Neonatal Society Autumn Meeting, 19 November 2026
Royal College of Obstetricians and Gynaecologists, 10 -18 Union Street, London, SE1 1SZ
Meeting Virtual Link: To be emailed to delegates on 18th November 2026

Session 1
09:15. Jo Craddock
Physical and psychological health perceptions and experiences of adults born preterm: a systematic review

09:30. Amy Bancroft
Amniotic fluid cotinine is associated with maternal nicotine-use intensity across smoking and vaping: implications for fetal exposure stratification

09:45. Arlan Abzhanov
Data driven congenital phenotyping identifies distinct neonatal risk groups in tracheo-oesophageal fistula/oesophageal atresia (TOF/OA)

10:00. Aine Fox
Improving neonatal patient safety and reducing harm through team working- phase 1

10:15. Morning tea/coffee break (30 minutes)

Session 2
10:45. Tessel Bazelmans
Neurophysiological responses in neonates vary by both intensity and repetition of somatosensory stimulation

11:00. Chun-Yi Kang
Sleep spindle features on EEG in infants with hypoxic-ischaemic encephalopathy at three months

11:15. Alix Danis
Visual assessment of neonatal heart rate variability and sleep cycling in term infants

11:30. **Keynote Lecture**
Professor Ed Juszczak, Professor of Clinical Trials and Statistics, University of Nottingham. 'Getting to the truth - why trial design matters'.

12:30. Lunch Break (30 min)

13:00. **Annual General Meeting for Members of the Neonatal Society** (60 min)

Session 3
14:00. Joshua Steed
Is the longitudinal analysis of arginine metabolism in preterm infants with necrotising enterocolitis using residual blood volumes possible?

14:15. Miri Taneichi
Long-term respiratory consequences of preterm birth

14:30. T’ng Chang Kwok
Predicting ventilator dependence risk in preterm infants using a machine learning respiratory trajectory prediction tool (prem-vent-predict)

14:45. Sharmila Vasudevan
From bench to bedside safety testing: establishing protocol for safe use of ultra low field point-of-care MRI in neonatal intensive care

15:00
The Widdowson lecture
Professor Per Torp Sangild, Professor of Comparative Pediatrics, University of Copenhagen. ‘Comparative Perinatology, Hope and the first Human Existence'.

16:00. Afternoon tea/coffee break (30 minutes)

Session 4
16:30. George Maple
Intranasal umbilical cord-derived mesenchymal stromal cells administered during and after hypothermia augment brain protection compared to therapeutic hypothermia alone in a piglet model of hypoxic-ischaemic encephalopathy

16:45. Simran Bhatia
Thalamic [NAA] predicts adverse neurodevelopmental outcomes after mild hypoxic-ischaemic encephalopathy

17:00. Ashwini Thayyil
Neurodevelopmental outcome assessments after early erythropoietin monotherapy for hypoxic ischaemic encephalopathy: a pilot randomised controlled trial

17.15. Siqi Li
Treadmill exercise-mediated adiponectin signalling rescues medial prefrontal circuit dysfunction and social memory deficits in offspring subjected to maternal immune activation

17:30. Sumit Thakur
Neonatal chylothorax: management strategies, treatment response and outcomes from a 10-year tertiary neonatal experience

17:45. Drinks Reception

Title (Upper case)

PHYSICAL AND PSYCHOLOGICAL HEALTH PERCEPTIONS AND EXPERIENCES OF ADULTS BORN PRETERM: A SYSTEMATIC REVIEW

Authors *(Presenting author underlined. If no author is a Society member, please provide the name of the member introducing the author to the Society)*

Jo Craddock, Annemarie Lodder, Diana Varaden.

Corresponding author e-mail address:	Jo.craddock25@imperial.ac.uk

Institution(s)

Imperial College London

Introduction ***(include hypothesis)***

Adults born preterm have increased risks of physical and psychological health difficulties compared with those born at term, although outcomes vary considerably [1, 2]. Longitudinal studies have advanced our understanding of long-term health outcomes [1], but these findings do not necessarily explain how individuals experience their health. This review aimed to synthesise qualitative evidence on how adults born preterm experience and perceive their physical and psychological health, and support needs.

Methods (*include source of funding and ethical approval if required)*

We conducted a systematic review using Thomas and Harden's thematic synthesis approach. Studies reporting qualitative findings from adults aged ≥18 years born before 37 weeks' gestation were eligible. Following systematic searches of five databases, 4,262 records were screened and 20 full texts assessed. Study findings were coded line by line and developed into descriptive and analytical themes. Ethics: ICREC 7862395.

Results

Twelve studies (2011–2026) from seven high-income countries were included. Three analytical themes were developed: **1. The meaning of preterm birth can change across the life course. 2. Everyday demands can create strain across different parts of life. 3. The value of support depends on how needs are understood and addressed.** The significance of preterm birth varied between adults and could change through later experiences. Some remained uncertain whether health difficulties were linked to prematurity, and adults' understanding of their health could differ from that of family members or healthcare professionals. Some reported few difficulties; others described considerable effort, exhaustion and competing demands in managing everyday life. Support could encourage independence or leave individuals feeling different or restricted. In healthcare, some adults struggled to obtain relevant advice. Adults wanted knowledgeable, individualised healthcare advice, and opportunities to connect with others born preterm.

Conclusions

Adults born preterm described diverse health experiences. Achievements and independence did not necessarily reveal the effort involved in everyday life or the support needed. Their perspectives offer insights beyond clinical outcomes and may inform long-term follow-up and research attentive to how health experiences and support needs may change across adulthood.

References ***(include acknowledgement here if appropriate)***

1) Crump C. An overview of adult health outcomes after preterm birth. Early Hum Dev. 2020;150:105187 2) Raju TNK, Buist AS, Blaisdell CJ, Moxey-Mims M, Saigal S. Adults born preterm: a review of general health and system-specific outcomes. Acta Paediatr. 2017;106(9):1409-37. We thank Lauren Ingledow, Adult Preemie Advocacy Network, for contributing to discussions and interpretation of the analytical themes. The first author is in receipt of PhD studentship funded by NIHR BRC Imperial

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Sabita Uthaya

Title (Upper case)

AMNIOTIC FLUID COTININE IS ASSOCIATED WITH MATERNAL NICOTINE-USE INTENSITY ACROSS SMOKING AND VAPING: IMPLICATIONS FOR FETAL EXPOSURE STRATIFICATION

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

[1]Amy Bancroft, [2]Prajwal Shetty, [3]Jake Lain, [2]Patricia Acuna, [4]Brian Keevil, [5]Yulia Berkun, [1]Artur Abelian

Corresponding author e-mail address: Dr Artur Abelian. artur.abelian@wales.nhs.uk

Institution(s)

[1]Department of Paediatrics and [2]Department of Obstetrics and Gynaecology, Maelor Hospital, Wrexham, UK, [3]NIHR Centre for Precision Approaches to Combating Antimicrobial Resistance, Wythenshawe, UK, [4]Clinical Biochemistry, Wythenshawe Hospital, Manchester, UK, [5]Pathology Laboratory, Maelor Hospital, Wrexham, UK.

Introduction *(include hypothesis)*

Routine antenatal surveillance records smoking status through self-report and, where available, carbon monoxide monitoring, but does not provide a quantitative, product-inclusive measure of nicotine-use intensity, an important determinant of fetal risk. We examined whether amniotic fluid (AF) cotinine at term was associated with maternally reported nicotine-use intensity across smoking and vaping, and whether it discriminated maternally reported heavy use.

Methods (*include source of funding and ethical approval if required)*

In a single-centre pilot at term (≥37^{+0} weeks), nicotine use was ascertained by structured, interviewer-administered questionnaire and categorised as none, light, moderate or heavy using daily cigarette-equivalents. AF was collected during routine care and cotinine quantified by liquid chromatography–tandem mass spectrometry, with the bioanalytical laboratory blinded to interview data. Ordered-group association was assessed using Spearman's ρ and discrimination of heavy use using the AUC.

Results

Among 34 participants, AF cotinine ranged from <10 to 306.8 ng/mL and showed a strong graded increase across nicotine-use categories Spearman's ρ=0.84 (95% CI 0.69–0.94), p<0.001, encompassing smoking and vaping (Figure). AF cotinine discriminated maternally reported heavy use, with an AUC of 0.92 versus all other participants and 0.88 versus light/moderate users. Results were similar in a sensitivity analysis excluding two exposure-discordant samples.

Conclusions

These findings support AF cotinine as a fetal-compartment marker for stratifying fetal nicotine exposure across smoking and vaping. Interpretation is limited by the small sample and use of maternally reported exposure as the reference standard. If externally validated and linked to infant outcomes, AF cotinine could contribute to exposure-informed risk stratification and targeting of early-years support.

References *(include acknowledgement here if appropriate)*

We are indebted to the study participants for their willingness to be interviewed and to provide AF samples, and to the midwives and staff of the obstetric theatre at Wrexham Maelor Hospital for their assistance with AF collection.

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Dr Artur Abelian (NNS member)

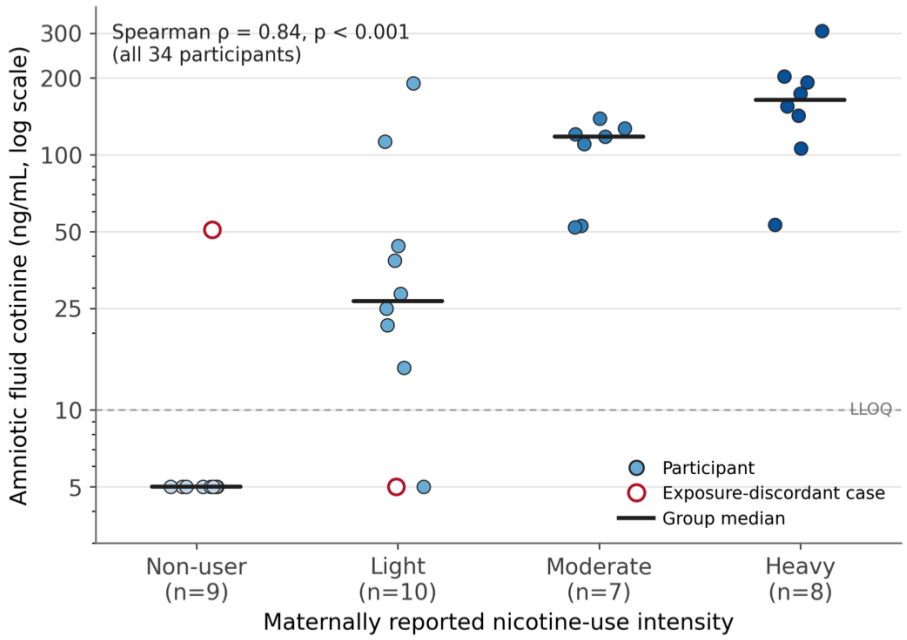


Figure. Amniotic fluid cotinine across categories of maternally reported nicotine-use intensity. Each point represents one participant's amniotic fluid (AF) cotinine concentration (ng/mL), plotted on a logarithmic scale and grouped by maternally reported nicotine-use intensity. Points are jittered horizontally to reduce overplotting; horizontal bars denote group medians. The dashed line marks the lower limit of quantitation (LLOQ, 10 ng/mL); values below the LLOQ were assigned 5 ng/mL. Open red markers indicate the two exposure-discordant cases. Group sizes are shown on the horizontal axis.

