits at 48h (P=0,01) and manteinment until 72h. Improving or even partial correction of hemostasis, and normalization of infectious parameters were assessed in all patients. No adverse effects were observed. One patient died. Discussions and conclusions: the administration of PC concentrate had a marked benefit on the deranged coagulation status of patients and revealed safe leading to a resolution of coagulation imbalance. These encouraging clinical and laboratory results and the absence of side effects warrant the initiation of a double blind randomized controlled multicenter trial.

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PROLONGED SEDATION / ANALGESIA (S/A) AND 4-YEAR OUTCOME IN PRETERM NEWBORNS : RESULTS FROM THE EPIPAGE COHORT.

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Background: It seems adequate to relieve pain in newborns and necessary to evaluate the benefit/risk ratio of this therapy.Is there a relationship between prolonged S/A and long-term outcome of extremely preterm infants?

Objective: Evaluation of association between prolonged S/A and 4-year outcome of preterms in EPIPAGE cohort.

Method: Based on a propensity score, preterms were divided in 2 groups according to the probability of needing prolonged S/A :low (< 20 %) or high probability (>/=20 %).Dependent variable was S/A. Independent variables were CRIB score, prematurity, ventilation, surgery and postnatal corticotherapy. 4-year outcome was classified as: death, alive at 4 years with or without difficulties (cerebral palsy, developmental problem considered by parents or difficulties at school).

Results: Information on S/A was recorded in 2441 newborns alive at discharge. Without taking account propensity score, 35.5 % and 75.5 % of preterms with or without prolonged S/A respectively had no difficulties at 4-year follow-up.

	Low		High	
Probability of prolonged S/A	0-20 %		>/= 20 %	
prolonged S/A	no	yes	no	yes
n	1993	39	91	62
Death	21 (1 %)	1 (2.5 %)	0	0
Difficulties	373 (18 %)	8 (20.5 %)	33 (36 %)	26 (42 %)
No difficulties	1599 (81%)	30 (77 %)	58 (64 %)	36 (58 %)
	p = 0.60		p = 0.48	

Conclusion: Prolonged S/A is associated with a poor 4-year outcome in preterm newborns.But this may be explained by the severity of the illness.