ID: 114  
TITLE: DOES PREGNANCY DURATION OR HOLDER PASTEURISATION INFLUENCE MACRONUTRIENTS OR BIOACTIVE PROTEIN CONTENT IN HUMAN MILK?  
AUTHORS: Ieva Jura Paulaviciene (1, 2), Arunas Liubsys (1, 2), Rimutė Vaitkeviciene (2), Rymanta Gudaitiene (2), Vytautas Usonis (1, 2)  
AFFILIATIONS: 1 - Clinic of Children Diseases, Institute of Clinical Medicine, Faculty of Medicine, Vilnius University, Lithuania  
2 - Children’s Hospital, Affiliate of Vilnius University Hospital Santaros Klinikos  

CONTENT:

Donor human milk is the second best food for sick newborns when their mothers’ milk is unavailable. Holder pasteurisation (milk heating for 30 minutes at 62.5 ºC) is the most commonly used method in donor milk banks for microbiological safety of the donated human milk. Holder pasteurisation not only destroys microorganisms, but it can also change human milk’s nutritional and biological properties. The aim of our study was to evaluate the influence of Holder pasteurisation on macronutrients, energy, or bioactive protein content in human milk. Comparison of macronutrients and bioactive protein concentration in preterm and term milk was the secondary aim of our study.

The study was conducted at the Neonatal Centre of Vilnius University Children’s Hospital in the period of October 2017 – July 2018. Human milk samples from 42 women (22 preterm and 20 term infants’ mothers) between 14 – 16 days after childbirth were collected. Macronutrients and bioactive proteins (lactoferrin, lysozyme) concentrations from each sample were evaluated twice – in fresh milk and after milk being kept frozen at -40 ºC for up to 10 months, then thawed and pasteurised. The Miris human milk analyser (mid-infrared spectrophotometry method) for macronutrients and energy evaluation in human milk samples was used, and an immune-enzymatic ELISA assay – for estimation of lysozyme and lactoferrin concentrations in human milk. Statistical data analysis was performed using the R program.

Forty-two paired human milk samples were analysed for macronutrients (protein, fat, and carbohydrate), energy, and bioactive protein (lysozyme and lactoferrin) content. Human milk freezing and pasteurisation did not influence macronutrients and energy content in human milk (p > 0.05). Concentrations of lactoferrin and lysozyme were significantly lower in thawed pasteurised milk compared with fresh milk (p < 0.05). The average loss of lysozyme and lactoferrin was 35% and > 99%, respectively after pasteurisation (figure 1). The samples from preterm and term infants’ mothers did not differ significantly according to the infants’ gender, birth-giving method, mothers’ age, or ethnicity. There were no statistically significant differences in any macronutrient, energy content, or lysozyme and lactoferrin concentrations in preterm and term fresh human milk samples (p > 0.05).

No significant differences in macronutrients, energy, lysozyme or lactoferrin content in preterm and term milk were detected. Freezing and Holder pasteurisation caused a significant loss of bioactive proteins but did not change the macronutrients content in human milk. It is important to look for new methods of milk processing in order to minimise loss of bioactive components of human milk.

IMAGES: https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=b272226b67fc5123262448a6d6a5d2d4-MjAxOS0wNSM1Y2UyNjY2YmQxYWE0

Figure 1. Holder pasteurisation influence on bioactive protein content in human milk

COI: None declared
ID: 120

TITLE: DOES DEXTROSE GEL IMPROVE BREASTFEEDING IN NEONATES AT RISK OF HYPOGLYCAEMIA?

AUTHORS: Georgina Farmer 1; Hannah Steedman 2; Madhuvanthi Dhamodharan; 3 Aakarshan Mehta ; 4 Alok Sharma 5

AFFILIATIONS: Dept of Neonatal Medicine, Princess Anne Hospital Southampton, UK

CONTENT:

The British Association of Perinatal Medicine introduced national guidance regarding management of neonatal hypoglycaemia (NH) in 2017. In addition to proposing higher thresholds for treating NH they also endorsed use of Dextrose gel (DG) as a treatment option. The guidance recommends the use of DG when blood glucose level is 1.0–1.9 mmol/L but in keeping with the Waikato ‘Sugar Babies’ trial we retained a treatment threshold of 2.6 mmol/L. The intention was to keep the baby breastfeeding offering up to 3 doses of DG with clinical review prior to administration of the 3rd dose. A key question was whether we would see benefits such as better breast-feeding rates, a decline in the use of formula and less hypoglycaemia.

A retrospective study (2018) of a cohort of 50 neonates (CH1) at risk of hypoglycaemia was performed after implementation of DG treatment for neonates at risk of NH. The data was compared with a cohort of 48 babies (CH2) for the same data set (Table 1). The 2nd cohort was chosen before any QI initiatives, education or new guidance was implemented. Data was collected regarding demographics, reason for monitoring, timing of blood sugars, dextrose gel administration, doses used and incidence of hypoglycaemia and symptoms if any. The use of preventative strategies like skin to skin care and early breastfeeding were analysed. The type of feeding and whether the baby received or transitioned onto formula was also analysed. Statistical analysis was performed using Fishers Exact test (Table 1).

The top 4 reasons for monitoring babies in both groups were similar but there were a higher number of babies who were IUGR and preterm in CH1. The most common reason for monitoring in CH2 was maternal diabetes followed by hypothermia. The rates of exclusive breast feeding (54% vs 33%; p=0.04 ), early skin to skin care (84 % vs 72%) and feeding within the hour (70 vs 50%) were higher in CH1 vs CH2. The incidence of hypothermia was less in CH1 compared to CH2 (11% vs 22%). There were 3 babies admitted in cohort 2 and none in cohort 1. 9 babies in CH1 received DG and all of them received a single dose after which they were discharged. This helped maintain breastfeeding in 6/9 (66%) babies who would have previously gone onto formula. Fewer babies were symptomatic in CH1 compared to CH2 (6% vs 17%), but the incidence of hypoglycaemia in both groups was the same.

After starting DG we have seen rise in the breastfeeding amongst babies at risk of NH. Early breastfeeding and skin to skin care may have contributed to this by promoting bonding. However, 66% of neonates were able to continue breastfeeding while on DG. They avoided formula. DG appears to be a beneficial intervention for sustaining breastfeeding. The study limitations are that it is retrospective and there is demographic variation in the cohorts.