Title (Upper case)

DATA DRIVEN CONGENITAL PHENOTYPING IDENTIFIES DISTINCT NEONATAL RISK GROUPS IN TRACHEO-OESOPHAGEAL FISTULA/OESOPHAGEAL ATRESIA (TOF/OA)

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

AA Abzhanov[1,2], S Haider[1], C Gale[1], S Uthaya[1], C Battersby[1]

Corresponding author e-mail address: zcakabz@ucl.ac.uk, aa5725@ic.ac.uk

Institution(s)

[1] Neonatal Medicine, School of Public Health, Faculty of Medicine, Imperial College London, UK
[2] Infection, Inflammation & Immunity Dept, UCL GOS Institute of Child Health, University College London, UK

Introduction *(include hypothesis)*

Tracheo-oesophageal fistula and oesophageal atresia (TOF/OA) are rare congenital abnormalities with substantial heterogeneity in associated anomalies not fully captured by oesophageal anatomy or conventional classifications. We hypothesised that patterns of co-occurring congenital anomalies could be captured by unsupervised data-driven phenotyping, and that these phenotypes would be associated with distinct neonatal outcomes and provide prognostic information beyond established baseline factors.

Methods (*include source of funding and ethical approval if required)*

We analysed data from the National Neonatal Research Database for 2,437 infants with TOF/OA born in England and Wales between 2007 and 2023. Congenital anomalies were mapped to ICD-10 blocks that group diagnoses by organ system. Unsupervised phenotypes were derived using Jaccard-distance partitioning around medoids (PAM) and latent class analysis (LCA). Outcomes were in-hospital mortality and neonatal length of stay. Associations with these outcomes were assessed using adjusted regression models. Predictive performance was compared across conventional regression, Elastic Net regression and Random Forest models, and evaluated using repeated cross-validation. Ethical approval for use of de-identified NNRD data without consent was granted through the neoWonder study (East Midlands-Leicester South Research Ethics Committee, 21/EM/0130).

Results

PAM identified three phenotypes: fewer (associated) anomalies (n=1,135, 46.6%), cardiac (n=639, 26.2%) and multisystem (n=663, 27.2%) (Figures 1a, 1c). LCA identified four phenotypes: fewer (associated) anomalies (n=1,808, 74.2%), cardiac (n=307, 12.6%), multisystem (n=246, 10.1%) and craniofacial (n=76, 3.1%) (Figures 1b, 1c). Compared with fewer-anomalies phenotypes, cardiac phenotypes had the higher mortality, while multisystem and craniofacial phenotypes had longer stays (Figure 2). These associations persisted after adjustment for baseline characteristics. Including information on associated congenital anomalies improved predictive performance, with models incorporating ICD-10 blocks plus VACTERL performing best. Phenotype-based models retained substantial prognostic information in a simpler representation (Figure 3).

Conclusions

Data-driven unsupervised phenotyping identified distinct patterns of congenital anomalies associated with neonatal outcomes. These phenotypes provided a clinically interpretable summary of congenital complexity with potential utility for prognostic counselling and case-mix adjustment.

References *(include acknowledgement here if appropriate)*

van Blankenstein, E., Aveline, A. & Battersby, C. A protocol for neoWONDER: Neonatal whole population data linkage to improve long-term health and wellbeing of preterm and sick babies. *PLoS One* **19**, e0305113. (2024)

Check box if presenting author is a trainee: **basic science trainee** ☒ **clinical trainee** ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Dr Cheryl Battersby

Figure 1: Congenital phenotype characteristics. Congenital phenotype profiles derived using PAM and LCA. **(a)** Difference in prevalence of congenital anomalies in each ICD-10 block versus their prevalence in the full cohort (in percentage points). **(b)** LCA-estimated conditional probabilities of each ICD-block within each phenotype. **(c)** Correspondence between PAM and LCA phenotype assignments.

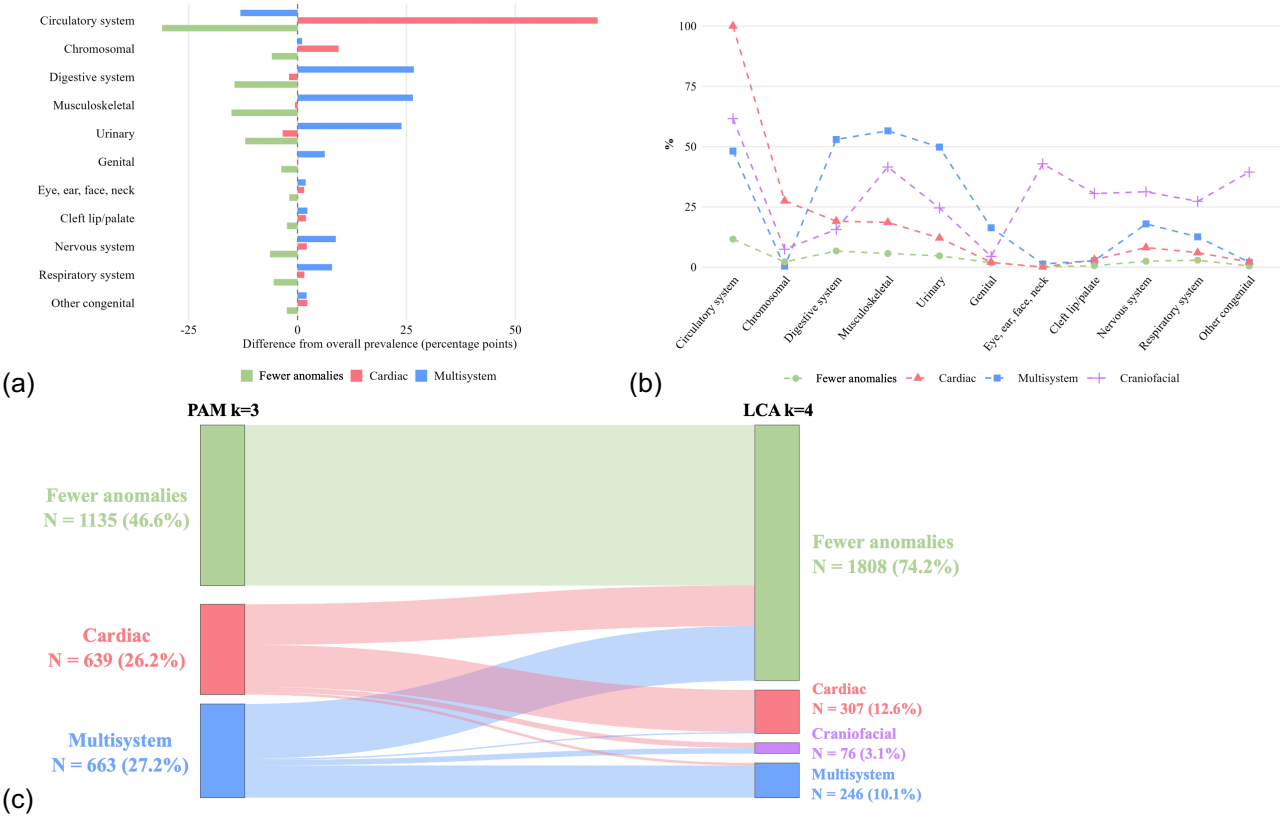


Figure 2: Associations between congenital phenotypes and neonatal outcomes. Adjusted effect estimates with 95% confidence intervals; fewer anomalies is the reference phenotype.

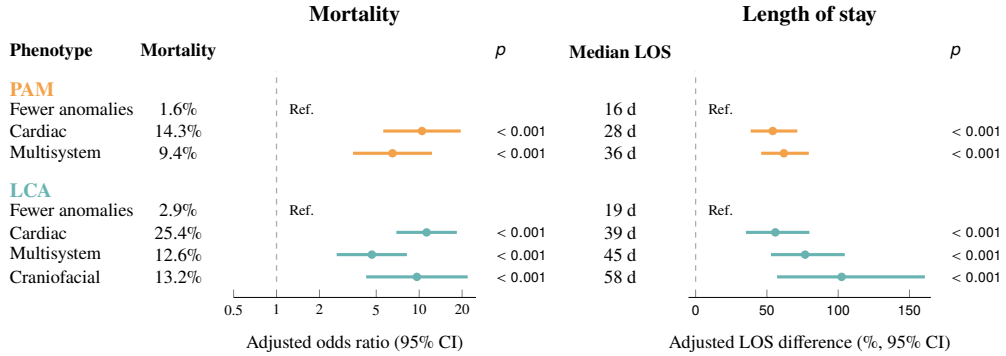
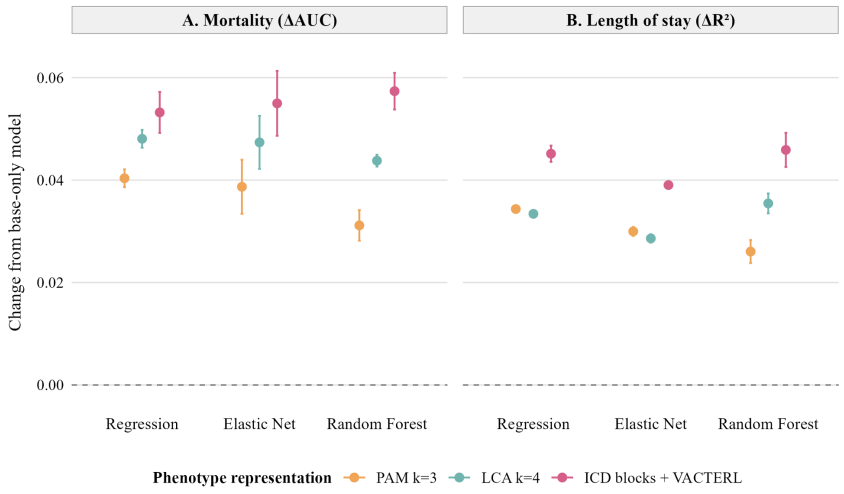


Figure 3: Incremental predictive performance from adding congenital information to baseline models. Change in cross-validated **(a)** AUC for mortality or **(b)** R^2 for length of stay after adding PAM phenotypes, LCA phenotypes or all ICD-10 blocks plus VACTERL. Points show mean change in predictive performance across 5 cross-validation repeats, error bars show ±1 SD.



Title

IMPROVING NEONATAL PATIENT SAFETY AND REDUCING HARM THROUGH TEAM WORKING- PHASE 1

Authors (Cora Doherty, senior author, is a Neonatal Society Member)

Aine Fox[1,2], Mairead Thompson[1], Keith Iradon[1], Maryam Bano[1], Ann Hickey[1,2], Margaret Moran[1,2], Mahmoud Farhan[1,2], Cora Doherty[1,2]

Corresponding author e-mail address: Aine.fox22@gmail.com

Institution(s)

1 Department of Neonatology, Children's Health Ireland, Dublin; 2 Royal College of Physicians Ireland, Dublin

Introduction

Rates of adverse events in neonates are higher than most other patient groups and increase with complexity of care. Teamwork and communication have been shown to improve patient safety. Children's Health Ireland is a national referral centre providing complex quaternary neonatal care across 2 hospital sites with plans to merge into a single site National Children's Hospital. Integrating departments, new working relationships, aligning

Methods

Assessment of safety events was evaluated through **1**. Assessment of multidisciplinary team (MDT) voluntary reporting through the formal incident/near miss reports from the National Incident Management System (NIMS) over a 6-month period (Nov 2025-April 2026) across two neonatal High Dependency Units (HDUs) **2.** Targeted deep dive review of notes to collect adverse events/near misses over a 4-week epoch during the same period, utilising a modified Institute for Healthcare Improvement (IHI) Neonatal Global trigger tool to identify events. **3.** Staff were invited to complete a modified SAFE psychological safety survey to understand attitudes to safety.

Results

NIMS identified 135 safety incidents over six months: 34 (25%) medication-related, 26 (19%) transfer-related, 12 (9%) central line-related and 10 (7%) staffing-related. Four-week chart review across both sites identified 257 incidents: 129 (50%) involving temperature regulation, 73 (28%) documentation/reporting errors and 13 (5%) prescription errors. Extrapolation suggests over 1,600 potential incidents in six months, approximately 12 times voluntary reports, assuming a constant event rate rather than a directly measured capture rate. Of 30 psychological safety survey respondents, 93% felt encouraged to report concerns, 83% knew how to report and 100% agreed that patient safety was consistently prioritised

Conclusions

Despite having a strong culture of psychological safety demonstrated by positive survey responses, extrapolated chart-review findings suggest that voluntary reporting captures approximately 10% of incidents; this proportion was not directly measured. A department-specific trigger tool may complement reporting and improve risk assessment. Understanding where and why incidents occur can inform patient safety.

Phase 2 will introduce an MDT safety huddle to improve safety awareness, reporting, and patient care.

References

nil

Check box if presenting author is a trainee: **basic science trainee** ☐ **clinical trainee X**☐

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: yes ☐

Senior author supporting presentation on day of meeting: Cora Doherty

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Title (Upper case)

NEUROPHYSIOLOGICAL RESPONSES IN NEONATES VARY BY BOTH INTENSITY AND REPETITION OF SOMATOSENSORY STIMULATION

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

Dr T Bazelmans, Dr Amy Lawson, Prof Emily Jones, Prof Lorenzo Fabrizi, Dr Judith Meek

Corresponding author e-mail address: Tessel.bazelmans@bbk.ac.uk

Institution(s)

Babylab, Centre of Brain and Cognitive Development, Birkbeck University of London; Medawar, Pain and Somatosensory Labs, Dept of Neuroscience, Physiology and Pharmacology, University College London; Neonatal Unit, Elizabeth Garrett Anderson Wing, UCLH.

Introduction *(include hypothesis)*

The last trimester and first weeks after birth are marked by rapid changes in the somatosensory cortex. Although some evidence shows neurophysiological responses to tactile stimulation[1], it is unknown whether neonates can modulate these responses. We hypothesise that at full-term age, neonates can modulate their neurological response to the stimulus intensity (registration) and suppress their response to repeated stimulation (gating).

Methods (*include source of funding and ethical approval if required)*

Eleven neonates (postmenstrual age (PMA): 37+4 to 41+6) had electroencephalography at the NICU and maternity ward of UCLH. Using a vibrating tactor attached to the inside of the palm, we delivered somatosensory stimulation at high, middle and low intensity (registration: N=11) and a paired-vibration (gating: N=9) paradigm. Amplitude, latency and prominence of the P100 (80-160ms) and N200 (170-250ms) event-related potentials were extracted. Funded by the Medical Research Council, Ethical approval: REC ref: 11/LO/0350.

Results

First, we compared the contralateral (C3/CP3) and ipsilateral (C4/CP4) responses to high-intensity stimulation using a one-sided cluster-based permutation test to test whether the response was larger over the contralateral hemisphere. It was significantly larger at approx. 170–240 ms (cluster p=.044). An earlier stretch at approximately 100–130 ms did not survive correction (cluster p=.140). Next, for the contralateral side we compared the P100 and N200 peak latency, amplitude and prominence (how far a peak stands out from its surroundings) and the P100-N200 amplitude differences. For Registration, P100 prominence differed across intensities (Greenhouse-Geisser RM-ANOVA: F=5.85, p=.020; Holm corrected posthoc t-test: low vs high: p=.075, mid vs high: p=.043; non-parametric Friedman χ^2= 3.45, p=.178). The P100-N200 difference approached significance (F=3.55, p=.055). For Gating, the P100-N200 amplitude difference was smaller to the second, compared to the first vibration (paired t=3.50, p=.013). Other contrasts tested were not significant.

Conclusions

Neonates at 37-42 weeks PMA show a lateralised somatosensory response and some intensity modulation of their P1 response, and can suppress ('gate') their response to repeated stimulation. These findings provide a baseline for studying responses in babies born prematurely and links with sensory behaviours in toddlers.

References *(include acknowledgement here if appropriate)*

1. Whitehead, K., C. et al. The Emergence of Hierarchical Somatosensory Processing in Late Prematurity. *Cerebral Cortex* 29, no. 5 (2019): 2245–60; https://doi.org/10.1093/cercor/bhz030.

Check box if presenting author is a trainee: **basic science trainee** ☐ **clinical trainee** ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Judith Meek

Title (Upper case)

SLEEP SPINDLE FEATURES ON EEG IN INFANTS WITH HYPOXIC-ISCHAEMIC ENCEPHALOPATHY AT THREE MONTHS

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

Chun-Yi Kang[1], Sara Rapuc[1], Ela Chakkarapani.[1,2]

Corresponding author e-mail address: Ela.Chakkarapani@bristol.ac.uk

Institution(s)

1. Centre for Academic Child Health, Bristol Medical School, University of Bristol, Bristol
2. Neonatal Intensive Care Unit, St Michael's Hospital, Bristol

Introduction *(include hypothesis)*

Children treated with therapeutic hypothermia (TH) for hypoxic-ischaemic encephalopathy (HIE) experience cognitive difficulties and microstructural brain injury at school age.[1] Sleep spindles (11-16Hz), reflecting thalamocortical activity involved in memory consolidation,[2] may provide early markers of cognitive outcomes. We hypothesised that infants with HIE would have reduced spindle density compared with healthy controls, and spindle features would be associated with early developmental outcomes and neonatal brain injury.

Methods (*include source of funding and ethical approval if required)*

We prospectively compared spindles in 34 infants who received TH for moderate-to-severe HIE (cases) and 23 healthy controls. Cases were recruited from neonatal intensive care units across South West England and South Wales. Spindles were identified using an automated MATLAB-based detector. Multiple linear regression was used to assess group differences. Simple linear regression was used to explore associations between spindle features and three-month development. Two-sample t-tests were used to explore differences in cases with neonatal brain injury. The study received ethical approval from North West–Preston Research

Results

Spindle density did not differ significantly between cases and controls ($p > 0.05$; Figure 1). Frontal spindle frequency was higher in cases (13.48 ± 0.42 Hz vs 13.30 ± 0.30 Hz; $\beta = 0.24$; $R^2 = 0.061$; 95% CI [0.03 0.46]; $p = 0.026$), although this association did not survive false discovery rate correction. In cases, frontal spindle density was positively associated with fine motor skills ($\beta = 12.82$; $R^2 = 0.15$; 95% CI [1.97 23.67]; $p = 0.022$). Compared with cases without white matter injury, those with injury had shorter spindle duration in both frontal (0.99 ± 0.25 seconds vs 1.23 ± 0.32 seconds; $t(14) = 2.18$; Cohen's $d = 0.91$; $p = 0.047$) and central (0.99 ± 0.16 seconds vs 1.43 ± 0.38 seconds; $t(10) = 3.53$; Cohen's $d = 1.80$; $p = 0.005$) regions. Spindle amplitude was also lower in cases with white matter injury in both frontal (10.53 ± 3.55 μV vs 15.34 ± 3.95 μV; $t(15) = 3.34$, Cohen's $d = 1.32$; $p = 0.004$) and central (13.72 ± 5.02 μV vs 19.41 ± 4.91 μV; $t(17) = 3.06$; Cohen's $d = 1.14$; $p = 0.007$) regions.