IMAGES:
https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=2773fd58023290b343c9678c053a8ff3-MjAxOS0wNSM1Y2UyNjY2YmQ0YmFh

Table 1 Comparison of Cohort 1 (CH1) with Cohort 2 (CH2)

COI: None Declared
ID: 138

TITLE: PERIPHERALLY INSERTED CENTRAL VENOUS CATHETER VERSUS PERIPHERAL VENOUS CATHETER. GROWTH AND NEURODEVELOPMENT OF VERY LOW BIRTH WEIGHT NEWBORN. A RANDOMISED TRIAL

AUTHORS: Ilona Aldakauskienė 1; Rasa Tamelienė 2; Vitalija Marmienė 3; Inesa Rimdeikienė 4; Kastytis Šmigelskas 5; Rimantas Kėvalas 6

AFFILIATIONS: 1 Department of Neonatology, Medical Academy, Lithuanian University of Health Sciences, Lithuania; Hospital of Lithuanian University of Health Sciences, Lithuania
2 Department of Neonatology, Medical Academy, Lithuanian University of Health Sciences, Lithuania; Hospital of Lithuanian University of Health Sciences, Lithuania
3 Hospital of Lithuanian University of Health Sciences, Lithuania
4 Department of Rehabilitation, Medical Academy, Lithuanian University of Health Sciences; Hospital of Lithuanian University of Health Sciences, Lithuania
5 Department of Health Psychology, Medical Academy, Lithuanian University of Health Sciences, Health Research Institute, Medical Academy, Lithuanian University of Health Sciences,
6 Department of Pediatrics, Medical Academy, Lithuanian University of Health Sciences, Hospital of Lithuanian University of Health Sciences, Lithuania

CONTENT:

In very low birth weight (VLBW) newborns, parenteral nutrition (PN) is delivered via a peripheral venous catheter (PVC), a central venous catheter (CVC), or a peripherally inserted central venous catheter (PICC). Up to 45% of PICCs are accompanied by complications, the most common being sepsis. A PVC is an unstable PN delivery technique requiring frequent change. The growth and neurodevelopment of VLBW newborns may be disturbed because of catheters used for early PN delivery and complications thereof. The aim of the conducted study was to evaluate the effect of two PN delivery techniques (PICC and PVC) on anthropometric parameters and neurodevelopment of VLBW newborns.

A prospective randomized clinical trial was conducted at the Department of Neonatology of the Hospital of the Lithuanian University of Health Sciences Kauno klinikos between 1 January 2014 and 31 March 2017. Low birth weight (≥750 - <1500 g) newborns that met the inclusion criteria were randomized into two groups: PICC and PVC. For the entire period of treatment, PN was delivered via a catheter chosen during the randomization. In the trial, we assessed short-term outcomes, i.e., anthropometric parameters (weight, length, and head circumference) from birth until CA 36 weeks or upon discharge, and long-term outcomes, i.e., anthropometric parameters (weight, length, and head circumference) from 3 months to CA 12 months as well as neurodevelopment at CA 12 months according to Bayley II.

In total, 108 newborns (57 in the PICC group and 51 in the PVC group) underwent randomization. Short-term outcomes were assessed in 47 PICC and 38 PVC subjects. Long-term outcomes were assessed in 38 and 33 subjects of PICC and PVC groups, respectively. There were no differences observed in anthropometric parameters between the subjects of two groups in the short and long term. Delayed mental performance (MDI <85) was observed in 26.3% and 21.2% (p=0.781), and delayed psychomotor performance (PDI <85) was observed in 39.5% and 54.5% (p=0.239) of PICC and PVC subjects, respectively. Significantly delayed mental performance and psychomotor performance were observed only in the group of PICC subjects (10.5% and 13.2%, respectively); meanwhile, no such delay was determined in the group of PVC subjects; however, this difference was not statistically significant (p=0.118 and p=0.057).

In the short and long term, no differences were observed in anthropometric parameters of newborns when PN was delivered using PICC and PVC. At 12 months of corrected gestational age (CGA), there was no difference in the rate of mental and motor neurodevelopment in both groups.

COI: "None declared"
ID: 175

TITLE: SHORT-TERM OUTCOMES IN NEONATES BORN TO WOMEN WITH ABSENT OR REVERSE END DIASTOLIC FLOW (AREDF) IN A NEONATAL NETWORK OF A DEVELOPING COUNTRY

AUTHORS: Binoy shah 1; Ashish mehta; Praveen kumar 3; Srinivas Murki 4; Deepak Chawala 5; Nandkishor kabra 6; Ashok Deorari 7; naveen jain 8; suman rao 9; Tandur Baswaraj 10; Sreeram Subramniam 11;

AFFILIATIONS: Neonatology Dept., Arpan newborn care center, Ahmedabad, Gujrat, India

CONTENT:

A number of observational studies have reported neonatal outcomes in intrauterine growth restriction with abnormal antenatal Doppler flow patterns but there are few such studies from the developing world.

Twenty centres participating in the network prospectively collected data of all neonates fulfilling pre-defined criteria which included need of admission to neonatal intensive care unit (NICU). Mutually agreed upon pre-defined uniform definitions were used across all sites for collecting data. Antenatal, intrapartum and postnatal variables influencing outcomes across centres were analysed. Continuous variables were analysed by using Discrptive statistics. Odds ratio was derived by using binary logistic regression. P value was derived by using independent t test while P value for median was derived from Mann Whitney test.

From 1st January 2017 to 31st October 2018, 3287 infants born at ≤32 weeks of gestational age were enrolled. In the subgroup of neonates born at ≤28 weeks (n=783) 49 (6.2%) had AERDF and 298 (38%) had normal diastolic flow. In those born at 29-32 weeks (n= 2504) 249 (10%) had AERDF while 714 (28.5%) had normal diastolic flow. In the remaining infants Doppler details were either not available or Doppler was not done. Baseline characteristics of both the groups are shown in Table 1.

Incidences of NEC (≥ stage 2) and death were higher in infants with AERDF (Table 2). Median time of reaching full feeds was lesser in subgroup with normal Doppler as compared to AERDF group (9 Vs 15 days in < 28 weeks , 6 Vs 9 days in 29-32 weeks), it was stastically significant (P value <0.05) (Mann Whitney test).

Neonates born to women with absent/reverse end diastolic flow neonates are at increased risk of death or NEC ( ≥ stage 2).

IMAGES: https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=9beb972158ff0ffbbaa0432aa95e6b03-MjAxOS0wNSM1Y2UyNjY2YmU5Mjih

COI: None Declared
ID: 272

TITLE: LATE ONSET VITAMIN K DEFICIENCY BLEEDING IN AN EXTREMELY PRETERM INFANT RECEIVING AN EXCLUSIVE HUMAN MILK DIET AND A HUMAN MILK DERIVED FORTIFIER

AUTHORS: Sean Bryson 1, Atisha Pandya 1, Shaveta Mulla 1, David Card 2, Martin J Shearer 3, Paul Clarke 4, Vimal Vasu 1

AFFILIATIONS: 1. Department of Neonatal Medicine, East Kent Hospitals University NHS Foundation Trust, Ashford, Kent, TN24 0LZ, UK
2. Human Nutristasis Unit, Viapath, Guy’s and St Thomas’s NHS Trust, London, UK
3. Centre for Haemostasis and Thrombosis, Guy’s and St. Thomas’s NHS Foundation Trust, London, UK.
4. Neonatal Unit, Norfolk and Norwich University Hospital, Norwich, UK

CONTENT:

All newborns need phylloquinone (vitamin K1; K1) after birth to prevent vitamin K deficiency bleeding (VKDB). In preterm babies, the main sources are prophylactic K1 given at birth and parenteral and/or enteral nutritional intake. However, preterm babies remain at risk of deficiency if ongoing K1 supplementation during infancy is inadequate. Human milk fortification with either bovine milk based fortifier or human milk derived fortifier (HMF) made from pooled donor milk is a widely utilised strategy to improve the vitamin status and growth of preterm infants. Here, we present a case of late-onset VDKB in an extremely preterm infant who received an exclusive human milk diet and HMF.