Conclusions

Sleep spindles were largely preserved at three months following TH for HIE. However, white matter injury was associated with altered spindle features, and frontal spindle density correlated with fine motor development. Long-term follow-up is needed to assess predictive value of spindle features for neurodevelopmental outcomes.

References *(include acknowledgement here if appropriate)*

1. Chakkarapani et al. *Pediatric Research.* 2025 Dec;98(7):2444-2458.
2. Clemens et al. *Neuroscience*. 2005 Jan;132(2):529–35.

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee v

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: v

Senior author supporting presentation on day of meeting: Ela Chakkarapani

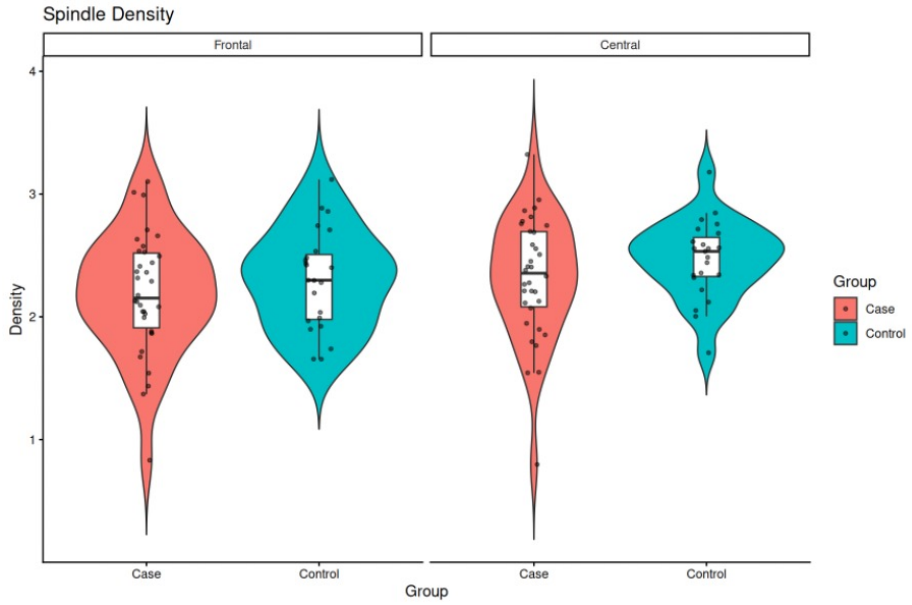


Figure 1. Spindle density did not differ significantly between cases and controls.

Title (Upper case)

VISUAL ASSESSMENT OF NEONATAL HEART RATE VARIABILITY AND SLEEP CYCLING IN TERM INFANTS

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

Alix Danis[1], David Wertheim[2], Anup C Kage[1,3], Galateia Papastergiou[4], Ivone Lancoma-Malcolm[3], Caroline Francia[3], Susana Pereira[5] and Divyen K Shah[1,3] .

Corresponding author e-mail address: D.Wertheim@kingston.ac.uk

Institution(s)

[1]Barts and the London School of Medicine and Dentistry, Queen Mary University of London, London, [2]School of Computer Science & Maths, Kingston University, Surrey, [3]Neonatal Intensive Care Unit, [4]Neuroradiology and [5]Fetal Medicine Unit, Royal London Hospital, Barts Health NHS Trust, London, UK.

Introduction *(include hypothesis)*

Heart rate variability (HRV) is considered a non-invasive marker of autonomic function[1]. We have developed a straightforward, visually interpretable method for assessing neonatal HRV by plotting, in segments of 30 minutes, heart rate (HR) in an upper panel together with respiration trace in a lower panel; the HR display is analogous to that of fetal heart rate in cardiotocograph (CTG) recordings. In this study we investigated HRV cycling[2] in neonates with and without sleep cycling on aEEG traces.

Methods (*include source of funding and ethical approval if required)*

aEEG together with ECG and respiratory traces were monitored as part of clinical care in newborn infants at risk of seizures and data recorded subject to parental consent at the Royal London Hospital (Funding: Barts Charity, Ethics approval REC reference 20/PR/0969). Our custom software developed with MATLAB (The MathWorks Inc., USA), calculates and displays beat-to-beat heart rate (HR) from ECG traces. HR patterns in epochs of 30 minutes were compared with sleep state deduced from aEEG recordings. Shorter sections were enlarged to compare heart rate with respiration.

Results

From recordings on 27 infants, 17 had periods with clear sleep–wake cycling (SWC) on aEEG with median (range) gestational ages of 40 (37–42) weeks; 10 infants without clear SWC had median (range) gestational ages of 38 (36–42) weeks. Corresponding HRV cycling was observed in 16 of the 17 infants with established aEEG SWC. Infants without clear aEEG SWC mostly had abnormal aEEG background activity and generally associated with reduced HRV without clear cycling. Expanded HR trace sections during quiet sleep revealed heart rate fluctuations could be synchronous with respiration, consistent with respiratory sinus arrhythmia.

Conclusions

Our CTG-style display of heart rate demonstrated HRV cycling corresponding to aEEG sleep–wake cycling. It enabled visualisation of heart rate and respiratory changes and of respiratory sinus arrhythmia. Combined assessment of heart rate cycling with respiratory traces using our approach is straightforward and may provide additional physiological information to complement neonatal aEEG monitoring.

References *(include acknowledgement here if appropriate)*

1.Vesoulis ZA et al. J Perinatol. 2017 Jun;37(6):679-683.
2.Pereira S et al. J Matern Fetal Neonatal Med 2022;35:7980–7985.

Check box if presenting author is a trainee: **basic science trainee** ☐ **clinical trainee** ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Prof Divyen Shah.

Title (Upper case)

IS THE LONGITUDINAL ANALYSIS OF ARGININE METABOLISM IN PRETERM INFANTS WITH NECROTISING ENTEROCOLITIS USING RESIDUAL BLOOD VOLUMES POSSIBLE?

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

Dr Joshua Stead[1,2], Dr Frances Callaghan[1,2], Dr Keziah Davies[1], Oliver McClurg[2], Miss Rachel Harwood[3], Dr Steven J McWilliam[2,3] Prof Colin Morgan[1]

Corresponding author e-mail address: joshua.stead@nhs.net

Institution(s)

1. Neonatal Intensive Care Unit, Liverpool Women's Hospital, Liverpool, UK, 2. Institute of Life Course and Medical Sciences, University of Liverpool, UK, 3. Alder Hey NHS Foundation Trust, Liverpool, UK,

Introduction *(include hypothesis)*

The current evidence regarding Arginine (ARG) and Asymmetric Di-Methyl Arginine's (ADMA) relationship to the development and severity of Necrotising Enterocolitis (NEC) report only a single measure of ARG and ADMA at birth or at the time of NEC diagnosis (1,2), This means there are no data describing longitudinal physiology during treatment and recovery from NEC. Aim: to measure ARG and ADMA during the treatment and recovery from NEC using residual blood volumes from clinical samples comparing medical and surgical NEC treatment.

Methods (*include source of funding and ethical approval if required)*

A prospective observational, physiological study of 40 infants being treated for NEC. Residual blood volumes from routine clinical tests were analysed by ELISA for arginine and ADMA over 30 days from diagnosis to assess the arginine and ADMA (absolute and as a ratio) in the pre diagnosis, diagnosis, treatment and recovery phase of infants treated for NEC. We will compare those treated medically and surgically. Funded by the Starting Well Research Capacity Programme (Liverpool Neonatal Partnership). Ethical Approval from East Midlands - Leicester Central Research Ethics Committee (IRAS 351465).

Results

The recruitment rate is 93% of the parents approached. 441/807 daily clinical blood samples provided sufficient residual blood volume for ELISA analysis for both ARG and ADMA. Samples from 28 babies have undergone the final laboratory analysis protocol. ELISA has produced reproducible readings in 46.5% and 64.6% of samples for ARG and ADMA respectively. This leads to an ARG/ADMA ratio in 31.5% of analysed samples. Preliminary analysis shows that during the treatment phase of NEC, the average ARG is significantly lower in those treated medically rather than with surgery (Median=87.1 IQR 84.8 v Median=132.8, IQR 114.6, U108, z=0.026, p=0.026). The ARG/ADMA ratio is lower in those treated medically versus surgically, but this is not statistically significant (p=0.301). There is no difference in ADMA between the two groups. Preliminary longitudinal analysis shows that those treated medically may become arginine deficient during the treatment

Conclusions

Longitudinal analysis of ARG/ADMA profile using residual blood volumes is both acceptable to parents and is producing results with consistent trends using ELISA analysis. Preliminary analysis shows there may be a difference in Arginine and the Arg/ADMA ratio between medical and surgically treated infants.

References *(include acknowledgement here if appropriate)*

1. Richir, M.C. *et al.* (2007) "Low plasma concentrations of arginine and asymmetric dimethylarginine in premature infants with necrotizing enterocolitis," *British journal of nutrition*, 97(5), pp. 906–911.
2. Moonen, R.M.J. *et al.* (2010) "The T1405N Carbamoyl Phosphate Synthetase Polymorphism Does Not Affect Plasma Arginine Concentrations in Preterm Infants," *PloS one*, 5(5).