A female infant was born at 23+5 weeks gestation via spontaneous vaginal delivery with a birth weight of 555 grams (25th centile). Antenatal sonography and maternal serology were unremarkable. There was no history of maternal medication use. She required intubation, surfactant and mechanical ventilation until day 41 of life. She received 0.4 mg/kg of intramuscular K1 on day 1 of birth in line with local neonatal unit policy. She received parenteral nutrition for 8 days. As part of an ongoing randomised trial, she received an exclusive human milk diet (either own maternal breast milk or a commercially available ready to feed donor human milk) and reached a full enteral feed volume of 150 mL/kg/day on day 13, at which time a commercially available HMF was commenced that provided daily K1 supplementation of 0.3 µg/100 mL milk. Cranial sonography in the first week of life revealed bilateral germinal matrix haemorrhages.

On day 73 (corrected age: 33+6 weeks; weight 1521 kg) she was noted to have significant ‘oozing’ from a heel-prick puncture site after routine capillary blood gas sampling. Investigations demonstrated markedly deranged coagulation (Prothrombin Time 150 s, Activated Partial Thromboplastin Time 84 s), and reduced concentrations of both extrinsic pathway coagulation factors II <3 IU/dL, factor VII 20 times lower than what it would have been if fortified with a bovine milk-based fortifier (0.3 vs 7 µg per 100 mL respectively). Current recommended minimum adequate K1 intakes for preterm infants range from 4.4 to 10 µg/kg/day. Full HMF-supplemented feeds at 150 mL/kg/d provided this infant with only ~0.45 µg/kg/day K1, which is ~10-20 times lower that the currently recommended minimum adequate intakes.

Preterm babies fed an exclusively human milk-derived diet (including HMF) receive inadequate K1 intake and may be at risk of VKDB without additional K1 supplementation. In this case, the prompt clinical suspicion and treatment may have prevented sentinel bleeding progressing to life-threatening intracranial bleeding. In addition, it highlights the value of PIVKA-II assay for retrospective confirmation of VKDB, even several days post treatment.

COI: None declared
ID: 275

TITLE: EFFECTS OF HOLDER PASTEURIZATION ON LEVELS OF METABOLIC HORMONES IN HUMAN MILK

AUTHORS: Réka A. Vass 1,2; Edward F. Bell 3; Tarah T. Colaizy 3; Karen J. Johnson 3; Mendi L. Schmelzel 3; Jacky R. Walker 3; Tibor Ertl 1,2; Robert D. Roghair 3

AFFILIATIONS: 1 Department of Neonatology, University of Pécs Medical School, Pécs, Hungary; 2 MTA-PTE Human Reproduction Scientific Research Group, Pécs, Hungary; 3 Department of Pediatrics, University of Iowa, Iowa City, Iowa, USA

CONTENT:

During human development, environmental conditions can be communicated by signaling molecules delivered across the placenta or within breast milk. While the fetus or newborn matures, hormones exert both metabolic and trophic effects on target organs. Preterm infants are deprived of the transplacental hormone transfer that typically occurs during the final months of pregnancy, but they have two potential sources of human milk, their own mothers and milk bank donors. When donor milk replaces maternal milk, Holder pasteurization (HoP) is required, but that process may further impact the concentration of metabolic hormones in the breast milk.

Breast milk samples were donated by 26 mothers who gave birth to preterm infants hospitalized in the University of Iowa Children’s Hospital. At the Mother’s Milk Bank of Iowa, 31 donor mothers breastfeeding their term infants were recruited. Leptin, cortisol, insulin, luteinizing hormone, thyroid-stimulating hormone, and follicle-stimulating hormone were measured in the preterm milk and donor milk samples by custom magnetic bead array. Then, the donor samples were processed by HoP, heating at 62.5 °C for 30 min, and the microarray was repeated. Samples were run in duplicate, and the data were analyzed by two-way ANOVA. The study was powered to detect moderate effect sizes (Cohen’s d = 0.6).

Compared to donor milk, leptin levels were significantly higher in milk provided by mothers of preterm infants (586 ± 121 [m ± SEM] vs. 198 ± 28 pg/ml, P<0.01), and leptin concentration was significantly decreased by HoP in both cohorts (HoP preterm: 52 ± 15 pg/ml and HoP donor: 34 ± 9). Cortisol concentration was not affected by HoP, but HoP donor milk contained significantly higher cortisol level compared to the preterm milk samples (4063 ± 707 vs. 1471 ± 433 pg/ml, P<0.01). Insulin concentration was not influenced by cohort or HoP. Pituitary glycoprotein hormones were present in similar amounts in human milk produced for preterm infants and term infants, but HoP increased the concentration of TSH by 17% (P<0.05), decreased the LH level by 29% (P<0.05), and did not influence FSH concentration.

In a hormone-specific fashion, the content of breast milk is impacted by maternal factors and HoP. Compared to non-pasteurized maternal milk, provision of HoP donor milk to preterm infants decreases leptin and LH intake and increases cortisol and TSH exposure. Further research is necessary to define the breast milk feeding practices that best mirror intrauterine hormone exposure and optimize the development of highly vulnerable preterm infants.

COI: None declared
ID: 290

TITLE: THE ROLE OF SKIN FOLD MEASUREMENTS, AIR DISPLACEMENT PLETHYSMOGRAPHY AND DUAL-ENERGY X-RAY ABSORPTIOMETRY IN THE ASSESSMENT OF ADIPOSITY IN PRETERM INFANTS AT TERM EQUIVALENT AGE

AUTHORS: Dana Yumani 1, Dide De Jongh 2, Harrie Lafeber 1, Mirjam van Weissenbruch 1

AFFILIATIONS: 1 Emma’s Children Hospital, Amsterdam UMC, location VU medical center, Vrije Universiteit Amsterdam, Neonatology
2 Faculty of science, Vrije Universiteit Amsterdam

CONTENT:

In adolescence and adulthood, preterm birth is associated with a higher percentage of body fat, higher blood pressure and increased risk of dysglycemia. Nevertheless, differences between premature and term infants in fat distribution are already seen in infancy and early childhood. As body fat percentage and fat mass index have been shown to positively correlate with the occurrence of metabolic syndrome components, monitoring body composition in early life could help to implement timely preventive measures.

The purpose of the present study was to assess the agreement between adiposity measured by air displacement plethysmography (ADP) and Dual-energy x-ray absorptiometry (DXA) in preterm infants at term equivalent age. In addition, the potential predictive value of the sum of skinfolds (∑SFT) in an anthropometric model was assessed.

Sixty-five preterm infants, mean (SD) gestational age 29 (1.6) weeks, were assessed for growth and body composition at term equivalent age. ∑SFT were successfully completed in 63 infants, ADP was in 58 and DXA in 32 infants. The level of agreement and potential bias were examined using the Bland-Altman analysis and multiple regression analyzed was used to investigate prediction models for adiposity.

DXA showed 4.5% higher fat mass percentages than ADP (limits of agreement: -4.2% and 13.0%). Seventy-five percent of the variance in fat mass percentage, measured with DXA, could be explained by waist circumference and the ∑SFT (P < 0.001). Only the ∑SFT was a significant predictor of fat mass percentage, measured with ADP (R² = 0.311, p < 0.001). Fat mass estimation based on the formula by Schmelzle and Fusch, which was originally modeled to predict fat mass measured with DXA, could not be validated in our population.

Despite the need for a reliable, low-cost, point of care instrument, this study has not been able to show that ∑SFT would qualify as such. ADP seems to be more practical to assess adiposity in preterm infants in early life. Nevertheless, it remains to be elucidated whether or not a properly executed DXA is more accurate than ADP.

COI: There is no conflict of interest.
ID: 297

**TITLE:** SETTING A STANDARD FOR GROWTH OF LIMB CIRCUMFERENCES IN VERY PRETERM INFANTS

**AUTHORS:** Aneurin Young 1
James Ashton 2
Edward Andrews 3
C Freya Pearson 4
R Mark Beattie 5
Mark Johnson 6

**AFFILIATIONS:**
1,3,4,6 Department of Neonatal Medicine, Southampton Children’s Hospital, University Hospital Southampton NHS Foundation Trust, Southampton, UK
1,6 National Institute for Health Research, Southampton Biomedical Research Centre, University Hospital Southampton NHS Foundation Trust and University of Southampton, Southampton, UK
2,5 Department of Paediatric Gastroenterology, Southampton Children’s Hospital, University Hospital Southampton NHS Foundation Trust, Southampton, UK
2 Department of Human Genetics and Genomic Medicine, University of Southampton

**CONTENT:**

Recent work has demonstrated that early weight loss and discharge below the birth centile (or z-score) is not inevitable in preterm infants. However, the composition of improved weight gain remains uncertain. Clinicians need convenient tools to robustly assess body composition (and especially lean growth). Limb circumference measurement is a candidate, but its implementation is hindered by a lack of longitudinal data and standards. This study prospectively and longitudinally collected limb circumference data from a cohort of growing preterm infants, compared these measurements to routine anthropometry and has begun to form standards and growth charts which can be used to track infant growth.

Infants born prior to 30 weeks post-menstrual age were recruited from a single neonatal unit. Mid-upper arm circumference (MUAC) and mid-thigh circumference (MTC) were measured with routine anthropometry at recruitment and weekly until discharge. Circumference measurements underwent correlation analysis to assess their change over time. Slopes of change over time for circumferences were compared to slopes for standard anthropometric measurements to assess whether limb circumference measurements reflect distinct patterns of growth. Growth charts were constructed from the measurement data, using the LMS method, so that the feasibility of such charts could be assessed. Data for the whole cohort were compared with published data from the first 93 infants to validate the earlier findings.

212 infants were recruited (mean gestational age at birth: 27 weeks; mean birthweight: 930g). All parameters were strongly correlated with time, weight increasing by 162g per week, length by 7.4mm, left MUAC by 2.9mm, right MUAC by 3.0mm, left MTC by 5.2mm and right MTC by 5.1mm (all p<0.05). Comparison of regression slopes demonstrated that those for right and left MUAC could not reliably be distinguished from each other, and nor could those for right and left MTC. MUAC and MTC slopes were significantly different from those for weight, length and head circumference (and slopes for MUACs were different from those for MTCs). Growth charts were created using the LMS method (e.g. Fig 1). When compared with data for only the first 93 recruited infants, demographics had not significantly changed but rates of gain in weight, MUACs and MTCs had increased.

Patterns of growth of MUAC and MTC are distinct from each other and from those for weight, length and head circumference. Further work should focus on whether they offer insight into changes in body composition, and change in relation to patterns of nutrient intake. Growth charts were formed from MUAC and MTC data, though whether these patterns of growth are optimal requires further investigations in a larger cohort with long term follow up.
Images: https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=ed934150f8a6f186ee967f22df2bbeae-MjAxOS0wNzY2MzY2YzIyOWRk

Posed growth chart for assessing the growth of right MUAC of preterm infants (LMS method, n=212) (lines at 0.4th, 2nd, 10th, 25th, 50th, 75th, 90th, 98th and 99.6th centiles)

COI: None declared
ID: 449

**TITLE:** WHAT IS THE OPTIMAL ARGinine CONTENT FOR NEONATAL PARENTERAL AMINO ACID FORMUlations?

**AUTHORS:** Colin Morgan (1,2)  
Chandini M Premakumar (2,3)  
Laura Burgess (1,2)

**AFFILIATIONS:**  
1. Neonatal Intensive Care Unit, Liverpool Women’s Hospital, Crown Street, Liverpool L8 7SS, UK  
2. Institute of Translational Medicine, University of Liverpool, Department of Women’s and Children’s Health, Liverpool Women’s Hospital, Crown Street, Liverpool L8 7SS, UK  
3. Faculty of Pharmacy, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300, Kuala Lumpur, Malaysia

**CONTENT:**

Arginine (ARG) is involved in multiple metabolic/immune pathways and required for growth. Current neonatal parenteral nutrition (NPN) amino acid (AA) formulations are associated with arginine deficiency and over-provision of essential AA in NPN dependent preterm infants (1) based on plasma AA data in healthy infants. Higher ARG plasma levels (>80µmol/l) may be required to prevention of necrotising enterocolitis (NEC) (2). Recent European NPN guidelines recommend ARG supplementation but do not explain how. Our aims were to use small physiological studies to rebalance NPN AA formulations, identify the optimal ARG content (%) and investigate the relationship between ARG intake/plasma ARG levels.

In a series of ethically approved physiological studies (each n=8), infants <30wks gestation, <1200g and aged <72 hrs were non-randomly allocated control NPN (ARG 6.3%), NPN (ARG 6.3%) with supplementary parenteral ARG equivalent to ARG 12-15% and finally a modified NPN (ARG 14%). Plasma AA profiles (and ammonia levels) were measured on day 3 and 10 of life using ion exchange chromatography. Total daily NPN and enteral intakes (day 1-10) were calculated from the electronic patient record. Changes in total ARG (ΔARG) intake and plasma level between day 3 and 10 were calculated. Infants receiving control NPN (ARG 6.3%) were compared to all infants receiving additional ARG: NPN ARG (12-15%) using t-tests with linear regression used to compare relationship between ARG intake and plasma levels.

40 infants were recruited to control (n=15) or ARG 12-15% PN (n=25). The mean (SD) gestational age was 26.8 (2.1) & 26.8 (1.8) weeks respectively. The mean (SD) plasma arginine level (µmol/l) for control versus ARG 12-15% PN was 28 (19) versus 47 (23) on day 3 (p=0.01) & 42 (24) versus 62 (39) on day 10 (p=0.08). Plasma essential AA showed a mean reduction of 9% in infants receiving the modified AA formulation. Actual arginine intake varied markedly on day 10 (but not day 3) reflecting the higher enteral feed intake (Figure 1). Actual intake and plasma level were correlated on day 10 (p=0.04) with an increase of 9µmol/l for every 100mg/kg/d increase in arginine intake. ΔARG intake and ΔARG plasma level were also correlated (p=0.01) showing a 13µmol/l increase for every 100mg/kg/d increase in arginine intake between d3 and 10 and 9µmol/l increase attributable to increased postnatal age.

Current NPN AA formulations can be successfully rebalanced to correct arginine deficiency and achieve AA plasma profiles closer to healthy preterms. The data suggest that future NPN AA formulations may require >15% ARG and >600mg/kg/day to achieve ARG plasma levels >80µmol/l in the majority of infants <30 weeks gestation.