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Prof Colin Morgan

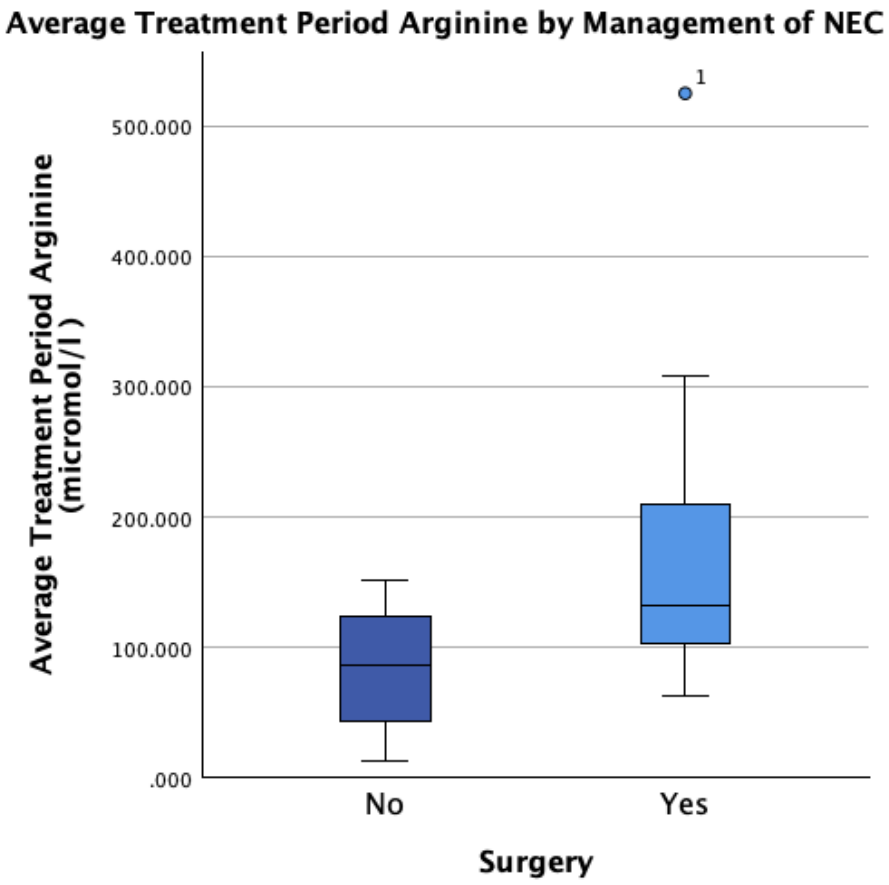


Figure 1: Boxplot of Average Treatment Arginine Levels in Medically and Surgically treated NEC

Title (Upper case)

LONG-TERM RESPIRATORY CONSEQUENCES OF PRETERM BIRTH

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

Miri Taneichi (medical student), Dr Allan Jenkinson, Professor Anne Greenough

Corresponding author e-mail address: allan.jenkinson@nhs.net

Institution(s)

Department of Women and Children's Health, School of Life Course Sciences
Faculty of Life Sciences and Medicine, King's College London

Introduction *(include hypothesis)*

Extremely preterm birth (<28 weeks of gestation) is associated with lasting respiratory consequences[1], including impaired lung function and reduced exercise tolerance. Advances in neonatal care have increased survival after extreme preterm birth, making it important to identify if there are lung function abnormalities in young adulthood and their risk factors. This study aimed to test the hypothesis that young adults born extremely preterm have abnormal lung function compared with term-born controls, characterised by peripheral airway dysfunction identified by the forced oscillation technique (FOT) as well as abnormal spirometric indices. Furthermore, we wished to examine if there were associations between oscillometric and spirometric abnormalities and self-reported respiratory symptoms.

Methods (*include source of funding and ethical approval if required)*

Twenty-six participants aged 23 to 28 years were included: 14 preterm participants born before 29 weeks of gestation, and 12 term-born controls. Participants attended a study visit and underwent FOT and spirometry. Spirometry followed ATS/ERS standards while FOT followed ERS technical standards[2], with reference equations from Quanjer et al.[3] for spirometry and Oostveen et al.[4] for oscillometry. Demographic data were recorded, while self-reported respiratory symptoms and smoking status were obtained by questionnaire. Oscillometric and spirometric outcomes were compared between groups. Correlations between FOT and spirometric parameters were assessed, and multiple linear regression examined whether prematurity predicted lung function outcomes after adjustment for asthma diagnosis and smoking status. The study was approved by the Northwest-Greater Manchester REC, and written informed consent was obtained. Funding: King's Medical Research Trust and King's College Hospital Charity.

Results

Compared with term-born controls, preterm participants had significantly higher area under the reactance curve (AX; 2.35 ± 0.59 vs 1.71 ± 0.74 z-scores, p = 0.024) and resonant frequency (Fres; 23.27 ± 3.69 vs 16.81 ± 4.89 Hz, p = 0.001), suggesting abnormal peripheral airway mechanics. They also had significantly lower FEV_1 (−1.96 ± 1.33 vs −0.10 ± 1.19 z-scores, p = 0.001) and FEV_1/FVC (−2.39 ± 1.22 vs −1.01 ± 0.91 z-scores, p = 0.004), consistent with expiratory airflow limitation. AX was negatively correlated with FEV_1, FEV_1/FVC and FVC, while Fres was negatively correlated with FEV_1 and FEV_1/FVC. Prematurity was a significant predictor of FEV_1, FEV_1/FVC, AX and Fres after adjustment for asthma diagnosis and smoking status. Self-reported respiratory symptoms did not significantly differ between groups.

Conclusions

Young adults from this extremely preterm cohort had abnormalities in peripheral airway mechanics and expiratory airflow limitation, but without increased symptom burden. FOT may provide useful complementary information to spirometry by assessing small-airway mechanics that are not directly assessed by conventional spirometry.

References *(include acknowledgement here if appropriate)*

1. Harris C et al. Pediatr Pulmonol. 2020;55:2289–2295.
2. King GG et al. Eur Respir J. 2020;55:1900753.
3. Quanjer PH et al. Eur Respir J. 2012;40:1324–1343.
4. Oostveen E et al. Eur Respir J. 2013;42:1513–1523

Check box if presenting author is a trainee: **basic science trainee** ☐ **clinical trainee** ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☐**x**

Senior author supporting presentation on day of meeting: Professor Anne Greenough

Title (Upper case)

PREDICTING VENTILATOR DEPENDENCE RISK IN PRETERM INFANTS USING A MACHINE LEARNING RESPIRATORY TRAJECTORY PREDICTION TOOL (PREM-VENT-PREDICT)

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

T'ng Chang Kwok[1]; Victor Applebaum[2]; Kyle Carlton Abesser Wedgwood[2]; Peter Challenor[2]; Chao Chen[3]; Edmund Juszczak[1]; Jonathan Garibaldi[3]; Krasimira Tsaneva-Atanasova[2]; Don Sharkey[1]

Corresponding author e-mail address: Tng.kwok@nottingham.ac.uk

Institution(s)

[1]School of Medicine, University of Nottingham [2]Department of Mathematics and Statistics, University of Exeter [3]School of Computer Science, University of Nottingham

Introduction *(include hypothesis)*

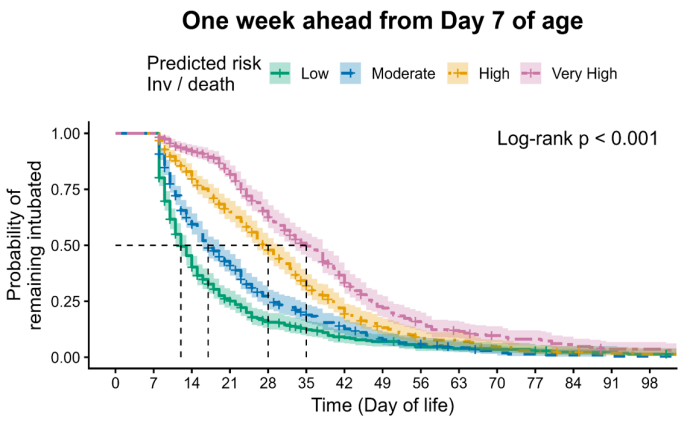
Predicting respiratory trajectories in high-risk infants could support targeted treatment plans including extubation planning and parental consultation. Current prediction tools are static, using clinical condition at a fixed time point to predict outcomes at a set time (e.g. 36 weeks postmenstrual age)[1]. Aim: Develop and validate a dynamic respiratory trajectory prediction tool for predicting respiratory trajectories. Hypothesis: The dynamic respiratory trajectory prediction tool could predict ventilator dependence risk with good model performance.

Methods (*include source of funding and ethical approval if required)*

A dynamic model to predict respiratory states/death daily was developed using Markov chain in a training cohort of 80,154 infants <32 weeks' gestation in England & Wales from 2010-2020. Fourteen static and six daily predictors were used. Discrimination and calibration were assessed in 2021-2022 validation cohort of 13,188 infants. To assess the tool's utility in predicting extubation likelihood, the predicted risks of remaining invasively ventilated or dying in infants who remained ventilated at day 7 of life, were split into risk quartiles. Kaplan-Meier analysis was used to demonstrate the proportion of invasively ventilated infants across the quartiles. Ethical approval was granted by the Sheffield Research Ethics Committee. Study funded by Action Medical Research.

Results

The tool predicted ventilator dependence or death within the next seven and fourteen days with good discrimination (Area Under the Receiver Operating Characteristic curve of 0.90-0.96) and calibration at various time points. 1,732 infants in the 2021-2022 cohort were ventilated in the first week of age. Kaplan-Meier analysis demonstrated a clear, early separation of the probability of remaining ventilated over time across the quartiles of the predicted risk of remaining ventilated or dying within the next seven (**Figure**) and fourteen days (p<0.001). The Prem-Vent-Predict tool is available online (https://premoutcome.shinyapps.io/Respiratory/).



Conclusions

The Prem-Vent-Predict respiratory trajectory prediction tool demonstrates good model performance in predicting ventilator dependence risk in very preterm infants. Further external validation and impact analysis is needed before clinical adoption of the tool in supporting targeted clinical decision making and parental consultation.

References *(include acknowledgement here if appropriate)*

We are grateful to the United Kingdom Neonatal Collaborative, Neonatal Data Analysis Unit and participating units for the PRIOR study. [1] Kwok *et al* Pediatric Research 2023.

Check box if presenting author is a trainee: **basic science trainee** ☐ **clinical trainee** ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Don Sharkey

Title (Upper case)

FROM BENCH TO BEDSIDE SAFETY TESTING: ESTABLISHING PROTOCOL FOR SAFE USE OF ULTRA LOW FIELD POINT-OF-CARE MRI IN NEONATAL INTENSIVE CARE

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

S. Vasudevan, D.Cromb, Y. Collins-Sawaragi, C. A Gregorio, M. Malnor, K. St Clair, W. Norman, C. Fauni, D. West, C. O'Brien, J. Cleary, A. Uus, R. P. A. G. Teixeira, F. Padormo, A. N. Price, K. Colford, S.C.R. Williams, M.A. Rutherford, A. D. Edwards, J. V. Hajnal, T. Arichi, P. Cawley

Corresponding author e-mail address:	Sharmila.vasudevan1@nhs.net

Institution(s)

Early Life Imaging Research Department, King's College London / Department of Neuroimaging, King's College London

Introduction *(include hypothesis)*

Transporting critically ill infants for Magnetic Resonance Imaging (MRI) poses clinical risk. Ultra-low field (ULF) portable MRI may enable "point-of-care" evaluation of neonatal brain injury[1], provided key safety considerations are addressed. These safety constraints are uniquely pertinent to neonatal cohorts, given vulnerability to thermal challenge and acoustic noise. We describe the acoustic, thermal, and equipment assessments that enabled the first documented ULF MRI study within a UK NICU environment and support safe wider implementation.