**IMAGES:**  
https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=b0bc79aa9f0d2b77651af509251700ba-MjAxOS0wNSM1Y2UyNyY2YzYxNmM3

Figure 1: Scatterplot showing day 10 arginine intake (g/kg/d) versus plasma arginine levels (µmol/l) in preterm infants <30 weeks gestation.

**COI:** The modified amino acid formulation is the subject of a patent application.
ID: 478

TITLE: BODY COMPOSITION (FAT MASS AND FAT-FREE MASS) OF PRETERM INFANTS LESS THAN 32 WEEKS AND NEURODEVELOPMENT AT 18 MONTHS

AUTHORS: Niels Rochow 1; Eunice Tsang 1; Anaam Ali 1; Gerhard Fusch 1; Salhab el Helou 2; Christoph Fusch 1,3

AFFILIATIONS: 1 Pediatrics, McMaster University, Hamilton, ON, Canada.
2 Pediatrics, McMaster Children’s Hospital, Hamilton, ON, Canada.
3 Pediatrics, University Hospital Nuremberg, Nuremberg, Germany.

CONTENT:

Weight measurements alone are insufficient indicators of individual body composition (i.e. fat mass and fat-free mass). Also, there is growing evidence that nutrition and resulting body composition at discharge are related to the neurodevelopment outcome. Air displacement plethysmography (PEA POD) was used to create a database of body composition measurements for preterm and term infants. Aim of the study was to calculate percentiles for body composition measurements and to compare the body composition with the neurodevelopmental outcome at 18 months.

A longitudinal, observational study was conducted for infants (gestational age (GA) 6 cm H2O or high-flow nasal cannula > 6 L/min) were excluded. Body composition indicators including % body fat (%BF), fat mass (FM), fat-free mass (FFM), fat mass/length2 (FMI), fat-free mass/length2 (FFMI) were graphed against postmenstrual age (PMA). At 18 months, the infants received a Bayley III assessment. For descriptive statistics, the infants were stratified in two gestational age groups: <28 weeks and 28 to 31 weeks. Percentiles were calculated using GAMLSS package in r statistics. Further, the infants were subdivided into three quantiles according to the neurodevelopment.

Of the 147 infants which were enrolled in the original study, 96 infants received a Bayley III assessment at 18 months (Figure 1). In total, 398 body composition measurements were performed.

At 35 weeks, the younger preterm infants had higher %BF compared to those born with 28 to 31 weeks. At 50 weeks PMA, %BF leveled out in both groups at 23 to 25% and remained stable at this value until 70 weeks PMA (Figure 2).

Preterm infants with GA <28 weeks had slightly shorter body length and lower neurodevelopmental scores. Infants with higher measurements for fat mass had higher Bayley score. For %BF, and fat mass the average curve for infants with lower language score (<33 percentile) was considerably lower (Figure 3). Also, fat-mass and percent free-mass were significantly correlated with language score (p<0.05).

There seems to be a relationship between body composition and neurodevelopment at 18 months. The strongest relationship was found for language score, for both fat-free and fat mass. Associations with motor and cognitive scores were weaker (p=0.08–0.15). The reported association is an important finding and supports the concept that optimized nutrition during NICU is crucial to achieve a body composition which is related to optimal neurodevelopment.

IMAGES:

https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=5ef53224a34629516e14ce84a64f2479-MjAxOS0wNSM1Y2UyNjY2YzZlNjU4

Association between body composition and neurodevelopment. (Black lines represent body composition of infants with language scores >97, red lines for language scores <87)

COI: None declared
ID: 535
TITLE: COMPARISON OF NEONATAL OUTCOME AMONG SEVERE SGA(<3P), MODERATE SGA(3-10P), AGA IN ELBWIs.
AUTHORS: Jinwha Choi 1; Jisook Kim 2; So Yoon Ahn 3; Se In Sung 4; Won Soon Park 5; Yun Sil Chang 6
AFFILIATIONS: Korea university Guro Hopital, Seoul, Korea
Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

CONTENT:

The outcomes of small for gestational age infants in extremely low birth weight infants are controversial. Multiple criteria for small for gestational age have been used, including less than the 10th, 5th and 3rd percentile in weight, length or head circumference. This study evaluated to determine whether severe small-for-gestational age (SGA) infants among extremely low birth weight infants (ELBWIs; < 1,000 g) are at increased risk for morbidity, neurodevelopment impairment and catch-down growth compared with moderate SGA and appropriate-for-gestational age (AGA) infants focusing on subdividing SGA.

All ELBWIs who admitted to neonatal intensive care unit of Samsung Medical Center from January 2011 to December 2015 were included. Severe and moderate SGA were defined as birth weight < 3rd percentile and 3-10th percentile for gestational age, respectively, based on Olsen growth curves. Maternal and infant characteristics, neonatal morbidity, neurodevelopment and growth data were compared among severe SGA, moderate SGA, and AGA groups. Neurodevelopmental outcomes were assessed via Bailey scales of infant development II (BSID-II). Growth outcomes were assessed via Z-score of body gauge at corrected age 12, 24 month, chronological age 36month, 4 year.

Among 336 ELBWIs, 59 (17%) infants were severe SGA, 36 (11%) were moderate SGA, and 241 (72%) were AGA infants. Severe SGA infants showed increased mortality during hospitalization compared with moderate SGA and AGA (35.6% vs 2.8%, p-value < 0.05; 35.6% vs 11.2%, p-value < 0.05). On multivariate analysis, mortality was greater for severe SGA than AGA infants (OR 7.62, 95% CI [3.65-15.93]), as was severe IVH (OR 3.13, 95% CI [1.47-6.67]), severe ROP (OR 2.26, 95% CI [1.06-4.81]). Severe SGA infants had a higher rate of early pulmonary hypertension (34% vs 14%, p-value < 0.05; 34% vs 15%, p-value < 0.05) and late pulmonary hypertension (10% vs 6%, p-value >0.05; 10% vs 2%, p-value < 0.05) With regard to neurodevelopmental outcome, severe SGA infants showed lower mental and psychomotor developmental index (Regression Coefficient - 5.3, 95% CI [-9.8 - -0.7], - 4.8, 95% CI [-9.6 - -0.1]). They also showed lower weight, shorter stature, and shorter head circumference at corrected age of 12, and 24 months compared with AGA infants at the same corrected age, so severe SGA had a more growth hormone treatment at 4 years compared with AGA(50% vs 4.8%, p-value < 0.05).

Severe SGA infants are at increased risk of mortality, severe IVH, severe ROP, pulmonary hypertension during NICU hospitalization, lower mental and psychomotor developmental index on BSID-II, and growth restriction at corrected age of 12 and 24 months compared with AGA infants. They may require special care including tailored nutrition, rehabilitation, and growth hormone treatment.

COI: none declared
ID: 613

TITLE: INTAKE OF UNPASTEURISED MATERNAL BREAST MILK, UNLIKE PASTEURISED DONATED BREAST MILK, IS POSITIVELY ASSOCIATED WITH POSTNATAL WEIGHT, LENGTH AND HEAD CIRCUMFERENCE GROWTH IN EXTREMELY PRETERM INFANTS

AUTHORS: Anna-My Lund 1; Magnus Domellöf 2; Ann Hellström 3; Elisabeth Stoltz Sjöström 4; Ingrid Hansen-Pupp 1

AFFILIATIONS: 1 Lund University, Skåne University Hospital, Department of Clinical Sciences, Lund, Paediatrics, Lund, Sweden
2 Department of Clinical Sciences, Paediatrics, Umeå University, Umeå, Sweden
3 Section for Ophthalmology, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden
4 Department of Food and Nutrition, Umeå University, Umeå, Sweden

CONTENT:

The preferred choice of enteral feeds for preterm infants is unpasteurised maternal breast milk. If maternal milk is absent pasteurised donor milk is often offered as an alternative. The purpose of pasteurisation is to inactivate infectious agents, however important biological factors such as immunological components, growth factors and enzymes are reduced or destroyed in this process. Previous studies indicate that preterm infants receiving a greater proportion of maternal milk rather than pasteurised donor milk have a more favourable postnatal growth pattern. The aim of our study was to investigate the relationship between intake of maternal and donor milk and subsequent postnatal growth.

The study population originate from the Extremely Preterm Infant in Sweden Study (EXPRESS; 2004-2007) where infants had a gestational age (GA) <27 weeks (n=707). Data regarding neonatal morbidities were collected prospectively. For the first 28 postnatal days, daily intakes of breast milk, parenteral and enteral nutrition, were obtained retrospectively from hospital records and nutritional intakes were thereafter registered weekly (day 35, 42 etc.) until discharge. All available weight, length and head circumference (HC) measurements were obtained from hospital records. Infants with conditions known to affect enteral nutrition and growth were excluded. Finally, 456 surviving infants with complete breast milk data from birth to 32 weeks postmenstrual age (PMA) were included in the analyses.

Infants had a mean GA of 25.4 weeks, a mean birth weight of 778 g and a mean birth weight z-score of -0.78. Mean intake of maternal milk (ml/kg/d) from birth to 32 weeks PMA correlated positively and significantly with z-scores of weight (r=0.230, p=<0.001), length (r=0.132, p=0.008) and HC (r=0.192, p=<0.001) at 36 weeks PMA and with change in z-score from birth to 36 weeks PMA for weight (r=0.283, p=<0.001), length (r=0.126, p=0.027) and HC (r=0.256, p=<0.001). No such associations were found for donor milk milk. Mean total breast milk intake (i.e. maternal and donor milk combined) correlated positively and significantly with z-scores of weight (r=0.342, p=<0.001), length (r=0.224, p=<0.001) and HC (r=0.307, p=0.001) at 36 weeks PMA and with change in z-score from birth to 36 weeks PMA for weight (r=0.420, p=<0.001), length (r=0.264, p=<0.001) and HC (r=0.437, p=<0.001).

An increased intake of unpasteurised maternal breast milk, as opposed to pasteurised donated breast milk, is associated with more favourable longitudinal growth outcomes of weight, length and HC until 36 weeks PMA in a Swedish population-based cohort of extremely preterm infants. All neonatal health care professionals should collaborate to promote and encourage an increased use of unpasteurised maternal breast milk within the preterm population.

IMAGES:
https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=e6b0783974c694cea709fbe70dfe4a5-MjAxOS0wNSM1Y2UyNjY2Y2E2MmY5

Relationship between mean intake of maternal, donor and total breast milk (ml/kg/d), respectively, from birth to 32 weeks postmenstrual age (PMA) and change in weight z-score from birth to 36 weeks postmenstrual age.
COI: None declared.
ID: 631

TITLE: AN 'OMICS' APPROACH TO INVESTIGATING THE EFFECTS OF ARGinine SUPPLEMENTATION OF PARENTERAL NUTRITION-DEPENDENT VERY PRETERM INFANTS

AUTHORS: Laura Burgess 1,2
Brian Flanagan 2
Eva Caamano-Gutierrez 2
Carolyn Slupsky 3
Duncan Sylvestre 3
Helen Wright 2
Mark Turner 2
Colin Morgan 1

AFFILIATIONS: 1. Neonatal Intensive Care Unit, Liverpool Women's Hospital, Liverpool, UK
2. Faculty of Health and Life Sciences, University of Liverpool, Liverpool, UK
3. Department of Nutrition, University of California, Davis, USA

CONTENT:

Our current parenteral nutrition (PN) formulation results in both overprovision of some essential amino acids (AAs) and underprovision of certain conditionally-essential AAs, including arginine. Arginine has a vital and versatile role in nutrition and metabolism and is involved in multiple metabolic pathways. Arginine deficiency results in growth failure in animal models and there is evidence that arginine depletion has negative effects on T-cell function and immune-signalling. This exploratory physiological study used transcriptomics and metabolomics to assess the impact of parenteral nutrition arginine supplementation on the immune system and metabolism of very preterm infants.

Very preterm infants born <29 weeks’ gestation and/or <1200g were eligible for parenteral nutrition (PN). The aim of the study was to investigate changes in gene expression and metabolomic profiles following arginine supplementation. Study infants received standard PN only or continuous intravenous arginine supplementation alongside standard PN until day 10 (D10) of life. Blood samples were taken on day 3 (D3) and D10 of life and analysed for AA levels, microarray and metabolomics. Plasma AA levels were measured using ion exchange chromatography. Gene expression was measured on Agilent SurePrint microarrays. Plasma metabolomics were analysed by NMR spectroscopy and the resulting spectra were manually phased, baseline-corrected, and the metabolites identified using Chenomx software.

26 infants with mean gestational age of 26+4 weeks’ and a mean birth weight of 855g were recruited. 8 infants received standard PN only (6% arginine), 12 received 12% arginine and 6 received 15% arginine. Plasma arginine levels were significantly higher on D10 of life in the supplemented infants (mean 72.8 v 45.5µmol/L, p=0.03). The microarray and subsequent qPCR validation experiments confirm significant up regulation from D3-D10 of B cell differentiation factors APRIL (p<0.01) and BAFF (p<0.05) and pathogen recognition receptors TLR2 (p<0.01) and TLR4 (p<0.01). Gene expression profiling indicates expression changes between infants with low versus normal plasma arginine levels to be similar to changes from D3 to D10 of life. We found different metabolomic profiles on D10 of life for infants with normal arginine levels following supplementation versus non-supplemented infants (Graph 1).

PN arginine supplementation can correct arginine deficiency. Supplemented infants with normal plasma arginine levels exhibit changes in immune pathways similar to the temporal changes seen from D3 to D10 of life. These gene expressions changes are consistent with the development of a functional immune system. Arginine supplemented infants with normal plasma arginine levels exhibit different D10 metabolomic profiles to unsupplemented infants.
IMAGES:
https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=1566fdbcbe1a32a233a7f83c8503da91c-MjAxOS0wNSM1Y2UyNjY2Y2FjMjk5

COI: None declared
ID: 749

**TITLE:** MELATONIN AND SUPEROXIDE DISMUTASE RICH FETAL NUTRITION BY AMNIOTIC FLUID

**AUTHORS:** Soyhan Bagci 1; Özlem Altuntas 1; David Katzer 1; Ebru Aileen Alsat 1; Brigitte Strizek 2; Heiko Reutter 1; Peter Bartmann 1; Andreas Müller 1

**AFFILIATIONS:** 1 Neonatology and Pediatric Intensive Care, Children’s Hospital, University of Bonn, Bonn, Germany
2 Department of Obstetrics and Prenatal Medicine, University of Bonn, Germany

**CONTENT:**

Antioxidant molecules have shown to play a protective role in the gastrointestinal system. Melatonin (MT) plays an important physiological role through specific receptors or directly in immune regulation, anti-inflammatory responses and oxidative stress. Human breast milk contains important enzymatic and non-enzymatic antioxidants such as superoxide dismutase (SOD) and MT. An embryo starts swallowing amniotic fluid (AF) as early as the tenth week of gestation. However, little is known about the antioxidative enzymes in AF, which is the first fluid to enter the gastrointestinal tract. The main purpose of the present study was to evaluate MT and SOD status in AF during fetal period.