Methods (*include source of funding and ethical approval if required)*

Local safety evaluation was led by clinicians, radiographers and MRI physicists[2]. Common ICU equipment and patient skin-contact devices underwent four safety assessments: 1) radiofrequency induced heating, 2) acoustic noise testing, 3) magnetic-induced deflection, and 4) bi-directional signal interference between monitoring equipment and the scanner. Tests were conducted on a 64mT Hyperfine Swoop MRI system (Hyperfine, Guildford CT) using water-based phantoms, high-conductivity gels, biological tissue-mimic models, and healthy adult volunteers. Funding sources: UNITY (INV-005798), Rosetrees [PGL24/100023], & MRC [MR/Y009665/1]

Results

Safety testing showed no significant radiofrequency induced heating of skin sensors (**Figure**), magnetic displacement of equipment, and no evidence of bidirectional interference from critical care equipment and the portable MRI system. Noise measurements were <85 dBAeq for all sequences throughout scanning duration. These findings enabled the development of local safety protocols, and procedures, for the first bedside ULF MRI at St. Thomas' Hospital NICU. A complete neonatal neuroimaging protocol (T1w, T2w and diffusion weighted imaging; 1 hour) was successfully performed cotside for a preterm neonate (male infant, born at 23+^{3}, scanned at 43+^{1}), following informed parental consent (REC: 19/LO/1384). The infant was scanned during natural sleep, using a feed-and-wrap approach, with CPAP support, hearing protection, and continuous physiological monitoring utlilising standard bedside monitoring equipment. No adverse clinical events, or device related complications were reported during or after the scans. Observations remained within acceptable limits.

Conclusions

We demonstrated that portable ULF MRI can be performed safely at the bedside in a NICU setting, following extensive safety testing of monitoring equipment and critical care support devices. Development of novel MR safety notations for devices operating within ULF field strengths are required.

References *(include acknowledgement here if appropriate)*

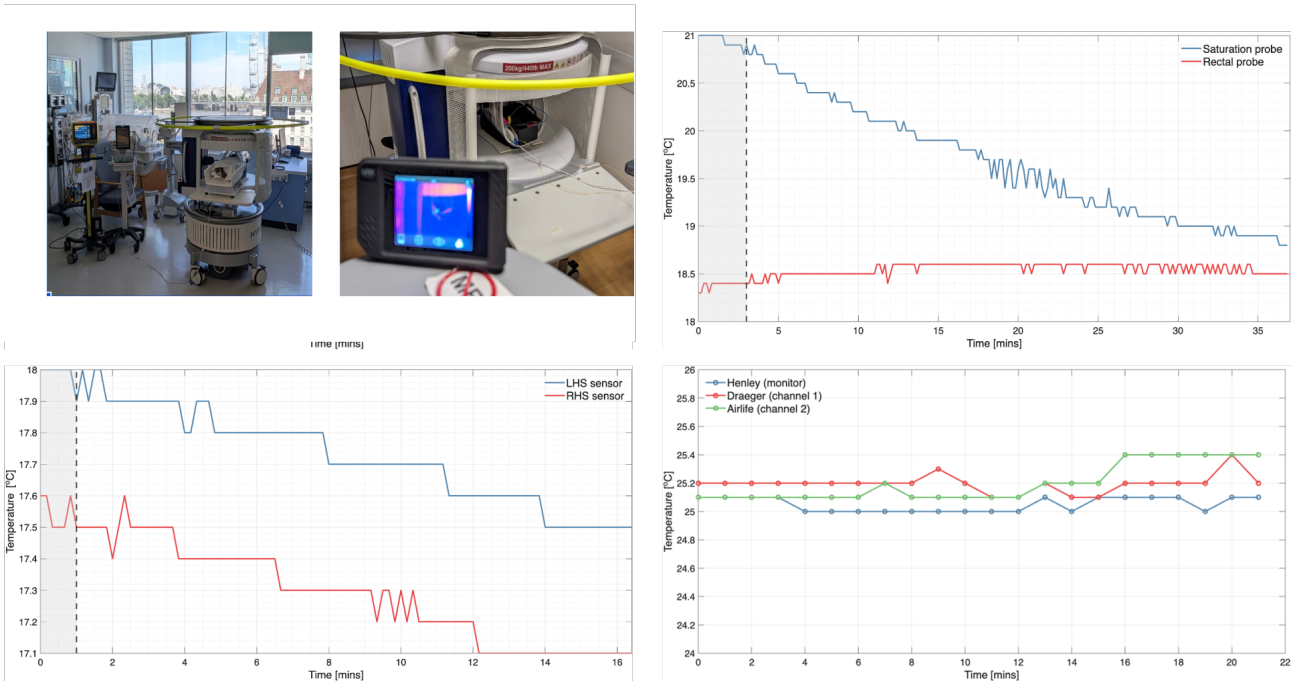
1. Cawley P, Padormo F, Cromb D et al. **Development of neonatal-specific sequences for portable ultralow field magnetic resonance brain imaging: a prospective, single-centre, cohort study** Clinical Medicine, 2023; 65
2. Cromb et al, 2026, **Safety and Performance Testing of 64mT ultra-low field MRI in the Critical Care Environment,** ISMRM 2027 (Submitted, under consideration).

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Dr P Cawley

Figure:



.

Top left: Scanner insitu on NICU & within MRI laboratory during thermal safety testing with SeekShot thermal camera

Top right: Temperature underneath an oxygen saturation probe (blue), and the tip of a rectal temperature probe (red) immersed in high-conductivity gel.

Bottom left: Temperature underneath each of the pulse-oximeter optical sensors (left and right hand-side), wrapped around a biological mimic.

Bottom right: Temperature of three different skin-temperature probes, immersed just under the surface of high-conductivity gel.

Title (Upper case)

INTRANASAL UMBILICAL CORD-DERIVED MESENCHYMAL STROMAL CELLS ADMINISTERED DURING AND AFTER HYPOTHERMIA AUGMENT BRAIN PROTECTION COMPARED TO THERAPEUTIC HYPOTHERMIA ALONE IN A PIGLET MODEL OF HYPOXIC-ISCHAEMIC ENCEPHALOPATHY

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

Alison Mintoft[1], Raymand Pang[1], George Maple[1], Carol Blain[2], Antoine Vallatos[3], Christopher Meehan[1], Michelle Serrano[2], Kennosuke Tsuda[1], Yujin Kim[1], Hakim-Moulay Debbi[4], Mark Lowdell[5], Nicola J Robertson[1,6]

Corresponding author e-mail address: n.robertson@ucl.ac.uk

Institution(s)

1) Institute for Women's Health, UCL, London, UK. 2) Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, UK. 3) School of Psychology and Neuroscience, University of Glasgow, Glasgow, UK. 4) Comprehensive Clinical Trials Unit, UCL, London, UK. 5) Research Department of Haematology, UCL, London, UK. 6) NIHR UCLH Biomedical Research Centre, UK

Introduction *(include hypothesis)*

Neonatal encephalopathy (NE) is a major health problem globally. Therapeutic Hypothermia (HT) is standard care in infants with moderate/severe NE > 36 weeks gestation. However, despite cooling, >50% of survivors suffer neurodevelopmental impairments at school age. Umbilical cord tissue-derived mesenchymal stromal cells (UC-MSC) show promise for brain protection above HT, although not in all models of NE (1, 2). We assessed the safety and efficacy of UC-MSCs in our piglet model of NE, with the hypothesis that UC-MSCs are safe and associated with enhanced brain protection compared to cooling after HI based on clinically established biomarkers and immunohistochemistry.

Methods (*include source of funding and ethical approval if required)*

Thirty-eight piglets underwent a controlled hypoxic-ischaemic (HI) insult by carotid artery occlusion and reduction in FiO_2 to 6% before randomisation to receive either HT + Saline or HT + UC-MSCs. HT was induced from 2-26h, with UC-MSCs administered intranasally (30 million cells/mL, 0.5mL per nostril) at 12h and 36h. Piglets underwent brain-orientated care for 65 hours, including continuous invasive physiological and aEEG/EEG monitoring, ^{1}H Magnetic Resonance Spectroscopy (MRS) acquisition at TE 35ms and 288ms in the thalamus and white matter at 60h, and brain immunohistochemistry following euthanasia. Four animals received PKH26-labelled UC-MSCs after HI and their presence assessed using fluorescent confocal microscopy. CSF biomarkers of brain injury were measured at baseline and 65h. Funding: UK Medical Research Council.

Results

29 piglets were included in the final analysis. Insult severity and physiological parameters did not differ between groups. HT + UC-MSC therapy was associated with reductions in the Lactate/N-Acetylaspartate peak area ratio in the WM voxel at TE 288ms (Probability of Treatment Superiority ($Pr_{(sup)}$) = 92.10%) and TE 35ms ($Pr_{(sup)}$ = 97.70%), and improvement in aEEG/EEG background activity ($Pr_{(sup)}$ = 93.0%) compared to HT + Saline. HT + UC-MSCs reduced overall TUNEL counts ($Pr_{(sup)}$ = 92.10%), with a modest increase in overall NeuN-positive cell counts ($Pr_{(sup)}$ = 81.00%) compared to HT + Saline. CSF analysis showed greater increases in GFAP (98.9% increase) and UCH-L1 (>500% increase) levels in HT + Saline animals over time following HI, compared to HT + UC-MSC piglets (52.1% and 342% increase respectively). UC-MSCs were detected in brain tissue, with 9.48mm^2 and 6.96mm^2 cells respectively present at 12h and 24h after dosing.

Conclusions

Administration of intranasal UC-MSCs, one dose during and one dose after HT, was safe and associated with robust neuroprotection based on improved neurometabolic, electrophysiological and histological outcomes. This data supports translation to early clinical trials of UC-MSC therapy for babies with moderate/severe HIE.