AF samples from 76 pregnant women (Median gestational age (GA) (min.-max.), 38.0 Weeks (14.3-40.1)) were obtained during an amniocentesis or an elective caesarean section. Immediately postnatal, blood samples were collected from the umbilical vein (n=53). According to gestational age (GA), the samples were divided into three groups: Group 1 (n=15), samples obtained before 28.0 weeks of gestation, Group 2 (n=12), samples obtained between 28.0 and 36.9 weeks of gestation, and Group 3 (n=49), samples obtained after 37.0 weeks of gestation.

GA, melatonin concentration (MTc) and SOD concentration (SODc) of the newborns enrolled in the study are shown in Table 1. MTc in AF was found positive correlated with GA (Pearson correlation’s coefficient, r= 0.282, p<0.014), while SODc was not correlated with GA (R=-0.103, p=0.378). Compared to serum samples, MTc was statistically significant higher in AF (11.2 pg/ml (6.1-20.7) vs. 58.4 pg/ml (14.7-135.5), p<0.001). SODc was not statistically significant different between serum and AF (88 ng/ml (69-131) vs. 77 ng/ml (51-94), p=0.090). Neither MTc nor SODc in AF was significantly correlated with their concentrations in serum (p=0.810 and p=0.799, respectively).

Our results indicated that the gastrointestinal system of fetus is continuously exposed to MT and SOD throughout its prenatal development. Further studies are needed to show whether the deficit of MT and SOD due to premature birth influences the development of the gastrointestinal tract and increases the risk for development of necrotizing enterocolitis in preterm infants.

**IMAGES:**

https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=67d12c2c0d6a1327e58a3dc83c1a0a13-MjAxOS0wNSM1Y2UyNjY2Y2RiMDNl

**Table 1.** Melatonin, and SOD concentrations in the amniotic fluid during pregnancy

**COI:** No
ID: 763
TITLE: FETAL DEPRIVATION SEQUENCE
AUTHORS: Nicola Mullins 1; Catherine Harrison 2; Simon Newell 2
AFFILIATIONS: 1 Neonatal Department, Hull University Teaching Hospitals NHS Trust, Hull, UK
2 Neonatal Department, Leeds Teaching Hospitals NHS Trust, Leeds, UK

CONTENT:

Intrauterine Growth Restriction (IUGR) as a consequence of substrate deficiency has many detrimental effects on the fetus. These effects present with a constellation of symptoms including thrombocytopenia, persistent lactic acidosis, hypoglycaemia, coagulopathy, renal and hepatic failure. However, this clinical presentation has not been formally classified making diagnosis challenging.

Aims:
1. To describe the detailed clinical sequelae of placental insufficiency.
2. To define a diagnostic classification for the proposed term “fetal deprivation”.
3. To aid correct diagnosis of fetal deprivation sequence (FDS) and enable a streamlined investigative and diagnostic approach.

Over a two-year period, on a large tertiary neonatal unit, seven cases of infants with multi-organ failure in the absence of an acute asphyxial event at the time of birth were reviewed. A review of the clinical notes and Badger database was utilised for data collection. A systems based approach was adopted. Maternal and obstetric history was reviewed in conjunction with birth history and the clinical features identified in the affected neonates. Placental histology and outcome was also incorporated in the review. Findings were then tabulated to identify common features.

The case review has identified common features of FDS. All cases were growth restricted and had reduced fetal movement reported. Lactate significantly elevated in all cases and if normalised achieved by day 4-6. All required 15% Dextrose or more to maintain normoglycaemia. All had platelets <30 and resistant to platelet transfusion. 6/7 cases required ventilator support but for <48 hours. 6/7 had deranged clotting remaining until day 7 of life. 5/7 required inotropic support due to cardiac dysfunction. 5/7 had renal dysfunction and 5/7 babies died.

The authors suggest that to fulfil a diagnosis of FDS all of the major criteria should be present with minor criteria strengthening the diagnosis. The suggested diagnostic criterions are proposed in figure 1. A detailed literature review has identified pathophysiological explanations for these criteria.

Our review shows that babies affected by FDS have multi-organ failure with relative “brain sparing” due to fetal substrate deprivation. Since collating this data, we have recognised the pattern of FDS in over 20 more term babies all fulfilling the criteria suggested for this diagnosis. This has helped rationalise investigations and management and enabled a thorough approach to follow-up including postnatal counselling for families.

IMAGES:
https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=13119e61946e5b7bd2e9e08834c187fc-MjAxOS0wNSM1Y2UyNyNjY2Y2RmMjM0

Figure 1 – Proposed criteria for diagnosing Fetal Deprivation Sequence

COI: None declared
ID: 768

**TITLE:** MIDWIFERY OR MEDICAL CLINICAL LEADER TO IMPLEMENT A NATIONAL GUIDELINE IN BABIES ON POSTNATAL WARDS (DESIGN): A CLUSTER-RANDOMISED, BLINDED, CONTROLLED, TRIAL.

**AUTHORS:** Jane Alsweiler 1  
Caroline Crowther 2  
Jane Harding 2

**AFFILIATIONS:**  
1 Department of Paediatrics: Child and Youth Health, University of Auckland, Auckland, New Zealand  
2 Liggins Institute, University of Auckland, Auckland, New Zealand

**CONTENT:**

Neonatal hypoglycaemia is a common condition associated with developmental delay. Treatment of neonatal hypoglycaemia with oral dextrose gel has been shown to reverse hypoglycaemia and reduce admissions to intensive care unit for hypoglycaemia. A clinical practice guideline was written to guide the use of dextrose gel to treat neonatal hypoglycaemia in New Zealand. However, it is unclear what clinical discipline might most effectively lead the implementation. Our aim was to determine if midwives or medical clinical leaders are more effective at implementing a clinical practice guideline for oral dextrose gel to treat neonatal hypoglycaemia in babies on postnatal wards.

A cluster-randomised, blinded, controlled, trial. NZ maternity hospitals that care for babies born at risk of neonatal hypoglycaemia were randomised to having a local midwife or doctor lead the guideline implementation at that hospital. Randomisation was stratified by prior use of dextrose gel and by level of care of the maternity unit. Audits of dextrose gel use were done before, and three and six months after, implementation of the guideline. The primary outcome was the change in the proportion of eligible hypoglycaemic babies (blood glucose concentration <2.6 mmol/L, diagnosed in the first 48 hours after birth), treated with dextrose gel from before implementation to three months after implementation. Data were analysed by linear regression adjusted for the stratification variables.

Twenty four eligible maternity hospitals in New Zealand consented to participate, 15 hospitals had eligible babies at both time points for the primary outcome (7 randomised to midwifery led, 8 randomised to medical led implementation). 463 eligible hypoglycaemic babies were included in the analysis (292 midwifery led, 171 medical led implementation). There was an increase in eligible babies treated with oral dextrose gel from before implementation of the guideline to 3 months after implementation (122/153(80%) v 144/163(88%), OR(95%CI); 3.42(1.67-6.98), p<0.001). There was no difference in the primary outcome between hospitals randomised to midwifery or medical led implementation (percentage treated with gel, mean(SD); midwifery led: before 70(38), after 87(12); medical led: before 63(43), after 86(16); adjusted change in proportion (mean difference(95%CI); 19.3(-4.4-43.0), p=0.11)).

Implementation of a clinical practice guideline increased the use of oral dextrose gel to treat neonatal hypoglycaemia. Midwives and medical clinical leaders were equally effective at implementing this guideline for treatment of babies on the postnatal ward.

**COI:** None declared
ID: 906

**TITLE:** ASSOCIATION OF BRONCHOPULMONARY DYSPLASIA (BPD) WITH FEEDING INITIATION AND ADVANCEMENT

**AUTHORS:** Lance Wyble 1; Maushumi Assad 2

**AFFILIATIONS:** 1 Morton Plant Hospital, University of South Florida, Morsani College of Medicine, Tampa, FL, USA
2 Boston Children's Hospital, Boston, MA, USA

**CONTENT:**

Breastfeeding and the use of human milk are the standards for the feeding of newborn infants. The use of donor milk (DM), when Mother’s Own Milk (MOM) is unavailable, is recommended for preterm infants (AAP and WHO). The Exclusive Human Milk Diet (EHMD) (MOM or DM, fortified with human milk based fortifiers) has been associated with decreases in mortality and morbidity in Very Low Birthweight Infants (VLBW) (Sullivan, 2010; Hair, 2015; Assad, 2015; O’Connor, 2018) as well as improvements in feeding tolerance. Specifically, decreased incidence of BPD has been associated with EHMD. We report a novel association of earlier, rapid EHMD feeding with a lower incidence of BPD.

Post hoc analysis of raw data from three recent publications (Sullivan, 2007; Hair, 2014; Assad, 2015). VLBW infants received very early BM feedings and also EHM, and so an was performed in an attempt to describe the possible association with BPD. Day of 1st feeding and age at full feeding (150ml/kg/d) were the primary variables of investigation. Data analysis consisted of Wilcoxon rank-sum tests for unadjusted comparisons between the BPD and non-BPD groups and multivariate logistic regression for adjusted comparisons.

In the Sullivan, 2007 trial, delay in first enteral feed and increased days to full feeds were both related to the development of BPD. This effect was not seen in the cow milk fed group. In the retrospective Assad study, infants were started on feeds earlier than in Sullivan. This post hoc analysis showed a significant association between feeding and BPD in both the EHMD and bovine groups with increased time to full feeds. In the Hair, 2014, all infants received EHMD, but there was a significant decrease in days on TPN in infants without BPD. This can arguably be a surrogate marker for days to full feeds. A logistic regression model relating BPD to day of 1st feeding or age at full feeding on data from Sullivan, 2007 revealed a 9.9% increase in the odds of developing BPD for every day longer to first feed and a 5% increase for every day longer to full feeds.

There is an association of early enteral feeding and fairly rapid advancement to full feeds and a decreased incidence of BPD. Exclusive human milk intake may enhance to that effect.

**COI:** None declared
ID: 947

**TITLE:** PROTECTION OF THE FETAL GUT AGAINST UREAPLASMA-INDUCED CHORIOAMNIONITIS: A POTENTIAL ROLE FOR PLANT STEROLS

**AUTHORS:** Charlotte van Gorp 1,†, Ilse H. de Lange 1,2,†, Owen B. Spiller 3, Frédéric Dewez 4, Berta Cillero Pastor 4, Ron M. A. Heeren 4, Lilian Kessels 1, Nico Kloosterboer 1, Wim G. van Gemert 2, Michael L. Beeton 5, Sarah J. Stock 6, Alan H. Jobe 7, Matthew S. P

**AFFILIATIONS:**
1. Department of Pediatrics, School of Oncology and Developmental Biology (GROW), Maastricht University, 6202 AZ Maastricht, The Netherlands
2. Department of Surgery, School for Nutrition, Toxicology and Metabolism (NUTRIM), Maastricht University, 6202 AZ Maastricht, The Netherlands
3. Cardiff University, School of Medicine, Cardiff CF10 3AT, UK Institute of Molecular and Experimental Medicine, Cardiff University School of Medicine, Edinburgh, UK
4. Maastricht Multimodal Molecular Imaging Institute (M4I), Maastricht University, 6202 AZ Maastricht, The Netherlands
5. Cardiff School of Health Sciences, Cardiff Metropolitan University, Cardiff CF14 4XN, UK
6. MRC Centre for Reproductive Health, Queen’s Medical Research Institute, University of Edinburgh, Edinburgh EH16 4TJ, UK
7. Division of Neonatology/Pulmonary Biology, The Perinatal Institute, Cincinnati Children’s Hospital Medical Center, University of Cincinnati, Cincinnati, OH 45229, USA
8. Division of Obstetrics and Gynecology, School of Medicine, The University of Western Australia, Crawley, Australia
9. School of Women’s and Infant’s Health, The University of Western Australia, Crawley WA 6009, Australia
10. Department of Nutrition and Movement Sciences, School for Nutrition and Translational Research in Metabolism (NUTRIM), Maastricht University, 6202 AZ Maastricht, The Netherlands

*Correspondence: tim.wolfs@maastrichtuniversity.nl; Tel.: +31-(0)-43-388-2228
† These authors contributed equally to this work

**CONTENT:**

Chorioamnionitis, clinically most frequently associated with Ureaplasma, is linked to intestinal inflammation and subsequent gut injury. No treatment is available to prevent chorioamnionitis-driven adverse intestinal outcomes. Evidence is increasing that plant sterols possess immune-modulatory properties. Therefore, we investigated the potential therapeutic effects of plant sterols in lambs intra-amniotically (IA) exposed to Ureaplasma.

Fetal lambs were IA exposed to Ureaplasma parvum (UP) for six days from 127 d – 133 d of gestational age (GA). The plant sterols β-sitosterol and campesterol, dissolved with β-cyclodextrin (carrier), were given IA every two days from 122 d – 131 d GA. Fetal circulatory cytokine levels, gut inflammation, intestinal injury, enterocyte maturation, and mucosal phospholipid and bile acid profiles were measured at 133 d GA (term 150 d).

IA plant sterol administration blocked a fetal inflammatory response syndrome. Plant sterols reduced intestinal accumulation of proinflammatory phospholipids and tended to prevent mucosal myeloperoxidase-positive (MPO)+ cell influx, indicating an inhibition of gut inflammation. IA administration of plant sterols and carrier diminished intestinal mucosal damage, stimulated maturation of the immature epithelium, and partially prevented U. parvum-driven reduction of mucosal bile acids.

In conclusion, we show that β-sitosterol and campesterol administration protected the fetus against adverse gut outcomes following UP-driven chorioamnionitis by preventing intestinal and systemic inflammation.
COI: None declared