References *(include acknowledgement here if appropriate)*

1) de Theije, C. G. M., De Palma, S. T., Vaes, J. E. G., Dallaglio, K., Volpi, G., Ardigò, D., van Rijt, S., van Bel, F., Benders, M., & Nijboer, C. H. A. (2025). Intranasal Wharton's Jelly-Derived Mesenchymal Stem Cell Therapy, Alone or in Conjunction With Therapeutic Hypothermia, Alleviates Neonatal Hypoxic-Ischemic Brain Injury in Mice. Ann Neurol, 98(6), 1380-1394. https://doi.org/10.1002/ana.78000

2) Robertson, N. J., Meehan, C., Martinello, K. A., Avdic-Belltheus, A., Boggini, T., Mutshiya, T., Lingam, I., Yang, Q., Sokolska, M., Charalambous, X., Bainbridge, A., Hristova, M., Kramer, B. W., Golay, X., Weil, B., & Lowdell, M. W. (2021). Human umbilical cord mesenchymal stromal cells as an adjunct therapy with therapeutic hypothermia in a piglet model of perinatal asphyxia. Cytotherapy, 23(6), 521-

Check box if presenting author is a trainee: **basic science trainee** ☒ **clinical trainee** ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Professor Nicola J Robertson

Figure 1. Magnetic Resonance Spectroscopy (MRS). Long TE (288ms) ^{1}H MRS lactate to N-acetyl aspartate (Lac/NAA) and short TE (35ms) ^{1}H MRS lactate-lipid macromolecule to N-acetyl aspartate (LLM/NAA) peak area ratio between HT + Saline (blue) and HT + UC-MSC (orange) groups in the white matter (WM) and thalamic voxels at 48h. Panels A, C, E and G present individual metabolite ratios (dots) and boxplot. The posterior distribution plots that follow Bayesian analysis with non-informative priors are shown in B, D, F and H. The $Pr_{(sup)}$ for HT + UC-MSC to reduce Lac/NAA was 92.1% in the WM voxel and 82.5% in the thalamic voxel. The $Pr_{(sup)}$ for HT + UC-MSC to reduce LLM/NAA was 97.8% in the WM voxel and 80.9% in the thalamic voxel.

THALAMIC [NAA] PREDICTS ADVERSE NEURODEVELOPMENTAL OUTCOMES AFTER MILD HYPOXIC-ISCHAEMIC ENCEPHALOPATHY

Authors

S Bhatia, P Montaldo, R Garegrat, G Atreja, V Shivamurthappa, U Kariholu, N Aladangady, P Fleming, B Palanisami, A Soe, S Pattnayak, P Sashikumar, S Harigopal, T Thaventhiran, H Venkateswaran, A Thayyil, R Pressler, M Wilson, E De Vita, S Shankaran, S Thayyil; for the CONNECTIONS group

Corresponding author e-mail address: simran.bhatia4@nhs.net

Institutions

Imperial College London, UK; University of Campania “Luigi Vanvitelli”, Italy; Homerton Healthcare NHS Foundation Trust; Liverpool Women's NHS Foundation Trust; Medway NHS Foundation Trust; Royal Victoria Infirmary; Great Ormond Street Hospital; University of Birmingham; University of Texas, USA

Introduction

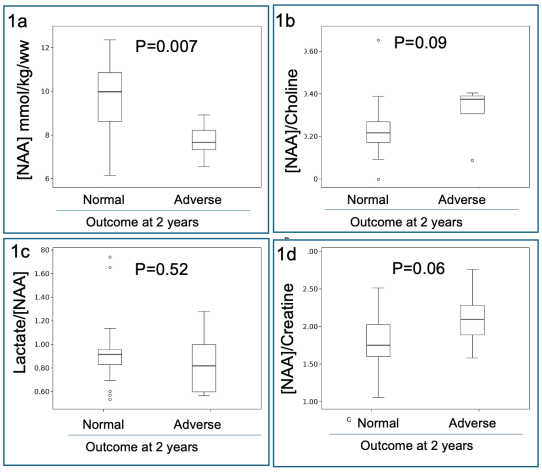
Adverse neurodevelopmental outcomes may occur after mild hypoxic-ischaemic encephalopathy (HIE), but prognostic biomarkers are lacking. We examined if neonatal magnetic resonance spectroscopy (MRS) predicts neurodevelopmental outcomes in infants with mild HIE.

Methods

We conducted a substudy within the COMET pilot trial recruiting infants ≥36 weeks’ gestation with mild HIE, across several neonatal units in the UK and Italy between Oct 2019 and Jan 2025 [1]. Harmonised 3T MRI and spectroscopy were performed on days 4–7 to quantify thalamic [NAA] and metabolite ratios using SPANT, masked to outcomes [2]. The primary outcome was death or moderate/severe neurodevelopmental disability at ≥2 years, assessed using Bayley-IV. Ethics: UK National Research Ethics Service; Funding: NIHR.

Results

Of 101 infants recruited, MR was performed in 99 infants at 6 ± 2.5 days. Death or moderate or severe disability occurred in 8 of 76 (10.5%) infants assessed, while 27 (36%) had a Bayley-IV score <85 in at least one domain. Thalamic [NAA] was lower in infants with adverse versus normal outcomes (n=68; 7.86 ± 0.94 vs 9.93 ± 1.63 mmol/kg/ww; mean difference, 2.07; 95% CI, 1.13–3.01; p = 0.007). [NAA] predicted adverse outcomes with an area under the receiver operating characteristic curve of 0.85 (95% CI, 0.73–0.98), 100% sensitivity (95% CI, 55%–100%), and 60% specificity (95% CI, 48%–71%). No significant differences were observed in lactate/NAA, NAA/creatine, or NAA/choline ratios (Fig 1). Conventional MR imaging (n=74) showed white matter injury in 44/74 (59.5%), cortical abnormalities in 11/74 (14.9%), and basal ganglia/thalamic abnormalities in 1/74 (1.4%), but had poor prognostic accuracy. Conclusions and Relevance: Death or moderate or severe disability occurred in 10.5% of infants with mild HIE. Thalamic [NAA] was the only MR biomarker that predicted adverse outcomes. No significant differences were observed for lactate/NAA, NAA/creatine or NAA/choline ratios. Conventional MRI showed white matter injury in 44/74 (59.5%), cortical abnormalities in 11/74 (14.9%), and basal ganglia/thalamic abnormalities in 1/74 (1.4%), but had poor prognostic accuracy.



Conclusions

Death or moderate or severe disability occurred in 10.5% of infants with mild HIE. Thalamic [NAA] was the only MR biomarker that predicted adverse outcomes, while Lac/NAA was uninformative.

References ***(include acknowledgement here if appropriate)***

1) Montaldo, P., et al.. JAMA Netw Open, 2024; 2) Lally, P.J., et al.. Lancet Neurology, 2019;18(1):35-45

Check box if presenting author is a trainee: **basic science trainee** ☐ **clinical trainee** ☒

Senior author supporting presentation on day of meeting: Professor Sudhin Thayyil

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

NEURODEVELOPMENTAL OUTCOME ASSESSMENTS AFTER EARLY ERYTHROPOIETIN MONOTHERAPY FOR HYPOXIC ISCHAEMIC ENCEPHALOPATHY: A PILOT RANDOMISED CONTROLLED TRIAL.

A Thayyil, MK Annayappa, H Venkateswaran, T Thaventhiran, L Deshmukh, A Londhe, S Fattepur, P Montaldo, SK Dey, S Pant, F Alobeidi, PE Grant, S Shankaran, S Thayyil, and R Garegrat, on behalf of the Consortium for Time-Critical Neuroprotection Trials in Neonatal Encephalopathy (CONNECTIONS) group.

Corresponding author e-mail address: ashwini.thayyil1@nhs.net

Imperial College London, UK; Medical College, Aurangabad, India; Karnataka Institute of Medical Sciences, India; Bangalore Medical College and Research Institute, India, Madras Medical College, India (CNK, EK, DS, TR); Bangladesh Medical University; Harvard University, USA, and Dell Children's Hospital, USA (SS)

Introduction

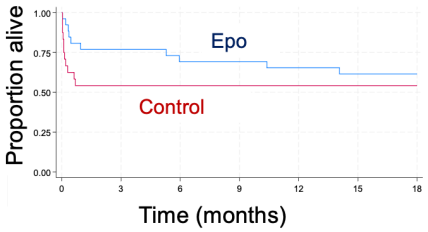
Although erythropoietin (EPO) is highly neuroprotective in preclinical models when administered immediately after hypoxic-ischaemic injury [1], delayed therapy is ineffective [2,3]. The safety and efficacy of early EPO treatment within 6 hours of birth remains unknown. We examined the feasibility of a randomised controlled trial of early EPO monotherapy therapy in infants with hypoxic-ischaemic encephalopathy (HIE),

Methods

We conducted a multicentre, double-blind, pilot randomised controlled trial across several tertiary neonatal units in India, Bangladesh and Nepal. Fifty infants born at ≥36 weeks' gestation with moderate or severe HIE were randomised to receive either erythropoietin (EPO; 500 U/kg/day for nine doses; n=26) or placebo (n=24) within 6 hours of birth. The primary outcomes assessed feasibility, including recruitment, protocol adherence, timely delivery of intervention, MRI acquisition, and completion of follow-up assessments at 18-22 months using the Bayley Scales of Infant and Toddler Development, Fourth Edition (Bayley-IV). Ethics: Imperial Research Ethics Committee; Funding: Thrasher Research Fund

Results

Among the 50 infants enrolled, 45 (90%) had moderate HIE and 5 (10%) had severe HIE. The intervention was administered at a mean (SD) age of 4.3 (1.1) hours. All 33 infants who survived beyond one week underwent MRI, of which 30 (91%) showed abnormalities.



Overall, 16 (32%) infants died before hospital discharge: 5/26 (19%) in the EPO group and 11/24 (46%) in the placebo group. By 18–22 months, deaths had increased to 21 (42%), including 10/26 (38%) in the EPO group and 11/24 (46%) in the placebo group. Death or moderate-to-severe disability occurred in 29 (58%) infants: 14/26 (54%) in the EPO group and 15/24 (63%) in the placebo group. There were no loss to follow up.

Conclusions

Initiating early EPO therapy within 6 hours of birth and excellent neurodevelopmental outcome assessment follow-up at 18-22 months is feasible in South Asia, thus supporting future clinical trials to evaluate its impact on clinical outcomes.

References *(include acknowledgement here if appropriate)*

1) Oorschot, D.E et al., Int J Mol Sci, 2020. 21(4); 2) Wu YW, et al NEJM 2022;387(2):148–159; 3) Liley HG et al JAMA Pediatrics. 2026;180(10):1085–1093.

Check box if presenting author is a trainee: **basic science trainee** ☐ **clinical trainee** ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Professor Sudhin Thayyil

Title (Upper case)

TREADMILL EXERCISE-MEDIATED ADIPONECTIN SIGNALLING RESCUES MEDIAL PREFRONTAL CIRCUIT DYSFUNCTION AND SOCIAL MEMORY DEFICITS IN OFFSPRING SUBJECTED TO MATERNAL IMMUNE ACTIVATION

Authors *(Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)*

Siqi Li，Qiyi Zeng

Corresponding author e-mail address: zqy_88@aliyun.com

Institution(s)

Department of Neurobiology, Jinan University; Department of Pediatrics, Southern Medical University

Introduction *(include hypothesis)*

Maternal immune activation (MIA) is a well-established preclinical model recapitulating prenatal inflammatory insults linked to neurodevelopmental disorders, including social memory impairment. Peripheral adiponectin acts as an exerkine mediating exercise-driven neuroprotection, yet whether adiponectin signalling translates exercise benefits to repair prefrontal circuit injury after prenatal inflammation remains unclear. **Hypothesis**: Adolescent treadmill exercise rescues MIA-induced social memory deficits via adiponectin receptor signalling, by restraining excessive glial neuroinflammation, restoring medial prefrontal cortex (mPFC) excitatory-inhibitory (E/I) homeostasis and recovering social-cue-evoked neuronal activity.

Methods (*include source of funding and ethical approval if required)*

regnant C57BL/6J mice received intra-peritoneal Poly(I:C) (20 mg/kg, GD12.5) to establish the MIA model; saline-injected dams served as controls. Male offspring underwent progressive low-intensity treadmill exercise from postnatal day P28-P55. Gain-of-function AdipoRon (adiponectin receptor agonist, 20 mg/kg i.p.) and loss-of-function antagonist (ADP, 20 mg/kg i.p.) pharmacological interventions were performed. We applied behavioural social novelty memory assays, Iba1/GFAP glial immunofluorescence, Sholl morphological analysis, western blot, mPFC RNA-seq transcriptomic profiling, transmission electron microscopy (TEM) for synaptic ultrastructure, and in-vivo fibre photometry calcium recording of mPFC excitatory neurons.

Ethics: All animal experiments were approved by Jinan University Institutional Animal Care and Use Committee (Approval No.20231016-01).

Funding: Supported by National Natural Science Foundation of China (Grant No.U22A200086).

Results

MIA male offspring exhibited selective social novelty memory impairment without changes in general locomotion or anxiety-like behaviour, accompanied by repetitive stereotyped grooming. MIA triggered elevated microglial and astrocyte reactivity in the mPFC, together with disrupted synaptic ultrastructure, loss of mature mushroom-shaped dendritic spines and disturbed mPFC E/I synaptic balance. In vivo fibre photometry demonstrated blunted mPFC neuronal calcium responses evoked by social stimuli in MIA mice. Treadmill exercise restored social memory, dampened glial over-activation, repaired excitatory synaptic ultrastructure and rescued social-triggered neuronal calcium transients. The adiponectin receptor agonist AdipoRon recapitulated these protective behavioural, glial and synaptic improvements. Transcriptomic sequencing of mPFC identified a 61-gene rescue module reversed by AdipoRon, with CXCL10-centred inflammatory signalling as a key hub. Blocking adiponectin receptors with antagonist ADP completely abolished exercise-mediated neuroprotective effects. Peripheral serum adiponectin, TNF-α and IL-17 levels paralleled brain tissue changes after intervention.

Conclusions

Adiponectin signalling is an essential mediator of exercise-driven neuroprotection in MIA offspring. Exercise-adiponectin axis suppresses prefrontal neuroinflammation, remodels excitatory-inhibitory synaptic ultrastructure and recovers social-cue-triggered mPFC neuronal activity, thereby ameliorating prenatal inflammation-related social memory deficits. Circulating adipokine-cytokine profiles may serve as

References *(include acknowledgement here if appropriate)*

Acknowledgements: We thank Jinan University core facilities for technical support in electron microscopy, confocal imaging and RNA-sequencing. Animal facility staff provided mouse husbandry support. No conflicts of interest declared. *Conference abstract, limited reference list; full references appear in the associated manuscript.*

Check box if presenting author is a trainee: **basic science trainee** √☐ **clinical trainee** ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: √☐

Senior author supporting presentation on day of meeting:Siqi Li

NEONATAL CHYLOTHORAX: MANAGEMENT STRATEGIES, TREATMENT RESPONSE AND OUTCOMES FROM A 10-YEAR TERTIARY NEONATAL EXPERIENCE

S. Thakur, K. Hunt
Neonatal Medicine, St Michael's Hospital, Bristol, UK
Corresponding author email: sumit.thakur1@nhs.net

Background

Neonatal chylothorax is one of the most common causes of pleural effusion in the neonatal period. It is rare, with an incidence of approximately 1:15,000, but is associated with high mortality (15–57%)[1]. It may be congenital or acquired, the latter most often following thoracic surgery, and results from disruption or malformation of lymphatic channels causing lymph leakage into the pleural space. Evidence-based therapies remain limited, yet prompt diagnosis and management are important given the risk of complications and mortality[2]. We aimed to describe the clinical characteristics, management strategies and outcomes of neonates with chylothorax managed at a tertiary centre over a 10-year period, and to evaluate treatment response and factors associated with survival.

Methods

We conducted a retrospective case series of neonates with radiologically and/or biochemically confirmed chylothorax managed at a tertiary neonatal centre between 2016 and 2025. Data extracted from electronic patient records included perinatal characteristics, aetiology (congenital or acquired), associated genetic conditions, management strategies, drain output, and use of octreotide (dose, duration, day of initiation) and adjunctive therapies. Daily pleural drain output was recorded to assess disease course, treatment response and its relationship to outcome.

Results

26 neonates with confirmed chylothorax were included (21 congenital, 5 acquired); all 26/26 (100%) required pleural drainage. Octreotide was administered to 17/26 infants (65.4%; median day of initiation 10 [range 1–76], median dose 10 mcg/kg/hr [range 6–15], median duration 21 days [range 10–44]). Following octreotide initiation, drain output trajectories showed marked inter-patient variability with no consistent early population-level reduction; 8/17 infants (≈46%) showed reduced drain output within 10 days. The majority of infants survived to discharge, while mortality occurred predominantly among those with congenital and syndromic chylothorax: all infants with Noonan syndrome (3/3, 100%) died, whereas infants with other chromosomal abnormalities survived to discharge (2/2, 100%). Quantitative analysis showed clear outcome-related separation in cumulative pleural drainage: survivors had low output (mean ≈24 ml), while infants who died had persistently high output despite therapy (mean ≈427 ml). Persistently high or rising drain output was observed exclusively in infants with poor outcomes.

Conclusions

Neonatal chylothorax is a heterogeneous condition associated with prolonged pleural drainage and variable outcomes. Octreotide is frequently used (65%) but shows an unpredictable response. Syndromic chylothorax, especially Noonan syndrome, carries a poor prognosis, while progressive reduction in pleural drain output is strongly associated with survival. Serial drain output trends may provide a simple and clinically useful tool to support prognostication and multidisciplinary decision-making.

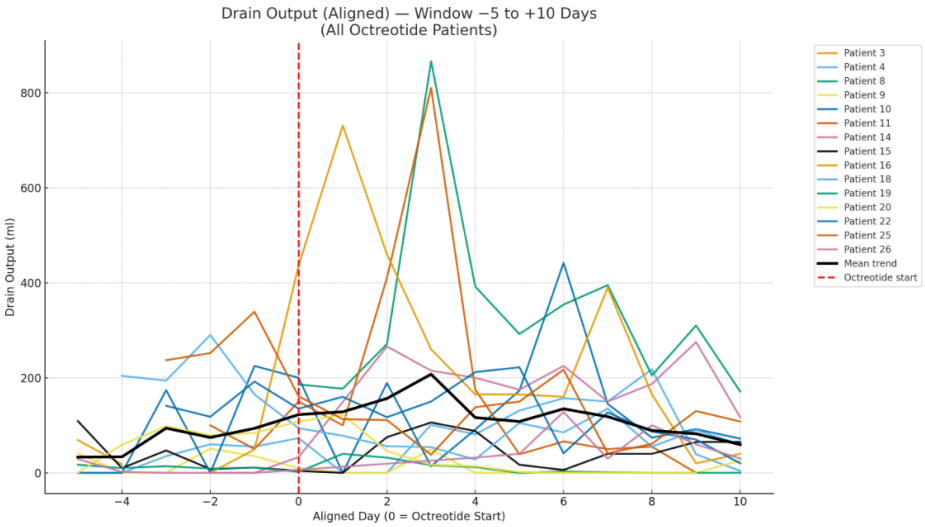
References

1. Bellini C, Boccardo F, Bonioli E, Campisi C. Lymphodynamics in the fetus and newborn. Lymphology 2006;39:110–7.
2. Walsh M, Tutor JD. The management of neonatal chylothorax. Curr Treat Options Pediatr 2025;11:28.
3. Bellini C, Cabano R, De Angelis LC, Bellini T, Calevo MG. Octreotide for congenital and acquired chylothorax in newborns: a systematic review. J Paediatr Child Health 2018;54(8):840–7.

Declarations

All authors have approved this abstract.
Conflicts of interest: none declared.
This abstract has not been presented/published before.

Figure 1. Pleural drain output aligned to octreotide start (all octreotide patients)



Each line represents one patient's drain output over time, aligned to day 0 = octreotide initiation. The black line shows the mean trend across all patients. The graph illustrates marked inter-patient variability with no consistent population-level reduction following treatment commencement.